

## Search for Nation's First Nuclear Waste Repository Focuses on Yucca Mountain Site

If Yucca Mountain at Nevada Test Site is not the most well-studied mountain in the country today, it may be tomorrow.

One of the reasons it will get further attention is that Congress recently selected it as *the* front runner among possible sites for a civilian nuclear waste repository (see "Political Background" story).

But Yucca Mountain may already hold the "most-studied mountain" title — Sandia, LANL, LLNL, and the USGS (US Geological Survey) have been investigating its appropriateness as a site for a waste repository since 1978; more recently, SAIC (Scientific Applications International Corp.) joined the investigation.

An entire Sandia department — Tom Hunter's 65-member NNWSI (Nevada Nuclear Waste Storage Investigations) Projects Dept. 6310 — and 20 Sandians from other organizations support the DOE in investigating the Yucca Mountain site. Many of the Sandians contributed to a pair of recently issued complementary reports based on those investigations.

The larger of the two reports, the Site Characterization Plan, contains the findings of all the participant organizations; Sandia contributed about a third of its 5100 pages. And the SCP isn't yet in final form — this is the "consultation draft" version, which DOE's Nevada Operations Office will use in discussions with the State of Nevada and the NRC (Nuclear Regulatory Commission). The state performs an independent evaluation of DOE's program, and, if the site is determined by the DOE to be suitable for a repository, a license must be obtained from the NRC to construct and operate it.

The other report, the Conceptual Design Report (CDR), was compiled by about 15 Sandians in Al Stevens' NNWSI Repository Engineering Div. 6311 and Joe Tillerson's Geotechnical Design Div. 6314 (with help from two architectural/engineering firms — Bechtel National Inc. and Parsons, Brinkerhoff, Quade and Douglas Inc. — and technical/editing support from Los Alamos Technical Associates). Initial work on the CDR was performed by Leo Scully, who recently retired from 6311.

### Nature of the Yucca Mountain Site

The CDR is a kind of reference document that defines what a Yucca Mountain repository would look like above and below ground, and describes the operations necessary to take a shipment of waste through the surface facilities to a subterranean chamber for permanent disposal. "It takes the site as we have come to understand it — mostly through core drilling — and tailors a repository to that site, allowing for its geologic and hydrologic character," says Tom.

A mountain is a mountain. The implication here is that access can be more-or-less horizontal — a waste containment package (being designed by LLNL) would be loaded aboard some type of vehicle at the surface, then transported down a ramp to the final storage area. A vertical shaft, such as the one needed for WIPP access, is not needed in the design for waste emplacement.

Some mountains, however, are tuff. And that's the case with Yucca Mountain — it's composed of monolithic rock produced by squeezing volcanic ash and other volcanic fragments together under high temperatures. And this tuff is tough — "Not nearly as soft as concrete," notes Tom. More precisely, it's "welded tuff," which is even tougher than other tuffs.

It's a big enough mountain to contain the 70,000 metric tons (a metric ton is 1000 kg or 2200 lbs., 200 lbs. more than a standard ton) of waste specified in the design criteria. That breaks down to 62,000 metric tons of spent nuclear fuel and 8000 of defense-related waste (which is also slated for the civilian repository on a cost-reimbursable basis).

The waste would be placed in holes in the floors or walls of underground chambers. Some of the

(Continued on Page Five)



**MASSIVE UNDERTAKING, MASSIVE RESULT** — Some of the key people involved with one of the two multi-volume reports in the foreground are (from left) Tom Hunter (6310), Joe Tillerson (6314), Al Stevens, and Hugh MacDougall (both 6311). The 3026-page, 27-lb. Conceptual Design Report (right) grew primarily out of efforts by the two divisions to conceptualize a nuclear waste repository at Yucca Mountain in Nevada. These four and many other Sandians inside and outside 6310 (and other project participants as well) worked on the second report (left), a 5095-page Site Characterization Plan, which summarizes the site data and designs produced to date and the plans for getting and using new data. Both reports were released on Jan. 8.



# LAB NEWS

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SANDIA NATIONAL LABORATORIES

JANUARY 29, 1988

### Have Expertise, Will Respond

## Advisory Board on Call To Review Packaging Problems

**ATTENTION, WEAPON DESIGNERS:** *Troubleshooting group will, on request, review component packaging designs, identify potential problem areas, seek to resolve. Also on call for packaging problems just before or during production. Contact PAB; ask for T.J. or Barney.*

If LAB NEWS ran a "Personals" column, this ad might well appear in every issue. Because there's a group at Sandia — the Packaging Advisory Board (PAB) — chartered to help on component packaging problems that need to be resolved before a weapon enters production.

The PAB, co-chaired by T. J. Williams (2361) and Barney Barnett (2363), stands ready to assist in several areas of expertise (see "PAB Members") — but only on request, T. J. emphasizes. "We don't presume to preempt the weapon designer," he says. "But it's important for people to be aware that we're available for consultation if a problem arises, or that we can review a preliminary design and offer constructive comments that might head off a problem — thus assisting and building quality into the design right from the beginning.

"We're available as a resource to Sandia's entire design community, both at Livermore and Albuquerque."

And, adds EVP Orval Jones (20), "The 'technical networking' that the PAB provides is extremely valuable to our engineering success."

Packaging is critical, of course, because it helps protect components from the severe or abnormal environments that a weapon may encounter. "A weapon headed for stockpile may well remain there for 25 years," T. J. says. "During that time it will be subjected to all sorts of temperature variations, moisture, and other conditions that may lead to corrosion. Packaging shields components against those conditions."

The ability to withstand severe shock is another important packaging consideration. For instance, some artillery shells are designed to withstand 16,000 g's; encapsulation cushions the blow for the components inside them.

Safety in an abnormal accident environment is also a primary concern; as T. J. puts it, "We must ensure that a weapon doesn't work in a situation where it's not intended to [work] — for example, as the result of an accident."

### Original PAB

The original PAB was established in the early 1970s to work on some of the complex encapsulation problems observed in weapon electronic subsystems (firing sets). "It was more or less a crash program to take a look at high-voltage control problems and firing-set components that broke after they

(Continued on Page Four)



# Antojitos

Sandia Has 1000-Foot Rocket Sled -- At least that's what the January issue of DOE This Month says. It's an item in the 1987 DOE Highlights section for December, and it reads, in full: "Sandia Laboratories' 1000-foot rocket sled for testing munitions goes into operation at Albuquerque."

Ah, yes. Little known outside weapon development circles, the 1000-ft. rocket sled permits us to conduct simultaneous impact tests on 100 weapon shapes, lined up nose to tail, on our 10,000-ft. sled track.

What the item should have said, of course, was "Los Alamos' 1000-foot rocket sled track for testing munitions goes into operation at Los Alamos." And it could have added, " -- with some help from Sandia."

LANL's Jim Steger, the project honcho, made several trips to our sled track to visit with Dave Bickel, supervisor of Track and Cables Div. 7535, and his people about instrumentation, control systems, firing systems -- all the stuff you gotta know before you strap a rocket to a sled and launch it horizontally. And Sandia gave LANL a hundred rocket motors from its stock of military surplus motors; that's getting the LANL rocket sled under way with a bang.

(Two ex-Sandians, Gary Laabs and John Hill, are now part of LANL's new sled track crew.)

\* \* \*

The New Woman, Courtesy Materials Science -- An ad for K2 LTP skis brags that they're "engineered specifically for women with the best materials available." And what are these materials? According to the ad, "Kevlar, sintered base, fiberglass and Durafoam core." Well, the new woman certainly sounds resilient.

\* \* \*

Words We Wish We'd Coined Systematics' newsletter, "Around the System," has these sniglets (made-up words) that our brethren in the 2600 vineyards and others who interface with computers can appreciate:

superstitinitiate - to resubmit a job that abended [an IBM term for "abort-end"] previously without making any changes, hoping it will magically work this time.

onosecond - the amount of time between the pressing of the ENTER key and the realization that you have just made a horrible mistake.

pscrewdocode - the gibberish that results when you put your typing fingers on the wrong set of keys.

purgeatory - where jobs go after they are purged.

dorkumentation - incomplete documentation.

stupiduplicate - to make an error and then copy it.

beepcreep - one who keeps pressing ENTER when the terminal is locked up.

queue pasa - looking at a computer's queue list to see what's happening.

overbytes - unit of measurement for unavailable disk space.

paper popper - a job that prints one line per page and spews paper all over the floor. ●BH

\* \* \*

De decir a hacer hay mucho que ver. (From saying to doing is a lot to see, OR Talk's cheap.)



SEN. JOHN GLENN (right) visited Sandia two weeks ago. Here he chats with Orval Jones (20) as they head for Bldg. 868. The Senator spent much of his time at Sandia discussing INF Treaty verification technology with Roger Hagengruber (9000), Paul Stokes (9110), and John Holovka (9111); he also met with Bob Clem (9100) on ACM programs and with Rick Wayne (8400) on SDI technologies. President Welber hosted the Senator's visit.

## Supervisory Appointment



DENISE KOKER to supervisor of Benefits, Medical, and EEO Division 8526, effective Jan. 16.

Denise joined Sandia Livermore in 1980 as the EEO/Affirmative Action coordinator. For the past six years she has worked as a budget analyst in the Financial Division, where her responsibilities included energy and internal programs and, most recently, the weapon programs.

She has a BA in history and an MBA, both from UC Berkeley.

A native of the Bay Area, Denise and her husband Mark have one son. They live in San Leandro. Denise's outside interests include European antiques, wine tasting, and recreational swimming.

## Take Note

Bill Ormond (8514) has been awarded the Meritorious Service Medal for 10 years service in the US Army Reserve. He served in the Chemical Corps as a colonel from 1977 to 1987. The certificate accompanying the award said, in part: "For outstandingly meritorious service as a Citizen Soldier of the US Army Reserve whose service was characterized by selfless dedication and great personal commitment."

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## Congratulations

To Betty Mayer (8281) and Steve Folkendt (8536), married in Nevada, Dec. 27.

To Debbie and Michael (8231) Pendley, a son, Steven Anthony, Jan. 8.

To Lorenna (8523) and David Petersen, a son, Russell Eugene, Jan. 17.

## Gitcher Own Little Blue Book Now — It's Easy!

The 1988 issue of the "Little Blue Book," the Sandia information booklet officially titled "Sandia National Laboratories," is now available. A handy guide to Sandia programs, facilities, and personnel statistics, it's being sent to all Sandia supervisors, but you can get a personal copy by sending a self-addressed internal mailing envelope (9" x 12") to Div. 3162 (no phone calls, please).



## Visitor Accelerates Research in Pulsed Combustion

As Ichiro Hongo, a Toshiba Corporation researcher, completes his 16-month assignment in the Combustion Research Facility, he praises both the facility and the visiting-scientist concept.

"Your visiting-scientist program is a good one because it combines the fine facilities of a national laboratory with private industry participation," says Ichiro. "It provides the motivation for some new ways of thinking — as well as the opportunity for sharing new know-how between Sandia program people and visitors."

Ichiro is the second Toshiba scientist to take part in a long-term research program with Sandia. The first was Kazuo Saito, who arrived four years ago accompanying a laboratory pulse combustor (actually a mock-up of a unit used on a commercially available water heater) contributed by Toshiba to the CRF.

DOE's Energy Conversion and Utilization Technologies (ECUT) program supports pulsed combustion research within its combustion technology program. "Studying efficient and clean utilization of alternative fuels in pulse combustor applications meets many of the ECUT program goals," says Jay Keller of Combustion Applications Div. 8362. "So, after Kazuo's two-year visit ended in 1986, we invited Ichiro to come over and work with our laser diagnostics systems — systems that allow us to study the fundamental processes of pulsed combustion.

"We view this ongoing exchange as a great opportunity to accelerate our research in pulsed combustion," Jay continues. "Toshiba provided an operating pulse combustor, and we share our diagnostic techniques."

### Good Opportunity for Fundamental Work

Sandia researchers first simplified the original Toshiba unit to convert it into a laboratory research combustor. With Ichiro's background in heat transfer, he has used the combustor along with Sandia's laser diagnostics, computer, and data acquisition systems to study the problems connected with pulsed combustion.

"I find it a wonderful opportunity to share in the fundamental work possible with Sandia's lasers and computers," says Ichiro. His work has focused on basic heat release and pressure fluctuation mechanisms. He has also studied heat flux in the combustor's tail pipe, and, with Jay, has performed NO<sub>x</sub> formation studies.

As a part of the long-term exchange between Toshiba and Sandia, Jay spent three months in Japan two years ago. "We view the ongoing relationship as a very healthy exchange," says Jay. "Pulsed combustion offers great potential for improved energy efficiency, low emissions, alternative fuel utilization, and compact packaging [see "Pulse Combustor"]."

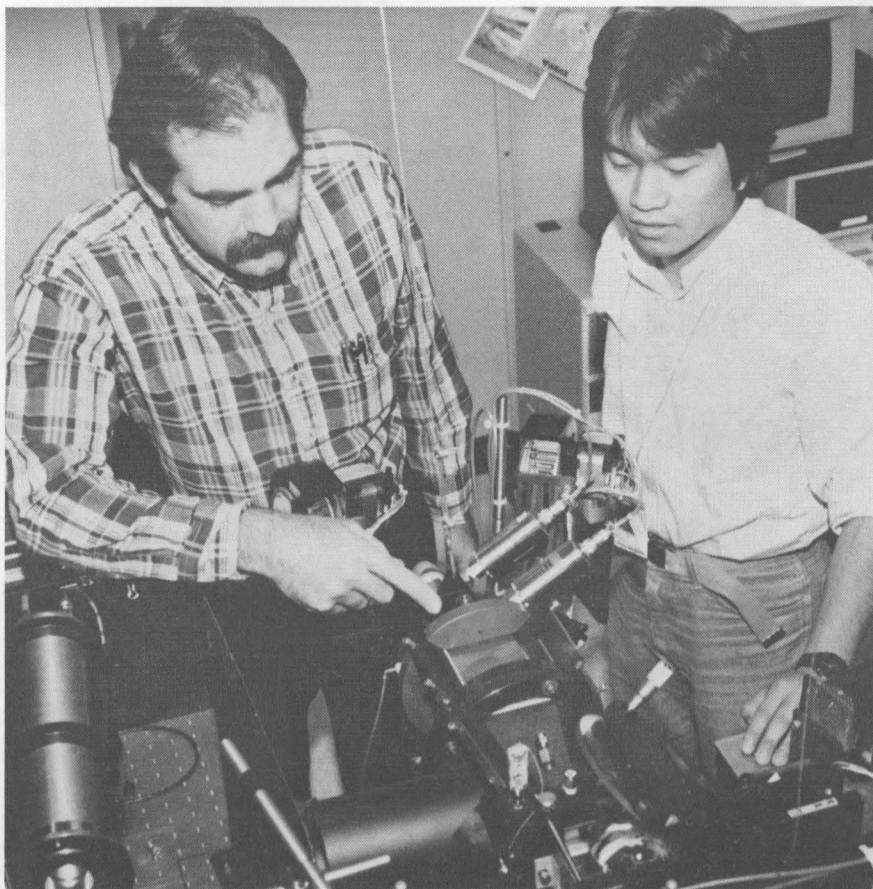
"Our interaction with Toshiba provided the initial impetus for us to pursue this technology," Jay continues. "It has now developed into a strong effort that improves US industry's ability to compete in the international marketplace. It's an excellent example, from both Sandia's and Toshiba's perspective, of 'giving some — receiving a lot.'"

### Bypassing Trial-and-Error Approach

"Our research is designed to provide a better fundamental understanding of the processes that control the pulse combustor," Jay adds. "That understanding will allow manufacturers to build a second- or third-generation system without having to go through trial-and-error procedures — which is how current systems are designed."

The Japanese use this technology in many applications — water heaters, home heaters, even deep-fat fryers. In the US, Lennox Industries has commercialized the same technique and has been working with Sandia to capitalize on the pulsed combustion concept for more fuel-efficient heaters.

"The Toshiba-Sandia exchange is one of the best examples of our *quid pro quo* policy of interacting with international industries," says Peter Mat-



LABORATORY PULSE COMBUSTOR in the CRF is focus of the attention — and the studies — of Jay Keller (8362, left) and Ichiro Hongo, visiting scientist from Toshiba Corp. in Japan.



# SANDIA LIVERMORE NEWS

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tern, Director of Combustion and Applied Research 8300. "In this case, Toshiba provided the commercial pulse combustor and we supplied the laser diagnostics. By working together, we both learned a lot about the performance of this kind of burner. As a result, Sandia has developed next-generation computer models that have already directly benefited US industry."

Ichiro is finishing a report — "I'm struggling to do it in English," he says — that focuses on improving the laser diagnostic measurements used in the pulse combustor. Co-authoring the paper are John Dec (a visiting scientist from the University of

Michigan) and Jay. Another paper, recently completed by Ichiro and Jay, deals with their research on the formation of NO<sub>x</sub> pollutant emissions from the combustor, a phenomenon that has not been well defined until now. This paper has been submitted to the 22nd International Symposium on Combustion.

Before Ichiro and his wife Yoko leave for home at the end of February, they will travel to several other states and Canada to meet with other combustion scientists — including those at Kansas University, Georgia Tech, the American Gas Association Laboratory in Cleveland, and the University of Calgary.

### 200-Year-Old Concept

## Pulse Combustor: How It Works

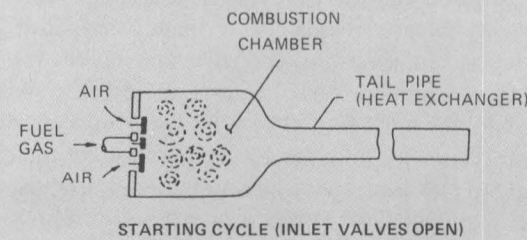
The pulsed (or acoustic-augmented) combustion process was first discovered in 1777 by a Dr. Bryan Higgins of Great Britain. His device was nothing more than a tube with a Bunsen burner inserted in the tube. The flame from the burner set up an acoustic field, and the device began to "sing"; that is, the acoustic wave bouncing around in the tube created a pure tone not unlike one produced by a tuning fork.

The first known patent on the process was obtained by the French in 1906. Similar technology was used by the Germans in World War II to propel V-1 buzz bombs. Today the process has been refined and is used in propane and natural gas heating systems to produce more heat per unit of fuel than in non-pulse combustors.

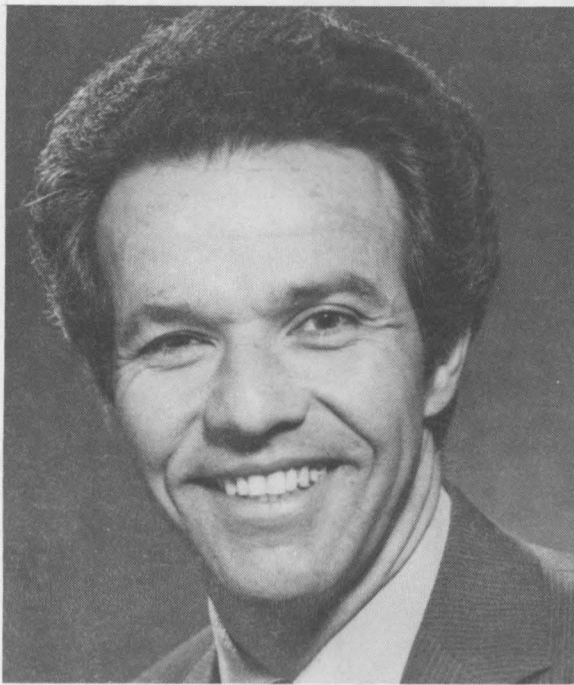
In operation, pulses of acoustic energy, generated by repeatedly igniting a fuel-air mixture, enhance the heat transfer. Each pulse, or wave, races to the far end of the combustion chamber and is reflected in sequence. Pulse combustors are inherently efficient, inherently low in pollutant formation, compact, and noisy. Sandia's studies are designed to provide a better understanding of pulsed combustors so that their

strengths can be scientifically optimized and their weaknesses reduced.

Sandia's laboratory combustor is operated in a premixed (air and fuel) mode, so it needs only one valve. (Most units are not premixed, so they have one valve for fuel and one for air.) When combustion raises the pressure in the chamber, the valve closes, and expanding gases push the exhaust gases out the tail pipe (see sketch). Soon thereafter, the pressure in the combustion chamber drops below the supply-line pressure, and the valve opens. A new charge of fuel then spurts in and is ignited, and the combustion process starts over again. The lab combustor is configured to operate at 83 Hertz; that is, it pulses 83 times per second.







SAMUEL ROLL

### Community Focus

## Adolescents: Why No One Should Ever Have One or Be One



“Why are kids in such a hurry to grow up?” says one parent. “Why can’t I stay out as late as I want?” says a teenager. “Who am I?” says

another. “Why don’t you listen to me?” say both parent and teenager.

Adolescence can be a hard time for parents and youths. What are adolescents trying to tell parents, and why do the doors of communication between them slam shut?

Samuel Roll, professor of psychology and psychiatry at UNM is the next speaker in the Community Focus series at the Technology Transfer Center (Bldg. 825) on Feb. 11 at noon. In his speech, “Adolescents: Why No One Should Ever Have One or Be One,” he will discuss how to identify what’s going on with an adolescent and how it affects the family.

### Crisis of Adolescence

“In industrialized societies there is a relatively long period of time between the physical ability to have children and the psychological and economic ability to care adequately for them,” says Roll. “That period of time is adolescence, and it is accompanied by a number of issues that adolescents and their families must face. These issues in turn often become crises for both the adolescents and for their families. The issues can be summarized as those involving orientation in time, degree of self-certainty, sexuality, ideology, and work.”

Roll received his PhD in psychology from Pennsylvania State University and did clinical postdoctoral work at Yale, where he supervised those who provide intensive psychotherapy to hospitalized schizophrenic adolescents. He joined UNM’s Psychiatry Dept. in 1970. He is currently consultant to the Instituto de Salud Mental de Nueva Leon in Monterrey, Mexico; the Navajo Nation Dept. of Justice and Dept. of Social Services; the Office of the District Attorney; the Office of the Public Defender; the Albuquerque Child Guidance Center; and the Albuquerque Public Schools. He is an expert in forensic psychology, civil and criminal.

His major fields of interest include general clinical psychology, developmental psychology with emphasis on cognitive development, and cross-cultural psychology. He’s the author of more than 50 publications and papers.



BEFORE AND AFTER — T. J. Williams (2361, right) holds a breadboard of the principal electronic modules and safety switches for the B83 firing set. Barney Barnette (2363) holds an encapsulated version of the same components, some of which are shown in the packaging cell at the bottom of the cylinder. Packaging ensures proper placement of components and protects them from severe or abnormal environments.

(Continued from Page One)

## PAB

were packaged,” says T. J.

The PAB’s specific goals back then were to investigate mechanical and electrical failure modes of individual components in an encapsulated unit, and to develop techniques to calculate stress vulnerability in electronic packages. As word spread about its work, the Board soon was asked to take a look at many other weapon subsystems, and to take on problems related to packaging in general.

“In the early 80s, though,” says T. J., “many PAB members moved on to new responsibilities, and Board activities were significantly reduced.”

The PAB, however, experienced a rebirth in early 1986 when Trident program manager Dan Hardin (5150) requested that the Board review packaging of the Mk5 MC3810 AF&F (arming, fuzing, and firing) system. Paul Longmire (2360), who had also received similar requests from others at Sandia and at Bendix (Kansas City), reactivated the group and appointed new members, many of whom are still on the Board.

Besides its work on the Mk5, the PAB — since its revival — has also reviewed the telemetry package for an earth penetrator, and the firing set package for the W82 artillery shell (the latter at the request of SNLL designers).

Collectively, PAB members represent a long corporate memory, and they’re hoping to extend that

memory by documenting some of the group’s experimental study programs. “We’d like to give people a list of do’s and don’ts for specific electronic packages we’ve worked on,” says T. J. “Mainly, we’d like to help people avoid some of the pitfalls that we’ve seen. So we’ll be publishing the results of some of our work.”

(The Board is considering the possibility of developing an expert system on packaging in the future, after the group has a couple more years of experience under its belt.)

The PAB’s primary task of reviewing specific weapon component packaging designs has three purposes:

- To identify potential problem areas, so they can be studied and resolved before a weapon goes into production;
- To identify areas in which information is lacking, especially where problems are common to multiple components; and
- To identify new packaging concepts.

“We like to channel our efforts toward problems whose solutions will clearly advance the understanding of packaging,” says T. J. “On the other hand, if we’re asked for help on something, and an answer already exists, we’ll steer the requester in the right direction.”

PAB subgroups work on individual problems, depending on the areas of expertise required. And, when the problem occurs in a weapon that’s near production, T. J. says, “We’re ready to jump right in; we move very rapidly!” ●PW

## PAB Members Represent Many Technical Areas

Technical expertise in a number of fields is available, on request, from members of Sandia’s Packaging Advisory Board.

If you think you could use some help from PAB on a packaging problem, contact either of the co-chairmen: T. J. Williams (2361) or Barney Barnette (2363). They’ll get you in touch with one or more PAB members, who include: Mike Lucas (7472), PAB secretary; Dave Larson (1513), heat transfer; Steve Burchett (1521), stress analysis; John Curro (1813), polymers; Wendell

Jones (1832), metallurgy; John Sayre (7472), organic materials; Ken Wischmann (DMTS, 7472), encapsulants; Gerald Cessac (7476), packaging; Robert Martinez (7472), adhesives and bonding; Robert Sowell (1831), cleaning; Bob Sanders (Bendix), materials; Al Gordon (Bendix), packaging of microcircuits; and Ron Baxter (Bendix), packaging of firing sets.

(You may wish to clip and save this list for ready reference.)





YUCCA MOUNTAIN straddles the southwest boundary of the Nevada Test Site, which is about 100 miles northwest of Las Vegas. The area is composed of a series of long, narrow ridges (several miles long and up to one mile wide) that stand 1000 to 1200 feet above the surrounding desert floor. More than 30 geologic and hydrologic exploratory drill holes, which produced some 50,000 feet of core samples, have been drilled into the mountain. One of the drill rigs is shown in the lower left.

**(Continued from Page One)**

## Yucca Mountain

underground openings would be excavated by the kind of machines used to bore tunnels for highways and subways; others would be dug out by commercial mining equipment. The array of drifts and chambers needed for the 70,000 tons would cover some 1400 acres (about 2.2 sq. miles).

"Obviously, we won't use the entire mountain," says Tom. "The storage area has to be at least 200 m [630 ft.] below the surface and yet remain in Yucca Mountain's unique 'unsaturated zone' — that is, well above the water table, which generally lies 1600 to 2500 feet below the ground surface and about 600 to 1400 feet below the repository level. Ideally, we'd like to confine the facility to one central region within the mountain, which is bounded by major fault lines."

Another constraint is that the waste must be retrievable — "in case we're wrong about Yucca Mountain's suitability as a permanent disposal site," adds Tom. "That means the design is tougher — we can't plan to decommission the repository when all the waste is emplaced. Rather we must maintain the ability to retrieve the waste until the time of permanent closure — about 50 years after the start of emplacement.

"And we have to worry about the heat generated," Tom continues. Each ton of waste produces only about 1 kW of thermal power at emplacement. (A kilowatt is equal to the power consumed by ten 100-watt light bulbs, less than a toaster.) But the total heat produced by 70,000 tons is considerable over the thousands of years necessary for effective isolation of the waste. And the need for retrievability means the repository would have to have stable chambers, controllable temperatures, and ventilation systems; the design criteria for chamber temperature is 50° C (about 120° F) after 50 years of operation.

The wastes the repository is designed to contain are "high-level," so they're hot radioactively too — a half-ton fuel rod assembly produces 20,000 rem ("roentgen equivalent man") per hour at its surface (approximately 500 rem is a lethal dose). That means special precautions in both handling and storing it. "Remote handling is required, and robotic handling within the surface facilities is a likely possibility," notes Tom. It also means concern for the long term — the waste containment packages, for example, must have a 300- to 1000-year lifetime in the Yucca Mountain environment.

### The Years Ahead

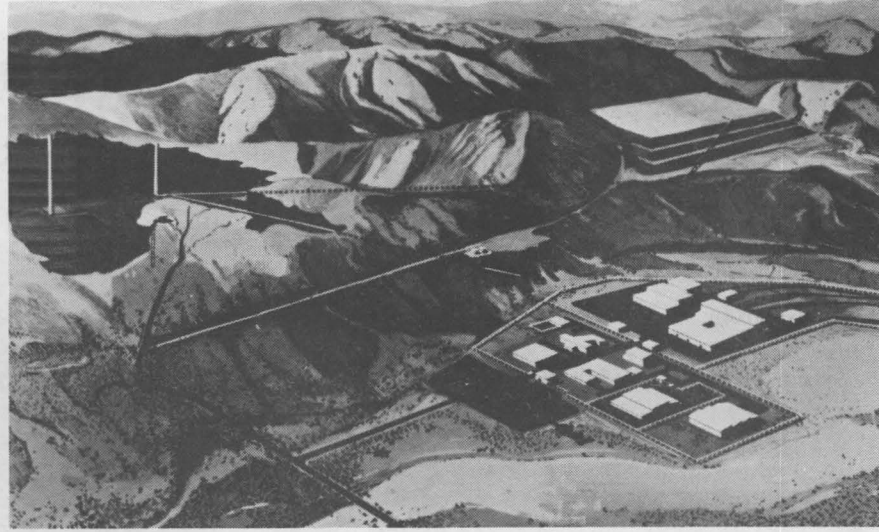
"Collectively, we've come a long way in defining Yucca Mountain's characteristics in terms of a waste storage site," says Joe Tillerson (6314). "The two reports specify what we know of the site today, what we have to learn in the future, and how we're going to use the data that we'll get in the future."

Geologic and hydrologic data from the site will be obtained primarily by the USGS. LANL is

directing the effort to evaluate the geochemical properties of the disposal medium, the tuff.

"Sandia will use all of those data to design facilities for the site and to do the performance assessment needed to determine whether the site is suitable for a repository," adds Al Stevens (6311).

"Among the many things that the project will evaluate in the future, there are three major ones," concludes Tom. "One is to fully understand the nature of the unsaturated zone that appears so attractive as a waste storage medium. Another is to continue to explore Yucca Mountain's seismicity, its potential for earthquakes. We can design a facility to survive ground motion, but we don't want to overdesign. Finally, we have to be sure that the repository is compatible with the Nevada Test Site and with the Air Force — Yucca Mountain lies partially inside NTS and partially on land controlled by the Air Force."



ARTIST'S CONCEPT of a nuclear waste repository at Yucca Mountain — The surface facilities (foreground) would be located at the base of the mountain so that waste containers could be moved into the underground disposal area (left) through ramps rather than vertical shafts. (The terraced layers that resemble an unfinished Inca pyramid in upper right represent the materials removed from the waste disposal area.) If there are no unexpected delays, a waste repository would be in operation by 2003.

Sandia has estimated the cost to construct a Yucca Mountain repository at about \$1.4 billion. It will cost another \$5.2 billion to operate it over the 80 years it will take to fill and then decommission it. The funds would come from the 1 mil/kW-hr tax collected by the utilities from consumers of nuclear-generated power.

In addition to the Dept. 6310 people, about 20 other Sandians from Depts. 1410, 1510, 1520, 2850, 6230 (was 1540), 7110, 7120, 7130, and 7220 have worked on the project. Carl Mora (3151) provided editorial support for the project reports at Sandia. Hugh MacDougall (6311) was Sandia project leader for the CDR; Al Stevens led the SCP task.

"It took good teamwork by many people here at Sandia and in other organizations to develop these two reports," concludes Tom. "They've all worked diligently over the last few years. Even though we can't name them all here, they deserve the credit." ●BH

### The Political Background

## Waste Repositories: Long History, Longer Future

Back in 1982, after years of debate over nuclear waste disposal, Congress passed the Nuclear Waste Policy Act. It mandated DOE to develop two repositories for permanent (albeit retrievable) disposal of high-level wastes, the kind exemplified by spent fuel rods from commercial nuclear power reactors and by waste from defense program activities.

"At the time of that act, Congress apparently envisioned one waste repository from the sites the DOE was investigating, primarily in the West and the south central US," says Tom Hunter (6310). (A second repository program would subsequently investigate sites in the Midwest and the East, where most of the reactors are located.) "Sandia has been helping to define the characteristics of one of those potential 'first repository' sites, Yucca Mountain."

In 1983 nine sites for the first repository were identified in six states — Louisiana, Mississippi, Nevada, Texas, Utah, and Washington. Then, in May 1986, the President narrowed the list of sites to be further characterized to three — Deaf Smith County in the Texas Panhandle, the Hanford site in Washington State, and Yucca Mountain in Nevada Test Site. Site characterization work has been concentrated in those three locations since then.

In a surprise cost-reduction move during Christmas week 1987, Congress decided to speed up the site-selection process by naming Yucca Mountain as the sole site for formal site characterization.

The issuance of the "consultation draft" version of the Site Characterization Plan (see

"NNWSI Milestone" story) is just one important milestone. If Yucca Mountain continues to bear up well under future scrutiny, the DOE will formally propose it as a repository site about 1995. If that proposal is accepted by the President and supported by the Congress, then a license application would be submitted to the Nuclear Regulatory Commission, which has the same responsibility to license nuclear waste disposal sites that it has to license nuclear power reactors. The NRC would verify that certain basic questions — is the site suitable? are the proposed facilities capable of performing the necessary functions? — are answered positively.

If the NRC is satisfied, it would issue a construction authorization license around 1998. Construction would begin, and, in the year 2003, the site would become operational — ready to accept the tons of nuclear waste that have been stored (generally on power reactor sites) since the nuclear power era began in the early 1950s.

"If that schedule is achieved, the nation's search for a final closure to the nuclear fuel cycle will essentially be realized," says Tom. "The search began in the late 60s, so it will have taken almost four decades — about the same length of time that Sandia has existed at this point. Although individual projects of this duration are unique at Sandia, we have made significant contributions to the nation's nuclear waste disposal program, beginning with our support for the WIPP project and nuclear waste transportation in the mid-70s and continuing with our support for the evaluation of the Yucca Mountain site."



# Railroading Mexico's Sierra Madre

By John Shunny (ret.)

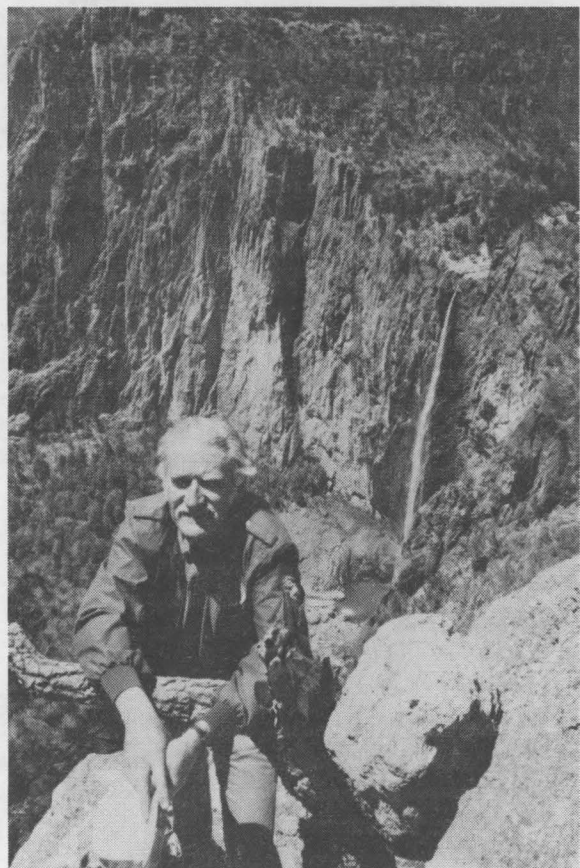
The stream meanders along the edge of the village of Cerocahui. Willow trees overhang the water, and the women wash their clothes on the stream bank. I felt we'd been transported a hundred or so years back into a French romantic painting. I assayed some Spanish from my out-of-hours course: "Lavar las ropas aqui es un poco duro." (Washing clothes here is rather hard.) One of the women replied, a little dryly, that washing clothes anywhere was hard.

Located deep in Mexico's Sierra Madre Occidental, Cerocahui was perhaps my favorite stop in ten days of railroading from Chihuahua in central Mexico across the mountains to Los Mochis, a few miles from the coast and the Sea of Cortes. For one thing, you don't get much more remote than Cerocahui, with a rail stop at Bahuichivo, a tiny lumber camp, followed by a jolting bus ride for an hour to the village. Cerocahui: lovely old church (original dates to 1681), home to a few hundred Mexicans, site of Holy Week festivities by Tarahumara Indians, kerosene lamps (hotel fires up generator for 7-11 p.m. electricity), elevation around 5000 feet, setting a spectacular river valley walled in by mountain ridges. There's even a respectable waterfall nearby.

If you are a fan of railroad travel, I submit that the rail trip from Chihuahua to Los Mochis, 404 miles, aboard the Ferrocarril Chihuahua al Pacifico, should be high on your list. To my knowledge, it hasn't appeared on PBS's *Great Railroad Journeys* series, but it should.

Consider its attributes: First, heading southwest from Chihuahua in the early morning, it crosses the piedmont of the Sierra Madre, climbing gradually, stopping at Cuauhtemoc (about which more later) and La Junta, elevation 6775 feet and a hundred miles into the journey. The scenery up to now is, if not remarkable, at least congenial. At La Junta the train turns more southerly and begins its serious climbing into San Juanito, at 8000 feet and 40 miles downtrack.

Then we're in Sierra Madre country, a high tableland, forested, with a complex system of deep canyons, the most well known of which is the Barranca del Cobre (Copper Canyon), inevitably compared with our Grand Canyon. It's not an apt comparison. The Grand has more sheer vertical, less depth, and a wider spectrum of color. The Barranca has steep but not sheer sides, a breathtaking depth whose full reach can be seen from a number of overlooks, and it is covered with trees and other flora. The Grand is austere, even forbidding, while the Bar-



THE AUTHOR, John Shunny (ret.), takes a break. Behind him is Basaseachic Falls; at 1000 feet, it's the second longest single-drop fall in the world, according to the locals.



SOME SPECTACULAR VIEWS of the Barranca del Cobre, often called Mexico's Grand Canyon, mark the 404-mile rail journey from Chihuahua to Los Mochis via the Ferrocarril Chihuahua al Pacifico. This view is from an overlook called Cerro del Gallego.

ranca supports life — it's where the Tarahumara Indians live.

## No Place for a Railroad

From San Juanito on the eastern slope across the Sierra Madre to the bottom of the range's western slope is 120 rail miles. Those miles include 86 tunnels and 37 bridges, and ascents and descents through incredibly rugged terrain. It's no place for a railroad (as the litter of wrecks along the way affirm), and one sees why it took more than 90 years to complete. At one point near Temoris Station, three levels of railroad track can be seen on the steep slopes.

Finally, once clear of the mountains, the train runs west another 110 miles to its final destination, Los Mochis.

If you ride this train from start to finish, it takes 12 to 14 hours. Thus it's possible to take the train west one day, stay overnight in Los Mochis, and catch the 6 a.m. train east the following day to return to Chihuahua. You will have had your fill of train riding. We elected a more leisurely schedule with layovers of a day or two at a number of locales, including Cerocahui. I'll describe those of more than routine interest:

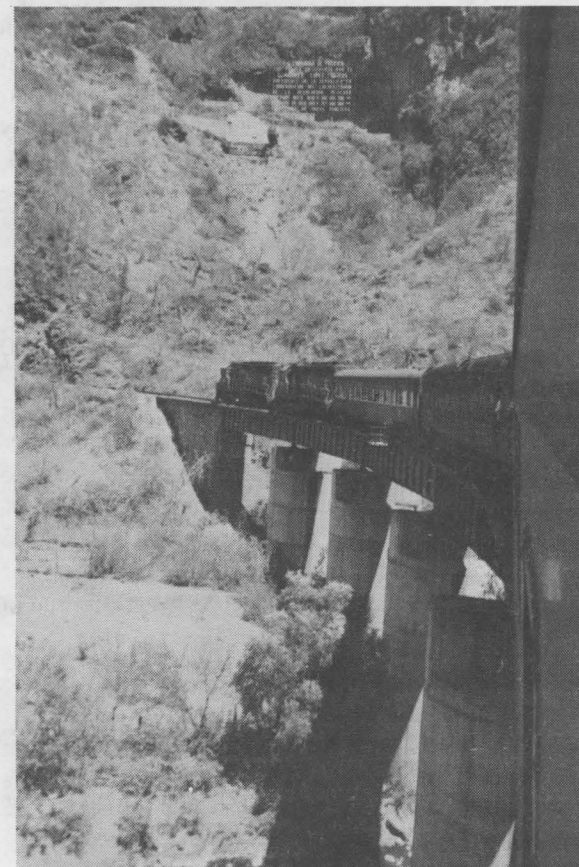
**Cuauhtemoc.** Named after the nephew of Moctezuma, Cuauhtemoc is city-size with city amenities. Just a few miles north, we visited an extraordinary community of German-speaking Mennonites who moved into the area from Canada in 1921. They are prosperous farmers. Their enclave, rigidly aloof from surrounding Mexico, might have been set there by alien spaceships. Also out of Cuauhtemoc, we bussed a hard nine hours (total) to Basaseachic Falls, with a free fall of 1000 feet, the second highest single-drop fall in the world. The bus ride included one flat tire.

**Divisadero/Posada Barrancas.** Tremendous vistas here on the rim of the Barranca del Cobre. We were able to walk down to an Indian's home (at his

urging) under an overhanging cliff where his wife and children make and sell baskets. I bought a big one — 4000 pesos, then about \$3.50. Gazing from the rim, one can pick out small plots of cultivated land, terraced into the precipitous slopes, where the Indians grow maize.

**El Fuerte.** This old colonial town, close to the

(Continued on Next Page)



SANTA BARBARA BRIDGE over Rio Mina Plata leads into Temoris. Three levels of railroad track are sometimes visible on the slopes of the canyon.



# Sierra Madre

western end of the line, has more of the flavor of old Mexico than Chihuahua or Los Mochis, both modern cities. The Posada del Hidalgo where we stayed was once a residence; it's built along classic lines with an interior courtyard and luxuriant tropical plants. The swimming pool was appreciated. And the nearby restaurant, Anita's, served up the best meal of the trip: pulpo a la Veracruzana (octopus and a great sauce).

*Topolobampo.* A squat little village with a name that deserves a song, Topolobampo and its bay open onto the Sea of Cortes, where we boated some 30 miles to Farallon Island, a thrusting rock made white by guano; zillions of birds and sea lions and some pretty fair snorkeling in the warm water. Topolobampo features a world-class bay, third deepest in the world, and could be a major seaport. Given the present Mexican economy, that's not likely to occur for a while.

Logistics — Although not keen on tours, I took this one (Adobe Tours) because it seemed a good way to explore a, for me, *terra incognita*. All Mexican travel arrangements are long on the uncertainty principle, and the experience of the tour leader in the occasional scramble for places — rail, bus, and hotel — was invaluable. Cost (at the time I took the trip last Easter, and based on a double) was \$639 each for the ten-day excursion; the cost includes about half the meals.

Current costs range from \$550 (per person, double) for an 8-day trip to \$725 for a 10-day Easter



HOLY SATURDAY procession of Tarahumara Indians in the village of Cerocahui. Mission in background dates to 1681.

week trip.

PS. If the place names — Cerocahui, Bahuchivo, Chihuahua, Topolobampo, Cuauhtemoc — leave you tongue-tied, don't blame it on your halt-

ing Spanish. These are Indian names. A number of the tribes of northern Mexico, including the Tarahumara and Seri, remain unreconstructed, preferring to pursue their traditional ways.

## The Health Care Cost Conundrum: #1

# Health Care: Increasingly Necessary, Increasingly Expensive

By B. J. Jones (3545)



When we hear the word "compensation," we usually think only of our paychecks. But there's another form of compensation we all should be more aware of — benefits — because one of those benefits threatens to throw our whole compensation package out of balance.

First, what do we mean by "benefits"? The term includes everything Sandia provides beyond salary and wages: pension and death benefits; contributions to the savings plans; medical, dental, vision, group life, and other insurance-type coverages; and Sandia's share of Social Security taxes. Of course, there are other benefits included in salary and wages, such as vacations, holidays, and other paid absences.

In the next few months, I'm going to concentrate on one of those benefits — the Medical Care Plan and how its rising costs affect all of us — in some LAB NEWS articles.

First, however, let's look at "why offer a benefits package at all?"

Major employers — like Sandia and AT&T — see a need to protect employees and their families from financial hardships caused by serious illnesses, disabling injuries, or death. It's unlikely that employees buying coverage on their own could afford the level of protection they receive from the Sandia benefits package.

### Good Benefits Mean Good Employees

Good benefits help to attract and retain good employees. So, to ensure that its benefits remain competitive, Sandia periodically compares its programs with those offered by other companies. Its surveys have consistently shown that Sandia's total benefits package ranks high when compared with those provided by other R&D and industrial companies.

Clearly, there are solid reasons for companies to provide benefits. But doing so can be surpris-

ingly costly. Consider this — Sandia spent more than \$48 million on pension, savings, life insurance, and health care plans in FY87.

In the same way that other costs associated with doing business are being explored, we are scrutinizing the costs of the benefits we offer; we're continually looking for better ways to keep all our costs under control.

But we're particularly concerned about one segment of the benefits package where costs are rising rapidly — medical benefits provided by our Medical Care Plan. Statistics tell the story best. From 1981 to 1986, the cost of medical benefits per employee rose at an average rate of 14 percent per year, more than four times faster than the average inflation rate for that period. Medical inflation (that component of general inflation attributable to medical care, services, and supplies) rose at an average annual rate of seven percent during the same period.

### \$26 Million for Medical Care

Medical expenses were nearly eight percent (as a percentage of gross payroll) in calendar year 1986, compared to less than five percent in 1980. In dollar figures, Sandia spent more than \$26 million last year on medical care benefits, and these costs are expected to rise eight to ten percent during 1988.

Those of us in the Benefits Department are not the only ones concerned. Sandia management is all too aware of the rising cost of medical benefits. Why? Because these costs come directly out of Sandia's budget, and *that's* because the Medical Care Plan is self-insured, which means that Sandia pays no premiums to an insurance company and takes the risk of funding any claims. Provident, our claims administrator, handles only the administrative function of paying the bills.

Sandia is not alone. The federal government, state legislatures, and hundreds of corporations are all trying to find ways to slow the increase. The reasons for the increase vary, but the primary reason is

the nature of the health care system, which — speaking generally — delivers treatment without regard to cost.

And *that's* because bills are most often paid by third parties, such as the federal government (through Medicare and Medicaid), an insurance company, or a private employer, like Sandia. So consumers — patients — pay a relatively small portion of their medical expenses out of their own pockets. With health insurance picking up most of the tab, patients are not encouraged to consider price when purchasing medical care. Another cause is that hospitals and physicians set their own charges, which are reimbursed within certain "reasonable and customary" limits (LAB NEWS, June 5, 1987).

Other factors are involved in the cost increase too — inflation, new technologies, the threat of malpractice suits (which drives doctors to recommend a high number of tests), increased use of medical facilities, and an aging population.

It really comes down to this: Unlike other markets, in which consumers determine their own needs, consumers of medical care have to rely on their doctors to decide what services to purchase. The health care system offers few incentives for hospitals, physicians, or patients to select the most appropriate treatment for the least cost.

Companies nationwide have begun to address the problem. It is clear that, for the sake of the employees and the company, Sandia must find ever more effective ways to control and manage medical costs.

The next article in this series will examine various approaches industry is using to control medical costs.

## Fun & Games

*Hockey* — Sandia has challenged LANL to a lab-vs-lab hockey match on Jan. 30 at 11 a.m. in Los Alamos. If you're ready for a face-off, contact Rich Carson (2531).



# Supervisory Appointments



JENNIE NEGIN (3140)

JENNIE NEGIN to manager of Technical Library Department 3140, effective Feb. 1.

Jennie joined the Labs in November 1975 as a staff member in the Personnel Data Systems Division, where she designed a computerized radiation exposure badge system. In 1977, she transferred to the Material Systems Division, where she worked on a nuclear materials control system. In 1980, she went to the Personnel Data Division to set up a personnel node on the Administrative Distributed Network. Jennie was promoted to supervisor of Systems and Appraisal Division 3411 in February 1986. In July 1987, she transferred to Assets and Procurement Division 2629.

She has a BS and MA in mathematics from the University of Florida. Before coming to Sandia, she worked in that university's computing center and in the computer directorate at LANL. She was a computer consultant to the UNM Law School and the Maxwell Museum of Anthropology.

Jennie is a member of the Association for Computing Machinery and the New Mexico Network for Women in Science and Engineering. She served as division chair for Architects and Engineers in this year's United Way campaign, and was named a 1987 YWCA Woman-on-the-Move.

In her spare time, Jennie enjoys skiing and aerobic dancing. She is active as a volunteer in several community groups.

Jennie has two children. She and her husband Harold Folley (4010) live in the NE Heights.

\* \* \*

DAVID WILLIAMS to supervisor of Optoelectronic Components Development Division 2531, effective Sept. 16.

David joined Sandia in August 1976 as a staff member of the Safeguards organization. In January 1979, he left Sandia and went to Washington, D.C. where he was Director of Research at the Bureau of Alcohol, Tobacco, and Firearms. David came back to Sandia in July 1981 and joined the Explosives Components Department. He was a member of the Optoelectronic Components Development Division when he was promoted.

He has a BS in physics from the University of California at Irvine, and an MS and a PhD in the same field from Cornell. He is a member of the American Physical Society. He is an adjunct professor in the Computer and Electrical Engineering Department at UNM.

David's spare-time activities include marathon and ultra-marathon running, long-distance bicycle touring and racing, skiing, and backpacking. David is also active in the Sunport Optimist Club of Albuquerque.

He and his wife Cecelia have two grown daughters and a grandson. They live in Sandia Heights.

\* \* \*

GERALD HAYS to supervisor of Laser and Plasma-Processing Sciences Division 1128, effective Dec. 16.



(FROM LEFT) DAVID WILLIAMS (2531), GERRY HAYS (1128), and RICHARD ROMERO (3716)

Gerry joined Sandia in March 1974 as a staff member in the laser research organization where he participated in new laser development for laser fusion. In 1980 he transferred to the Laser Physical Chemistry Division where he continued development work on new lasers. In 1982 he joined the High-Energy Beam Physics Division where he worked on laser guiding of electron beams. In 1983 Gerry returned to the Laser Physical Chemistry Division where his work included research on nuclear-reactor-pumped lasers and transient phenomena in high-power microwave breakdown of air.

He has a BS in physics from the University of California at Riverside and a PhD in plasma physics from the University of Minnesota. He is a member of the American Physical Society.

Gerry's spare-time activities include backpacking and reading. He is also active in Cub Scouts.

He has two sons and lives in the NE Heights.

\* \* \*

RICHARD ROMERO to supervisor of Purchasing Division 3716, effective Nov. 16.

Richard joined Sandia's Purchasing organization in March 1977 as a member of Contracts Division 3711. In 1979, he transferred to Purchasing Planning Division 3732. In 1981, he returned to Purchasing Department 3710 and worked in various contracts divisions.

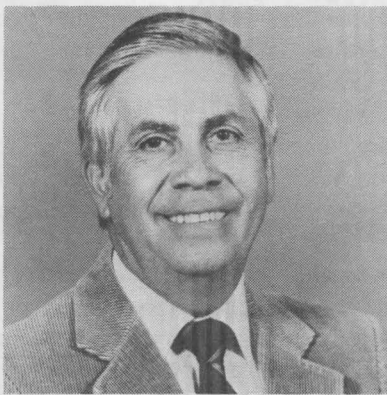
He has a BA in secondary education, an MA in English, and a JD (Juris Doctor) from UNM. He is a licensed attorney and is a member of the American Bar Assn. and the New Mexico Bar Assn.

Richard served as a Russian-language specialist with the US Air Force from 1962 to 1966.

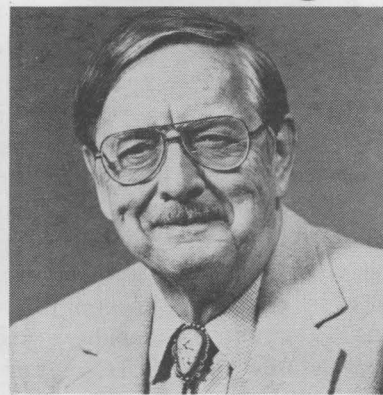
In his spare time he enjoys playing golf and tennis.

Richard and his wife Jane have one daughter and live in the NE Heights.

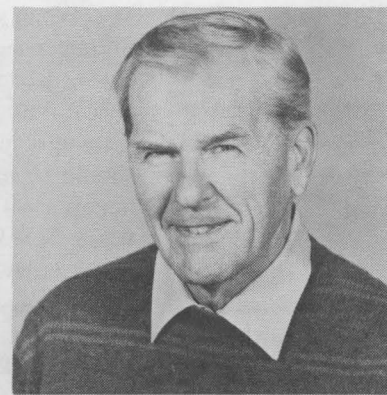
## Retiring



Jake DeVargas (3510) 32 yrs.



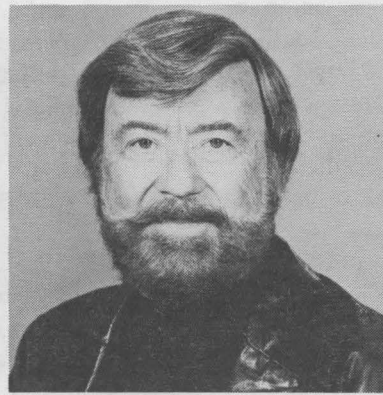
Jerome Durrie (5114) 38 yrs.



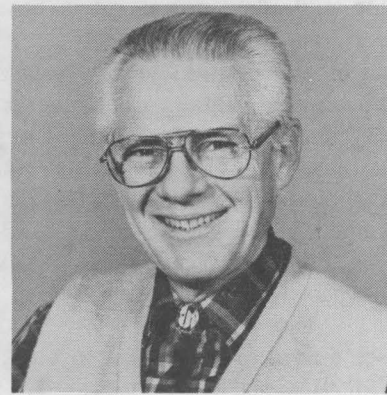
Charles Jennings (7413) 30 yrs.



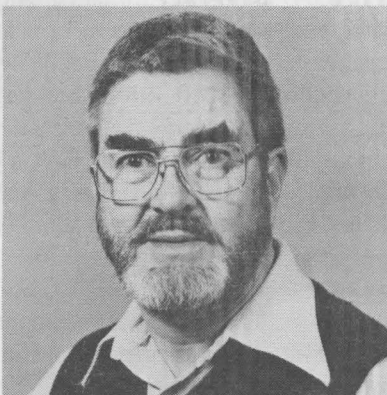
Robert Lowery (7261) 35 yrs.



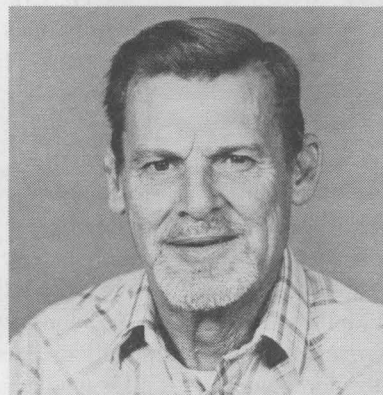
T. A. Allen (7484) 39 yrs.



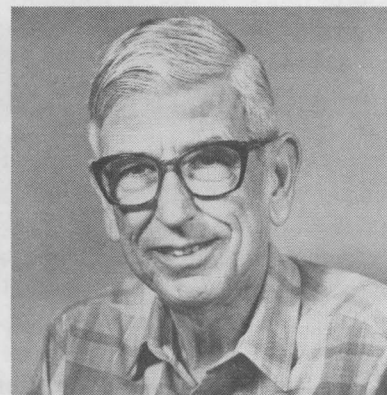
Roland Hewitt (7137) 30 yrs.



Richard Womelsduff (7241) 40 yrs.



Leonard Hitchcock (5152) 31 yrs.



Pierce Brown (5153) 35 yrs.





GOVERNOR GARREY CARRUTHERS, sporting a sling because of tendinitis problems, congratulates Joe Padilla (7485) on the award he received at the 1st annual Governor's Community Achievement Awards ceremony in Santa Fe recently; Kathy Carruthers looks on. Joe was recognized for his volunteer service as work projects coordinator for the Albuquerque Chapter of the N.M. Wildlife Federation — a job he's had for four years. He coordinates the activities of some 60 volunteers on wildlife-related projects — usually on Forest Service land. "We're always looking for more helpers," says Joe. Give him a call for more info on 831-2114.

### Medical Corner

## It's Gonna Be Great in 88! (... Or Is It?)

By Lynne Judge, Family Counselor  
Sandia Alcoholism Program

If you live with someone who drinks too much or uses drugs, you need to pay attention to what the situation is doing to you.

That's because people who live with alcoholics or drug addicts focus so much of their attention on the alcoholic/addict that they fail to see what is happening to themselves.

Here's a list of questions to help you check yourself out: Have you had an increase in health problems? Do you have allergies? Frequent colds? Chest colds? Flu? More tension headaches? Migraines? High blood pressure? Digestive problems? Ulcers? Back pain? Foot pain? Chest pain? Insomnia? Need more and more sleep? Exhaustion? Are you over-eating? Unable to eat?

How about your social life and extracurricular activities? Are you isolating yourself from family members and friends? Are you avoiding social situations? Are you staying away from church or clubs or groups? Have you given up hobbies or other creative activities?

What's going on at work? Are you too tired to function properly? Are you so preoccupied with worry and anxiety you can't concentrate? Are you cranky and irritable with supervisors and co-workers? Do you feel overwhelmed?

How are your finances? Are you short of cash because it's going for drugs and alcohol? Are there legal expenses due to problems caused by drugs and alcohol? Are you constantly repairing or replacing wrecked or damaged cars, furniture, appliances? Do you always seem to be doing without while your alcoholic/addict plays millionaire-of-the-day?

How are you doing emotionally? Are you dizzy from a merry-go-round of anger, fear, depression, worry, guilt, and emotional numbness? Do you compulsively use work, spending, dieting, exercise, politics, or religion as a means to escape painful situations at home?

As these questions suggest, people who are closely involved with alcoholics/addicts suffer too and can deteriorate physically, mentally, emotionally, and spiritually as rapidly as the addicts/alcoholics

themselves. Too often, you, as a "co-alcoholic/addict," believe that if only the addict/alcoholic would recover, your own life would automatically improve.

Not so! If you are closely involved with an addict/alcoholic, you can recover now! Even if your loved one doesn't. Conversely, your alcoholic/addict can get clean and sober, but unless you get help, your life will continue to deteriorate.

For more information on how to begin a program of life enhancement for you, whether or not your alcoholic/addict gets better, call me at 4-3993.



MOISES LUCERO (3426) brought home two trophies from the World of Wheels car show at the Convention Center last weekend. His '73 Corvette took Best in Class in the late-model domestic sports competition and Best Paint in class as well. It didn't always look so nice — last April vandals broke into his garage and did \$4000 worth of paint damage. "I've spent more than 100 hours restoring it since then," says Moises. Half a dozen other Sandians also entered their vehicles in the show, and several won trophies in various classes. "Next stop for me, my Vette, and my '79 Cadillac Seville Elegante is the national competition in Amarillo," adds Moises.

## feed n'iback

*Q. My recent eye exam cost me \$57.75, which is up a fair amount in the last few years. I noticed, however, when checking my Vision Care Plan benefits section that the fee that "Mutual" will pay has remained fixed at \$22 for four years. When the benefit becomes such a small fraction of the total cost involved, one has to ask if it isn't time to raise the coverage, say to about \$30/exam.*

*A. The policies and practices for employee benefits provided through Sandia are developed in accordance with the normal practices of AT&T Technologies and AT&T Bell Laboratories. Any changes made in Sandia's Vision Care Plan would reflect the policies of AT&T's program. Sandia's Plan was initiated, as was AT&T's Vision Care Plan, in 1983. This plan is provided at no fee to the employee to help with the cost of routine eye exams, prescription lenses, and frames. Previously, no benefits were payable for these types of expenses. The Vision Care Plan is only a part of Sandia's benefit package for employees. Along with the many other benefit programs provided by Sandia, it is continually evaluated to remain competitive both locally and nationally. A vision benefit is one of the less commonly provided benefits, according to a 1986 Group Benefits Survey conducted by a private company (24 percent of 1418 companies of varying sizes offered vision benefits) and a 1985 US Department of Labor survey (35 percent of 1325 companies with more than 100 employees offered vision benefits). AT&T has not changed the schedule of benefits for its Vision Care Plan, nor do we expect it to in the near future.*

Ralph Bonner - 3500

### Sympathy

To Susan Wayland (3723) on the death of her stepfather in Calif., Dec. 27.

To Kay Worth (6512) on the death of her sister in Hastings, Nebr., Jan. 3.

To Jerry Freedman (6322) on the death of his father in Albuquerque, Jan. 10.

To Bob (9112) and Susan (3723) Wayland on the death of his father and her father-in-law in Texas, Jan. 11.



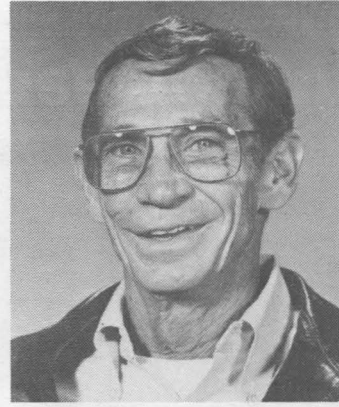
# MILEPOSTS

## LAB NEWS

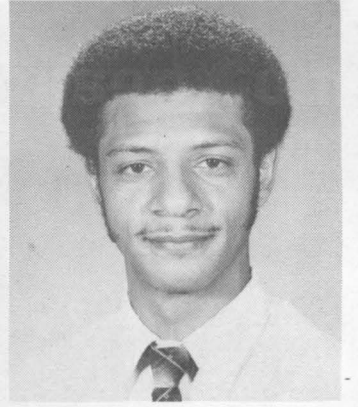
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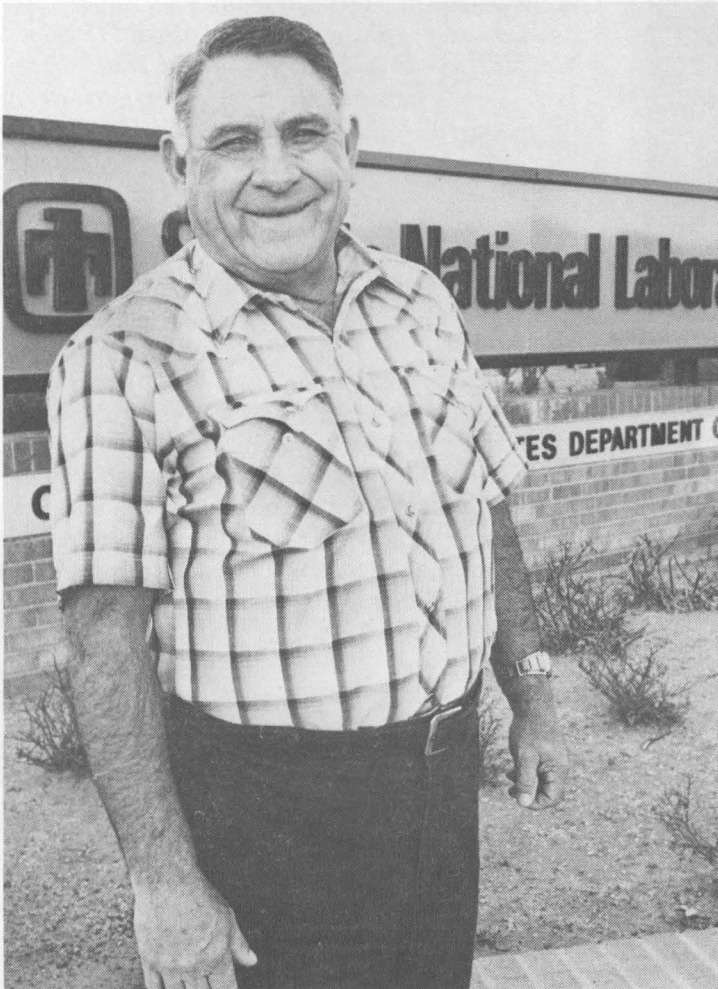
Charles Lowe (7243) 30



James Gearhart (5127) 15

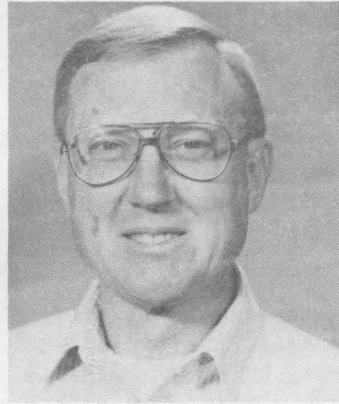


Larry Stevenson (5123) 10

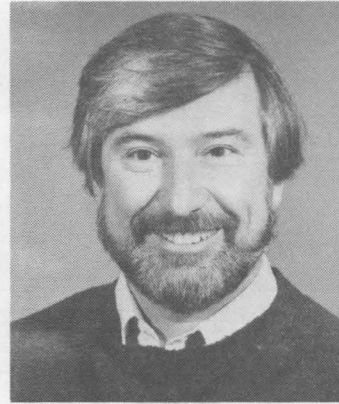


John Lowery (3426)

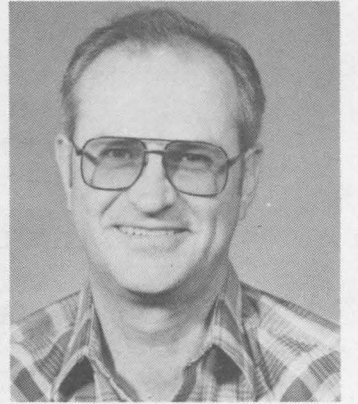
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Dan Aeschliman (1554) 20



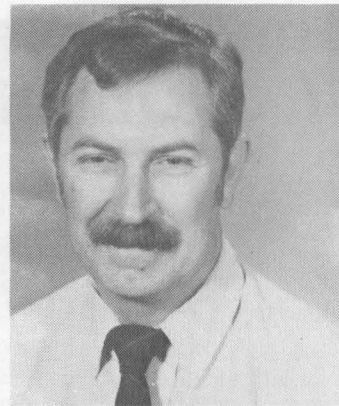
Gene Neau (1252) 25



Robert Simpson (2117) 25



Robert Chavez (7818) 25



Arthur Verardo (2313) 10



Virginia Padilla (7251) 20



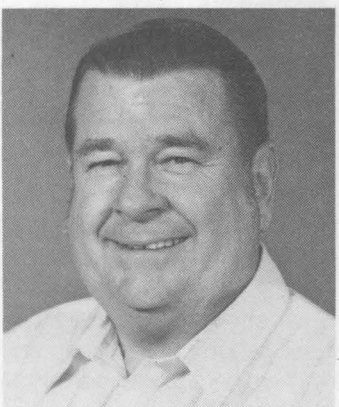
Dean Davis (6400) 30



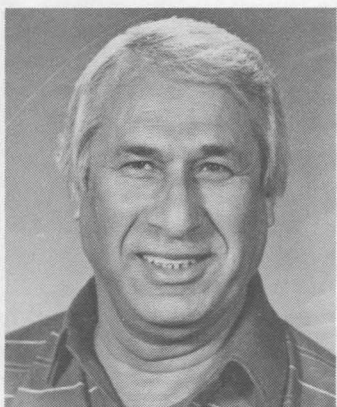
Russell Maxwell (DMTS, 5248) 35



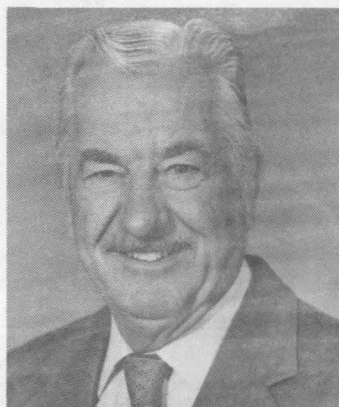
Vernon Easley (7830) 30



Ernest Sanders (5234) 30



Joe Costales (3413) 35



Kenneth Edwards (5122) 35



Gary Montague (3316)

25





LEE BRAY (30, left) recently presented a Disadvantaged Business Award from DOE to Jon Bedingfield, supervisor of Supplier Relations and Purchasing Information Division 3731. The award, signed by DOE Secretary John Herrington, recognizes Sandia's "superior performance and meritorious support of the disadvantaged business program" in FY86.

## "Eat Right" Lectures at Pres

A series of free lectures on nutrition, presented by members of the NM Association of Registered Dietitians, is set for Tuesday evenings beginning Jan. 19. Each lecture is presented at 5:30 and again at 7 p.m. at Savage Auditorium, Presbyterian Hospital (1100 Central SE).

Feb. 2	Sensible Sweets
Feb. 9	Fill Up, Not Out
Feb. 16	Great Grains
Feb. 23	Plenty of Produce
March 1	The Protein Picture
March 8	Capitalize on Calcium
March 15	Beyond the Basics
March 22	Food vs. Pills

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#### Ad Rules

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

#### MISCELLANEOUS

COFFEE BEAN ROASTER, electric, w/coffee beans, new in unopened box, 1-yr. warranty, \$70 value, sell for \$35. Wilson, 344-5373.

SEARS 19" COLOR TV, needs \$6 capacitor for improved vertical linearity, \$30. Auerbach, 296-1489.

ANTIQUA SEWING MACHINE, White Rotary, treadle-operated, 65 yrs. old, attachments, original cabinet (weathered), \$45. Schkade, 292-5126.

COMMODORE C64 COMPUTER 1541, disk drive, NEC color monitor, \$350. Shepherd, 299-9066 after 5.

BABY CRADLE AND STAND, solid pine, wood sealer, ready to stain, \$150. Romero, 281-9423 evenings.

ZENITH COLOR TV, 17", remote control, w/stand, 11 yrs. old, \$90. Barr, 821-5870.

STUDIO PIANO, Kohler & Campbell, oak finish, 10 yrs. old, w/bench, \$1500. Smith, 275-0919.

BABY CRADLE w/mattress, \$40; outdoor baby swing, \$8; stroller, \$6; girl's clothes, sizes 2 & 3; 2 Executive lifetime memberships at Cosmopolitan Spa, male or female, \$300/ea. Davis, 298-5868.

EIGHT SURPLUS POWDER CANS, sealed, painted, \$5/ea. Bland, 265-6286.

MOTOR'S AUTO REPAIR MANUAL; electric dipstick heater, \$3.50; '60 Ford 1/2-ton pickup, for parts, \$35. Padilla, 877-2116.

MOSSBERG .22-cal. semi-auto rifle, Weaver scope, walnut stock, tube mag., \$50. Mooney, 281-2612.

AMEREC 610 ROWING MACHINE, \$175 OBO. McCormack, 296-3936.

POLICE SCANNER, Realistic PRO-2001, keyboard entry, bands: 144-174, 30-50, 450-512 MHz, \$150. Kirkland, 299-3461.

KOHLER CAST-IRON DOUBLE SINK, almond, w/garbage disposal, \$85.

Beeler, 822-9485.

HAMMOND ORGAN, model J111, 2 keyboards, bass pedals, cherry-wood finish, \$475. Hole, 255-1444.

FLAT-BED TRAILER, 96" long, 93" wide, 24" sides, 16x750 tires, \$500. Rainhart, 869-2517.

TWO WOODEN BARRELS, \$20/ea.; 3 exterior wooden doors, \$5/ea.; 2 Marchant rotary calculators, \$5/ea. Mozley, 884-3453 leave message.

DINETTE TABLE, yellow, two 10" self-storing extensions, 4 chairs w/Naugahyde seats, \$150; DP Body Builder rowing machine, \$30. Krahl, 268-8126.

STEREO AMPLIFIER, Dynaco SCA35, and pair of speakers, \$35. Caskey, 294-3218.

RATTAN DESK/DRESSING TABLE, 3 drawers across top, cost \$350, sell for \$95. Hines, 821-8592.

WOOL DRESS, Yves St. Laurent, black and white, never worn, jr. size 12-14; Gunnie Sachs flannel dress, same size. Wagner, 823-9323.

FOUR STYLE STEEL WHEELS, for Mercury Zephyr, Fairmont, or Mustang, \$80; couch and love seat, \$50; electric hollow-body guitar, \$125. Gonzales, 344-4933.

SLIDING PATIO DOOR, aluminum, 6'7-3/4" tall, 6' wide; aluminum slider window, 2' tall, 6' wide, best offer. Hammel, 265-1381.

TWIN-SIZE MATTRESS AND BOX SPRING, American Furniture, used 3 times, cost \$230, sell for \$150 OBO. Slagle, 296-4616.

CAB-OVER CAMPER, 8', \$500; horizontal freezer, \$100; TV/stereo cabinet, \$75; OBO on all items. Guay, 281-3891.

BABY CRIB and mattress, \$75. Falacy, 293-2517.

FOUR MICHELIN TIRES, 185/70-13 XZX, 5-10K miles left, \$8/ea. Kovacic, 256-9867.

KIMBALL ORGAN, \$750; Tru-Spoke wire wheels, 15", fit Cadillac, \$500. Mitchell, 884-4219.

CAST-IRON DOUBLE KITCHEN SINK, \$15 OBO; double built-in electric oven, self-cleaning, \$50 OBO. Cilke, 296-3665.

FRANCISCAN STONEWARE, Madeira pattern, extra serving pieces, \$100. Robertson, 299-7561.

SEARS CHAIN SAW, w/case and tool kit, \$125; new tires, Ford 700x16LT, w/wheels, \$25/ea. Dean, 299-3281.

BOXER PUPS, AKC-registered, w/shots, brindle and fawn, \$150 to \$200. Greene, 892-7102.

OLYMPUS OM-1 35mm CAMERA, w/35mm lens and skylight filter, \$150. Maenchen, 298-9496.

ACTIVE SOLAR MOTORS, heat exchanger, blower, ducting, insulation, free. Brabson, 299-8114.

BAR, dark wood, \$100. Haid, 292-0159.

TACHOMINI CLASSICAL GUITAR, w/case, \$300 OBO; single-rail motorcycle trailer, factory-built, \$200 OBO. Pryor, 294-6980.

FISHER-PRICE NURSERY MONITOR, new, still in package, \$20; Alcot stroller, purchased 8/87, \$20. Foty,

268-0412.

JAYCO "J" TRAVEL TRAILER, '83 model, bunk beds, sleeps 8, AC, rear bath, \$7500. Miskowicz, 821-4149.

ZENITH 19" COLOR TV, \$50; CB rooftop antenna, \$10. Hughes, 265-1698.

ROUND PEDESTAL TABLE, 42", w/two 8-1/2" leaves, hardwood, walnut finish, \$175. Dalphin, 265-4029.

GE B&W TV, table model, 17", VHF/UHF, \$25. Kubiak, 265-6525.

BUNK BEDS w/mattresses, solid pine, walnut stain, \$200; Wilson staff woods, \$60. Olbin, 275-2681.

GARAGE DOOR, 16' x 7', all hardware included, \$100. Graham, 293-7302.

COLORADO RED FLAGSTONE, for walks and patios, \$1/sq. ft. or \$200 for 275 sq. ft. Davidson, 293-9486.

VIVITAR TRIPOD w/case; 2x teleconverter for Canon; 6' sliding glass door; 10' x 13' Sears Hillary tent w/bag, used twice. Golightly, 293-5987.

REAR WINDOW for '86 Ford Ranger Supercab, \$10; exercise trampoline, 33" sq. in., heavy-duty, \$10. Shrouf, 821-0765.

WHITE BEDROOM SET from 1950s, double bed w/bookcase headboard, dresser w/mirror, chest, night table, \$250. Reno, 296-6290.

EARLY AMERICAN BEDROOM SET: bed, \$55; dresser, \$145; mirror, \$45; nightstand, \$35. Stephenson, 296-9330.

PRINTER FOR HP-41 CALCULATOR SERIES, \$185; 1920s wingback chair, \$100. Loucks, 281-9608.

HELMS MOTOR MANUALS, 5 volumes, for '80 Zephyr, Fairmont, T-Bird, and Monarch, \$20. Rebarchik, 299-1385.

KING-SIZE WATER BED, mirrored bookshelf headboard, 12-drawer pedestal, padded rails, waveless mattress, heater, and ski stow. Shortencarier, 292-3575.

ROTO-HOE SHREDDER, model 550, Cut "N" Shred, \$275; National cash register, electric, \$100. Sanchez, 255-5515.

#### TRANSPORTATION

'78 TOYOTA CELICA GT LIFTBACK, 2-dr., 5-spd., 68K miles, \$1700. Wellman, 296-8089.

'84 CHEV. SCOTTS DALE, crew cab, 3/4-ton, 350 V-8, 4-spd., AC, \$8400. Furman, 281-5830.

'79 FORD F150-XLT RANGER, 4x4, rebuilt engine, AT, dual tanks, extras, \$4500. Hesch, 268-6122.

'83 ITASKA CLASS A MOTORHOME, 28', deluxe package, extras. French, 293-3451.

'67 CHEV. VAN, 4 mag wheels, new battery, replacement windshield included, \$400. Turner, 294-9674.

'79 HONDA CIVIC, AT, new paint, \$2000 OBO. Johnston, 294-4574.

'85 HONDA PRELUDE, 5-spd., mag wheels, tinted windows, extras. Moya, 293-7959.

'73 PONTIAC BONNEVILLE, 4-dr., PS, PB, AT, PW, 400-cu.-in. engine,

\$800. Kelly, 869-2760.

'83 CHEV. PICKUP, 4-WD, 4-spd., AC, PS, PB, AM/FM, cruise, dual tanks, 25K miles, \$8900. Falacy, 293-2517.

'78 BMW R100RS MOTORCYCLE, European model, extras, blue book. Kovacic, 256-9867.

'79 FORD MUSTANG, AT, AC, AM/FM, 2-dr., 4-cyl., \$1500. Federico, 892-7662.

'78 PONTIAC PHOENIX, PS, PB, AC, AT, tilt, AM/FM 8-track, new paint and battery, \$1400. Ferguson, 292-3824.

DIAMONDBACK TRAIL BIKE, 15-spd., \$150. Mitchell, 884-4219.

'73 VW SUPERBEEETLE, rebuilt engine, \$1500 OBO. Pierson, 296-7532.

'83 BUICK REGAL SW, V-6, all power, one owner, below book. Winblad, 898-9762.

'83 DODGE RAM CHARGER, 4x4, AT, PS, AC, 57K miles, \$6850. Moore, 292-2707.

'74 DODGE RAM CHARGER, 4x4, 318, 4-spd., Positraction, 73K miles, \$2200 OBO. Pryor, 294-6980.

'84 GRAND WAGONEER, V-8, 6-litre, Select-Trac, loaded, 50K miles, \$10,500. Robischon, 298-3992.

BOY'S 20" HUFFY BMX BIKE, black, \$20. Girard, 821-5529.

'64 EL CAMINO, 283, 4-spd., PS, tilt, new radials, \$3450 OBO. Senglaub, 1-832-6371.

'69 EL CAMINO SS396, charcoal gray, silver SS stripes, new silver and charcoal interior, T/A tires, tinted windows, \$5500. Macias, 831-9414.

'85 ISUZU TROOPER II, 80K miles, \$6000 OBO. Krebs, 281-9638.

TOYOTA ODYSSEY RV, 20', 4-spd., 20K miles, 19 mpg, 2 ACs, extras, \$13,450 OBO. Randolph, 299-2057.

'81 KAWASAKI KZ-1000, 16K miles, new paint, seat, clutch, tires, and brakes, best offer. Spinello, 256-1597.

'84 DODGE CARAVAN SE, 2.6-litre, AT, PS, PB, AC, cruise, luggage rack, AM/FM, rear defrost, 37K miles. Ledwith, 821-9154.

'84 BRONCO II, Eddie Bauer edition, PS, PB, AC, tilt, cruise, 62K miles, \$8000 book value, sell for \$6500. Weatherbee, 869-2849.

'84 HONDA VF750F INTERCEPTOR, 11K miles, Supertrapp exhaust, luggage rack, new battery and tires. Barnard, 831-4114 evenings.

'85 SUBARU XT SPORT COUPE, silver; '82 Jaguar XJ6 sedan, black/tan leather. Ewing, 268-6920.

'84 CELEBRITY, 4-dr., V-6, fully loaded, 27K miles, \$6500. Graham, 293-7302.

'78 TOYOTA COROLLA, 4-spd., 72K miles, \$1100; moped, 900 miles, \$175. Cook, 299-5061.

'85 GMC JIMMY 4x4, \$10,000 OBO. Fitzpatrick, 881-9357.

'83 MAZDA GLC CUSTOM, 5-spd., 4-dr., \$3500. Lachenmeyer, 268-7818.

'65 CHEV. II, classic, make offer. Golightly, 293-5987 after 6.

'66 FJ40 LANDCRUISER, needs paint, removable hardtop, \$1600 OBO. Loucks, 281-9608.

'81 HONDA ACCORD, 4-dr., 5-spd., AC, AM/FM cassette, \$3200. Estrada, 823-1704.

'84 DODGE CARAVAN, loaded, \$8100. Garrison, 821-6859.

'78 AMC MATADOR, 4-dr., 360 engine, AT, PB, PW, \$1950; '85 Honda Interceptor 500, \$2350. Sanchez, 255-5515.

#### REAL ESTATE

2-BDR. HOUSE, NE Heights, \$61,000. Radigan, 299-8345.

3-BDR. HOME, Eubank/Montgomery area, 1/3-acre lot, 1-3/4 baths, LR, DR, den, study, workshop, solar, \$98,000. Kelly, 293-2475.

4-BDR. HOME, NE foothills, cul-de-sac, solar, exterior 5 yrs. old, interior remodeled 6 months ago, 2800 sq. ft. French, 293-3451.

10.4 ACRES, Edgewood, hill slope to south. Zimmerman, 296-1058.

2-BDR. TOWNHOME, new, Montgomery/Moon area, 1500 sq. ft., 1-3/4 baths, FP, double garage, landscaped, \$89,500. Field, 828-1131.

1-BDR. CONDO, ground floor, 2800 Vail SE, utilities paid, pool, Jacuzzi, security, original owner, \$25,750 firm. Gregory, 344-1436.

3-BDR. HOME, Towne Park, 2 baths, 2-car garage, 2 yrs. old, FP, extras, assumable ARM, \$84,900. Clark, 292-1495.

#### WANTED

SPEECH SYNTHESIZER for TI-99 home computer. Mooney, 281-2612.

STRAIGHT 8mm FILM EDITOR, to rent, borrow, or buy. Westman, 881-0471.

APPLE II w/disk drive or two and printer, or Macintosh and printer, w/word processing, spread sheet, and book-keeping programs. Snowdon, 344-4637.

TRS-80 PORTABLE COMPUTER, model 100 or 102. Pierson, 296-7532.

OUTSIDE DOG, relatively young, not an excessive barker, will be kept tethered within a large yard. Pryor, 294-6980.

SUPER-SINGLE WATER BED, with or without drawers, must be in good condition. DeBaca, 892-1139.

TWO OR MORE DISPLAY CASES, flea-market-type. Greene, 299-4163.

VACATION COMPANIONS, 2 women to join 2 women on Kentucky vacation, share expenses, 3/26/88 to 4/3/88, fly/drive, bound for Louisville and Lexington sites. Johnson, 296-1917.

GOOD HOME for 2 pure-blood beagles, brother & sister, 4 yrs. old. Beasley, 298-3398.

#### SHARE-A-RIDE

OPENINGS AVAILABLE for full-time and stand-by riders for the Rio Rancho Vanpool, riders picked up in Rio Rancho and Corrales, contact Nick Durand on 4-3265 for information.



## It's Swing-and-Sway Time With Lesmen and Crew

HOP ABOARD THE A-TRAIN tonight and chug on over for an evening of dancing to the best Big-Band sound in town, courtesy of Don Lesmen's swing-and-sway crew. Dancing's from 8 to 11 p.m., right after the two-for-one special dinner; take your choice of prime rib or scallops. Reservations people are standing by at 265-6791.

SPEND SUPER SUNDAY this weekend at the Club's big Super Bowl celebration in the lounge, from noon until the football frolicking's finished. The BIG GAME isn't until 4 p.m., but in the meantime, all you Bronco boosters can needle the Red-skin rooters — and vice versa — while you're munching on free goodies. Special prices on draft beer and margaritas, too. Touchdown giveaways include T-shirts and hats.

ALL YOU LITTLE DOGIES better get along to the C-Club next Friday night to take some free stomp lessons (7:30-8:30 p.m.) before the *real* shuffling starts (8:30-12:30). Everybody's favorites, those good ol' Poor Boys from Isleta are on hand to keep things lively. The two-for-one chow line features T-bone steak and snow crab — elegant trail fare, for sure.

FAMILY NIGHT on Saturday, Feb. 6, promises lots of fun for everybody. A low-cost buffet (starting at 5 p.m.) offers taste treats like pizza, hot dogs, burgers, French dip, etc. "Song of the South," starring Uncle Remus, Brer Rabbit, and other whimsical creatures, lights up the big screen at 6. As usual, the movie is free.

THUNDERBIRDS BENEFIT at their monthly meeting on Feb. 8 when Al Chavez and some of the other folks from the Benefits organization drop by to discuss program changes for retirees. Meet your friends for lunch ahead of time; Al's discussion begins at 1 p.m. in the south end of the ballroom. This one's open to all retirees. Afterward, stick around for the T-Bird Board meeting.

MANAGER SAL TELLS US that January and

February are "Open House Months" at the C-Club. If you're not a member, but would like to check out what's happening, you're welcome at all Club functions: two-for-ones, brunch, happy hour — whatever turns you on. The deal applies to everyone employed at KAFB — Sandians, DOEans, civilians, and military types. Participation in SERP activities not included.

T-BIRD CARD SHARKS circle back to the tables on Feb. 11, starting at 10:30 a.m. Wheeling and dealing is only part of the fun; enjoy free refreshments, door prizes, and good conversation too. Round 2 this month is on Feb. 25, so mark your calendar.

LITTLE DOGIES, CONTINUED . . . Another special Country-Western Night is set for Thursday evening, Feb. 11. Come on out and live it up at free c/w lessons from 6 to 7 p.m., followed by more stompin' from 7 to 10. Crossover puts together the kick-up-your-heels music that night.

CUPID CAPERS about mid-February include a dance and two-for-one special on Feb. 13 and a Valentine brunch on the 14th. More details next issue. You may want to make reservations right now to avoid the rush later.

I'M ALWAYS CHASING RAINBOWS — and you can too if you head for Arizona and Rainbow Bridge next month (March 18-21). Other highlights include Canyon de Chelly and Monument Valley. Price is \$256/person (double); a \$50 deposit is required, and final payment's due Feb. 26.

Another Outstanding Opportunity for travel comes up this spring (May 17-June 1) with the Club's "Best of Britain" tour. You'll visit all sorts of places in England, Scotland, and Wales: Stonehenge, Edinburgh, Stratford-upon-Avon, the Scottish highlands, England's Lake District, London, and more. The \$1585/person (double) tab includes RT air from Albuquerque, all lodging, some meals, free travel insurance, taxes and transfers, etc., etc. Deposit \$150/person ASAP to guarantee your space. Balance is due by April 1; cancellation insurance available.

## Events Calendar

- Jan. 30 — "P. D. Q. Bach," New Mexico Symphony Orchestra, humorous concert featuring Peter Schickele, creator and biographer of P. D. Q. Bach, the "last but not least" of J. S. Bach's children; 8:15 p.m., Popejoy Hall, 842-8565.
- Jan. 30 — "Bayanihan," Philippine Dance Company, presented by the KiMo Theatre; 8 p.m., Kiva Auditorium, 848-1370.
- Jan. 30-31 — National Cutting Horse Association Championship; 9 a.m.-4 p.m., Horse Arena, NM State Fairgrounds, free, 869-6737.
- Jan. 31 — Concert, Albuquerque Youth Symphony, conducted by Dale Kempter; 3 p.m., Popejoy Hall, 842-3684.
- Jan. 31 — "The Gathering of the Clans," authentic Gaelic celebration; 8 p.m., KiMo Theatre, 848-1374.
- Feb. 2 — Candlemas Day Indian Dances: Buffalo dances at Picuris, San Felipe, and Santo Domingo Pueblos; free, 843-7270.
- Feb. 5 — Dance Company of Belgrade: singers, dancers, and musicians from all the provinces of Yugoslavia, presented by the KiMo Theatre; 8 p.m., Kiva Auditorium, 848-1370.
- Feb. 5-7 — "Swan Lake, Act II," "Rite of Spring," and "Pas de Dix," Southwest Ballet Company; 8:15 p.m. Sat.-Sun., 2:15 p.m. Sun.; Popejoy Hall, 294-1423.
- Feb. 5-26 — "La Valija," by Argentine playwright Julio Mauricio, contemporary play about a love triangle, performed in conversational Spanish; 8 p.m. Fri.-Sat., 2 p.m. Sun.; La Compania de

- Teatro de Albuquerque, Menaul School, 242-7929.
- Feb. 5 — Exhibit opening, "The California Connection: Sixteen Paintings from the Gifford and Joann Phillips Collection"; 6-8 p.m.; upper gallery, UNM Art Museum, 277-4001.
- Feb. 6-7 — Collector's Showcase, antiques and collectibles; 10 a.m.-6 p.m. Sat., 10 a.m.-5 p.m. Sun.; Exhibit Hall, NM State Fairgrounds, 883-6986.
- Feb. 7 — Concert, 15th anniversary of the Albuquerque Philharmonia Orchestra; 2 p.m., KiMo Theatre, free, 848-1374.
- Feb. 7 — "Wind and Thunder," traditional West African rhythms and ancient musical instruments and American jazz; 7 p.m., KiMo Theatre, 848-1374.
- Feb. 7 — Concert, Fine Arts Quartet performing works by Shostakovich, Debussy, and Mendelssohn, presented by the June Music Festival and the Albuquerque Academy; 4 p.m.; Simms Fine Arts Center, Albuquerque Academy, 881-0844.
- Feb. 9 — KODO, Heartbeat Drummers of Japan; 8:15 p.m., Popejoy Hall, 277-3121.
- Feb. 10 — "The Rose — With Love," multimedia presentation with reflection, insights, song, and images of the classic flower; noon, Albuquerque Garden Center (10120 Lomas NE), 296-6020.
- Feb. 10-21 — "Tartuffe," farce by Molière, presented by New Mexico Repertory Theatre; 8 p.m. Tues.-Sat., 2 p.m. Sat.-Sun.; KiMo Theatre, 243-4500.

## Take Note

"Update Your Management Know-How" at a seminar featuring Kaycee Hall, an international lecturer on management skills, executive leadership, personal image projection, and professional development. The seminar is from 9 a.m. to 4 p.m. on Feb. 11 at the Holiday Inn-Pyramid, and is sponsored by the Rio Grande Chapter of the Special Libraries Assn. Send your name, phone number, and \$30 registration fee to Jackie Stack, Los Alamos National Lab, MS-P362, Los Alamos, NM 87545 by Feb. 4. For more information, contact Gloria Zamora (400) on 4-3909.

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David Nichols (2858) reports that the Christmas Food Basket Drive in Org. 2800 set an all-time high of \$2494. Twenty-five gift certificates were delivered to households representing 150 people in Albuquerque, Los Lunas, South Highway 14, and Edgewood.

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Correction to photo on page five of the Jan. 15 LAB NEWS: Rose Patrick (not Jan Williams) reported on activities of Sandians (an org. for wives of Sandia employees) at the recent discussion, "Networking Through Women's Organizations," sponsored by the Women's Program Committee.

## Welcome

Albuquerque

Hong-Nian Jow (6415)

Alan Liang (2144)

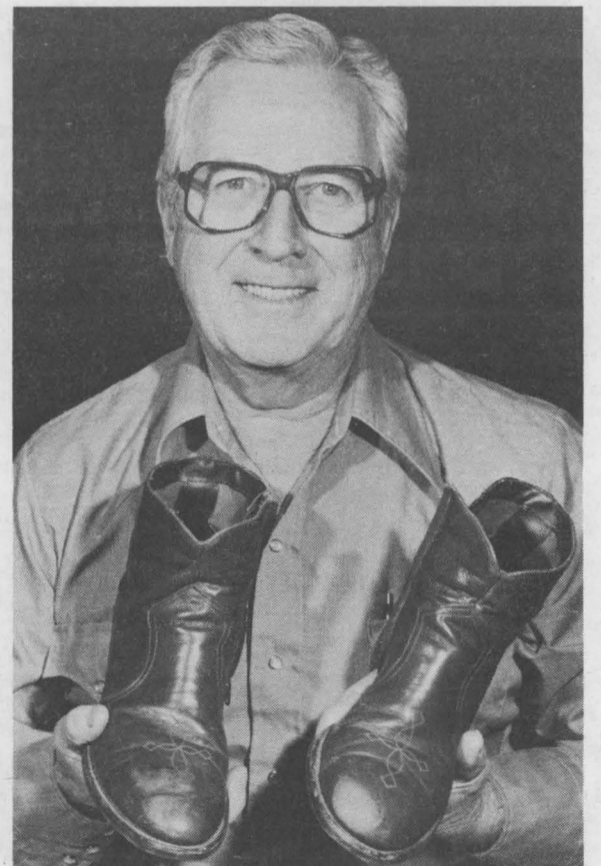
Nebraska

David Gardner (6425)

## Congratulations

To Dina Garcia and Phil Salazar (3426), a son, Anthony James, Jan. 9.

To Theresa (1513) and Arnold Romero, a daughter, Amanda Michelle, Jan. 18.



THE GRIN IS GRATITUDE — Joe Mickey, a contractor assigned to Tech Art 3155, had just stepped off a curb downtown when a Jeep careened around the corner and ran over Joe's toes; note the two tire tread marks (the dark lines) on the boot in Joe's right hand. Luckily, Joe wears safety shoes. The impact did knock him down, so he ended up with a bruised hip and a scraped hand — but no squished toes. "The Jeep driver backed up, asked how I was," Joe reports. "I don't know what I said, but he drove off. And, no, I didn't get the license number."