

1500: Development Testing

The questions can be simply stated:

- Will weapons work after 10–15–20–25 years in stockpile?

- What effect will fire, impact, vibration or long-term storage in a hot, wet climate have on electronic components?

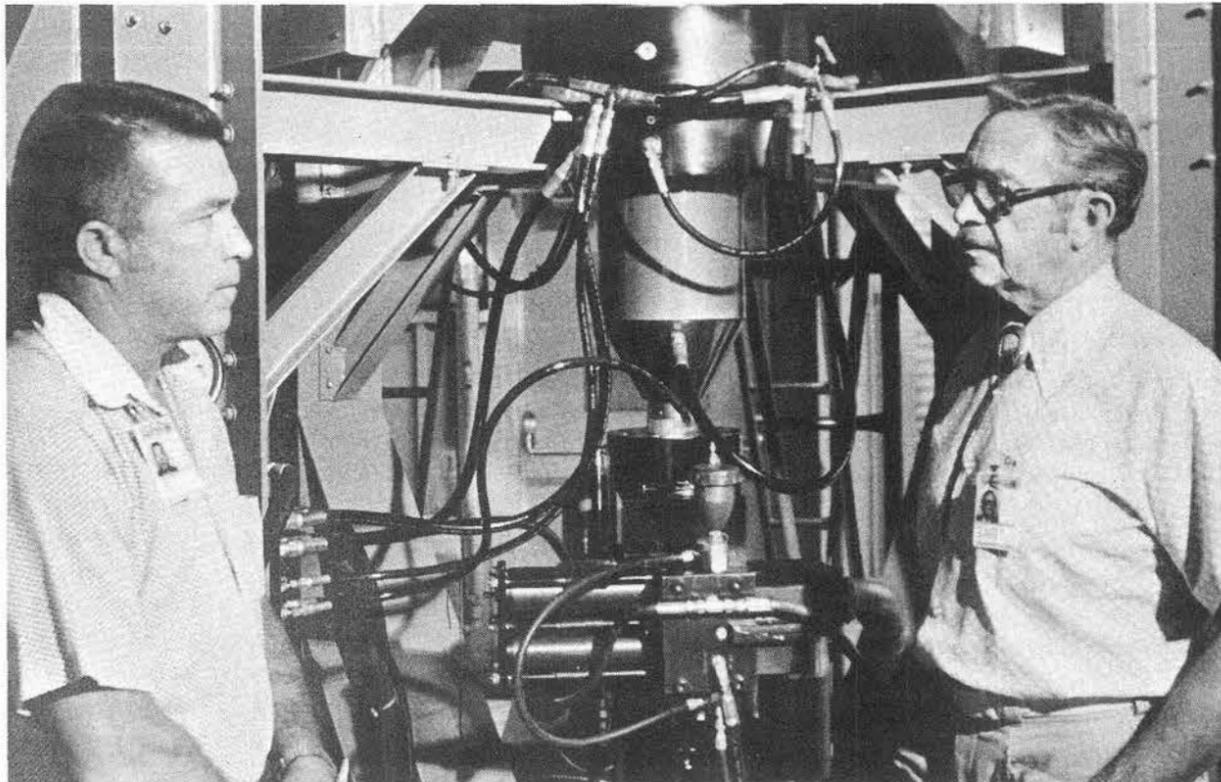
- How accurate is a solar reflector surface?

- What effect will an EMP (electromagnetic pulse) from a near-nuclear burst have on in-coming missile or bomb components?

Since you obviously can't detonate weapons to find out if they will work when you need them, nor subject components to EMP from a nuclear detonation, scientifically sound answers can be difficult to come by.

"The first challenge," says Bill Gardner, Director of Development Testing 1500, "is to define and then simulate actual conditions and events—and often to exceed these conditions. The second is to measure and record what happens." And that is the mission of 1500.

In pursuit of elusive answers, 1500 has assembled a vast array of equipment, a wide range of scientific and engineering disciplines. Primary emphasis is given to JTA's (Joint Test Assemblies). These include telemetry packages to send data to ground stations and instrumentation to re-



THE LOW FREQUENCY SHOCK and vibration encountered during transportation and handling can be simulated (with a displacement up to eight inches) on this vertical shaker in Area III. Operator Lynn Loveland (1546) and Bill Gardner, Director of Development Testing 1500, discuss upcoming tests on containers being developed for rail and truck shipment of nuclear materials.

place the nuclear portion of weapons during both stockpile sampling and quality assurance checks. The JTA's require ingenious design since they must duplicate the weight, center of gravity and moments of inertia of the stockpile weapon.

Any combination of heat, altitude and humidity is available in 1500's climatic chambers. And components and systems are exposed in other facilities to shock, vibration, impulse testing, blast loading, simulated fire and electromagnetic pulses.

Simulation, like the impact of a bomb on a runway or in a railyard, the effect of a steam turbine breaking up, the side loading forces on a rocket-propelled bomb during a tight turn (to name but a few) was the incentive for development of the cable sites, sled tracks, centrifuges and other facilities that are spread over 40 square miles in Area III and Coyote Test Field.

On a smaller scale, 1500 also works with and develops minicomputers that are used to provide precise test data. The minicomputers have application in both test control and data handling, quickly giving the customer whatever data is needed.

"We do nondestructive testing, too," Bill Gardner told us, "for quality control, material properties measurements and locating defects. We started years ago with x-rays and ultrasonics, and both of these techniques are now much improved with image enhancement and automated data acquisition and analysis. Some of the new methods we've added involve acoustic emission, neutron radiography and laser holometry.

"One of our strong points," Bill sums up, "is our capability to gather and analyze data. We have one of the finest photometric groups in the country, a topnotch group that develops data-gathering instruments, and another that specializes in data analyses. Our goal in all departments is fast and accurate service."

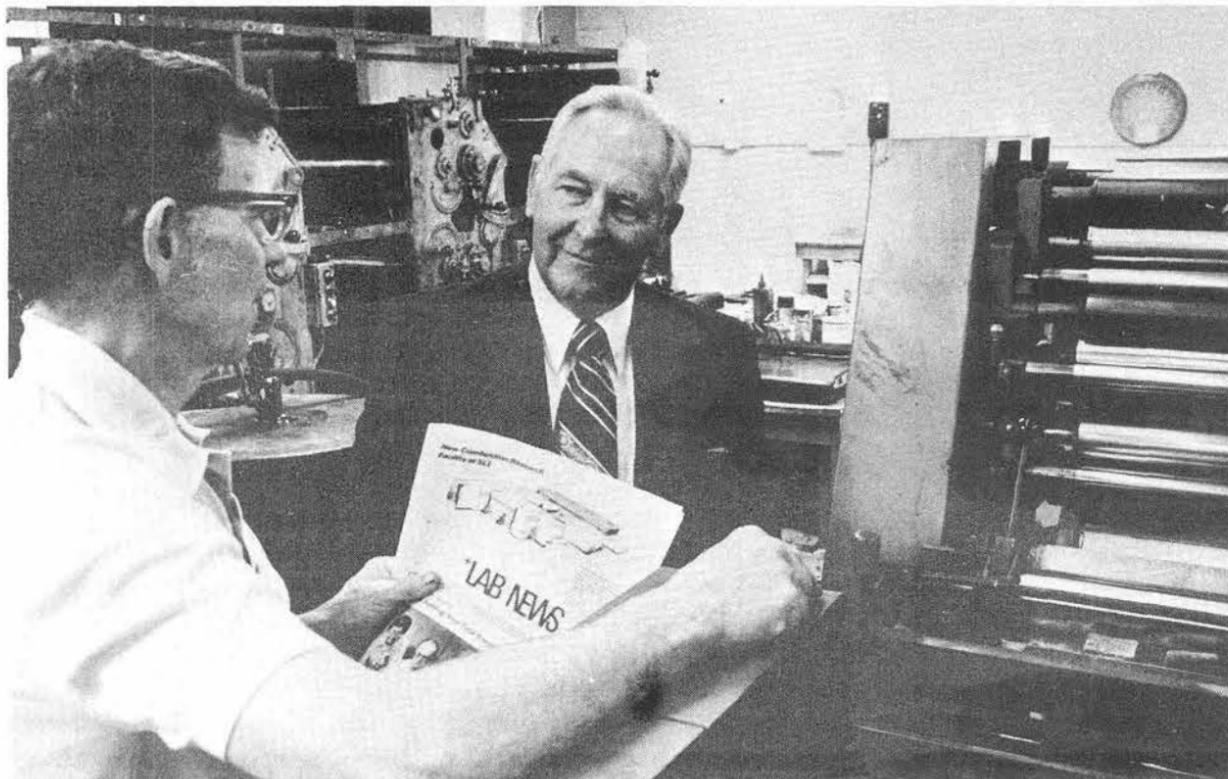
[Ed Note: Testing in support of development engineering was consolidated into one directorate on May 1 when 9300 and 9400 were combined. On June 1 the combined organization became 1500.]

LAB NEWS

VOL. 30, NO. 14

JULY 7, 1978

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



THE SMALL BUSINESS is big business at Sandia, and Jay Hughes (right) from Purchasing's Small & Minority Business Relations Division discusses the subject with Marty Carraher, owner of VanGuard Printing and a Sandia small business supplier (printing the LAB NEWS). VanGuard is one of more than eight thousand small and minority firms with whom Sandia does business. Complete story on this activity may be found on page 4.

Take Note

"Close Encounters of the Worst Kind" is the title of a talk to be given by Officer Phil Chacon of the Albuquerque Police Dept. His subject: rape and what women can do about it. He'll be giving the talk on July 25 in Bldg. 815, starting at 4:45. Employees and family members are invited to attend. Hazlet Edmonds (3511), 4-9481, has scheduled the talk and has additional information on it.

* * *

The New Mexico Symphony, conducted by Yoshimi Takeda, has announced its 1978-79 season, which opens Sept. 22 with pianist Horacio Gutierrez as the featured player. Eight concerts are scheduled through May of 1979. Each concert will be performed twice on succeeding dates, and season subscriptions (on which you save up to 30%) are now on sale. Subscribers may elect the eight-concert series, or a four-concert series. Season ticket holders have their seats reserved and receive advance notice of special extra concerts. A free brochure describing season offerings, prices and seat locations can be obtained by calling the NMSO office on 265-3689.

* * *

Death

Juvenal Baca, resident supervisor of White Sands Missile Range Operations Section 1127-1, died in an automobile accident June 26. He was 51.

He had worked at Sandia Labs since January 1951.

Survivors include his widow and several children.



Congratulations

Mr. and Mrs. Jim Raines (2627), a son, Eric Michael, June 6.

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

John Shunny is editor

&

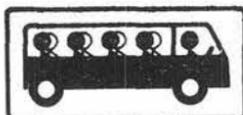
Don Graham asst. editor

Chuck Cockelreas & Norma Taylor write

Bill Laskar does picture work

So does Russell Smith

Bruce Hawkinson & Lorena Schneider report Livermore



The Bus—A Way To Go

Several hundred of us are bus riders. That is, we bus back and forth to the Labs. Some bus every day, others use the service now and then.

Do we know something you don't? Well, a recent survey cited conservation, convenience and cost as reasons why people rode the bus. If we had to sum it up, though, the bus is simply less of a hassle than driving in. There's a pleasant walk to the bus stop in the morning, reading or talking during the ride and, in the afternoon, the bus is air conditioned.

Schedules of buses entering Sandia's Tech Area are given below. If you live in an area not within walking distance of one of these buses, the chances are that the new grid system will enable you to ride to some point where you can transfer to one of them. For additional schedule information, you can call Sun Tran on 766-7830 or dial commuter info at the Labs, 4-RIDE.

Peak Hour Service To Sandia Labs

WYOMING—SANDIA

	AM	PM
McKinney & Academy	7:05	5:25
Burleson & Wyoming	7:11	5:19
Montgomery & Wyoming	7:15	5:15
Candelaria & Wyoming	7:19	5:10
Lomas & Wyoming	7:26	5:04
Central & Wyoming	7:31	4:59
Sandia Labs	7:45	4:45

EUBANK—SANDIA

	AM	PM
Montgomery & Eubank	7:19	5:11
Candelaria & Eubank	7:23	5:07
Lomas & Eubank	7:30	5:00
Central & Eubank	7:35	4:55
Sandia Labs	7:45	4:35

CHELWOOD—SANDIA

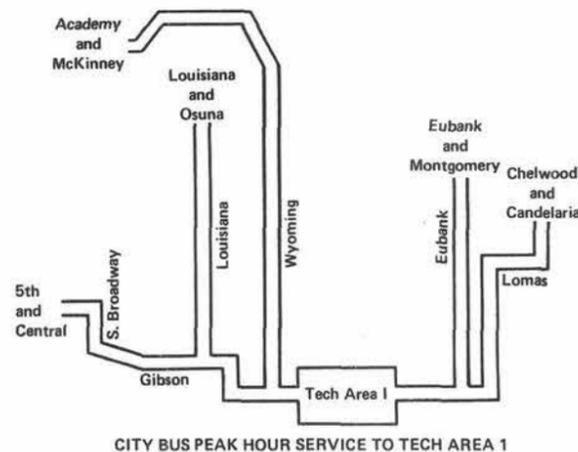
	AM	PM
Chelwood & Candelaria	7:16	5:19
Lomas & Chelwood	7:21	5:14
Sandia Labs	7:45	4:35

GIBSON—SANDIA

	AM	PM
5th & Central	7:05	5:35
Broadway & Gibson	7:21	5:18
Carlisle & Gibson	7:28	5:12
Sandia Labs	7:45	4:55

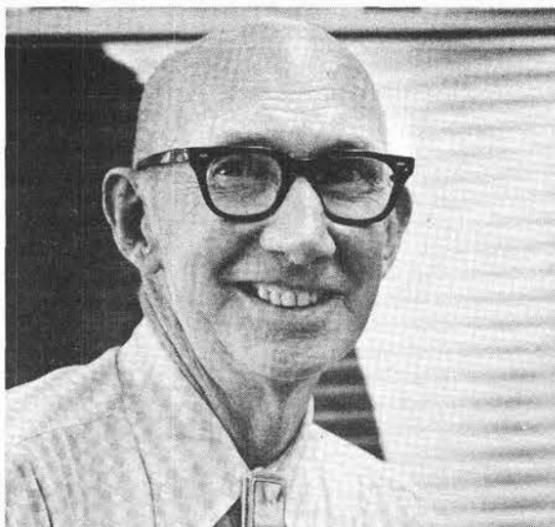
LOUISIANA—SANDIA

	AM	PM
Louisiana & Osuna	6:55	5:20
Louisiana & Candelaria	7:03	5:12
Winrock	7:11	5:04
Louisiana & Central	7:17	4:58
Sandia Labs	7:30	4:45

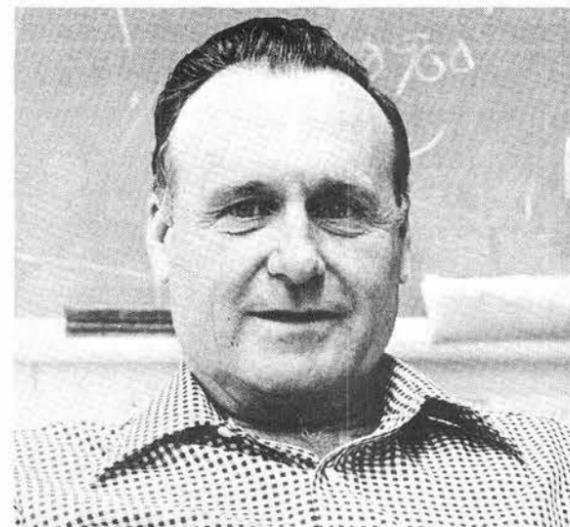


CITY BUS PEAK HOUR SERVICE TO TECH AREA 1

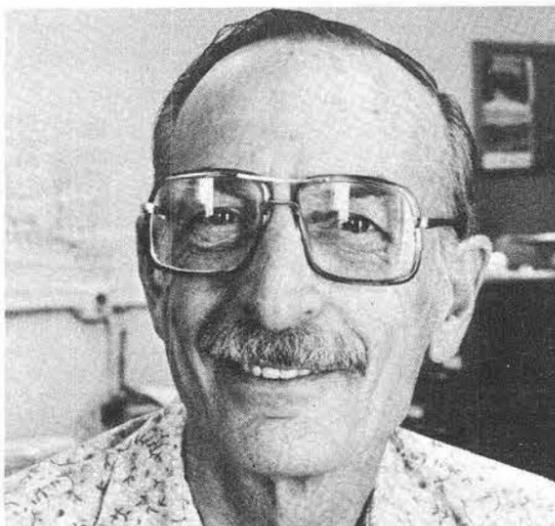
Retiring



Guy Robinson (4325)



L. D. "Bud" Watkins (1761)



Lou Boudoin (9655)



Salomon Baca (3421)

Retiring



Lina Harbo (8213)

Take Note

Diane Crump, a Work Experience student in Computing Division 8323, is graduating from Livermore High School this spring in something of a blaze of glory: an award from the Livermore Rotary Club as "Outstanding Office Occupational Student" and one from the high school as "Outstanding Work Experience Student." She'll continue working in the Input-Output area here this summer. Congratulations, Diane.

* * *

Several Sandians recently served as real-life role models for junior and senior high school students. Shirly Carson (8323) and Bert Barker (8327) showed off keypunch and remote terminal equipment and discussed computer-related careers with students at the East Avenue School in Livermore. Stanford grads Laurence Watkins, Rocky Bridges (both 8466), and Roger Tilley (8166) returned to their alma mater and met with minority high school students interested in careers in the physical sciences. The program was sponsored by the Black Engineering and Science Students Society in cooperation with MESA (Mathematics, Engineering, and Science Achievement), a statewide effort to encourage minority students to enter fields of mathematics and physical science.

Congratulations

Mr. and Mrs. Bill Wilson (8341), a daughter, Katrine Liv, May 17.

Sympathy

To Bill Robinson (8352) on the death of his father-in-law in Pueblo, Colo., June 8.

To Tabo Hisaoka (8271) on the death of his mother in Fremont, Calif., June 11.

To Al Harrison (8257) on the death of his father in Oakdale, Calif., June 17.

To Dave Anderson (8265) on the death of his father-in-law in Pleasanton, June 18.

To Bob Strout (8466) on the death of his father-in-law in Burley, Idaho, June 16.

LIVERMORE NEWS

VOL. 30, NO. 14

LIVERMORE LABORATORIES

JULY 7, 1978

National, State Marks

Sandian Coaches Winning Daughter

Never while on championship running teams at Highland High School in Albuquerque and, later while running at UNM, did Jerry Williams (8272) expect to coach a champion.

Yet his own teenage daughter Cheri, whom he began coaching several years ago, now ranks best in the U.S. at the high school level.

Last month, Cheri became national two-mile record holder with her 10:09.9 run in the North Coast Section Meet of Champions, and this month she broke both the one-mile and two-mile state records at the California Inter-scholastic track and field meet in Bakersfield. The Livermore High School senior became the first in California history to win both distance titles, the two-mile in 10:17.78, and the one-mile in 4:44.95.

"I remember her first time trial," recalls Jerry. "I ran with her and she barely broke six minutes. It's incredible where she is today, just a couple of years later."

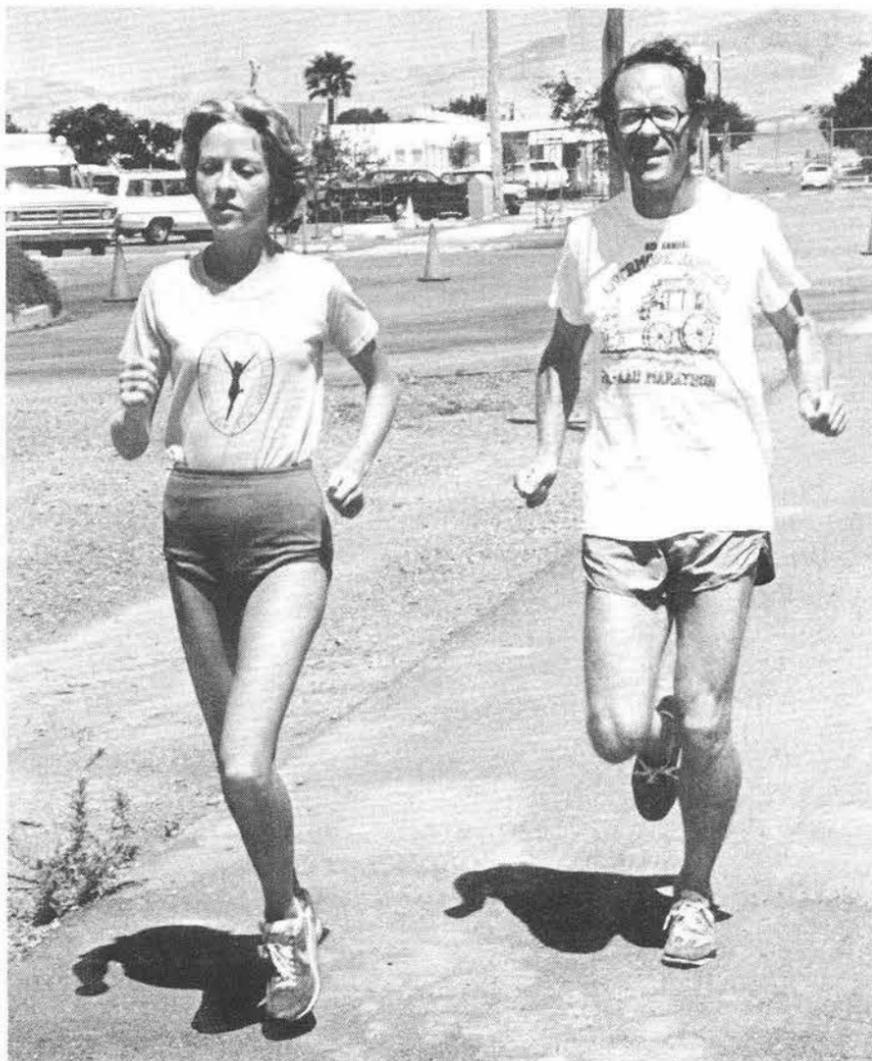
Jerry, Cheri and her two brothers began running together while she was in the eighth grade; then later just she and Jerry worked together in preparation for her sophomore year, running a few miles a day. "But she got to the point where she'd outrun me. I was a sprinter in college, not a distance runner," says Jerry.

More recently, Cheri has been training with the San Jose Cindergals, commuting 100 miles a day, five or six times a week. Each day the group works out at a different location and the competitiveness of the group has served to improve her speed markedly.

"Cheri is self-motivated," says Jerry. "Neither my wife nor I have to encourage her—it's her thing. Of course, she's had her ups and downs, but has been able to set realistic goals which have kept her from becoming discouraged. We talk a lot, especially about strategy. She's very sharp and figures out ahead of time what she wants to do in a given race."

"It's kind of scary, though, now that I'm number one," is Cheri's reaction. "Someone can come along and break my record just as I did." She will be attending the University of Oregon in the fall on an athletic scholarship with a major in pre-law. She'd like to be a lawyer but, as she noted, "The Olympics are coming up in 1980 and Oregon is great for running—not a better place to train."

Two weeks ago, she won the 1,500 meter (the metric mile) race at the AAU Nationals in Indiana with a 4:21.26, earning her a trip later this summer to Russia where she will represent the United States as a member of the National Junior team.



THE RUNNING WILLIAMS—Jerry (8272) and daughter Cheri, leading national and state high school two-miler and one-miler.

Small Businesses Are Big Business At Sandia

When a company spends more than \$60 million on something, most will agree that the "something" is a major effort, even allowing for inflation. Actually, the sum is \$63 million, and that's the amount Sandia spent with small business firms in FY77. Using another yardstick, the Labs awarded almost 50% of its commercial business to small business firms during that fiscal year. An important aspect of this program is minority business awards by the Labs which, in FY77, amounted to \$5 million.

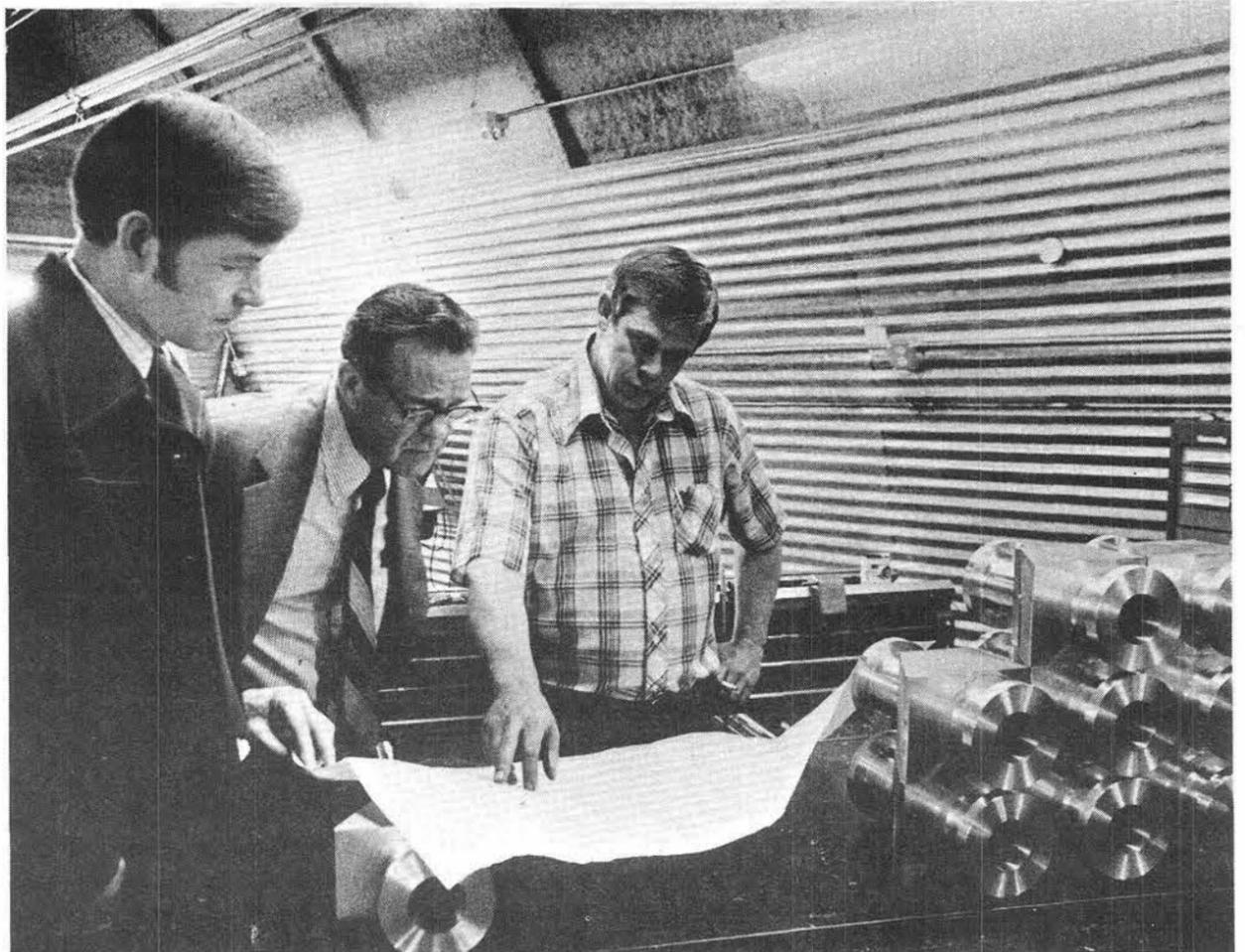
Jay Hughes, who is head of Purchasing's Small & Minority Business Relations Division 3731, describes our involvement with small businesses in another way. "In fiscal '77 we placed orders with nearly 8500 small business firms. That number may be even greater when we wind up the present fiscal year. Our aggressive program over the past few years to develop these small business sources is really paying off. Of all DOE/GOCO contractors, Sandia has one of the better track records. But we'll have to increase our small business activity to maintain this enviable position."

In Washington, the Small Business Administration recently recognized Sandia's efforts when it presented its Public Service Award to Larry Conterno, former Director of Purchasing at the Labs (LAB NEWS, May 26). Basis of the award was Larry's work in encouraging the development of small businesses and minority-owned businesses while he was with Sandia. During his time here, the four small business and minority owned firms nominated by Sandia as Small Business Firm of the year each won top regional honors in SBA's Region IV. The firms are Hi-Q Machining & Manufacturing, Service Circuits, Dikewood Industries, and—the most recent award winner—Missouri Research Labs.

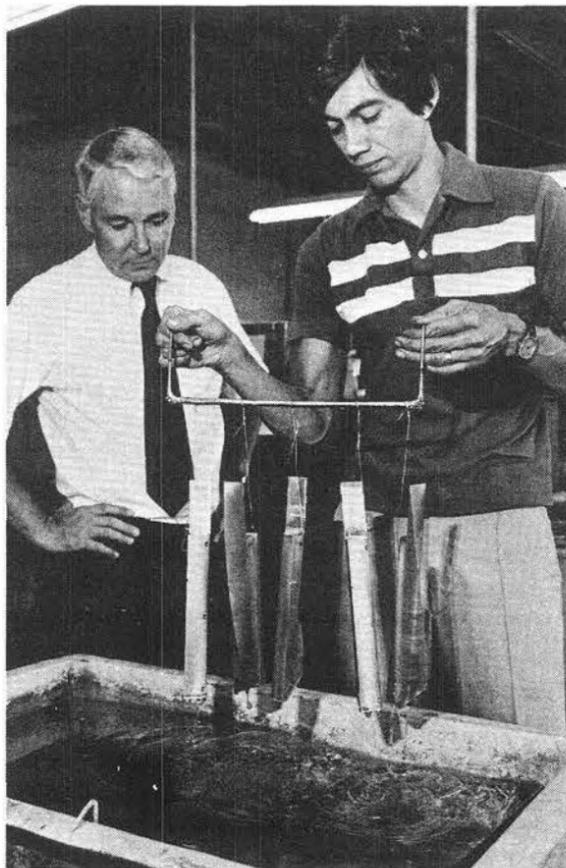
What's a "small business?" we asked Jay.

"The complete definition is pretty long, but generally it's one which is independently owned and operated, with less than 500 employees and not dominant in its field. Typically, the small business we deal with really is rather small. It will usually have less than 50 people and, not infrequently, may have only 10 or so."

Getting to be a supplier to Sandia, whether small or big, isn't exactly easy. Take, for example, a recent addition—Theta Plate of Albuquerque—whose plant we visited (see photo). Assuming that a firm is selling something of interest to the Labs, perhaps the biggest hurdle is to pass a "Supplier & Laboratory Evaluation" conducted by the Labs to determine that the firm can in fact deliver what it says it can. Concerning this small minority plating firm, the evaluation is detailed and searching: "...Results indicate Theta Plate to be qualified for electrodeposited gold plating per 990211,



WESTERN ELECTRIC representatives Terry Kennedy (left) and Robbie Robinson discuss machining and fabrication with Bob Bogue of the Bogue Machine Co., a local firm. The WE people, from the Indianapolis Works, came to visit a number of the city's small businesses following discussions with Labs' purchasing people, and purchase activity by WE with some of these firms is now anticipated.



PURCHASING's Director Jack Strassel observes owner Geri Valasquez of Theta Plate, a small, minority-owned firm, during plating operation. Theta recently qualified as a Sandia supplier, is located in Albuquerque. Almost half of Sandia's commercial business went to small business firms last fiscal year.

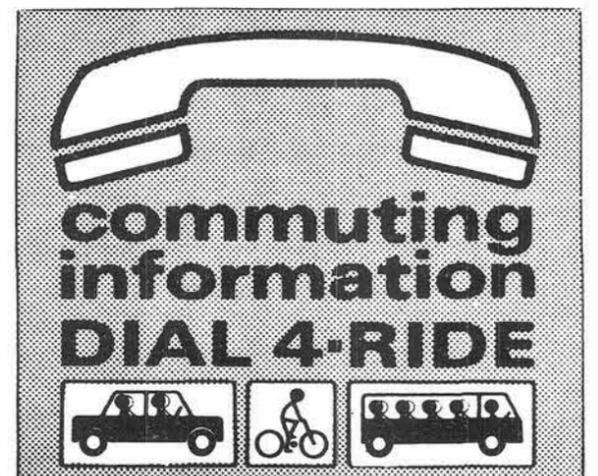
electrodeposited nickel plating per 9902105, etc...and corrosion resistant steel passivating per 9904301 and per QQ-P-35." Instrumentation needed for quality plating work was checked by the evaluation team for calibration and certification, and procedures relating to quality control and inspection were reviewed. Many other items relating to the business were examined and noted, much as your doctor and lawyer might examine your

physical and fiscal status. Theta Plate passed the evaluation and is now a "qualified" Sandia supplier.

"To be qualified by Sandia is a considerable asset," Jay explains. "You see, it's not just the business we happen to have with the supplier. As a consequence of being qualified, the firm will probably pick up additional business from other firms. For example, a machine shop doing work for Sandia would want to send its plating jobs through a qualified plating shop to insure that the finished work met Sandia standards."

What kind of a break do these small firms get when they bid on Sandia work? "Actually, none," says Jay. "What we're doing in this program is to encourage them to qualify so that they can bid on Sandia work. But once the bids are in, selection is almost always made by the numbers—low bidder gets the contract. So the small and minority owned businesses have no particular advantage in the bidding process."

As it turns out, the small business firm can, and frequently does, underbid a larger overhead-heavy competitor. It's not set up to be a David vs Goliath contest but, when the little outfit wins one, Jay Hughes & Co. enjoy a quiet smile.



Old G-Tunnel at NTS Now A New Kind of Laboratory

At the Nevada Test Site in the old G-tunnel complex, familiar to many Sandians as the site of a number of underground nuclear events, is another kind of laboratory. Called a Geophysical Laboratory, the site is currently being used for experiments in hydraulic fracturing and explosives containment. The results are applicable to both the oil and gas industries and to underground nuclear weapons testing.

Hydraulic fracturing—pumping fluids under high pressure into oil or gas wells to fracture rock formations to increase production—is a common technique in use by the oil industry for more than 30 years. Until now, however, no one had ever actually seen the created fracture in situ. Increased oil or gas production was the only measure of the fracture's behavior.

In a series of experiments, Sandia is fracturing the volcanic tuff of Ranier Mesa and subjecting the results to laboratory scrutiny.

The area of the fracture is being "mined back" using a mining machine which grinds away the surface of the rock to produce a smooth face. The fractures (containing colored cement) are thus easily visible for evaluation.

Under investigation are, first, the physical phenomena—length, height, width and orientation of the fracture. Second, the rock mechanics aspects are being studied—in situ stress, strength, modulus, fracture toughness, saturation, permeability and geologic variation. Third, the fluid behavior of the fracture process is investigated—pressure, flow and fracture conductivity.

Goal of the program is two-fold. Scientists performing the experiments aim at developing models to predict more accurately the results of a hydraulic fracture and, secondly, to develop instrumentation that can remotely but accurately measure the size and orientation of the fracture.

In the beginning of the program, a series of small experiments was performed in which small holes were drilled horizontally into the walls of G-tunnel. Results of these experiments were "scaled up" to see how they compared with those from larger scale tests conducted from the surface of the mesa.

Three experiments were conducted by drilling 1400 ft. from the surface into the rock surrounding G-tunnel. These were conducted by oil industry service companies under contract to Sandia.

Two of the experiments have been mined back, and the data are undergoing analysis. Mine back is still underway on the third experiment where the behavior of hydraulic fractures at an interface between geologic formations is being investigated. The results from these tests impact both the weapons testing program and the technology for recovery of natural gas.

The latter portion of the work is under the direction of Dave Northrop, supervisor of Geotechnology Research Division 5732, and is part of DOE's Enhanced Gas



BILL VOLLENDORF (1133) examines a crack produced by hydraulic fracture experiment in the volcanic tuff of G-tunnel at NTS. Bill directs field operations for Sandia's Geophysical Laboratory at NTS.

Recovery program. Norm Warpinski and Rich Schmidt (both 5732) provide analytical support.

The weapons testing aspects of the program are headed by Carl Smith of Experiments Planning Division 1111. A series of experiments using charges of high explosives (up to 1000 lbs.) is being conducted to test behavior of an explosive detonation—especially the containment of the explosive gases.

"We are examining the 'stress cage' produced by underground explosions," Carl says. "When an explosion occurs underground, it produces a cavity which expands and then contracts slightly. Upon contraction, a strong compressive stress is created around the cavity. This stress field is believed to contain nuclear and high explosive shots. Here we want to be able to predict these phenomena—the extent of the stress cage, size of the cavity, cavity pressures and the residual stress fields. These are difficult and complex measurements."

Lynn Tyler did much of the original planning for the Geophysical Laboratory and directed the early experiments. Currently, Lynn is supervisor of Geologic Projects Division 5337; his group is planning to conduct experiments in the tunnel to explore the potential for nuclear waste isolation in various geologic formations at NTS.

Geologist Bill Vollendorf of Engineering Projects Division 1133 directs the field operations at the tunnel laboratory at NTS. Support is provided by B. G. Edwards' NTS Staff Division 1131.

Present activities are supported by funding from DOE's Division of Military Applications and Division of Oil, Gas Shale and In Situ Technology. Thus, the Geophysical Laboratory in G-tunnel is a unique wedding of weapons and energy programs at Sandia.

Speakers

A. W. Dennis (5341), "Predicted Occurrence Rate of Severe Transportation Accidents Involving Large Casks"; L. T. Wilson (1284), "Radioactive Fuel Cask Railcar Humping Study"; J. T. Foley (1282), "Technical Information Center for Transportation Analyses"; A. C. Marshall (5452), "The Effect of Compression on Reactivity of Plutonium Based Materials"; W. P. Schimmel, D. K. Gartling and A. W. Reed (all 1261), "Experimental and Analytical Investigation of Natural Convection in Spent Fuel Shipping Containers"; R. E. Luna (5432), D. R. Smith (5412) and J. M. Taylor (1233), "A Model to Predict the Radiological Consequences of Normal Transportation of Radioactive Materials"; Luna, Smith, Taylor, "Preliminary Evaluation of Alternatives in the Transportation of Radioactive Materials"; Smith and Taylor, "Analysis of the Radiological Risks by Transporting Spent Fuel & Radioactive Wastes by Truck & by Ordinary & Special Trains"; Luna and Smith, "The Environmental Impact of Accident-Free Transportation of Radioactive Material in the United States"; Smith, Luna and Taylor, "Standard Shipments Model for Radioactive Material Transport Analysis"; Smith, Luna, and Taylor, "Analysis of Alternative Transportation Methods for Radioactive Materials Shipments Including the Use of Special Trains for Spent Fuels and Wastes"; P. E. McGrath, M. S. Tierney, A. R. DuCharme (all 5413), D. M. Ericson (5412), B. H. Finely (1222), and J. M. Taylor (1233) "Generic Environmental Assessment on Transportation of Radioactive Materials in Urban Areas"; R. B. Pope (5433) and D. A. Wesley (9337), "A Parametric Evaluation of Heat Transfer and Coolant Options for LMFBR Spent Fuel Shipping Casks Designs"; J. D. McClure (1282), "An Analysis of the Qualification Criteria for Small Radioactive Material Shipping Packages"; G. C. Allen, J. M. Freedman and S. H. Sutherland (all 5433), "A Waste Transportation System Plan for Geologic Nuclear-Fuel Cycle"; W. F. Hartman, J. D. McClure (both 1282) and W. Von Riesemann (5431), "An Analysis of the Engine Fragment Threat and the Crush Environment for Small Packages Carried on U.S. Commercial Jet Aircraft"; G. C. Allen and J. M. Freedman (both 5433), "Conceptual Designs of Spent Fuel Shipping Casks for the US Breeder Reactor Technology Program"; J. M. Taylor (1233), "The Environmental Impact of Accident-Free Transportation of Radioactive Material in the United States"; W. H. Schmidt (5431), "Nuclear Criticality and Radiation Shielding Calculations for Damaged and Undamaged PAT Packages"; M. Huerta (1282), "Analytical and Scale Modeling Techniques for Predicting the Response of Spent-Nuclear-Fuel Shipping Systems Involved in Severe Transportation Accidents"; H. R. Yoshimura (5433), "Full Scale Simulations of Accidents on Spent Nuclear Fuel Shipping Systems," Fifth International Symposium, Packaging and Transportation of Radioactive Materials, May 7-12, Las Vegas, Nev.

L. C. Beavis (2353), "Recent History of the American Vacuum Society," Rocky Mountain Chapter of AVS, May 26, Denver.

L. K. Matthews and G. P. Mulholland (both 5713), "High Temperature - High Flux Materials Testing for Large Solar Flux Applications"; J. C. Dunn and A. Ortega (both 1262), "Transient Response of a Fluid Sensible Heat Storage Unit," AIAA-ASME Thermophysics and Heat Transfer Conference, May 24-26, Palo Alto, Calif.

T. Caffey (9384), "Locating a Buried Magnetic Dipole," EM Guided Waves Workshop, March 28-30, Boulder, Colo.

R. W. DeVore (9620), "Materials Lists (ML's) An Interagency File System," IMOG/NSG meeting, May 16-18, Amarillo.

W. H. Curry (1336), "Hybrid Computer Study of the Sensitivity of Aircraft Dynamics to Aerodynamic Cross-Coupling," AGARD Symposium on Dynamic Stability Parameters, May 29-31, Athens, Greece.

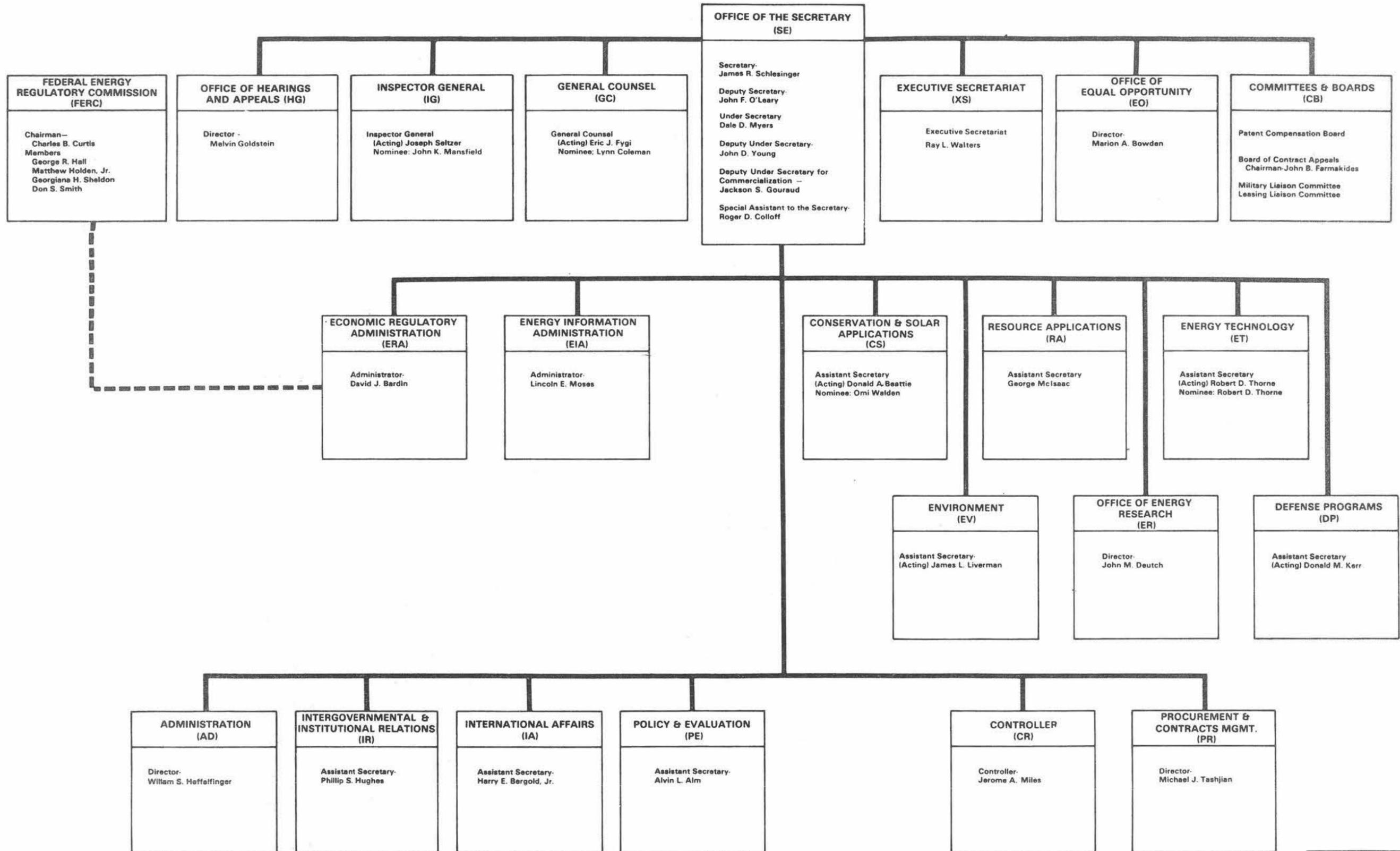
W. Wawersik and D. W. Hannum (both 5163), "Mechanical Behavior of New Mexico Rock Salt in Triaxial Compression up to 200°C," V International Salt Symposium, May 29-June 1, Hamburg, Federal Republic of Germany.

R. B. Pettit (5842), invited presentation, "Reflectors - Their Role in Solar Energy and the Need for Improvement," Argonne Materials Science Conference on Materials for Solar Energy Collection, Conversion and Storage, June 1-2, Argonne, Ill.

G. P. Steck (5121), "Lattice Paths and Accelerated Life Testing," Canadian Mathematical Congress Young Day, June 2, UNM.

C. W. Jennings (2153), "Measurements of Dimensional and Electrical Characteristics of Printed Boards Made with IPC Multi-Purpose Test Pattern, B-25" First Printed Circuit World Convention, June 5-8, London, England.

Department of Energy Organization



Deep Atlantic Seabed To Be Studied

Deep sea sediments from the Atlantic will be recovered this summer as part of a program to determine the feasibility of disposal of high level radioactive waste or spent fuel in ocean floors.

Numerous samples of the red clay sediment will be recovered using conventional and recently developed oceanographic corers. Core samples up to 50 feet long and 4½" in diameter are expected to be recovered from the 16,000-foot-deep study area.

One in a series of expeditions directed by Sandia in a program sponsored by DOE, this expedition includes representatives from Woods Hole Oceanographic Institute and the University of Rhode Island. Also scheduled this summer in the same general area—some 800 miles east of Virginia—is research by French scientists who will be further characterizing the site through deep penetration acoustic techniques. Results from the two expeditions will be compared.

"Research on burying wastes in the ocean floor is at an early stage," says Rip Anderson, supervisor of Seabed Programs Division 5336. "To date, we haven't identified any technical or environmental reasons why high level radioactive waste or spent fuel rods cannot be packaged and buried in stable sedimentary formations."

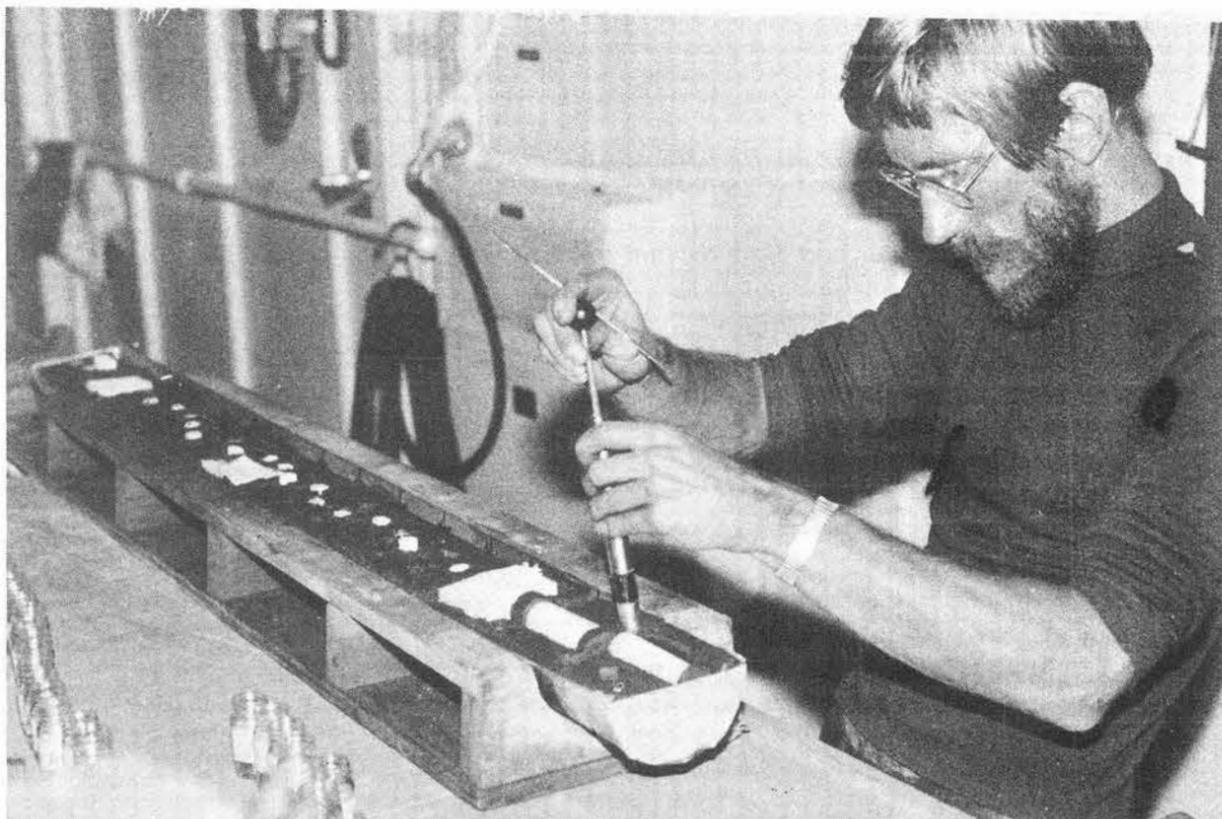
Seabed disposal is being considered as a possible complementary option to underground disposal. Basic concept is that containers of radioactive wastes would be placed within the geologically stable and biologically inactive deep ocean sediments; these have accumulated over millions of years and will ultimately become sedimentary rocks.

Deep ocean disposal differs from land disposal schemes in that water, generally considered undesirable in land disposal sites, is considered an integral part of the barrier. Research to date indicates that geologic formations beneath mid-gyre regions (mid-ocean "deserts" underlying slowly revolving cylindrical water masses) seem to offer the best possibility for deep sea disposal.

Possible advantages of seabed disposal are remoteness from human activity, radionuclide sorption characteristics of ocean sediment, heat absorption capabilities of the ocean, and large sediment areas available for possible disposal sites.

Emplacement, monitoring, and retrieval techniques have not yet been demonstrated, however, and special handling and vessel facilities would be required. Also, implementation of seabed disposal might violate existing international laws and agreements.

Sediment core was also recovered during 1976 from an area about 600 miles north of Hawaii. Core analysis indicates that the lower portions of the 80-foot sample are about 70 million years old, and the core



FROM THE OCEAN DEEP—A core sample taken from beneath 20,000 feet of North Pacific ocean is examined by Joe Stace from the Univ. of Rhode Island, one of the participants with Sandia in this summer's expedition to the Atlantic. Both ocean bottoms are being studied as part of program to determine feasibility of radioactive waste disposal in deep sea sediment.

seems to be continuous and undisturbed by occurrences such as earthquakes, volcanoes, ice ages, or tectonic plate movement. The sediments, with a thickness of at least 100 feet in the area and lying under 20,000 feet of water, were deposited at a rate of less than one millimeter every 1000 years.

Studies indicate that sediment should be several hundred feet thick to be considered as a burial site and that, in general, red clay is the most desirable disposal medium.

Tests are now being made of three other sediment types—siliceous, calcareous, and hemipelagic oozes—obtained from oceanographic laboratories.

The sediment to be recovered this

summer is expected to be softer than that from the North Pacific because of faster sediment deposition rate. The sediments in the area are several hundred feet thick.

Basically, cores are obtained by dropping a weighted tube into the sediment. This "piston corer," after penetrating the sediment, is winched back to the surface and the undisturbed sediment core is removed.

Environmental and technical feasibility tests of the seabed disposal technique are expected to continue through 1983. If results are favorable, further tests to assess the engineering aspects of seabed burial would then take place, possibly followed by small disposal demonstrations thereafter.

Authors

R. L. Iman (1223) and W. J. Conover (Texas Tech.), "On the Power of the T-Test and Some Rank Tests When Outliers May be Present," Vol. 5, No. 2, THE CANADIAN JOURNAL OF STATISTICS.

R. E. Allred and T. R. Guess (both 5844), "Efficiency of Double-lapped Composite Joints in Bending," April 1978 issue, COMPOSITES.

R. L. Alvis (5715), "Solar Powered Irrigation Project," March 1978 issue, SOLAR AGE.

W. J. Spencer (8100), "Diabetic Glucose Control: Matching Plasma Insulin Concentration to Dietary and Stress Hyperglycemia," Inaugural Issue DIABETES HEALTH CARE; "An Electronically-Controlled Insulin Pump," May 1978 issue, IEEE Transactions on SONICS AND ULTRASONICS.

P. Richards (5132), "Hopping Conductivity in a Quasi One-Dimensional Lattice Gas with Three-Dimensional Ordering," July 15, 1978 issue, PHYSICS REVIEW B.

J. W. Nunziato (5131) and E. K. Walsh (Univ. of Fla.), Addendum: "On the Influence of Void Compaction and Material Non-Uniformity on the Propagation of One-Dimensional Acceleration Waves in Granular Materials," Vol. 67, No. 4, ARCHIVE FOR RATIONAL MECHANICS AND ANALYSIS.

R. M. Axline (2344), "Controlled Alteration of Wide-Band Radar Data," Vol. 14, No. 2, Transactions AEROSPACE ELECTRON SYSTEMS.

R. J. Eagan (5845) and J. C. Swearingen (5846), "Effect of Composition on the Mechanical Properties of Aluminosilicate and Borosilicate Glasses," Jan.-Feb. issue, JOURNAL OF THE AMERICAN CERAMIC SOCIETY.

R. P. Clark (2523), "The Phase Diagram of the System $\text{Li}_2\text{CrO}_4\text{-K}_2\text{CrO}_4$," January 1978 issue, JOURNAL OF SOLID STATE CHEMISTRY.

R. M. Biefeld (5154), "The Vaporization Thermodynamics of Rubidium Iodide as Determined by

Mass-Loss Knudsen Effusion and Mass Spectrometry," Vol. 10, No. 5, JOURNAL OF CHEMICAL THERMODYNAMICS; "The Phase Diagram of the System $\text{Li}_2\text{CrO}_4\text{-K}_2\text{CrO}_4$," Vol. 21, No. 2, JOURNAL OF SOLID STATE CHEMISTRY.

R. S. Berg (5842) and R. D. Nasby (5719), "Structure and Morphology of Chemical Sprayed CdS Films," Vol. 15, No. 2, JOURNAL OF AMERICAN VACUUM SOCIETY.

J. Asay (5167) and J. Lipkin (5162), "A Self-Consistent Technique for Estimating the Dynamic Yield Strength of a Shock-Loaded Material," July 1978 issue, JOURNAL OF APPLIED PHYSICS.

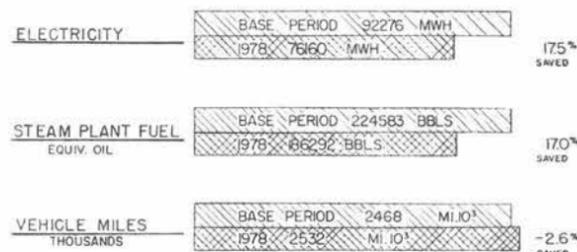
S. M. Myers (5111) and H. J. Rack (5832), "Ion Beam Investigation of Sb Diffusion and Solubility in Fe," April 1978 issue, JOURNAL OF APPLIED PHYSICS.

M. J. Landry, G. S. Phipps and C. E. Robertson (all 9412), "Measurement of Diffraction Efficiency, SNR and Resolution of Single- and Multiple-Exposure Amplitude and Bleached Holograms," Vol. 17, June 1978, APPLIED OPTICS.

R. A. Kiehl (5133), "Behavior and Dynamics of Optically Controlled TRAPATT Oscillators," June 1978, IEEE Transactions of ELECTRON DEVICES.

ENERGY SAVINGS

COMPARED WITH USAGE IN BASE PERIOD—JULY 1972 THRU JUNE 1973
CURRENT REPORTING PERIOD ENDING MAY '78



TGIF Not Traditional—But Still A Time For Dancing

TGIF (in the traditional sense) has little meaning for Frances Bustamante, internal reports clerk in Technical Library Department 3140.

At 4:30 this afternoon, when most of us are looking ahead to the cocktail hour, Frances (as she does each Friday) will be hurrying to her car, her mind racing ahead to the Folklorico dance classes she'll teach tonight and all day tomorrow. And chances are she'll be humming a few bars of something lively, like *La Bamba*, just to psyche herself up.

Slim and intense, Frances moves with grace, projecting the physical control and discipline of the trained professional dancer. Her present poise belies a childhood shyness so haunting and intense it sent her scurrying into closets and under beds to avoid visitors.

"I was really only happy when I was alone," Frances recalls painfully, "and then I used to dance to the music on the radio."

When she was barely three she had her first formal lesson. "My folks thought dancing might draw me out." It did. After six months of lessons she was a regular performer with *The Tiny Señoritas*, a professional troupe run by Regina Chavez.

"We danced at festivals and conventions in California, Arizona, Colorado. Before I was seven I had danced in two Warner Bros. musicals and performed at Knotts Berry Farm and Disneyland."

At nine, Frances turned both teacher and scholar, studied basic ballet, learned the history of dance in New Mexico. At 26, she's had her own school, her own Folklorico Group, *Los Tapatios de Frances Bustamante*, for 4½ years.

Sponsored by the N.M. Arts Commission under auspices of the Albuquerque Boys Club, there are now 73 *Los Tapatios* (literally, The Stampers) between the ages of 3 and 22. They come from Albuquerque, Los Lunas, Belen, Corrales. Many of the girls and boys are referred by APS—special ed students, introverted ones especially.

"My goal isn't necessarily to turn out prima ballerinas or lead dancers," Frances says. "I want to help kids grow, develop a positive self image. I tell parents if they're in a hurry, if they want their children to learn 20 dances the first year, then they've come to the wrong place."

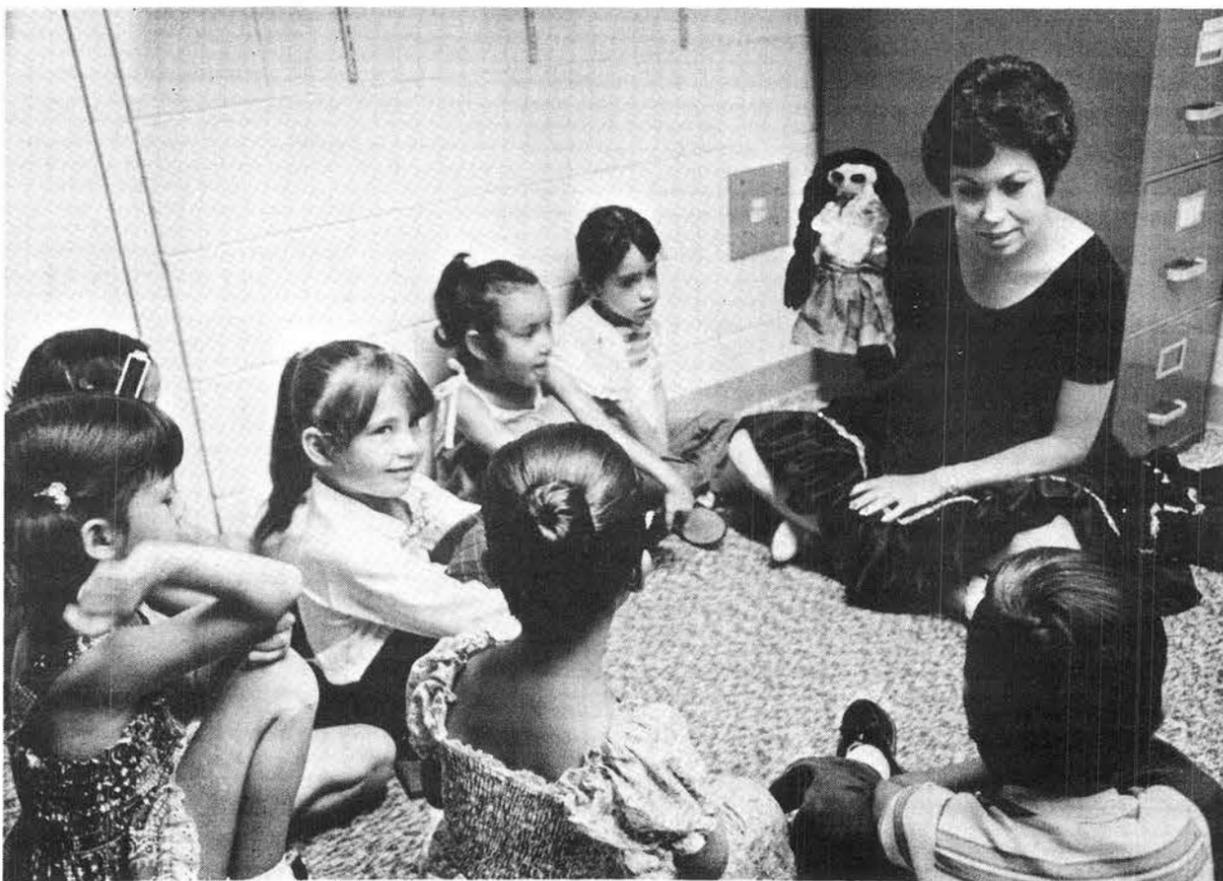
"With the little ones especially, we concentrate on history and meaning—teach the dances with puppets dressed in authentic costumes. I want them to absorb the dances, make the cumbias, the mambo, la bamba, part of their lives the way Folklorico dancers always have. It's the only way I know to achieve authenticity."

You can judge the success of her methods for yourself next week—July 15—when Frances and her troupe perform as part of Hispanic night during Saturday Night Downtown.

Details about *Los Tapatios* are available from Frances at 292-0073 after 5:30 p.m. But not on Fridays. She teaches tonight until seven—and with performances coming up next week, there'll undoubtedly be late rehearsals after that.



IN THE FOLKLORICO TRADITION. Frances Bustamante, internal reports clerk in Tech. Library, 3140, started dancing professionally at age 3½. She now heads her own dance school and her own dance troupe, *Los Tapatios* (literally, The Stampers) de Frances Bustamante. Above, she rehearses with three older students. Below she explains the history and meaning of a dance using a hand puppet dressed in authentic costume. Frances and her troupe appear July 15, Hispanic night, at Downtown Saturday Night.



Fun & Games

And now, macho Frisbee—Used to be that Frisbee players were about as assertive as ladies at a quilting bee—the Frisbee was an activity languidly pursued after a picnic. Now Larry Kovacic (9571), who is director of the NM Frisbee Assn., has described for us a mildly lethal form of Frisbeeing in which one team of five confronts an opposing team across a strip 15 metres wide. A team member on one side winds up with the Frisbee and flings it with maximum force across the strip at the opposing five, one of whom has to catch the missile or lose a point. Larry claims that the Frisbee travels about as fast as a well-thrown baseball, so catching one can

be a little hard on the hands (players wear handball gloves). Then the player who made the catch does his thing and throws the Frisbee back equally hard. Game is over when 21 points are scored. It's called Guts Frisbee and the Guts Players Assn. will have its Southwestern Tournament on July 15 and 16 at UNM's Johnson Gym fields. You can watch the Guts game and they'll also have a freestyle contest. The fun starts in the late morning.

Sympathy

To Ernesto Montoya (9571) on the death of his brother-in-law, Juvenal Baca (1127), June 25.

To Dave Henry (1241) on the death of his father in San Diego, June 22.

Stretch Now, Last Longer

At the gym you can observe any number of runners who change into their running clothing, slip into their Adidas, charge out the door and start running. That's what it's all about, yes?

Running is what it's all about. But let me quote from the Harvard Medical School Health Letter for May: "First, it is important to stretch and loosen muscles, especially those of the lower extremities. Unless this is done, the jogger will sooner or later develop pains due to tightness of joints or contraction of muscles...Is it really necessary to do heel cord stretch exercises? Yes. The heel cord or Achilles tendon joins two major muscles of the back of the leg to the back of the heel bone. In long-distance running, there is a tendency for this heel cord to become contracted. If this happens, several symptoms may result (i.e., tendonitis, heel pain), which can be prevented by stretching."

For years I ran without benefit of stretching, and every morning upon arising would hobble about the house like a centenarian, heels and lower calves protesting every step. So I followed the advice of my more experienced running friends, started doing calf and hamstring stretching exercises (described below), and the problem has pretty much gone away.

Aside from the potential for injury, there's another circumstance that makes stretching a desirable activity for all athletes, be they runners, bikers, swimmers or whatever. Certain muscle groups in these athletes will be highly developed, owing to their specific activity, while the remainder of their musculature will be relatively normal or average. Stretching helps keep the athlete limber by moderating the effect of the highly developed muscles.

Here's a sample of stretching exercises that I've collected, most from WE-HQ's Alan Colodny, physical fitness specialist. You don't have to do all—just the ones that best suit you. One caution—avoid bouncing. Hold the stretched position from 8 to 10 seconds and, while holding, try to go just a little further, smoothly.

Hamstring stretch—Sit up on the floor with legs extended straight out. Bend your right knee and put your right foot behind you and slightly under your seat. To stretch the hamstrings (the large muscles in the back of the upper leg), lean forward, keeping your left leg straight and try to touch your left shin with your nose. Switch legs and try again.

Quadricep stretch—Same start position as above with foot under seat but keep knee on floor and lean back as far as you can. The quadriceps, the large muscles in the front of the upper leg, are where you should feel the stretch.

Standing hamstring stretch—This is the one you see ballerinas doing. Raise your straightened leg to a rail or platform at waist height where the foot can be supported. Lean forward to touch nose to shin of the elevated leg. Hold for 8-10 seconds and shift to other leg (lowering

Bob Durand Serves Boys State

Boys State is a national program sponsored by the American Legion which gives selected young men entering their senior year in high school an intensive week's experience in democratic government.

In New Mexico, Bob Durand, supervisor of Purchasing Services Section B, 3725-2, has devoted 26 years to conducting Boys State. Earlier last month he spent a week in Roswell at NMMI with 454 boys from throughout New Mexico (two from each high school) getting down to the basics of the business of government. Bob, the associate director of New Mexico Boys State, is responsible for program, selection of staff, and much of the extensive logistics and coordination for the project.

"The boys learn by doing," Bob says. "We start at the city level, move up to county government and then on to state. At each step they are involved in the issues and concerns of government—services, taxes, maintenance, finances, protection, personnel—even debating energy alternatives and the WIPP project. And then there's the elections and campaigning. It's a busy schedule from 6:30 a.m. to 11:30 p.m."

Bob is highly complimentary of his staff of 66 volunteer counselors—educators, lawyers, politicians, police officers, military—many of them former Boys Staters themselves.

Bob was selected himself for Boys State in Needles, Calif., in 1944. He spent the next couple of years in the U.S. Navy serving on a carrier in the South Pacific. After returning to his native Albuquerque and joining Sandia, he became active in the American Legion, serving in many positions in addition to Boys State. For the past four years he has been a member of the American Legion's national executive committee. Bob has also worked with other

elevated leg first).

Standing quadricep stretch—With one arm lean against a wall and with the other raise a leg behind you, grasping the ankle and pulling as far as you can to stretch the quadriceps. Switch.

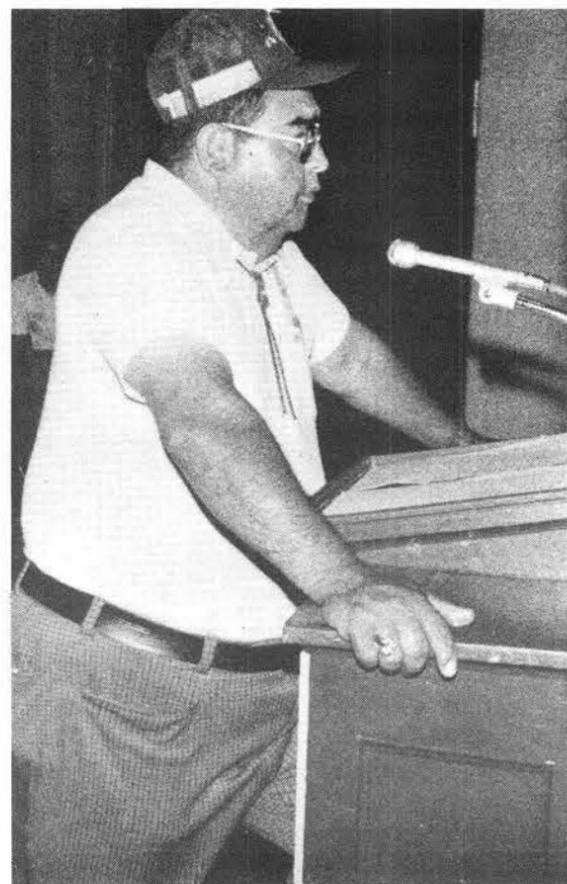
Calf stretch—With both arms lean against a wall and back your feet away as you keep them flat on the floor—the farther away, the more the stretch.

The three following exercises are widely recognized as beneficial for lower back problems:

Knee hug—Lie on your back with knees bent and feet flat on floor. Hug one knee to your chest for 8 to 10 seconds, then the other, then both. You should feel your lower back flatten out on the floor as you perform this exercise.

Cross leg stretch—Same start position as knee hug. Lift right ankle to left knee. Let your legs fall to your right. Keep shoulder blades on the floor. You'll feel a stretch on the left side of your back. Switch.

Hip rotation—Same start position as knee hug. Tighten the muscles in your buttocks—the gluteals—so that your pelvis rotates upward and your lower back flattens out on the floor. Repeat 10 to 15 times. •js



BOB DURAND (3725-2) addresses delegates to Boys State during a recent meeting at NMMI in Roswell.

Legion youth projects—baseball leagues, oratory contests, immunization programs and scholarship fund raising.

"Through the years," Bob says, "I've seen changes in the young people. In the '50's it seems they were quieter, milder. Then came the '60's and we had rebellion. Nowadays they're great. They've returned to the kind of values that made this country great. I'm talking about a sense of duty and responsibility—a willingness to work hard to achieve a goal.

"Boys State reinforces these values—maybe shapes some ambitions. My only regret is that we can't give every kid the experience of Boys State."

20 Years Ago

When Sandia Corporation's new computer—the IBM 705 Electronic Data Processing Machine—arrives next week, it will be installed in most unusual quarters in Bldg. 880...

Ingenious solutions by a team of plant engineers assure the 705 a dust-free atmosphere, a relative humidity of between 40 and 60 percent, constant temperature of 75° and a separate power sub-station free from fluctuations of voltage...

An electronic marvel, the 705 EDPM will be a new tool useful in many areas of activity...

* * *

Flexibility for expansion was a main requirement in the design of Sandia's new Materials and Standards Laboratory, Bldg. 861...

This will be the first three-story structure to be built at Sandia Laboratory since construction of Bldg. 802. Completion is expected about Sept. 1, 1959.

MILEPOSTS

LAB NEWS

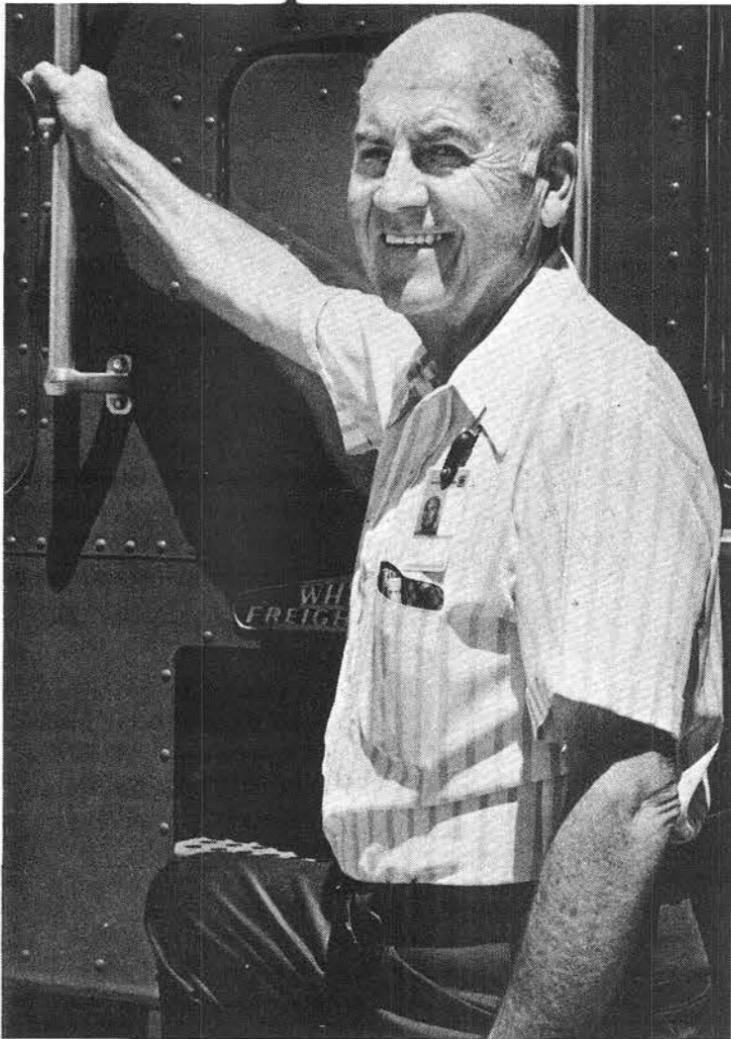
JULY 1978



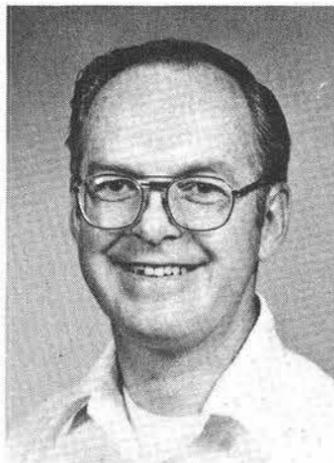
Tonni Nunley - 8116 15



Walter Cordek - 1131 25



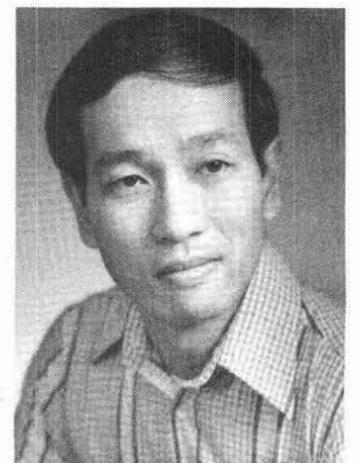
Clyde Dunlap - 1714 30



Hal Bennett - 5741 20



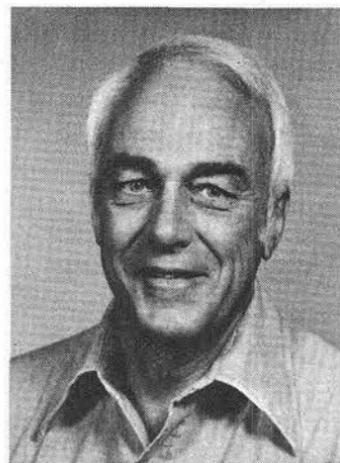
Mary Gonzales - 9572 10



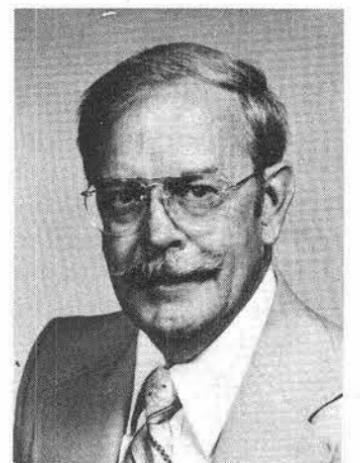
Ray Ng - 8442 10



Francis Higgins - 3721 20



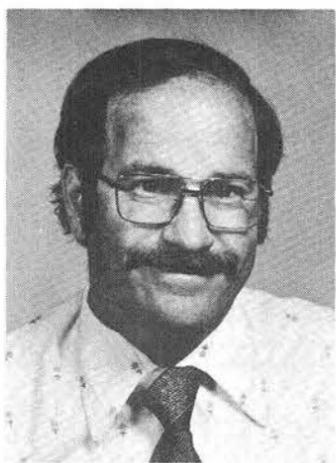
Dick Volk - 2354 20



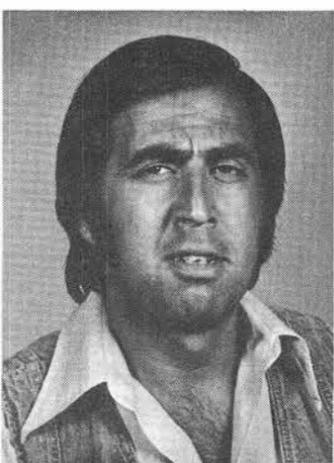
Sig Thunborg - 5711 25



Ernest Roberts - 9656 15



Charles Carson - 1311 10



Manuel Gonzales - 2141 10



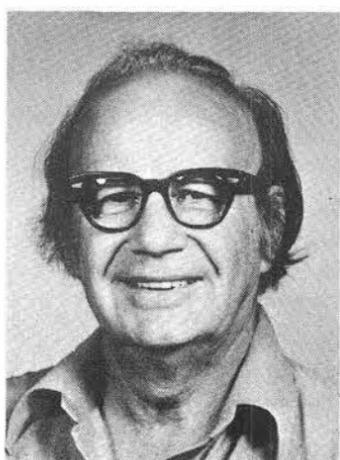
Ozzie Tjeltweed - 4336 25



E. M. Beezley - 1135 25



Kenneth Morgan - 2162 10



Edwin Zurawski - 9581 10



Hovey Corbin - 1733 10

ABQ. Arts Council: Art For Public; Public For Art

What does the Albuquerque Arts Council do?

More than you suspect; less than it might (limited as it is by a lack of funds).

For a number of years, I've dutifully sent off my \$10 annual active membership fee without quite knowing what the council does. But every second month I've received a Cultural Arts Calendar, which seemed recompense enough. It's an interesting document, a poster really, that details cultural events for the coming two months. At the *Lab News* we use it as a primary source for the Events Calendar.

Formed in 1969, the Council is a private, non-profit, tax-exempt organization (which means that membership fees are tax-deductible). Helen Sidler, a former head of the Nevada State Council of Arts, took over as Executive Director in 1975. "The Albuquerque Arts Council," she told us, "serves both the public and the artist."

Let's begin with a few of the public benefits:

- **INTRODUCTION.** A special juried competition and exhibition co-sponsored with the Museum of Albuquerque (as funds are available) to introduce the public to visual artists without gallery affiliation.

- **ARTISTS IN ELEMENTARY SCHOOLS.** A program in 73-74 and 75-76



A BREAKFAST SPECIAL—two eggs, hash brown potatoes, buttered toast and your choice of sausage or bacon—is offered for 96 cents every workday morning at the new Sandia cafeteria. Darlene Garcia (Szabo Food Service) cooks your eggs the way you like them. Breakfast is served from 7 to 7:45 a.m.

to promote interest in the arts by putting working potters, painters, poets, musicians and dancers in the elementary school classroom.

- **ARTS FIESTA.** The council coordinated this opening event of Art Month in New Mexico in 1974 and 1975.

There could have been, and could be, much, much more. But there isn't enough money.

"We've about reached our limit," Helen says. "We're trying for state, local, and national money. But often to get support you have to put up matching funds. We simply don't have them. That's why we need the support of individuals who care about the arts, businesses that believe in enriching the quality of life in the community through art."

Only 11 companies in Albuquerque belong to the council. Sandia is one.

Individual memberships cost \$10; family memberships \$25. For \$50 you can be a supporting member, for \$100 a sponsor, for \$500 a patron. To join, or for more information, call Helen Sidler at 265-3271 or write the council at 5900 Domingo NE, 87108.

•cec



The insidious (and sometimes blatant) influence of computers in our private lives has caused a music professor at the University of Lowell in Maine to sound a gentle note of warning: "The development of a reasonably priced, easy to operate, and reliable (computerized) sound input facilities combined with the powerful music processing and sound synthesis facilities already available will bring about a radical change in music. The systems resulting from this combination will permit people with only the slightest background to engage in the whole range of musical activities and will, of course, tremendously amplify the skills and techniques of professionals at the same time. It is impossible to predict what will be the effect of everything suddenly becoming 'easy.'"

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. 3182 (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 ERDA 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

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.

BELT VIBRATOR EXERCISER. "Eksasizer" model 5000, 1/4 H.P., 3-spd., 4" belt, \$25. Cox, 299-0480.

ALL SIZES ducks & chickens, some bantam chickens, Top Knot chicks, will trade for hay. Lackey, 898-6638.

POWER AUGER; radial arm saw; concrete mixer; lg. decorative lava; dinette set; refrigerator. Jeys, 299-4197.

PIANO, Wurlitzer spinet, Early American style, about 6 yrs. old, \$595. Bureta, 256-1833.

AKC REG. Labrador retriever puppies, golden males, \$100, black, \$75. Tipton, 298-1944.

ROCKING CHAIR, Early American, \$25; Sears padded reclining child's carseat, \$20; reinforced link chains for 13" tire, \$10. Gerstle, 298-7854.

FURNITURE PARTS: new alder wood, mostly chair spindles & legs. Wentz, 881-7125.

FORD TOT GUARD & GM infant car seat. Harrigan, 266-4143.

RAIN GUTTERS, 100 feet used alum. gutter w/baked on white enamel, downspouts, accessories, spikes, etc., \$25. Mulac, 281-3848.

LADIES DIAMOND RING, Marquise cut, over 1 ct., set in white gold, appraised at \$1500, sell for \$1300. Chavez, 268-6496.

71 HAWK 8 1/2' camper w/2 dbl. beds, 2-burner stove, upright ice chest, radio, runs off AC/DC, propane bottle, \$850 or best offer. Wingate, 9501 Woodland NE, 296-4457.

KODAK XL-33 movie camera; std. seat for Honda GL-1000. Perryman, 294-6113.

SHARES in Southwest Capitol Savings, \$4 ea. McGinn, 266-8471.

7' SOFA, woven stripes of blue, green & brown, \$50. Smith, 242-9576.

TRAVEL TRAILER, 23' Hi-Lo, '72, sleeps 5-6, self-contained w/generator & AC, deluxe, \$3600. Walker, 821-5938.

BITTERSWEET Independence ironstone, 60 pieces, octagonal from Sturbridge Yankee Workshop, Mass., open stock, half price, \$100. Dalphin, 265-4029.

AUTHENTIC California redwood burl tables. Kuhn, 266-7695.

WELDER, one-ten power, freq. 60 phase 1, \$75 or best offer. Moulds, 247-8433.

TENT, 10'x13' w/side room, \$50. Richardson, 298-6527.

COLEMAN 2-man pack tent, \$40. Klett, 298-7892.

YARD SALE: July 7, 8, 9; baby items, household goods, misc., 304 Fontana Pl. NE. O'Bryant, 268-9049.

5 BAGS insulation; gas stove; concrete mixer; gas powered auger. Jeys, 265-1584.

3-BURNER RV stove w/oven, horizontal mount LP bottle w/regulator,

all for \$150. Free RV ice box, needs repair. Worrell, 299-0381.

ENGLISH SETTER PUPPIES, proven parents in the field, 4 wks. old, reserve now. McNeill, 293-1897.

NEW OLIN MARK IV 190 skis, \$150. Mason, 281-3052.

'71 Starcraft tent trailer, sleeps 6, fully equipped. Linnerooth, 299-6154.

TRANSPORTATION

73 DODGE Dart compact, 4-dr. 6, manual trans., factory air, AM/FM, steel belted radials, \$1775. Smith, 255-5662.

76 TOYOTA Corona Deluxe 4-dr., 4-spd., radials, 16,000 miles, \$3400. Hickerson, 299-0673.

74 FORD Courier truck, low mileage, w/fiberglass camper shell, burglar alarm & stereo. Stump, 898-2546.

77 MERCURY Monarch, 2-dr., AC, AT, PS, PB, tinted glass, 1/2 vinyl roof, 10,700 miles. Davis, 821-8388.

70 FORD F-100 360, 8' OH camper, stove, sink, \$1900; camper only, \$700; 4 jacks. Sanchez, 292-3852.

76 MERCURY Monarch, 6 cyl., 2-dr., red w/white top, 24,000 miles. Pino, 242-9553.

73 FIAT sedan, front wheel drive, bucket seats, steel belted radials; plus cash for pickup truck. Smitha, 881-1001.

75 HONDA 550-F, new continental rear tire, 4-in-1 header pipe, orange metal flake paint, \$1000 or make offer. Downie, 293-1039.

74 FORD Pinto, AT, 35,000 miles, \$1295. Curry, 881-2061.

TWO matched Moto-Cross bicycles, Graco MX-500, rear shocks, front telescopic fork. Perryman, 294-6113.

74 PORSCHE 914, 1.8 liter engine, AC, AM-FM stereo cassette. Chandler, 296-9788 or 299-4496.

75 PINTO SW, 4-cyl., 4-spd., \$2100 or make offer. Johnson, 255-1469.

GIRLS 20" polo bikes (2), \$20 ea.

Schroeder, 881-2799.

'69 VW BUG, 4-spd., AM/FM/8-track, CB radio, rear window defroster, \$999. Rogers, 293-5726.

BICYCLES: 3-spd. ladies 26", \$30; man's 26", \$25. Coleman, 299-2377.

'65 CADILLAC, Sedan DeVille, white, deluxe equip., 54,000 miles, best offer. Slutts, 255-4975.

KAWASAKI KZ 200, 8 mos. old, \$439. Peet, 294-1250.

'71 OPEL Kadette, \$1100, engine recently rebuilt, R&H. Jaramillo, 294-4457 after 5.

15' LARSON tri-hull boat, walk through bow, 105 HP Chrysler engine, HD tilt trailer. Peeples, 877-3942.

76 CHEV. Monza hatchback, 4-spd., AM/FM cassette, new tires, 25,000 miles left on engine warranty, near wholesale. Nielson, 296-7076.

REAL ESTATE

SCENIC MOUNTAIN property w/ Pecos River frontage, just east of Rowe, 40 acres, all or part. Roehrig, 821-6855.

40 ACRES, 18 mi. SW of Taos, \$12,000. Olson, 268-2227.

14 x 70 MOBILE HOME on 1/2 acre, Los Lunas area, has trees & storage sheds, adjacent 1/2 acre also available. Sanders, 865-9478.

ALL BRICK, 2310 sq. ft., 3-bdr., plus spare, lg. den w/fp, lg. lot, low 70's, evenings, weekends. Ray, 299-1253.

MOBILE HOME, '68 Melody 12x50, 2-bdr. front & back, LR, kitchen, completely furnished, AC, skirted, carpeted throughout. Campos, 298-6942 after 4:30.

FOR RENT

3-BDR. HOUSE, garage, 1 1/2 baths, stove & refrig., lg. fenced lot in NE Heights. Patterson, 293-1622.

NEW 2-bdr. apartments at Skyline & Figueroa Rd. NE, near schools & Base, carpeted throughout, drapes, refrig., range, garbage disposal. Hill, 299-7813.

4-BDR. in NE near Eubank & Co- manche, 3 bath, 2 fp, den, dbl. garage, walled & landscaped, drapes, carpet, near schools & shopping, no pets, \$425/mo. + deposit. Williams, 821-2058.

3-BDR. in Academy Acres, available Aug. 1, no pets, \$345. Waller, 821-7900 or 821-2318.

CABIN IN TAOS mountains, deluxe, has everything, sleeps 8. Peet, 294-1250.

WANTED

BOY'S BICYCLE for 7-to-9-year old child. Harrigan, 266-4143.

SET OF CAMPER JACKS. Curry, 881-2061.

SEWING MACHINE CABINET for Kenmore free-arm. Markey, 299-9655.

TO RENT, 1-2 days, mountain cabin in northern N.M. for 4 people, last 2 weeks in August. Chavez, 294-1253.

PAIR WATER SKIS for children. Blaine, 299-1036.

6-STRING CLASSICAL GUITAR, good condition. Worrell, 299-0381.

LOST AND FOUND

LOST—2 gold keys on gold ring, VW key #4K107, 8-10 keys on chrome ring.

FOUND—Brass key #W2736, men's brown plastic-rimmed glasses, tie pin w/initials "LF", gold loop earring for pierced ear, ladies' rust-colored glass case. LOST AND FOUND, Bldg. 832, 264-1657.

Coronado Club Activities

Singles Mingle Tonight; Buffet Features Seafood

TONIGHT assorted seafood—shrimp, scallops, oysters, fish—tops the buffet menu while a group called 3 of Us and Jeremiah plays for dancing. Down at the Annex Pool, singles are mingling, swimming, dancing and like that. Plenty of party all around.

Next Friday's Happy Hour will see a pepper steak and Chinese-type buffet spread and the Greigo Brothers wired into the bandstand.

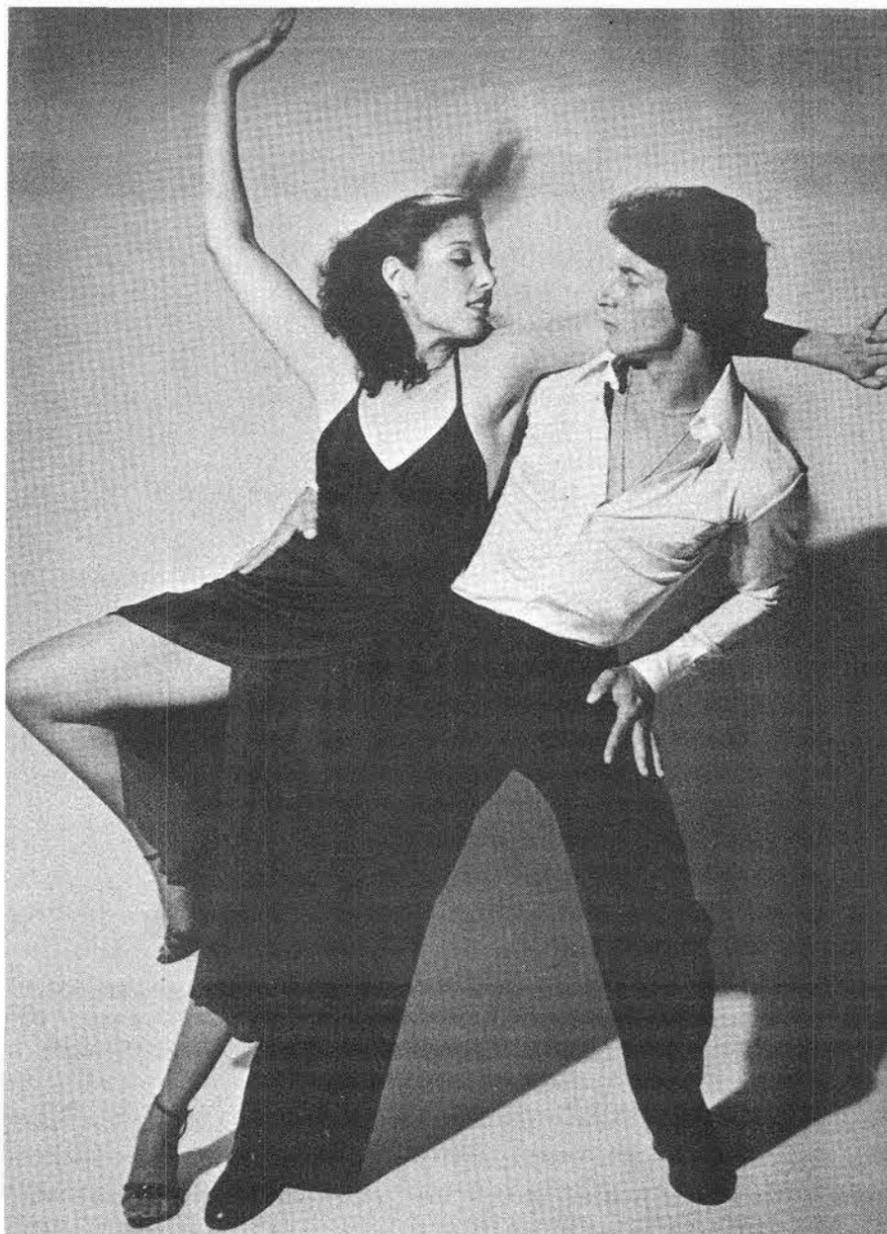
SOUL SESSION on Saturday, July 15, brings back the big country rock rhythm of Shalako. Admission is free for members, \$1 for guests.

TEEN DISCO EVENTS are set for July 13 and 27, 8 to 11 p.m. Door prizes and dance contests are part of the entertainment. Parents must pick up tickets for their youngsters.

THE BIG ONE this month is a Mongolian barbeque scheduled Saturday, July 22. According to Marv Plugge's Club newsletter, the chef has more fun than anybody preparing a custom order for each individual party goer. Dining is scheduled from 6 to 9 p.m. to give the man a little more room for his flourishes. La Ultima plays for dancing. July 15 is the ticket deadline.

TRAVEL DIRECTOR Ed Neidel reports that information on bus excursions to Chichen Itza and boat trips to Isla Mujeres is now available in the Club office for those who have signed up for the Cancun trip. It's available to those who haven't signed up, too, along with the scoop on this Yucatan travel package during the last five vacation days of this Fiscal Year. A Cancun pre-trip meeting is scheduled Tuesday, July 11, at 7:30 p.m. A movie will be shown in the Club ballroom.

Also open is the seven-day trip to Mazatlan starting Oct. 28. And the Aug. 26 outing on the Cumbres and Toltec scenic railroad. Ed should be in the Club lobby tonight with answers to your questions.



INSTRUCTORS Renee Velasquez and Jerry Libutti will teach disco dancing at the Club on Wednesdays from 7 to 8 p.m. starting July 12. Sign up now at the Club office. The series of five lessons costs \$15.

Events Calendar

July 7-9—Albuquerque Dance Theater performance at the Albuquerque Little Theater, 242-2656.

July 7-9—"Winnie the Pooh," Albuquerque Civic Light Opera, Popejoy Hall, 277-3121.

July 7-9—"Bus Stop," Corrales Adobe Theatre, 8:30 p.m., 898-1943.

July 14-16—World Wide Antique Show, Convention Center.

July 17—UNM Lecture Under the Stars by Charles Trumbull titled "Issues in Scientific Exchanges With the USSR," Central Mall, 8 p.m.

July 18—Native American Fine Arts Exhibit at the Indian Pueblo Cultural Center. Reception 2-4 p.m. Exhibit runs to Aug. 14.

Through July 16—"The Second Time Around," Barn Dinner Theater, 281-3338.

Through Sept. 17—Exhibit of rare 19th century Navajo weaving, Maxwell Museum of Anthropology.



RAY POWELL (VP-3000), center, talks with Indian leaders at a recent meeting at Sandia. The Labs' personnel procedures, hiring practices and educational opportunities were discussed with about 25 Indian program directors involved in educational and employment opportunities for Native Americans. From left are Tom Dailey, personnel director, All Indian Pueblo Council; Diana Suina, employment coordinator, Div. 3533; Mr. Powell; LaDonna Harris, director Americans for Indian Opportunity; and Frank Green, placement director, Southwestern Indian Polytechnic Institute.

