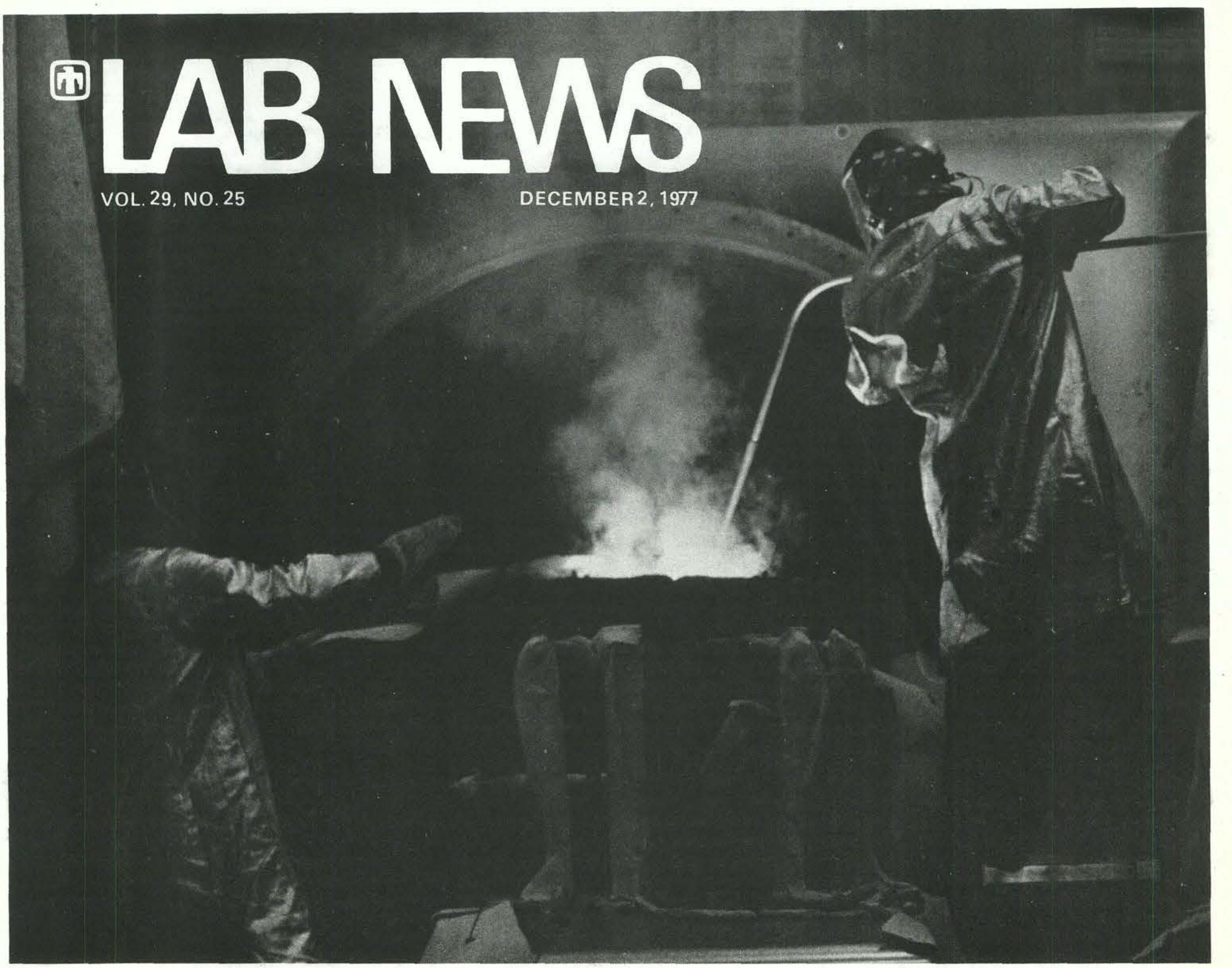
LAB NEWS
VOL. 29, NO. 25 DECEMBER 2, 1977



JUST BEFORE THE POUR, Mike Hosking (5833) uses an immersion thermocouple to measure the temperature of molten steel (approximately 1720°C) just prior to a pour into a concrete crucible. Bob Fisher (5833) looks on. The experiment was one of several being made as part of a study on the possible consequences of a fuel meltdown in a Light Water reactor.

Strictly Theoretical

Labs Performing Core Meltdown Study

For nearly three years, Dana Powers (5831) has been in charge of a project to melt steel and pour it into large concrete crucibles—all part of a study to determine the possible consequences of fuel melt in a light water reactor.

As it turns out, the motivation for the investigation is all pretty theoretical. "In some 200 reactor years of commercial operation," Dana says, "there's never been a fuel melt accident."

Another investigator, Dirk Dahlgren (5411) amplifies: "Because of the basic and backup safety systems in light water reactors, the possibilities of such an accident are so remote they aren't even considered in the safety review required for licensing U.S. nuclear plants. A fuel meltdown is what we would consider a Class 9 accident. It's a class that's highly improbable—but one we have to assess because it's conceivable that such an accident could occur."

The current study, sponsored by the Fuel Motion Research Branch of the U. S. Nuclear Regulatory Commission, is an outgrowth of an earlier study by MIT's Professor Norman Rasmussen.

Based on his risk assessment, Sandia was asked to make a comprehensive review of all experimental data available that had any bearing on hypothetical core meltdowns in light water reactors.

"It wasn't exactly a hunt for the proverbial needle," Dick Dahlgren says, "but nearly so. The major contribution of our review was to determine how little we really knew—and what we had to do to verify the limited data that were applicable."

Dana Powers, assisted by Frank Arellano and Anne Turbett (both 5831) has concentrated on defining what would happen if molten core material spilled down on the concrete floor of a leaktight containment building.

"It isn't a simple problem," Dana says, "because so many phenomena are involved. We need to know the concrete erosion rate, the mode and principal direction of erosion, the type and quantity of gas release, the melt and crust behavior, the partition of heat flux from the melt—to mention a few."

After early experiments at the Plasmajet and Radiant Heat Facilities, a series of melts and pours of steel took place in quantities up to 210 kilograms (463 lbs). These melts were made in Sandia's Melting and Solidification Laboratory (part of 5833). The steel was superheated to 1700°C and then poured into a concrete crucible.

To get needed data, some thermocouples were imbedded in the concrete crucible while others were inserted into the melt after it was poured. Other instrumentation included displacement gauges, gas samplers, motion picture cameras and thermovision recorders.

"Our initial goal," says Dana, "is acquisition of basic data. After that, the primary emphasis is on computer modeling."

Walt Murfin (formerly of 5412 and now on a two-year assignment for Sandia at a German research center investigating core meltdown accident potential) and Jim Muir (5412) developed and are perfecting a preliminary model for computing the rate of penetration of concrete by a molten light water reactor core.

Supervisory Appointments

BILL MARSHALL to supervisor of Thermal Test Facility Division 5713, effective Nov. 16.

Bill came to the Laboratories in June 1961 and for the next seven years his primary work was performing heat transfer calculations in the SNAP program. In 1968 he was selected to participate in the Doctoral Study Program and, in 1970, received his PhD in ME from Oklahoma State University. Earlier he had earned a BS from Louisiana State University and an MS—both in ME—from the University of Missouri at Rolla. When Bill returned to Sandia he worked with a fluid mechanics research group doing underwater acoustics studies. For the past several years he has been with the solar energy organization, working on total energy systems and photovoltaic systems.

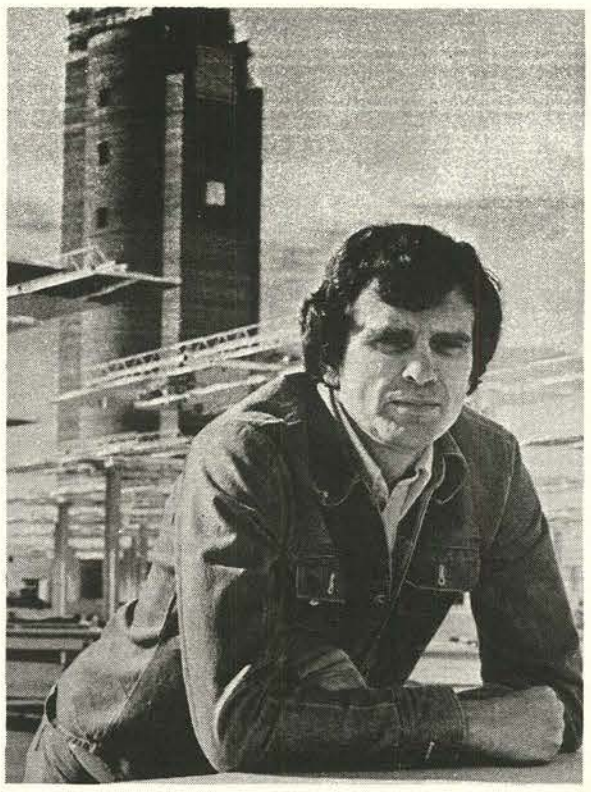
Off the job, Bill enjoys backpacking, camping, playing basketball and softball, and keeping active in his church. He and his wife Barbara have four children and live in Four Hills.

* * *

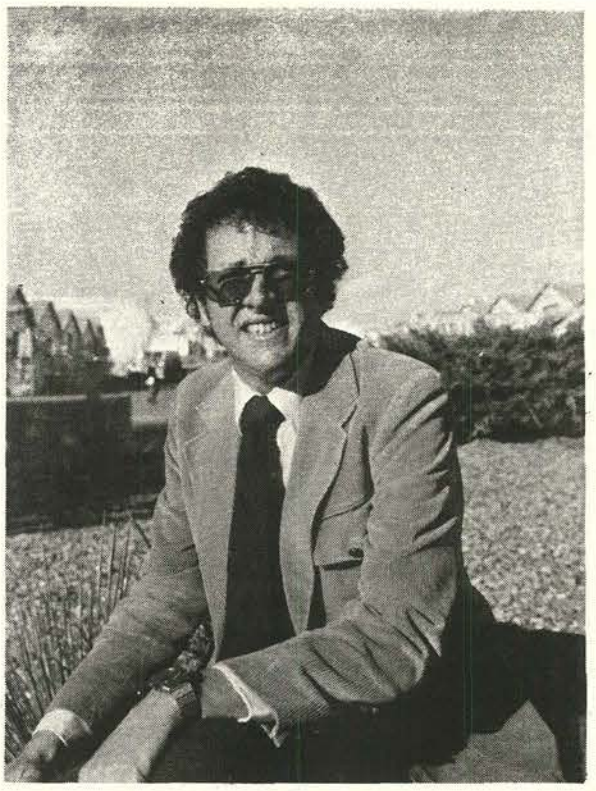
JOHN CANTWELL to supervisor of Education and Training Division II 3522, effective Dec. 1. John joined Sandia in September 1964 and since then has done advanced systems studies in Business Methods, worked in Wage and Salary and, for the past 10 years, has worked in the Education & Training Dept. John spent a two-year leave-of-absence at the National Center for Education and Development under HEW in Washington, D.C. Since returning in 1970, he has worked with the continuing education program.

John earned a BS in accounting from the University of Texas at Arlington. Under Sandia's Education Aids Program he earned an MA in Economics and a PhD from UNM. John is a member of the American Educational Research Association, the National Society for Performance and Instruction and the American Society for Training and Development. He devotes much time as a volunteer in many community projects, and enjoys gardening and photography.

John and his wife Gloria have six children and live in the NE Heights.



BILL MARSHALL (5713)



JOHN CANTWELL (3522)

Congratulations

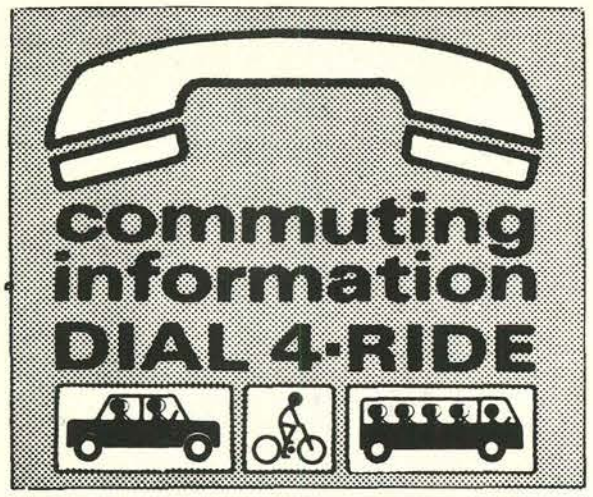
To Mr. and Mrs. David Sanders (5154), a son, David Thomas, Jr., on Nov. 2.

Sympathy

To Tom Harrison (5712) on the death of his mother Nov. 22 in Albuquerque.

To Florence Moore (3152) on the death of her mother in Ashland, Ky., Oct. 20.

To Della Jelski (3152), on the death of her mother in Illinois, Nov. 9.



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so does russell smith

bruce hawkinson & lorena schneider report livermore

NO. 2 in DOE, Deputy Secretary John O'Leary (at left) spent a morning at the Labs last week, being briefed on weapon and energy programs. Herm Roser (center), DOE/ALO manager, was Mr. O'Leary's host while Gene Reed (VP-2000) was among those making presentations. Mr. O'Leary went to Washington after having lived and worked in New Mexico.

SMOKE SPEWS OUT of B77 test unit as gas generator rotates weapon to proper attitude for lifting chute. Full-scale B52 low-level delivery sequence test took place at Tonopah Test Range. (TTR photo by Roque Feliciano-9473.)

B77 Delivery — — High, Low, Fast, Slow

SLL's B77 bomb delivery system has demonstrated that it does what it's designed to do. In recent tests to evaluate weapon compatibility with a range of aircraft delivery conditions, a prototype was successfully dropped at high altitude and at maximum velocity, while another unit performed well when dropped at low velocity and low altitude.

Arnie Rivenes (8158) represents one of many divisions that have developed the B77's highly sophisticated freefall and retardation delivery systems. "These were important tests," says Arnie, "especially the low-altitude retardation tests. We dropped the test unit from an operational aircraft—the B52 that will be the weapon's prime carrier—manned by an operational crew—a SAC group out of Mather Air Base. It was a completely representative loading and delivery sequence.

"The most important result, documented beautifully by the Tonopah Test Range photographers, was proof that the weapon can readily be dropped from a B52 at 200 feet, the lowest delivery altitude the Air Force has specified for that aircraft. In fact, we deployed it successfully at just 150 feet. And it impacted both vertical and slow, just as desired when you want to survive impact on a hard, irregular target."

The key to achieving a vertical/slow impact after such a low delivery, is the Sandia-developed lifting parachute (LAB NEWS, June 27, 1975) and roll control system. The lifting chute, manufactured by Pioneer Parachute Company, lifts the weapon above the delivery level, thus allowing the large conventional parachute to be deployed. Once deployed, it then provides the desired impact conditions.

A group of components, developed for Sandia by Thiokol, Moog, and Honeywell, forms the roll control system that puts the weapon in proper roll attitude before the chute is deployed and keeps it there during the lift of the trajectory. Essentially, the roll control system consists of a large gas generator coupled to eight nozzles around the weapon's circumference. Valves direct the gas flow through appropriate nozzles to provide rotating force. Which valves operate depends on bomb motion as sensed by a rate gyroscope. Gyro data is fed to a computer which, in turn, controls valve and nozzle operation.

"The B77 is the first bomb program in which Sandia has been responsible for the Phase 3 development of the total delivery system," says Arnie, "and we're proud to be on schedule in its development and testing. In fact, many components of the retardation system will enter early preproduction so that we can have productionlike retardation systems for weapon system tests set for 1979."

The test series also included an important aeroballistics test—a high altitude drop from an F111 traveling at Mach 2.2. The F111 imposes more severe separation conditions upon the B77 than any other aircraft. This test demonstrated that the B77 has excellent aircraft separation characteristics even at this high speed.

LIVERMORE NEWS

VOL. 29, NO. 25 LIVERMORE LABORATORIES DECEMBER 2, 1977

Spring and Fall In-Hours

New Nuclear Science and Technology Courses for MTS's

Members of the technical staff will have the opportunity in the Spring semester to begin an in-hours series of courses which relate to two of Sandia's major missions: nuclear weapons and nuclear energy.

Developed by Sandia's Education Committee, the Nuclear Science and Technology curriculum is comprised of three separate courses:

Atomic and Nuclear Physics,
Nuclear Energy Technology and
Weapons Technology.

"This series of courses," says Gene Reed (VP 2000), Chairman of the Education Committee, "is a major new offering of the In-Hours Program. It covers science and technology basic to much of Sandia's work. It is the mainstream material with which our technical staff works on a day-to-day basis."

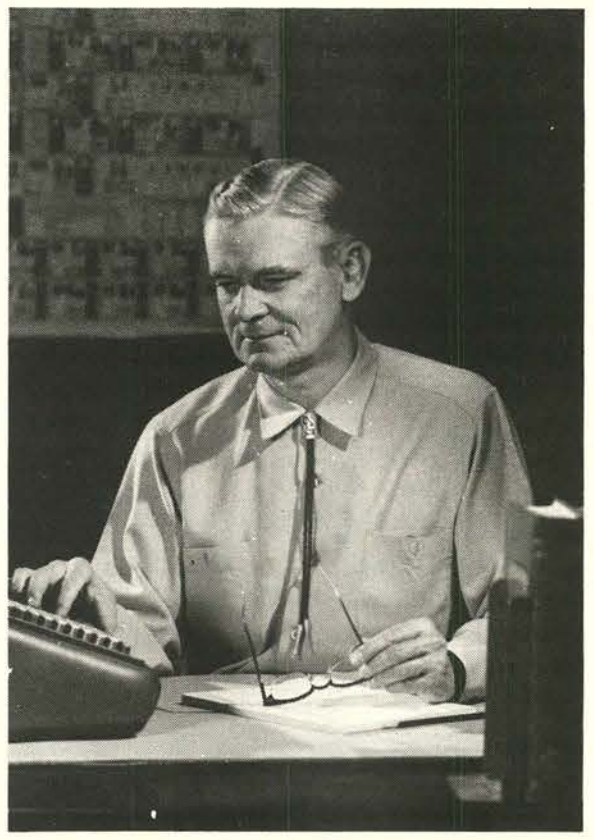
Orval Jones (5300), Chairman of the sub-committee on in-hours courses, reports that two of the three courses will be offered in the Spring semester: Atomic and Nuclear Physics (taught by Charles Critchfield, LASL, retired) and Nuclear Energy Technology (taught by Ron Knief, UNM). The Weapons Technology Course will be taught Fall semester by Dick Brodie (4371).

Since the prerequisite for both technology courses is Atomic and Nuclear Physics, two sections will be offered in the Spring, with a maximum of 25 students per section. Those who have the educational equivalent of the atomic and nuclear physics course may, with instructor approval, sign up for the Nuclear Energy Technology course.

Gene Ives (4360), overall course supervisor, described the two courses to be taught in the Spring:

Atomic and Nuclear Physics: Beginning with a review of basic quantum mechanics and electromagnetism, this course surveys the structure of atoms and nuclei, electromagnetic radiation and flow properties (i.e., hydrodynamics and particle transport including those of plasmas). The course requires some familiarity with vector algebra and differential equations.

Nuclear Energy Technology: This course analyzes the technologies for producing energy from nuclear fusion and nuclear fission. Introductory topics consider phenomena unique to nuclear systems—including neutronic feedback mechanisms; radiation effects and shielding, and thermal-hydraulic interactions. The remainder of the course deals with the nuclear fuel cycle, fission reactor systems and controlled thermonuclear fusion systems.



LASL's Charles Critchfield

Catalogs containing registration forms for in-hours courses (which require division and department approval) were distributed Labs-wide this week. Technical staff has until Dec. 16 to register. Classes begin Feb. 6.

Fit Is Better

Short Takes on the Fitness Scene

Beer lovers will be heartened to learn that their favorite drink is winning favor in the running world. Indeed, the medical guru of *Runner's World,* Dr. George Sheehan, has come out 4-square for the stuff. He comments editorially: "I'm getting a lot of flak on beer, but it's beginning to look as if it is one of the better replacement drinks in a long, hot race. Dr. Tom Bassler of the American Medical Joggers Association runs 25 miles on Sundays, taking a beer every five miles. When asked about the mileage, he says, "I jog a six-pack."

* * *

Running? Or jogging? *Newsweek* of Nov. 14, in an article entitled "Women on the Run" states "...officially, a nine-minute mile is running; anything slower is considered jogging." This manages to be at once a cheeky and amusing pronouncement, suggesting that somewhere there sits an august council, weighing with great deliberation such crucial matters as the distinction between running and jogging. In the fitness subculture the actual distinction is more along these lines: "I run. If you run slower than I you jog."

The same article states that about 500,000 women are now running (or jogging) regularly and gaining, aside from physical benefits, much greater self-confidence. As one woman runner puts it, "Running has given me the feeling I can do other things." Meanwhile, back at Sandia, we note that some half dozen women have signed up with the Sandia Runners Assn. Total SRA membership is 90.

* * *

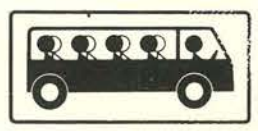
Success story—With the appearance of this column in LAB NEWS we've had a number of calls that fall in the "living witness" category. Latest is from a Sandian who, a year and a half ago, learned via a stress EKG and heart catheterization that two arteries to his heart were 30% closed. Under direction of his cardiologist he embarked on a diet and exercise regimen, has since dropped 45 pounds and now runs two miles five times a week. Last week he took another stress EKG, whose results his cardiologist declares to be "normal," with no indication of his prior problem. And he feels great. He also notes the irony that it sometimes takes a major medical setback to convince a person to alter a life style that is essentially self-destructive.

* * *

The fit trail—From Europe comes the parcours—a special running trail with checkpoints along the way at which the runner stops and performs whatever exercise is illustrated at the checkpoint, usually an exercise involving flexibility or muscular development. The trail includes apparatus such as low hurdles, a chinup bar, a low balance beam, and other basic equipment. After completing the trail, the participant will have exercised every part of the body (well, the important parts anyway). The parcours is becoming popular in this country at colleges, which usually build the course to circumnavigate the campus, and with a number of industrial concerns whose layout makes such a course feasible.

* * *

Definition from the other side—Of running for fitness: "the perverse dissipation of energy."



Bus Notes

Seeing the luminarias on Christmas Eve is a kick, but the traffic gets a little thick. So many residents and their holiday guests take the 1½-hour bus tour which goes through the Country Club area, Old Town and Los Altos. Tickets for the tour, at $2, go on sale Dec. 6 at the bus terminal on 619 Yale SE, at the Convention Center, and at Felicity Flowers in Winrock. The tour buses will leave Civic Auditorium at these times (you reserve a specific time): 6, 6:15, 6:30, 6:45, 7:30, 7:45, 8 and 8:15.

You can ride a shuttle bus for free between the Coronado and Winrock shopping centers starting Saturday, Dec. 8, and continuing on weekends through the Christmas period. The bus stop is north of Penney's at Winrock and at the southeast entrance to Coronado near the Broadway store. Object of the shuttle is to reduce traffic congestion.

For Info On Environments See EIC

What do the following have in common?
—The National Football League
—Full-scale truck and rail crash tests
—Packing cases for home videotape systems
—Data on the resistance of selected metals to sea salt corrosion?

The answer is elementary (provided you're clairvoyant). The common thread that links these items is the Sandia Environmental Information Center—a unique collection of data that can provide the answer to just about any question you might have on transportation, handling or storage environments (or the environments a component, a shipping container or a weapon system might encounter in actual use).

Tucked away on the second floor of 836, the Environmental Information Center won't exactly overwhelm you with its physical size. But its scope might. Part of Applied Mechanics Division II, 1282, the Center is principally the responsibility of three people: Jerry Foley, Cliff Magnuson and Dave Davidson. Their job has many facets, but the most important ones are collecting, interpreting, storing and disseminating information. C. A. Carlton (8122) runs a duplicate of the center at Livermore.

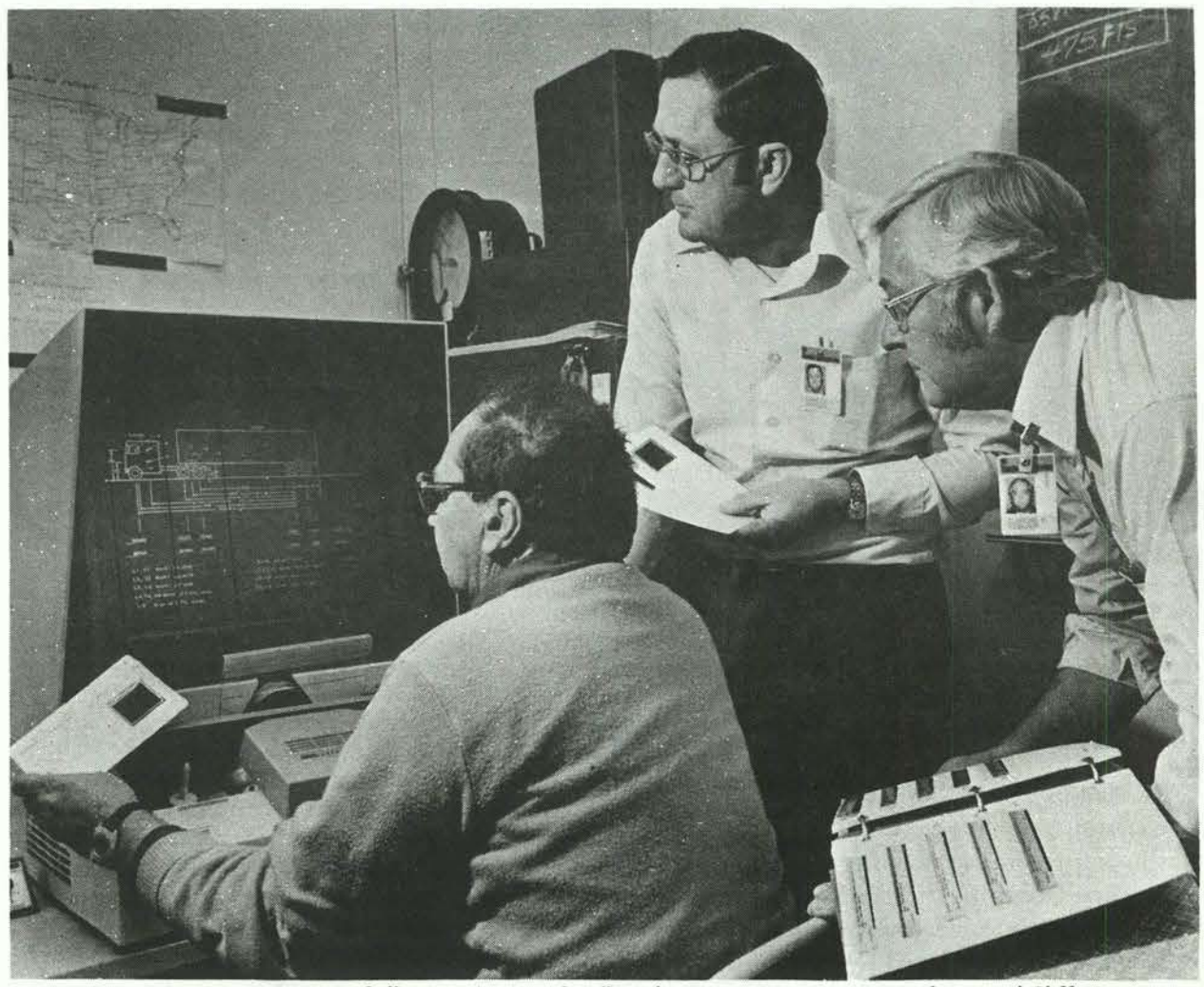
Started in the 1960's to supply environmental information to weapon designers in the AEC and DoD, the Information Center expanded its scope in 1975 to include transportation data of use to non-weapon designers in government, industry and education.

Fourteen categories of information are available in the Center's data bank—dealing with everything from A to W (Acceleration/time histories to Wind). Stops along the way include acoustic noise, atmospheric contents, biotics, fragmentation, humidity, precipitation, pressure, radiation, shock, temperature, trajectory and vibration.

Most of the data bank information is available on aperture cards and microfiche, which explains why the center doesn't take up a lot of space. But the files are being expanded all the time. Most new information is collected from Sandia projects and is frequently recorded and measured by the center's staff. Data is also obtained from literature searches of publications put out by the railroad, aircraft and trucking industries, and by military agencies like the Aberdeen Proving Grounds, the Wright Air Development Center, the Naval Ordnance Test Center and the Army QM R&E Center.

What kind of questions can they answer? Well, picking at random from their index, they can tell you the ozone content of the air in Los Angeles during a bad smog, or the noise level in a tropical thunderstorm. They can also tell you the load imposed on cargo during a 707's landing, or about the motion of a destroyer in heavy seas. The same goes for the April climate in Southeast Asia (or Kodiak, Calcutta, Malaga or Mississippi).

The Environmental Information Center was established mainly to make data



DATA ON ENVIRONMENTS is a full-time concern for (l to r) Jerry Foley, Dave Davidson and Cliff Magnuson (all of 1282). They run Sandia's Environmental Information Center—a prime source of information to weapon engineers and other designers.

available to Sandia component and system designers. That's still its primary function but, within the limits of time and security, the information is available to others as well. All requests go to Division 1282.

Out of a list of recent projects, we picked four as illustrative:

•They supplied DOE with data needed to select the proper crash speeds in the nuclear fuel cask tests and to model the grade crossing for the diesel/truck-trailer test.

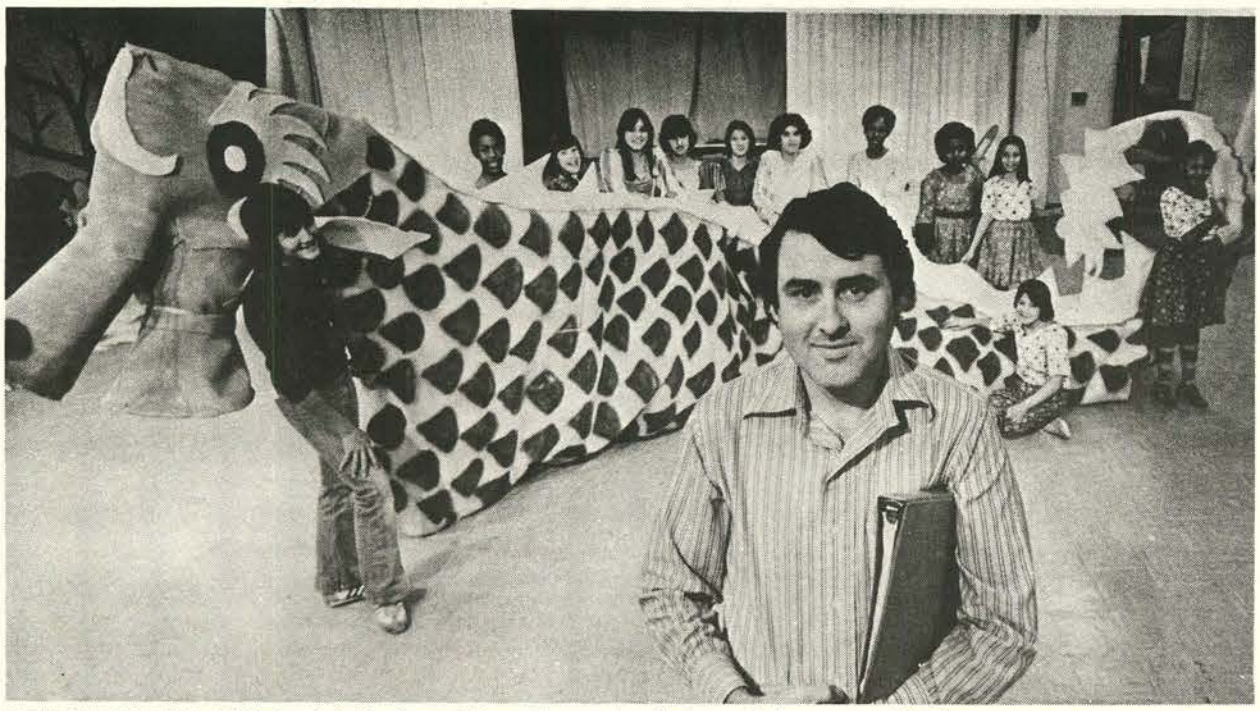
•They provided an electronic manufacturer with data which enabled him to design shipping packages for home videotape systems that would withstand the expected shock and vibration of transport and delivery.

•They defined the sea salt environment the Sandia wind turbine might encounter—data needed to select the most corrosion resistant blade material.

•They supplied a manufacturer of adhesive tape data on boxcar temperatures in the desert—data which explained why their product (shipped in uninsulated cargo containers) was unusable when it arrived in NFL locker rooms, the layers of tape literally welded together by high heat during transport.

Do they have limitations? Let's sum it up this way: if circumstances seem to be driving you out of your mind, the odds are eight to five the Environmental Information Center can't expound on the psycological climate or even help define the traumas you'll encounter. But you can get a straight answer on almost any other environmental question you'd care to ask.

DEBBIE CULLER (9571), an apprentice in materials processing, places one of these decals on an exhaust hood in the Glass Lab. Designed by Jim Walston (3155), the decals are reminders to turn hoods off when not in use. The heated or cooled air evacuated through hoods is replaced with outdoor air, which in turn must be heated or cooled to room temperature. Decals call attention to operating costs. Utility bills at SLA for FY'77 were: $990,000 for gas, $1,900,000 for electricity and $200,000 for oil. Limiting the nonessential flow of air through these hoods produces a substantial energy savings. Contact your energy monitor for the decals.



GARY SHEPHERD (2614) with firebreathing dragon and part of the cast of "The Magic Fountain" being presented tomorrow and Sunday by the Neighborhood Drama Project, 1020 Edith SE. Gary has directed the group for eight years.

'The Magic Fountain'

Kids, Gary Shepherd Present Musical

In the South Broadway area there is a dynamic, creative theatre group that has been presenting two original musicals a year since December 1969. Young talented performers and professional quality productions are appreciated by an enthusiastic audience—parents and friends.

The Neighborhood Drama Project is held together by Gary Shepherd (2614), computer consultant during the day; author, composer, director, producer and counselor during evenings and weekends.

The group will present "The Magic Fountain" tomorrow at 2:30 p.m. and again at 7:30 at the Neighborhood Center, 1020 Edith SE. Sunday, Dec. 4, the curtain rises at 7:30 p.m.

The show is a musical for children—hip children—written by Gary, songs by Gary, production by Gary and directed by Gary. And headaches for Gary.

About 40 youngsters from the ages of 10 through 16 are involved. Each is a small growing ego demanding attention, encouragement and approval. And time.

Gary is quick to point out that he has a lot of help—friends who design and make costumes, create choreography, play musical instruments, build props (a 12-ft. fire breathing dragon and a talking frog, for instance) paint sets, and generally make themselves useful. *They* are quick to point out that without Gary, there would be no Neighborhood Drama Project.

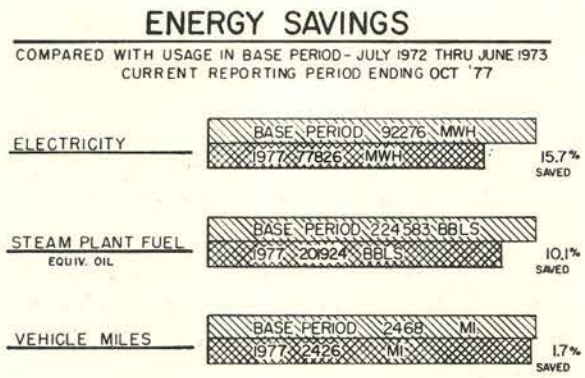
"I happen to believe," Gary says, "that involvement in theatre is a good way for kids to develop. I'm also a ham. I wrote a part for myself in this show and I get to sing and dance."

Mystery of Fire & Explosion Solved

A few weeks ago on a drizzly Sunday evening, the security inspector at the gate house at Area V called in to report an explosion in a nearby dumpster. The fire department duly responded, but could find no evidence of explosion or fire in the dumpster. Later that evening though, a fire did break out in the same dumpster and this time the fire department had to fill the dumpster with four feet of water to submerge and extinguish the fire. The cause of the fire was not immediately apparent, and it took some detective work by fire protection engineer Ray Cohrs (9751) to pinpoint the source.

Following chemical analysis of material remaining in the dumpster, Ray was able to determine that no radioactive material was involved but that the sodium content of the water used to extinguish the blaze was nearly 100 times higher than normal. A further search turned up two metal couplings of the type used on flasks for sodium. It then developed that on the preceding Friday three glass flasks containing several ounces of sodium had been placed in a metal trash can in the laboratory and, inadvertently, the trash can had been emptied into the dumpster.

Ray concluded that the glass flasks cracked when thrown into the dumpster and when rain water that Sunday evening finally reached the sodium the explosion occurred. Later on, as more rain water began to accumulate, the sodium again reacted with the water and a fire was started (For those forgetful of their chemistry, sodium reacts with water violently, yielding sodium hydroxide and hydrogen gas.) As the firemen applied water, some flaring up was noted but, eventually, the sodium was totally consumed and the blaze extinguished. "Sodium is hot stuff," Ray notes. "Handle and dispose of it with great care."



Administrative Info System To Be Updated

A long range computer plan to modernize Sandia's administrative information systems has been adopted by Small Staff. The plan was developed by the Data Processing Subcommittee chaired by Bill Colborne (3210) and approved by the Computer Committee chaired by Gene Reed (2000).

The Data Processing Subcommittee reviewed existing work being performed on the 1108 computer, surveyed user organizations and projected future requirements. Priorities were then set and resources allocated to achieve management information systems that are more responsive, accurate, timely and consistent than those now available.

The plan calls for replacement of the Univac 1108 and stresses use of new Information Systems technology—The Data Base Management System.

A data base is a set of data stored on high speed devices in a manner that defines the relationships between data elements and the different types of data records existing in the data file.

The major differences between data bases and the computer applications are:

- —Data bases serve multiple users and/or functions.
- —Data bases maintain all related data rather than just the data needed for a specific task.

The plan calls for the development of five major data bases to maintain information regarding people, finance, property, procurement, and engineering drawings.

As an example, the people system would include a master personnel file on all employees—name, date of birth, educational history, payroll data, attendance record, salary history, benefits status (insurance, health care, retirement, etc.), security status (clearances, badges, vehicle decals, etc.) and medical history.

From this large file, the computer could quickly prepare many different reports. In time, links between the data bases—from people to financial to procurement—could provide more timely budget analyses and project cost information.

Meantime, a cadre of analyst programmers will make required modifications to existing systems and provide operating people with needed data until the data bases are complete.

Target date for acquisition of the replacement computer is April 1979, and the plan itself is scheduled for completion by September 1982.

Back in February, President Carter promised that future federal rules would be written in "plain English for a change." Since then, manuscripts have been cycled back to bureaucratic authors for translation; the Interstate Commerce Commission has formed a "Zero-based Gobbledygook Committee" to banish words like "witnesseth;" OSHA has announced it will publish two versions of its new rules—one in legalese and one in English. There's always hope for improvement (and plenty of room). But more than likely the bottom line, now and always, was summed up succinctly by HEW Secretary Joseph Califano, when he described HEW's 13 volumes of regulations as a "Kafkaesque labyrinth."

New Space Programs for Sandia QA

QA work at the Labs on radioisotopic thermoelectric generators (RTG) for space applications is the subject of citations recently awarded to Sandia Labs and people associated with the program. With the citations came the announcement that four new development programs are underway requiring the same weapons-type quality assurance that Sandia has performed for space RTG programs since 1966.

The work, centered in Bill Thomas' Division 9512, is funded at more than $725,000 for FY78.

The new programs represent second generation development of RTG's. The original devices (used for Vikings, Voyagers and other spacecraft) generated electricity by converting heat from a plutonium capsule into power. The new devices, designed for greater efficiencies and output, incorporate a fluid that is heated by the plutonium capsule to drive pistons or alternators to produce more power.

Sandia will write QA specifications for the devices, monitor production efforts and check test results. During the more than 10 years of QA activity in the space program, Sandia has reached a 100 percent success rate with RTG performance.

The DOE citations read in part:

"The stable and outstanding performance of these nuclear generators is an eloquent testimonial to the dedicated application of your special skills in the accomplishment of the goals of this mission....you may take pride in having assisted in extending man's horizons and in demonstrating the unique value of nuclear power systems in remote, hostile or specialized environments."

The certificates were presented to Bill Thomas, Bob Harnar, Bob Hannigan, Ken Harrington, Hank Neues, Myron Pilat (all 9512), Bill Kraft (9510), John McKiernan (1143), Larry Grube (9654), Gary Reif (2522), Robert Martinez (5811), Gene Jeys (9515), Dusty Rhoads (9636) and Jack Wempling (3727).

PROJECT LEADER Bob Harnar (9512) displays a citation for Sandia's quality assurance role in the development of RTG systems for space applications.

Two psychological researchers in Britain say it isn't a coffee break we need so much as a stress break. As they put it, "boredom produces stress and exercise reduces it." Their advice for breaktimes: a fast round with a *punching bag*.

Magma Energy Research Project

Seawater Plus Magma For H-Generation

A new concept for producing hydrogen directly from the reaction of molten rock and water has been developed by Sandia scientists Clyde Northrup (5824), John Galt (5100), Terry Gerlach and Pete Modreski (both 5831).

The new technique shows the long range potential of producing an almost endless supply of hydrogen by pumping water, including seawater, into bodies of subsurface molten rock or magma. Carbon monoxide and methane can be produced by the same technique.

Hydrogen produced by the new technique is the result of a chemical reaction between water and hot ferrous iron in the magma. Basically, some of the oxygen atoms are pulled from the water molecules, further oxidizing the ferrous iron and freeing a portion of the hydrogen atoms in the water.

Laboratory experiments indicate that under ideal conditions—basaltic magma at 1200°C—about three mole (molecular weight in grams) percent of the water injected into the magma would be converted to hydrogen.

This would mean, for example, that 150,000 pounds of water (about 20,000 gallons) pumped into a magma body each hour would produce about 500 pounds of hydrogen. The remaining water would be converted to steam.

Hydrogen production is directly proportional to the amount of ferrous iron in the magma. Basaltic magma, such as that produced along mid-ocean ridges, contains 10 to 12 percent ferrous iron, compared to five to seven percent for andesitic magma and less than two percent for rhyolitic magma, both of which are commonly produced on continental land masses.

However, the hydrogen production of all types of magma can be doubled or tripled by adding biomass—chiefly plant cellulose—to the water injected into the magma chamber. Biomass is readily available on land in the form of sewage sludge, straw and stalks from harvested crops and bagasse from sugar cane processing and off-shore in the form of seaweed and similar plants.

Plant cellulose ($C_6H_{10}O_5$) contains a large amount of hydrogen which is freed during the reaction with the high temperature magma. At magma temperatures of 1300°C, injection of water containing 10 percent biomass into the magma would produce gases containing 10 percent hydrogen, four percent carbon dioxide, one percent carbon monoxide and a trace of methane.

At magma temperatures of about 600°C and injection of water containing 10 percent biomass, methane production would predominate, totaling about three mole percent, compared to two percent hydrogen and one percent carbon monixide. Use of lower temperature magmas would probably not be economical.

Cooling of the magma with water does not represent an immediate threat to a hydrogen-producing system. It is estimated that it would take several trillion gallons of water to lower the temperature of a cubic kilometer of 1200°C magma by 50°C; the magma would have to cool at least 150°C before solidifying.

Depth of burial of magma chambers is seen as the greatest obstacle to implementation of the new concept. Some chambers, however, appear to be located within two to three kilometers (6000 to 10,000 feet) of the ocean floor and should be reachable with nominal extension of current drilling technology.

Developers of the new concept estimate that 10 to 20 holes drilled into a large basaltic magma body having a temperature of 1200°C and 12 percent ferrous iron content would produce approximately 26-billion standard cubic feet of hydrogen annually.

This total would be about 1.3 percent of the 2-trillion cubic feet of hydrogen consumed in the U.S. each year. Addition of biomass to the water would increase the output two to three times.

In addition to the production of hydrogen and other gases, the water-magma interaction would produce a considerable amount of steam, which could be used to generate electricity to power chemical processing plants which would use the hydrogen as a feedstock.

Developers of the new concept see it as a long-range means of increasing the versatility of geothermal resources, which are now limited largely to production of heat and steam to generate electricity.

"Hydrogen is the highest quality fuel that we have," says Clyde Northrup. "It is easily transported, it can be burned without producing pollutants and for its heat, and it can be used as a chemical feedstock or to upgrade such feedstocks as coal and tar.

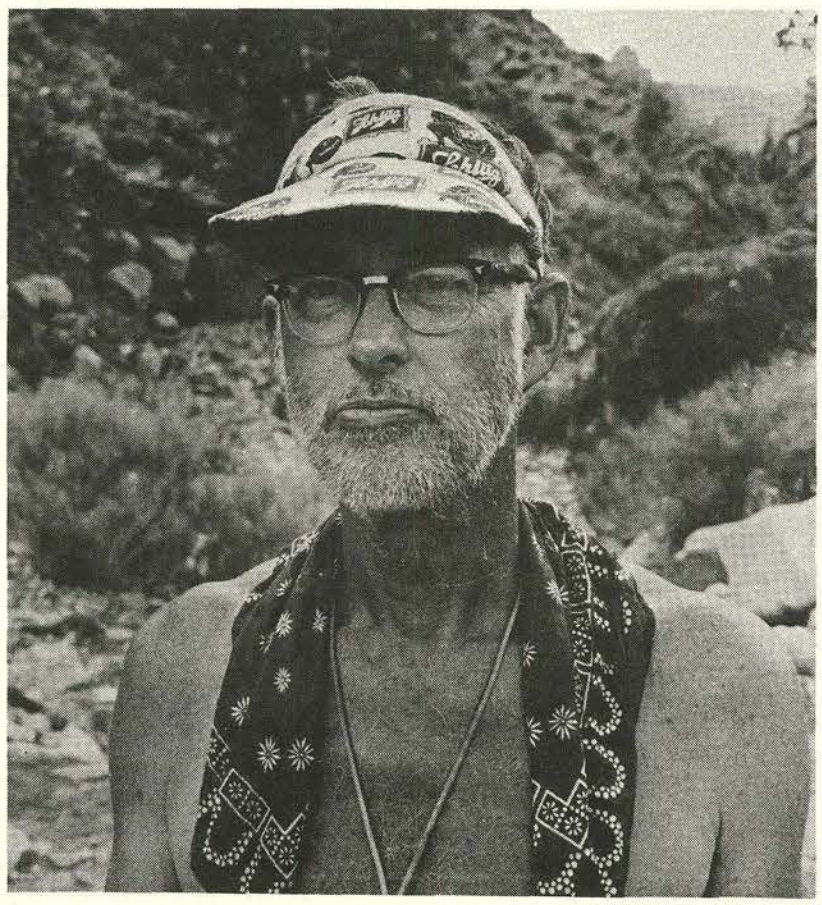
"However, large additional amounts of hydrogen for a so-called 'hydrogen economy' simply cannot be produced at reasonable cost with present means of production. Most hydrogen is now produced from natural gas, and thus is subject to the price increases and shortages brought on by changes in gas supply.

"Over the long term, large supplies of hydrogen will be needed at reasonable prices. Using the high temperature magma-water-biomass reaction appears to offer considerable promise in this regard."

The Longest Walk — — Steck Does Grand

Ten years ago one of our Labs' statisticians got embroiled in an affair. His family was concerned but raised no objection, noting that the object of his affection did possess a certain grandeur—colorful, tempestuous, even seductive. But they wondered: who would go off the deep end over something 300 miles long and a mile deep?

George Steck (5121) does. And when you discuss the Grand Canyon of the Colorado with George, he becomes (for George) pretty animated. It's not one of your fantasy affairs either. George has recently returned from a 43-day, 300 mile hike through the Canyon, from Lee's Ferry at the eastern end to Lava Falls, some 300 or so miles by foot downstream, all on the north side of the river. Forty-three days, 300 miles.



CANYON-MAN George Steck.

If Mr. Guinness is listening, the trip is a first as far as George knows. Many people have traversed the Canyon by boat. This writer has and the trip is a piece of cake. But the boat ride does give you some insight into what it would be like to walk through the awesome verticality of the Grand Canyon. For a local measure, climb the west face of the Sandias, then scramble back down. From bottom to top and down again is about the same as a trip from the river bottom to the rim of the Canyon and down again.

George hasn't toted up the number of Sandia-escarpment equivalents he and his party made in the course of their trek, but its considerable.

He's been going to the Canyon "for a month or so" just about every year for the last 10 years. A couple of years back he decided on this trip and has been planning it since. The key word is "planning." Hiking in the Grand Canyon is no romp in the park. Trails are very few, the weather tends to the extreme, steep and hair-raising vertical drops are frequent, there's no local food source, and perhaps most critical, water is either (a) non-existent or (b) found only at the bottom of that Sandia-like escarpment you've just climbed. Feel like going down again for a drink?

These constraints mean that the National Park Service people, who administer most of the canyon, are really rather picky about would-be Canyon hikers, feeling that each hiker poses a potential retrieval problem. So it was necessary for George to submit a detailed itinerary for each of the 43 days and to show how his group planned to cope with food and water demands. (The latter were met by a system of caches—5 gallon cans filled with provisions and planted several weeks before the trip by members of George's family). Noting George's good track record in the Canyon, the Park Service agreed and, on Sept. 16, the Steck party (George and six young people in their late teens and early twenties) was off.

George describes a typical day. "I'd be first up around 7 and would rouse the others out of their sleeping bags. Breakfast was easy—just open one of the 43 breakfast baggies that we'd prepared back in Albuquerque. Five ounces of granola, powdered milk and powdered egg. No hot tea or coffee, though it would have been nice those cold mornings.

"Once we started, the party spread out. I was usually at the end—the young people moved at a faster pace. I didn't have any physical problems, just moved somewhat slower.

"Lunch was another plastic baggie, this one with six ounces of nuts, dried fruit, beef jerky and candy. After a couple of weeks I realized that my breakfasts and lunches were a little thin because I was losing weight (he dropped ten pounds over the 43 days). But dinners were generous. We carried freeze-dried food and had some real banquets, especially at the caches."

If you divide the total mileage—300—by 43, you get an average of seven miles per day. But this is a totally misleading average; many times the party would spend an entire morning climbing or descending a steep stretch and gain only one or two "flat" miles in the process.

The trip didn't feel like 43 days. George recalls, "We'd sometimes play a game and ask one another 'Where did we camp four days ago?' And it was hard to remember—our perspective of time was confined to the day we were in and not much before or after.

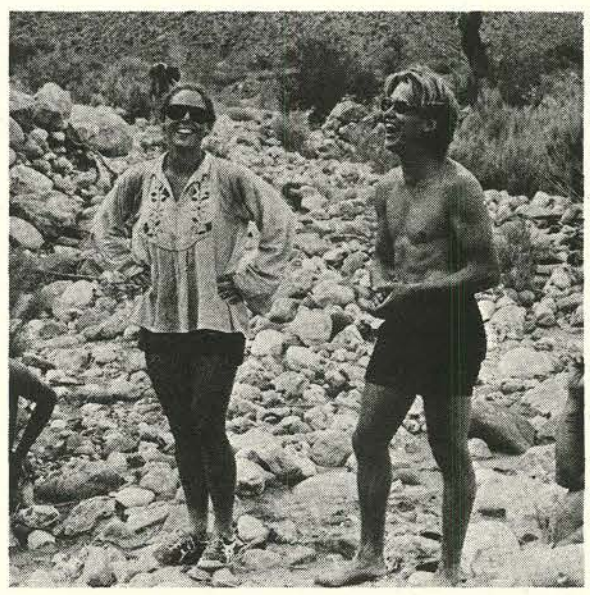
"I liked the solitude. When I hiked in the Himilayas, it was on the trade routes and you constantly encountered other people. In the Canyon we met only two other hiking parties. Aside from the jet contrails you felt totally alone, far away from civilization, but aware of being dependent upon it. After we'd been separated from the river for a day or two, we'd have a mystical, almost religious feeling as we again drew close to it.

"There was little 'intellectual' life. We rarely read, didn't play chess or anything like that. I think that's because most of our energy was absorbed by the physical and psychological demands of moving on and there was just so much to enjoy."

The Steck party emerged from the Grand Canyon at the Tuweep Ranger Station, not too far from Lava Falls, where the resident ranger—himself a veteran of 35 years on the edge of the Canyon—helped them celebrate (he furnished the steaks). In 43 days they'd dealt with hot days, cold nights, rain, some hunger, a scorpion bite, head colds and George's occasional grouchy spells.

"A marvelous trip," George reflects. "You know, there's another stretch of the Canyon below Lava Falls it would be fun to explore..."

• js



YOUNG PEOPLE flourished under trip demands.

HUGH PIERSON and Don Mattox (both 5834) ham it up. They joined party for few days.

PROVISIONS were cached in 5-gallon cans at various locations.

Take Note

If you want to keep a handy record of your vacation credits, there's a new form available in stock rooms: FY 1978 Individual Vacation Record, SA 4510-DAA (6-77). It consists of a fiscal year calendar with provisions for notation of vacation and sick leave; FY '78 holidays are also listed.

* * *

The Helping Hand Thrift Shop on 933 San Pedro SE is a non-profit outfit which uses its proceeds in the rehabilitation of drug addicts, alcoholics and ex-cons. According to its release, the shop needs contributions of clothing, appliances and furniture. Similar items are up for sale. The Thrift Shop operates in behalf of the Cenikor Foundation, a non-profit tax exempt organization. Its phone number is 268-9330.

* * *

An open house for the YWCA's new Women's Resource Center is scheduled Dec. 7 from 4:30 to 6:30 p.m. Located in the downtown YWCA, 316 Fourth SW, the Center offers information and referral services, a library pertinent to women's interests and concerns, plus programs and support groups for women. Refreshments will be served; the public is invited. Call 247-8841 if you plan to attend.

On Dec. 13, the first workshop will be offered at the new Center from 6:30 to 8:30 p.m. Called "Christmas Blues," the program will focus on coping with holiday depression. Call 246-8841 to register.

* * *

When you get your new city telephone directory be sure to take your old one to your building's paper recycling station. Keep the directory separate from other types of paper.

* * *

feedback

Q. Would it be possible for Sandia to evaluate its in-hours and out-of-hours courses and assign each course a Continuing Education Unit [CEU] value? It would be satisfying for a person who has taken many courses over the years to be able to summarize his efforts by saying he has so many CEU's.

A. The answer to your question is *yes* it would be possible to evaluate Sandia's in-hours and out-of-hours courses and assign CEU value to each. However, since the CEU is merely the number of contact hours in a course divided by 10, most companies do not feel it is worthwhile to acknowledge or give stature to the CEU since it merely records 'seat' time in a course. It has nothing to do with whether a person has learned anything or how well the person has learned. It is just as meaningful to say that you have taken 15 courses as it is to say that you have 35 CEU's.

Education accounting and accrediting systems are difficult to assess and manage. Since there is more activity in the non-traditional areas these days, the need for some kind of recognition is acknowledged. Because of this need, the American Council on Education has created a task force to review the problem and recommend changes. Other professional education groups are doing the same. Sandia Laboratories (through H. R. Shelton) is involved with these task forces and we will be responsive to the recommendations. In general, these task forces are not in agreement with the CEU as it is presently defined.

If you have other questions, please contact H. R. Shelton, Division 3521, since he is involved with the task forces on a national level and has current information on the subject.

R. Garcia—3500

Authors

D. M. Haaland (5825), "International-Reference Solid-Electrolyte Oxygen Sensor," Vol. 49, No. 12, ANALYTICAL CHEMISTRY.

M. E. Riley (5211) and M. A. Gusinov (5215), "Laser Beam Divergence Utilizing a Lateral Shearing Interferometer," Vol. 16, No. 10, APPLIED OPTICS.

W. S. Saric (VPI and VA. Univ.), K. J. Touryan (1260) and M. R. Scott (2613), "Stability of Slag in Turbulent MHD Boundary Layers," Vol. 1, No. 2, JOURNAL OF ENERGY.

R. R. Eaton, R. R. Fox (both 1261) and K. J. Touryan (1260), "Isotope Enrichment by Aerodynamic Means: A Review and Some Theoretical Considerations," Vol. 1, No. 4, JOURNAL OF ENERGY.

R. A. Anderson (5814), "Propagation Velocity of Cathode-Initiated Surface Flashover," Vol. 48, No. 10, JOURNAL OF APPLIED PHYSICS.

K. W. Mitchell (5133), et al, "Evaluation of the CdS/CdTe Heterojunction Solar Cell," Vol. 48, No. 10, JOURNAL OF APPLIED PHYSICS.

J. B. Moreno (1261), "Volume-Averaged Rate Equations for Planar and Disk-Cavity Lasers," Vol. 48, No. 10, JOURNAL OF APPLIED PHYSICS.

D. F. Cowgill (2353), "Dynamic Implant Profiling by Low-Energy Nuclear Reaction Spectroscopy," Vol. 145, No. 3, NUCLEAR INSTRUMENTS & METHODS.

R. G. Kepler (5810), "Electronic Properties of Polymers," Treatise on Materials Science and Technology, Vol. 10, PT.B, PROPERTIES OF SOLID POLYMERIC MATERIALS.

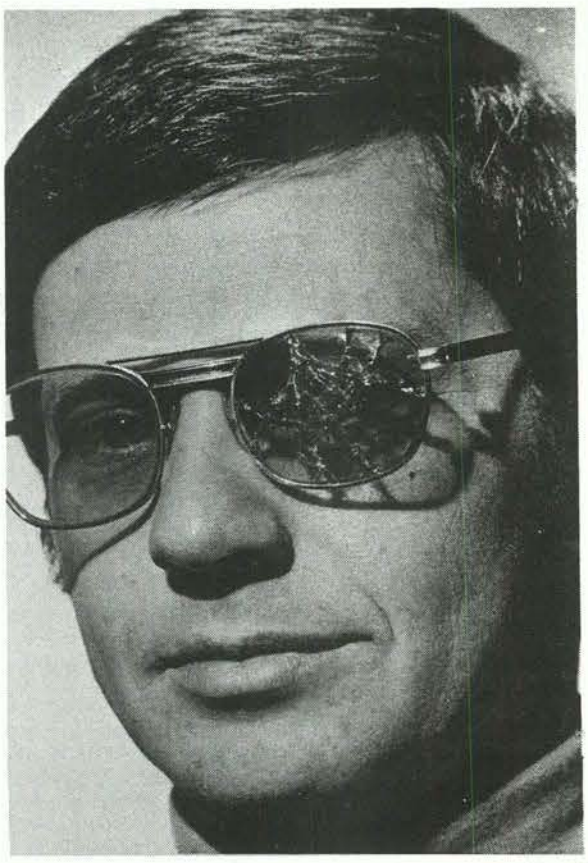
P. J. Feibelman (5151) and E. J. McGuire (5211), "Photoionization of 4f Electrons from Rare-Earth Atoms At A Surface," Vol. 16, No. 6, PHYSICAL REVIEW B.

M. L. Knotek (5155), "High-Field Magnetoresistance of Hopping Transport in the Disordered Impurity System of Transmutation-Doped Ge," Vol. 16, No. 6, PHYSICAL REVIEW B.

Chicago Sun-Times **columnist Bob Green says he's discovered an "obscene phone call club" in the Windy City. Membership is free for women and $19 a year for men. Once a woman leaves her phone number she presumably sits back and waits for the obscenities to begin. As Green put it, "there are apparently a lot of people interested in obscenity. I tried most of one day to call the club's toll free number—and got nothing but a busy signal."**

Making a call to Sandia Livermore?

On Monday, Dec. 5, the FTS prefix changes to 532 (was 469). That applies to calls to LLL as well. So it's 7-532-4 digit extension.



KER-CHUNK &/OR SPLATT! So went Ward Bower's safety lens as he applied his skil-saw to a piece of lumber. Whirling blade threw chunk of wood into lens in spite of guard. The lens broke but Ward's eye was untouched, converting ordinary citizen Ward Bower (2167) into Wise Owl Ward Bower—a member of that group whose vision has been saved through use of safety glasses.

Nome may be the last authentic stronghold of individualism. Albro Gregory, editor/publisher of the *Nome Nugget,* is waging a pitched battle to prevent changes to the city's Gold Rush image. He's against parking meters, paved streets and other signs of progress. His is a full-time battle—as full-time as he can manage in a twice-a-week paper that carries the masthead: "Published daily except Monday, Tuesday, Thursday, Saturday and Sunday."

Credit Union Reporter

Each member account insured to $40,000 NCUA by Administrator, National Credit Union Administration

The Board of Directors has recently approved several changes:

(1) Increasing the maximum term from 10 to 12 years on certain loans—FHA Title I property improvement loans, on those secured by real estate (improved or unimproved) and on those on mobile homes.

(2) Removing the $2500 unsecured loan limit. Exception—members with less than six months tenure at Sandia are limited to a maximum of one month's salary.

(3) Increasing the maximum permissible share account balance from $20,000 to $40,000 plus accrued dividends on all regular accounts and custodial accounts. These accounts are insured up to $40,000 by the National Credit Union Administration.

* * *

A reminder—the Credit Union will observe the same holiday schedule as Sandia Laboratories.

Fun & Games

Those locker room blues—The LAB NEWS investigative staff has plunged into the Base gym locker situation in the new and improved locker room and we're befuddled. There are 490 shiny new lockers. Some *185* bear the padlocks of those we assume to be permanent occupants. That leaves over *300* empties. So who gets 'em? Well, in the precedence listing of who gets a locker, Sandia Labs types come somewhere after KGB agents but before those who dislike the B1 bomber. Which means: don't hold your breath waiting for a locker assignment.

* * *

Basketball—A whopping 23 teams are playing this fall in the Rec Association's basketball league—8 in the "A" and 15 in the "B" league. Play got underway last month at the Base gym. Games start at 5 p.m., Monday through Thursday. For schedule info call league president Jerry Fossum, 4-2351 or rec manager Bob Giersberg, 4-3808.

* * *

Bowling—A Scotch Doubles Fun Tournament is set for Dec. 10 and 11 at the Eu-Can Bowl. Sandia and DOE bowlers will compete for door prizes and trophies. Tournament entry deadline is Dec. 7: Vern Christy, 4-2443, or Dee Schumpert, 4-8059.

* * *

Fitness For Women—The Sandia Recreation Assn. is organizing an eight week, three-times-a-week course, Fitness For Women, to be taught by Ann Lowry, a teacher with wide experience in the field. Classes will be run at the Coronado Club from 5 to 6 p.m., Monday-Wednesday-Friday, and are scheduled to begin on Dec. 12. Fee for the course depends upon the response. If you're interested, call Bob Giersberg at the C-Club on 4-3808 before Dec. 9.

* * *

Tennis—In the 1st annual Sandia Tennis Turkey Shoot Linda Fredlund and Bill Spencer (2100) shot down the opposition to bring home the 14-lb. turkeys. Joan Spencer, Ruth Tillerson and Kate Young trailed behind in the women's bracket, while Joe Tillerson (5162) and Bill Kennish (5742) were runners up in the men's bracket.

Dec. 17, a Saturday, marks the date of the Tennis Association's Christmas party at the Indoor Tennis Club. It takes off at 6 p.m. and courts are reserved till 10 p.m. for those wishing to get in some tennis with their jollity of the evening.

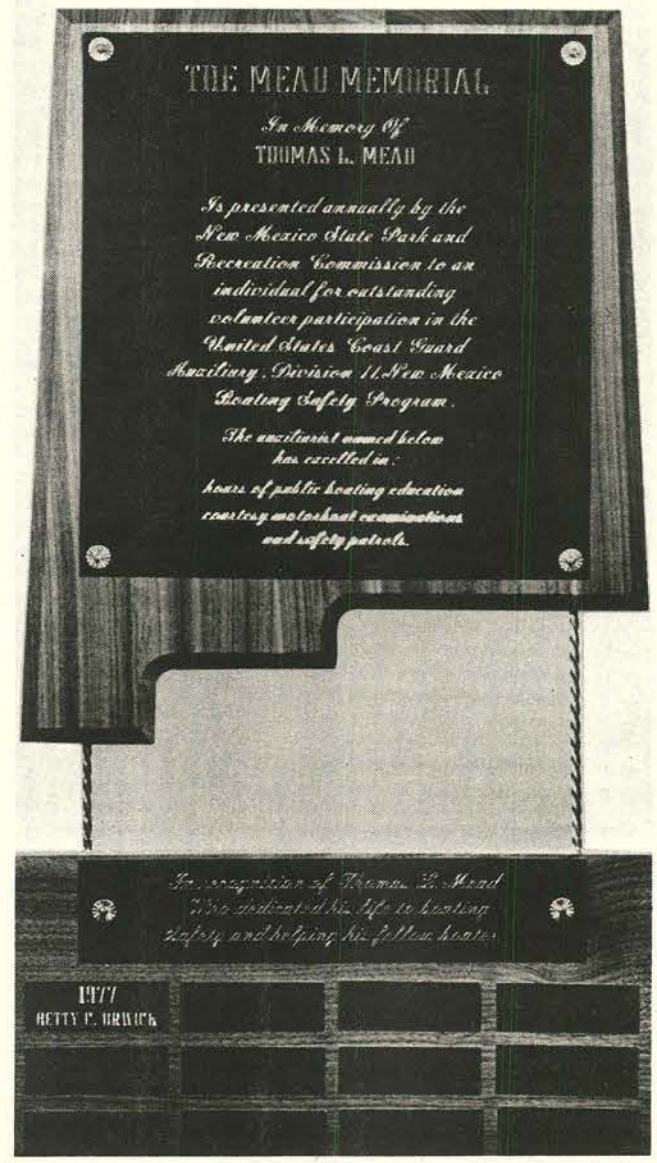
* * *

Sandia Runners—The Fiesta Bowl marathon is being held in Phoenix next weekend, Dec. 10. Entry blanks are available in the LAB NEWS office.

* * *

Skiing—The Coronado Ski Club is offering all sorts of goodies for the coming season. Discounted season passes and Alpine Ski Lesson Programs at Sandia Peak; a 5-day ski trip in January to Copper Mt., Vail, Winter Park, Keystone and Breckenridge; RMSA membership (which gives you a one-shot $5 discount on lift tickets at a number of ski areas); and lodging in Durango at reduced rates. Walt Westman on 881-0471 and Jack Hanna (9300) have more detailed information on the offerings.

Mead Memorial



A MEMORIAL has been established by the New Mexico State Park and Recreation Commission in memory of Tom Mead, a member of the Guard Force who died earlier this year as the result of a boating accident at Elephant Butte—an accident that occurred while he was on safety patrol as a member of the U. S. Coast Guard Auxiliary. The memorial will be presented annually to an individual in the Auxiliary in recognition of outstanding volunteer participation in the boating safety program. Betty Orwick received the award this year. The memorial will be on permanent display at the State Park Office at Elephant Butte.

INVENTORS of a nonviolent explosive destruct system Charlie Daniel and Bill Benedick (both 5131) were informed recently that the concept was awarded a patent for DOE. The device (a quarter scale model shown) contains a non-nuclear explosive capable of destructing a nuclear weapon or components should destruction become necessary. An example would be a field commander in imminent danger of being overrun by terrorists or attackers. Development work on the device was performed by several Livermore divisions after the inventors demonstrated feasibility of the concept. (LAB NEWS, Jan. 28, 1977)

Speakers

P. B. Bailey (5121), "A Calculus of Variations Problem," and "The Sturm-Liouville Eigenvalue Problems," Advanced Mathematical Modeling Course, Rensselaer Polytechnic Institute, Oct. 7-26, Albany, N.Y.

W. R. Wampler (5111), "A Study of the Metallurgy of Hydrogen in Copper," J. W. Mumford)5832), "Influence of Thermomechanical Processing on Hydrogen Embrittlement of 18 Ni (350) Maraging Steel," Hydrogen Embrittlement Symposium, Oct. 18-19, SLL.

H. A. Watts (2613), "Efficient Integration Processes for Solving Boundary Value Problems"; L. F. Shampine (5122), "Starting an ODE Solver," and "Efficiency of Phase Function Methods for Sturm-Liouville Eigenvalues," Ordinary Differential Equations Workshop, Nov. 4-5, Albuquerque.

E. L. Venturini (5132), "Effects of Dilute Pt on the Gd^{3+} ESR Lineshape in $ScH_{1.9}$"; J. E. Schirber (5150) H. Weaver (2354) and D. Ginely (5154), "Pressure Dependence of Crystal Field Splitting in Prpnictides and Chalcongenides"; A. Narath (5000) and D. Follstaedt (5111), "Nuclear Spin Relaxation in $Au^{51}V$: Spin Dynamics of a Kondo Alloy"; 23rd Conference on Magnetism & Magnetic Materials, Nov. 8-11, Minneapolis.

W. B. Gauster (5111), invited presentation, "Muon Spin Rotation in Solids," 11th LAMPF Users Group Meeting, Nov. 13-15, LASL.

W. H. Smyrl and S. L. Pohlman (both 5831), "Experimental Application of Design Principles in Corrosion Research"; J. G. Curro (5813), "Computer Simulation of Macromolecular Systems," Symposium on Computer Simulation Methods for Fluid and Solid Properties, Nov. 13-17, New York City.

L. C. Beavis (2353) and J. C. Newton (2352), "Thermal Desorption and Tube Performance"; L. C. Beavis, "Tube Operation and Processing Effects on Helium Emission"; J. M. Harris and J. A. Borders (both 2353), "Analysis of Cu/Be by Ion Beam Techniques"; Third Critical Process Meeting, Nov. 14-15, St. Petersburg, Fla.

F. J. Zanner (5833), "Melting, Casting, and Microcleanliness of a Series of 304L Stainless Steels," JOWOG 22 Subwog on Steels Meeting, Nov. 14-15, GEND.

M. A. Butler and D. S. Ginley (both 5154), invited presentation, "Prediction of Semiconductor-Liquid Interface Properties from Atomic Electronegativities," Materials Research Society Annual Meeting, Nov. 14-16, Boston.

A. J. Chabai (5166), C. W. Young (1324), P. Yarrington (5166), W. J. Patterson (1324) and R. K. Byers (5166), "Terradynamic Technology: Theory and Experiment"; S. E. Beazley and T. G. Priddy (both 1281), "A Comparison of Finite Element Computations with Experimental Ductile Fracture Data"; E. D. Reedy, Jr. (5844), "Analysis and Applications of a Cracked Stringer-Sheet"; M. E. Kipp (5162) and D. E. Grady (5163), "Continuum Modelling of Rate-Dependent Rock Fracture," 14th Annual Meeting Society of Eng. Science, Nov. 14-16, Lehigh Univ., Bethlehem, Pa.

A. J. Quant (5813), "New Urethanes"; R. R. Lagasse (5813) and K. B. Wischmann (5811), "Structure Property Correlations for Liquid Castable Urethane Elastomers"; L. H. Jones (5813), "Cable Jacket Aging Study: Comparison of Polyether and Polyester Urethane Materials"; C. J. Leedecke (5845), "Glass Ceramic Pin Seals for Lightning Arrester Connectors," 1977 Cable & Connector Symposium, Nov. 15-16, Bendix, KC.

F. R. Krause (5333), "Satellite Applications to Marine Operations—Conference Overview," Conference on Satellite Applications to Marine Operations, Nov. 15-17, New Orleans.

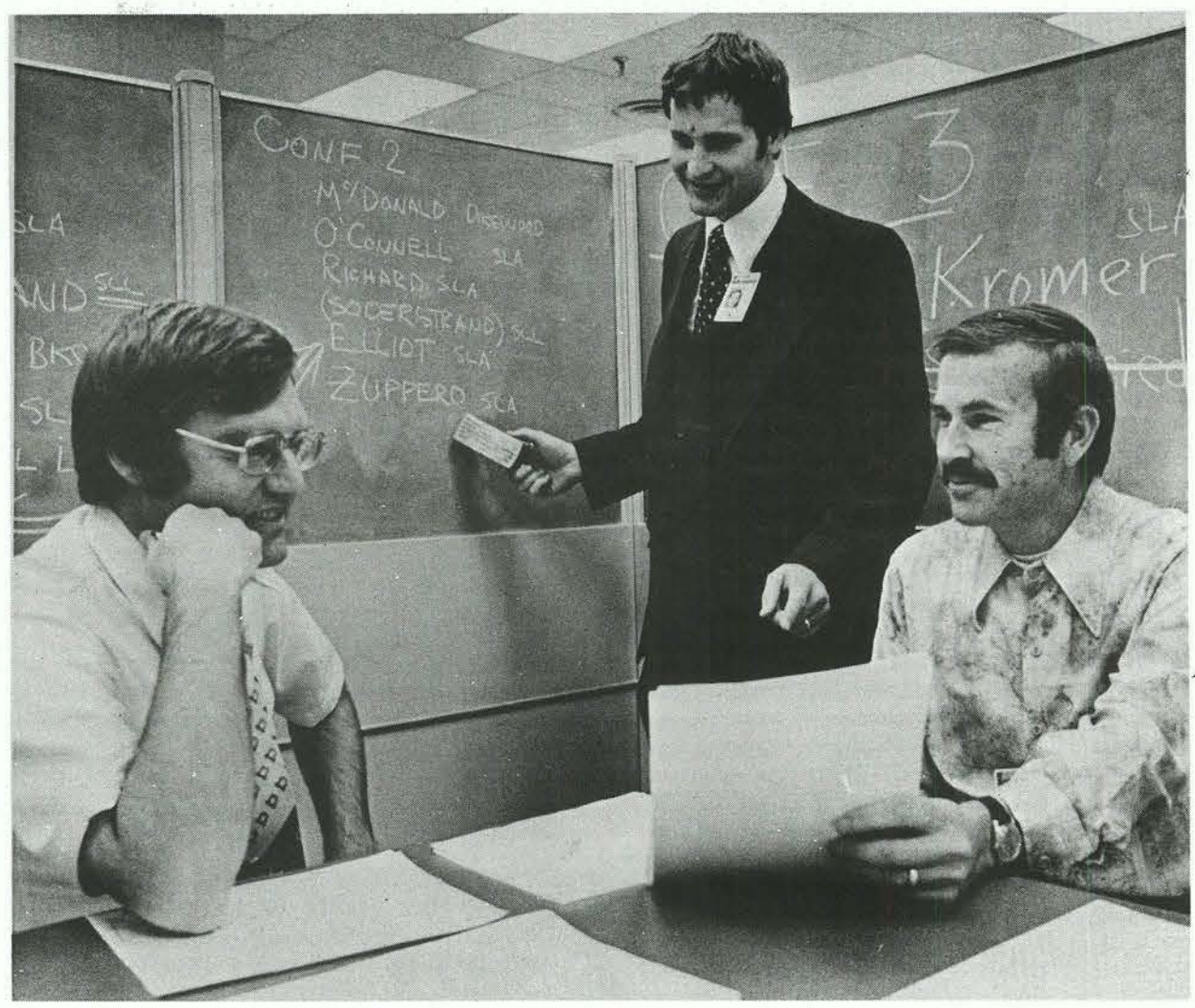
A. D. Swain (1223), "Practical Methods of Reducing Human Error in Production," Pittsburgh section of ASQC, Nov. 5, Pittsburgh.

L. P. Robertson (1756), "Brasil—A Sleeping Giant," Harvard-Yale-Princeton Club, Oct. 3, and Northwest Kiwanis Club, Oct. 12, Albuquerque.

R. M. Jefferson (5430), "Sandia's Nuclear Fuel Cask Testing Program," Kansas City, Mo., Section, ANS, Oct. 4.

H. C. Monteith (5411), "The Blessings and Curses of Nuclear Power," Duke City Civitan Club, Oct. 4; "Using Math on the Job," John Adams Middle School math classes, Oct. 6; "Research in Paranormal Phenomena," New Center Club, Santa Fe, Oct. 18 and Parents Without Partners, Albuquerque, Oct. 22.

T. F. Marker (6010), "The Oil Industry: Fact and Fiction," Albuquerque Breakfast Civitan Club, Oct. 11.



DIGITAL SIGNAL PROCESSING SYMPOSIUM is coming up next week, Dec. 6 & 7, and Jim Yoder (9625), Mike Soderstrand (8159) and Sam Stearns (1111) head committees concerned with the gathering. More than 175 people plan to attend the sessions, most of them to be held at the Labs in Bldgs. 815 and 632. Keynote speaker is Richard Hamming, well-known numerical analyst, author and leader in computer science applications.

G. H. Miller (5216), "Science History—Fact and Fancy," Northwest Kiwanis Club, Oct. 19.

E. C. Boes (5719), "Solar Energy Research," ASCE Student Chapter, UNM, Oct. 26.

R. L. Iman (1223), "Approximations of the Critical Region for Spearman's Rho with and without Ties Present," Albuquerque Chapter of the American Statistical Association, Oct. 19.

W. Bauer (8347), "ARAZ; Definition and Status"; W. R. Wampler (5111), "Precipitation and Trapping of Hydrogen in Copper"; S. T. Picraux (5111), "Hydrogen Isotope Lattice Location Entrapping Studies"; S. M. Myers (5111), "Observation of H Trapping by Ti in Fe Using Ion Beams"; R. L. Wilson (8347), "Thermal Desorption of Deuterium-Implanted Stainless Steel"; D. R. Begeal (2553), "An Evaluation of In-Situ Grown Refractory Oxide Films on Copper Alloys, and Tungsten Films on Molybdenum as Hydrogen Permeation Barriers"; J. E. Schirber (5150) and M. J. Davis (5830), "Proposed Mechanisms for Embrittlement of Steel"; G. J. Thomas, W. A. Swansiger (both 8347), and M. I. Baskes (8341), "Low Temperature ^3He Desorption in Nickel"; M. I. Baskes (8341) and J. H. Holbrook (8314), "A Calculation of the Induced Volume Changes in Copper"; J. H. Holbrook (8314) and W. D. Wilson (8341), "Helium Binding to Dislocations in Metals"; C. F. Melius (8341) and C. L. Bisson (8325), "Promising New Hydrides for ARAZ"; E. L. Venturini and P. M. Richards (both 5132), "Electron Spin Resonance of Gd^{3+} in $ScH_{1.9}$ and $Sc_{1-x}Pt_xH_{1.9}$"; L. C. Beavis and R. C. Patrick (both 2353), "Helium Flow from Ergium Tritide at Elevated Temperatures"; H. T. Weaver (2354), "NMR for Aging Tritides"; C. F. Melius and T. Upton (both 8341), "Quantum Chemical Calculation of H and He Motion in TiH_2 Clusters"; R. K. Quinn (2516), "Oxidation of Titanium Hydrides and Titanium Metal"; M. E. Malinowski (8347), "Deuteriding of Titanium Thin Film"; W. R. Wampler (5111), "Investigation of the Scattering of Conduction Electrons in Copper from Interstitial Hydrogen Using the DeHaas-Van Alphen Effect"; A. C. Switendick (5151), "Theoretical Studies of Hydrogen and Helium in Metals - Current Status and Future Prospects"; C. F. Melius (8341), "Quantum Chemical Atomistic Hybrid Approach to Hydrogen and Helium Diffusion in f.c.c. Nickel"; D. Emin (5151), "The Small Polaron Model of Light-Ion Diffusion"; M. I Baskes and W. D. Wilson (both 8341), "On the Applicability of Small Polaron Theory of ^3He Diffusion in Metals"; K. K. Murata (5151), "Percolation in Interactive Systems"; L. G. Haggmark and J. P. Biersack (both 8341), "Monte Carlo Calculations of Ranges and Stragglings of Hydrogen Implants in Metals"; D. Emin (5151), "On the Nature of Interstitially-Induced Lattice Strains," Symposium on Hydrogen and Helium in Metals, Oct. 13-14, SLA.

R. T. Dillon and J. F. Pearson (both 5413), "Development of a Methodology for Risk Analysis of the Disposal of High-Level Radioactive Wastes," High-Level Radioactive Waste Symposium, Nov. 6-9, Seattle.

T. A. Sellers (1751), "A Review of Potential Technology Contributions to Safeguards," ANS conference on Safeguards, Oct. 16-19, Hyannis, Mass.

L. C. Bartel (5732), "Sandia Laboratories Programs for in Situ Coal Gasification and In Situ Shale Oil Recovery," Section Meeting of IEEE, Oct. 20, Alamagordo, N.M.

B. L. Hulme (5122), "Shortest Path Algorithms Applied to Fixed-Site Safeguards Problems," Harvard Univ. Applied Mathematics Colloquium, Oct. 20, Cambridge, Mass.

E. C. Cnare (5233), M. Cowan (5230), T. P. Wright (5231) and W. K. Tucker (5233), "Pulsed Power Conversion with Inductive Storage," 7th Symposium on Engineering Problems of Fusion Research, Oct. 24, Knoxville, Tenn.

R. L. Iman (1223), "Statistics Methodology for Use in Risk Assessment of Radioactive Waste Disposal in Geologic Media"; I. J. Hall and R. R. Prairie (both 1223), "Generation of Standard Meteorological Year," Third ERDA Statistical Symposium, Oct. 27, Richland, Wash.

T. J. Young, D. R. Doehler and R. A. Adams (all 2531), "Radiation Induced Transient Thermal Effects in 5 MHz AT-Cut Quartz Resonators," 1977 Ultrasonics Symposium, Oct. 28, Phoenix.

R. K. Traeger (5731), "Energy from Magma - and Chemical Engineering?", Student AIChE Chapter, Nov. 10, University of Wisconsin, Madison.

R. J. Hanson (5122), "Basis Row-Column Operations with Orthogonally Linked Sparse Matrices for Use with FORTRAM," Univ. of Denver Computing Center, Oct. 21, Denver.

F. L. Vook (5110) "Use of Ion Beams in Studies of the Fundamental Properties of Matter," US-USSR Cooperative Program on Fundamental Properties of Matter, Oct. 23-Nov. 4, Moscow, USSR.

[Continued Next Page]

Speakers

A. W. Johnson (5126) and J. J. Ramirez (5246), "Excitation of Xe_2 Excimers With a Radially-Converging Electron Beam"; M. M. Widner, J. W. Poukey, J. P. Quintenz (all 5241), and J. A. Halbleib, Sr. (5231), "Enhanced Electron Deposition in Foils"; F. C. Perry (5242), M. M. Widner (5241), R. J. Leeper and A. J. Toepfer (both 5242), "Experimental Investigations of Shock Focusing and Double-Shell Targets"; L. Baker and J. R. Freeman (both 5241), "Heuristic Model for Non-linear Rayleigh-Taylor Instability"; M. A. Sweeney and M. J. Clauser (both 5241), "Voltage Shaping with Electron-Beam Targets"; J. P. Quintenz and J. W. Poukey (both 5241), "Non-Uniform Mesh Diode Simulation Code"; J. W. Poukey and K. D. Bergeron (both 5241), "Time Dependent Coax Calculations"; R. S. Clark, J. J. Ramirez and K. R. Prestwich (all 5246), "Studies on Microsecond, E-Beam Diodes Operating at Low Electric Fields and Current Densities"; J. J. Ramirez (5246) and J. A. Halbleib, Sr. (5231), "Energy Deposition in E-Beam Excited Gas Laser Systems-Theory vs. Experiment"; K. D. Bergeron and T. P. Wright (both 5241), "Theory of Double Sheaths in Plasmas"; M. T. Buttram and R. S. Clark (both 5246), "An Experimental Study of Current Instability in Relativistic Electron Beam Diodes"; R. J. Leeper and J. Chang (both 5242), "The Response of Heavily Shielded Plastic Scintillator-Photomultiplier Combinations to Nanosecond Neutron Pusles"; C. W. Mendel, Jr. (5244) and M. T. Buttram (5246), "Microwave Scattering from Needle Cathode Bursts"; S. A. Goldstein, P. A. Miller (both 5244), D. M. McDaniel (5245), and D. J. Johnson (5244), "Electron Beam Pincing Experiments on the Proto II Accelerator"; S. Humphries, Jr. (5244), Magnetically Insulated Intense Ion Beam Accelerators for Fusion Applications"; P. E. Bolduc (5232), "Generation of 7-10, 10-50 kA Pulsed Ion Beams"; M. K. Matzen (5211), J. S. Pearlman (USERDA, DLE), and R. L. Morse (Univ. of Ariz.), "Calculation of Non-Equilibrium Processes in Laser-Produced Plasmas"; E. J. T. Burns (5242). S. A. Goldstein, J. N. Olsen (both 5244), and L. P. Mix (5242), "Current Density and Electron Beam Target Temperature Measurements on Proto I"; A. V. Farnsworth, Jr., M. M. Widner, M. J. Clauser (all 5241), and K. E. Lonngren (Univ. of Iowa), "Hydrodynamics of Particle Beam Blowoff Plasma"; L. P. Mix, E. J. T. Burns (both 5242), M. J. Clauser (5241), S. A. Goldstein (5244), R. J. Leeper (5242), C. W. Mendel, J. N Olsen (both 5244), J. W. Poukey and J. P. Quintenz (both 5241), "Target Experiments on Proto I"; R. B. Miller (5244), "Ion Acceleration in a Traveling Virtual Cathode"; J. N. Olsen (5244), E. J. T. Burns (5242) and S. A. Goldstein (5244), "Temperature of Thin Foil Heated by Relativistic Beam"; J. Chang (5244) and R. J. Leeper (5242), "A Short Pulse Neutron Source"; M. J. Clauser and L. Baker (both 5241), "Effects of Turbulence on the Rayleigh Taylor Instability," Plasma Physics Meeting of the American Physical Society, Nov. 7-11, Atlanta, Ga.

T. E. Madey, P. H. Holloway (both 5825), R. R. Rye and J. E. Houston (both 5114), "Chemical State Effects in Auger Electron Spectroscopy"; W. B. Gauster (5111), invited presentation, "The Study of Radiation Damage in Metals by Positron Annihilation"; G. C. Nelson (5825), "A Combined Low Energy Ion Scattering and X-Ray Photoelectron Spectroscopy Study of $TA_2 0_5$ Bombarded by 500 to 3000eV He Ions"; D. R. Jennison (5151), "The One-Electron Theory of Auger Lineshapes: Silicon $L_{23}VV$ and $L_1L_{23}V$"; H. H. Madden (5114), D. M. Zehner and J. R. Noonan (both Oak Ridge), "Atomic-Model and Valence-Band Features in the MVV Auger Spectra of Copper"; R. S. Berg (5842) and R. D. Nasby (5155), "Structure and Morphology of Chemical Sprayed CdS Films," 24 National AVS Symposium, Nov. 8-11, Boston.

J. M. Taylor (1233), S. L. Daniel (5412) and A. R. DuCharme (5413), "A Model to Predict the Radiological Consequences of Transportation of Radioactive Material Through an Urban Environment"; A. R. DuCharme, M. S. Tierney (both 5413), J. M. Taylor (1233) and B. H. Finley (1222), "Assessment of the Environmental Impacts Produced by the Transport of Radioactive Materials through Urban Areas"; R. E. Akins, H. W. Church (both 5433) and M. S. Tierney (5413), "Simulated Atmospheric Dispersion of Radioactive Material Released in an Urban Area," 4th Joint Conference on Sensing of Environmental Pollutants, Nov. 6-11, New Orleans, La.

T. N. Simmons (3312), "EMP Measurements About Sandia Pulsed Electron Accelerators," Combined Fall meeting AIHA and HPS, Oct. 27-28, Albuquerque.

P. W. Conrad (5411), "Network Model for Free Convection Within Internally Heated Porous Media," Annual Post-Accident Heat Removal Information Exchange, Nov. 2-3, Argonne, Ill.

. . . AND TO THE LEFT . . . AND TO THE RIGHT . . . and not infrequently behind. But the schedule's not. With the New Year (light the tall tapers and dance in the streets!) Wyoming will be given back to us better than ever, they say. Detour signs, et al, will be sent to wherever old signs go.

E. A. Salazar and K. T. Gillen (both 5813), "Accelerated Aging Studies of Electric Cable Material"; L. L. Bonzon (5432), "Synergistic Effects and Source Term Considerations Associated with Class IE LOCA Qualification Testing"; L. J. Klamerus (5432), "Fire Protection Research Project," Fifth Water Reactor Safety Research Information Meeting, Nov. 7-11, Gaithersburg, MD.

J. F. Gonzales (9581), "Automated Equipment Management System in Use by the Process-Fabrication Organization," IMOG Maintenance Seminar, Nov. 14-17, Miamisburg, Ohio.

J. D. Keck and E. Edge (both 2521), "The Effect of Lead Stoichiometry on PZT Ceramics"; J. C. Swearengen (5835), R. H. Marion and E. K. Beauchamp (both 5846), "Fracture in Glass and Ceramics"; S. M. Lappin (5845), "Application of HR66B + CoO Glass Ceramic to Seal 304L Stainless Steel and Niron 52"; B. M. Schwartz and C. J. Leedecke (both 5845), "Fabrication of a Radar Connector/Sealing to Paliney 7"; T. D. Hund and C. P. Ballard (both 5845), "Crystallization of a Li_2O-Ba O-SiO_2 Glass Ceramic"; J. D. Keck (2521), "Lead Zirconate Modified by Barium, Strontium, and Niobium"; P. D. Wilcox (2521), "Some Observations on PLZT Lenses"; S. White and G. S. Snow (2521), "High Field Varistors," N.M. Section of the American Ceramic Society Materials Symposium, Nov. 18, SLA.

S. A. Wright (5423), J. H. Renken (5231) and F. R. Kroeger (2151), "In-Core Fuel Motion Detection in the Sandia Pulse Reactor"; M. A. Molecke (1141), "Waste Isolation Pilot Plant Transuranic Wastes Experimental Program" and "The Waste Isolation Pilot Plant High-Level Waste Experimental Program"; L. W. Scully (1142), "Conceptual Design of the Waste Isolation Pilot Plant for ERDA TRU Waste"; M. L. Merritt (1151), "Environmental Studies for the WIPP"; D. W. Powers and L. R. Hill (both 1141), "Site Evaluation for the Waste Isolation Pilot Plant (WIPP) South-Eastern New Mexico"; D. W. Lobitz, R. E. Nickell (both 5431), and J. D. McClure (1282), "Residual Stresses and Deformations in Multi-Pass Welding"; T. O. Hunter (1133) and Prof. Gerald L. Kulcinski (Univ. of Wisc.), "Temperature and Displacement Transients in Inertial Confinements Fusion First Walls"; J. L. Mitchner (5742), "An Economic Model of a Relativistic Electron Beam Hyrbrid Reactor"; J. E. Morel and J. A. Halbleib (both 5231), "A Generalized Quadrature Technique for Solving the Transport Equation"; R. B. Jones (5413), "A Geometric Interpretation of Optimal Iteration Strategies"; J. E. Smaardyk (5167), "Large Scale Sodium Interactions Part 2: Preliminary Test Results for Limestone Concrete"; E. Gorham-Bergeron (5425), "Theoretical Considerations of Rate Effects in Uranium Dioxide"; L. L. Bonzon (5432), K. T. Gillen and E. A. Salazar (both 5813), "A Consolidated Program to Evaluate Class IE Equipment Qualification Techniques"; P. S. Pickard (5420A) and D. J. Sasmor (5422), "Testing of BeO-UO_2 Fuels for the ACPR Upgrade"; P. S. Pickard (5420A) and J. P. Odom (SAI), "Calculated Physics and Performance Parameters for the ACPR Upgrade"; K. O. Reil (5422), "Effective Equation-of-State Measurements on Uranium Dioxide"; J. S. Philbin (5452) and M. F. Young (5425), "Large Scale Test Technology"; K. G. Adams and A. A. Trujillo (both 5741), "Considerations in the Evaluation of the Human Element of a Safeguards System"; R. W. Ostensen (5425), "Design of LMFBR Safety Test Reactors," "Effect of Thermal Stress on Oxide Crusts," and "Fission-Gas Bubble Modeling for LMFBR Accidents"; H. G. Plein (5422) and G. A. Carlson (5423), "First In-Core Molten Fuel Pool Experiment"; P. W. Conrad (5411), "Network Model of Free Convection within Internally Heated Porous Media"; D. L. King (9337), "Large Scale Sodium Interactions Part 1: Test Facility Design"; R. L. Knight (5411), "Thermal Behavior of Concrete"; L. S. Nelson (5443) and L. D. Buxton (5412), "Steam Explosion Triggering Experiments with Oxidized Corium-E Simulants"; M. F. Young (5425), "Hydrodynamic Analysis of the Prompt Burst Excursion (PBE) Experiment"; L. L. Bonzon (5432), "Adequacy of Radiation Sources for Qualification of Class IE Components"; G. C. Allen, B. G. Eakes and J. M. Freedman (all 5433), "Spent Fuel Shipping Cask Designs for Breeder Reactors"; R. M. Jefferson (5430), "Full Scale Tests of Spent-Fuel Shipping Systems"; J. G. Kelly (5423) and K. T. Stalker (1354), "Coded Aperture Imaging of Reactor Illuminated LMFBR Fuel Pins"; R. A. Sallach (5831), "Large Scale Sodium Interactions - Part 3"; T. R. Schmidt, B. F. Eakes (both 5451), and J. A. Reuscher (5450), "Recent Operational History of the New Sandia Pulsed Reactor III"; D. C. Williams (5425), "The Importance of Scale and Triggering Effects in Vapor Explosions"; D. H. Nguyen (5425), "On the Minimum Number of Fuel Pins for Prototypic Large-Scale Testing" and "Effects of Less-Than-Prototypic Fuel Length in In-Pile Testing"; D. A. Benson (5167), "Rate Effects in the Dynamic Vaporization of Uranium Dioxide"; J. A. Brammer (1136), "Mobile Helium Cooling Loop System for In-Reactor PAHR Experiments"; S. A. Dupree (5231), "Radiation Shield Design for LMFBR Spent-Fuel Shipping Casks"; P. R. Dawson and J. R. Tillerson (both 5162), "Thermally Induced Movement of Nuclear Waste Canisters in Salt Formations"; D. O. Lee (1261) and R. H. Wilson (1262), "Flow Visualization and Similarity Parameters for Debris Bed Studies"; J. B. Rivard (5422), "First In-Reactor Experiment with Simulated LMFBR Debris Bed," 1977 Winter Meeting, American Nuclear Society, Nov. 27-Dec. 2, San Francisco.

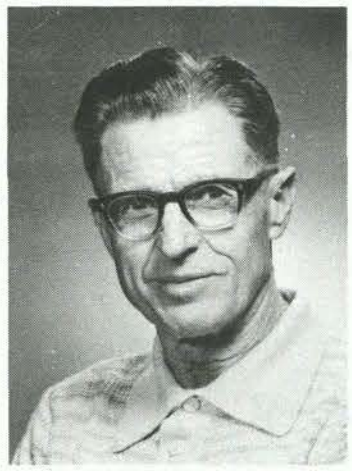
L. S. Nelson (5333) and L. D. Buxton (5412), "The Relationship of Reactor Safety Steam Explosion Data to Phreatomagmatic Explosions," Penrose Conference on Submarine Volcanism, Nov. 29, Santa Barbara, Calif.

G. R. Case and J. D. Stauffer (both 2113), "SALSIM - A Language for Control of Digital Logic Simulation"; G. T. Preas and C. W. Gwyn (both 2142), "Architecture for Contemporary Computer Aids to Generate IC Masks Layout," 11th Annual ASILOMAR Conference on Circuits, Systems & Computers, Nov. 7-9, Pacific Grove, Calif.

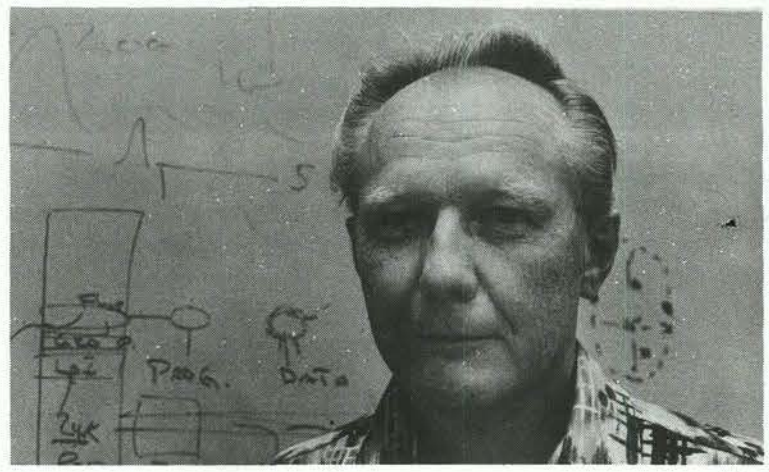
J. C. Cummings, D. P. Aeschliman and A. J. Mulac (all 5216), "Specie Concentration and Temperature Measurements in a CW, HF/DF Chemical Laser Using Raman Spectroscopy"; R. L. Fox (1261), "Multipoint Distribution Function Investigation of Turbulent Mixing" and "A Tracer Particle Method for Calculation of Fluid Flows," Division of Fluid Dynamics Meeting, APS, Nov. 21-23, Bethlehem, Pa.

MILEPOSTS
LAB NEWS

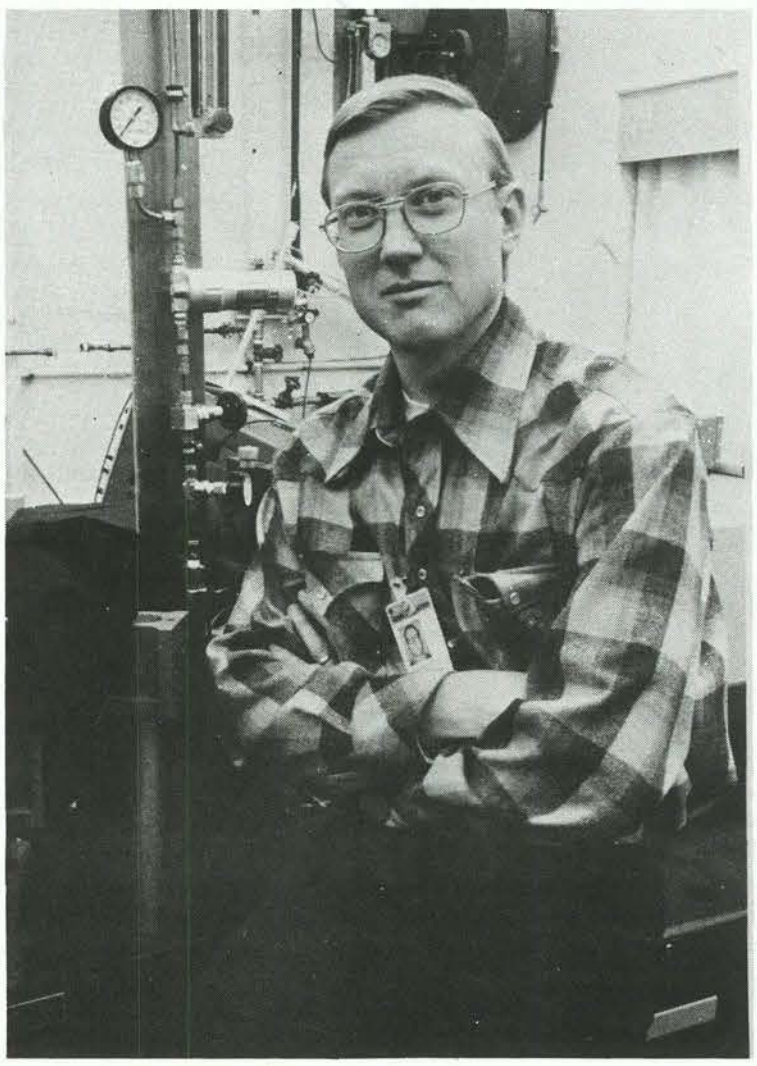
DECEMBER 1977



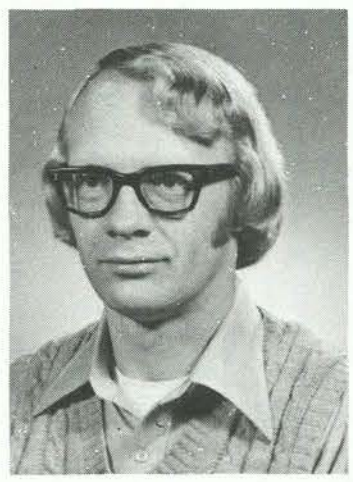
Joseph Phillips - 4337 25



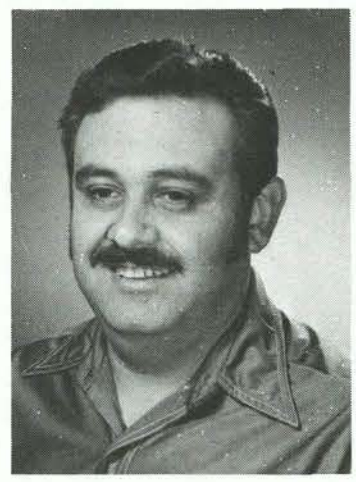
Milo Navratil - 9421 20



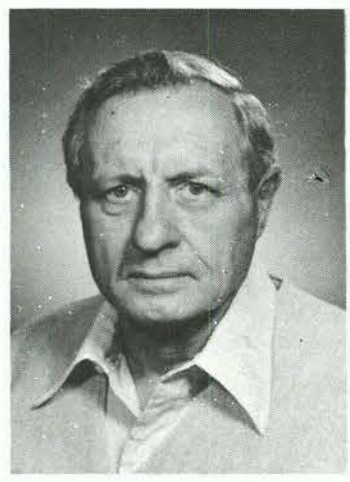
Daniel Aeschliman - 5217 10



Ronald Halbewachs - 2641 10



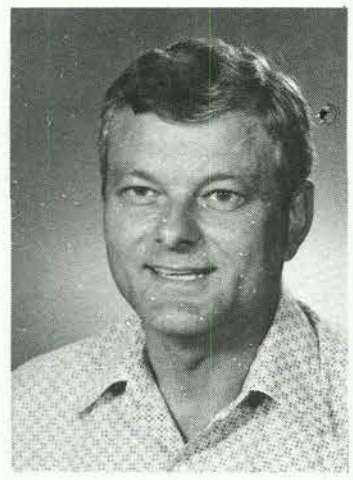
Arthur Anadzola - 2612 20



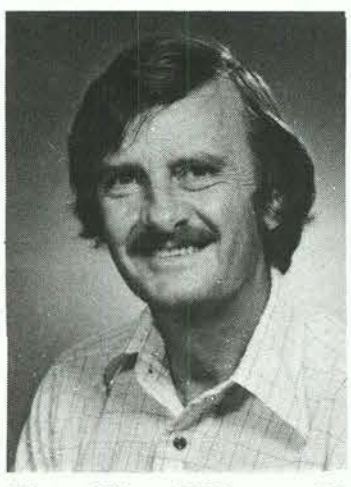
Ronald Helm - 2612 20

Eulita Welch - 9572 20

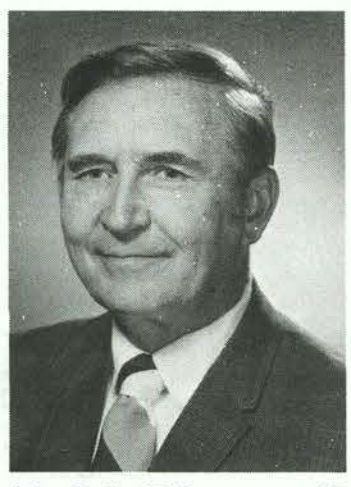
Angelina Gurule - 3152 25



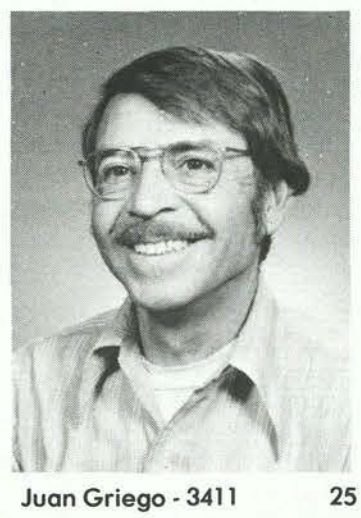
Joseph Flanagan - 3171 25



Edward Hart - 2313 20

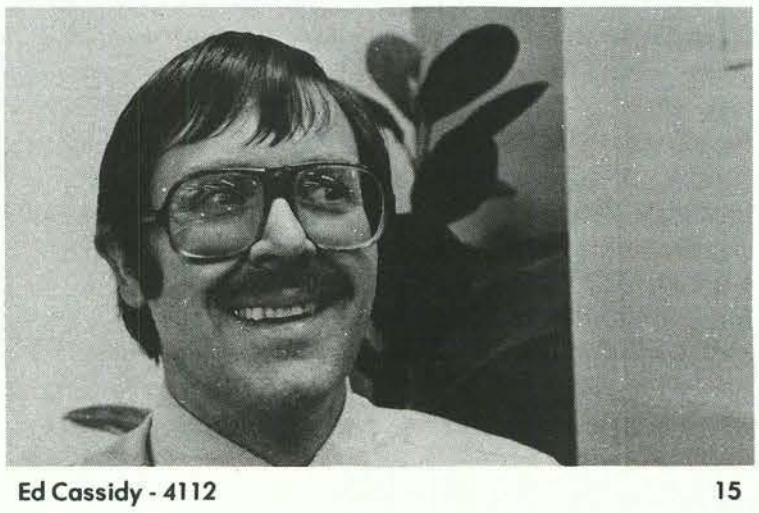


John Hall - 9743 15

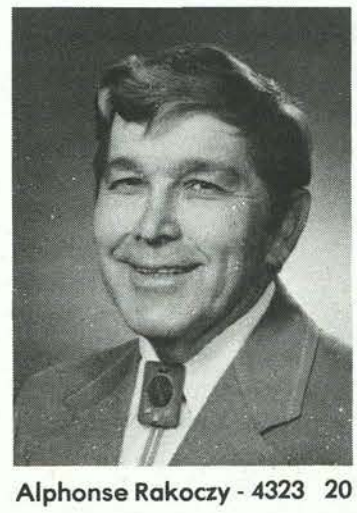


Juan Griego - 3411 25

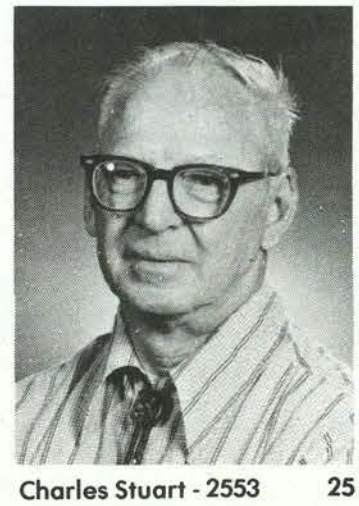
Pauline Laforest - 9563 25



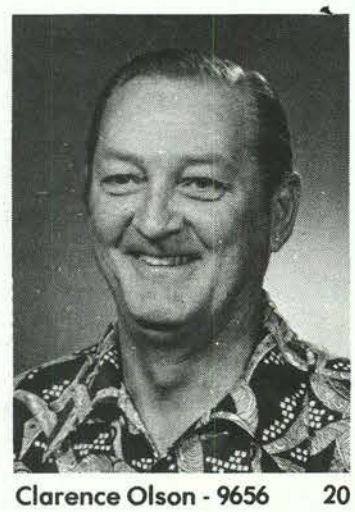
Ed Cassidy - 4112 15



Alphonse Rakoczy - 4323 20



Charles Stuart - 2553 25

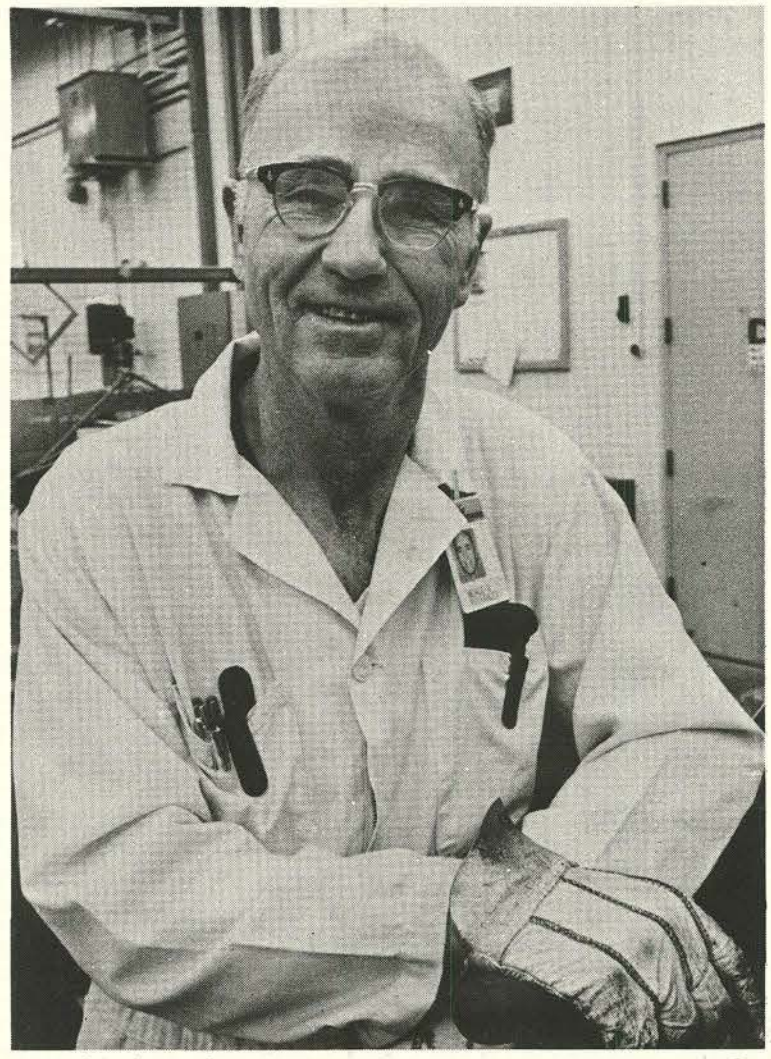


Clarence Olson - 9656 20

Jesse Harness - 9421 20

Ted Garcia - 2632 15

G. H. Donaldson - 2154 25

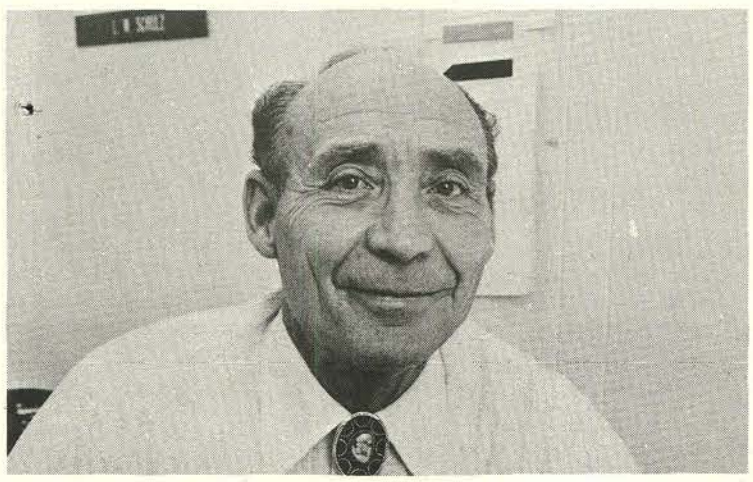


Merle Alexander - 9573 25

Charlotte Gilmer - 3252 20

Jack Dini - 8312 15

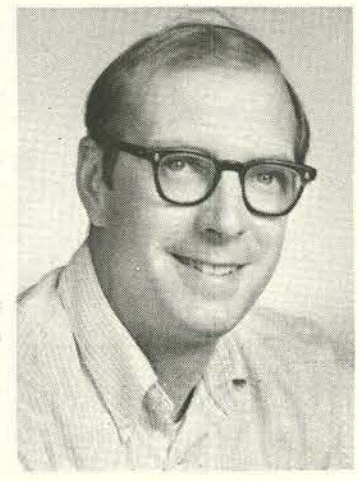
Ernest Sanders - 5232 20



Lee Schulz - 2324 30

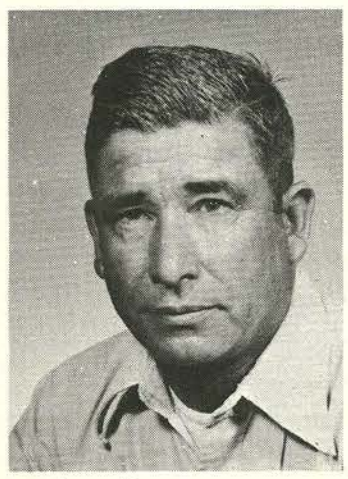
Nena Brannan - 3151 25

Walter Drake - 9335 30

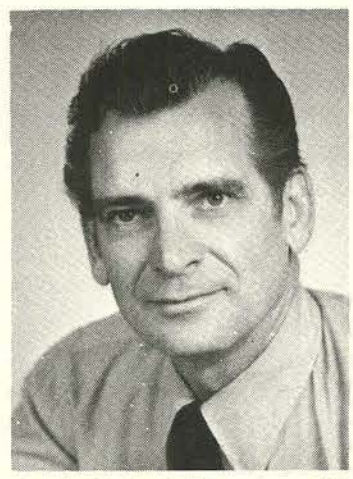


Sian Zehr - 8326 10

Reinhart Gauerke - 2533 25

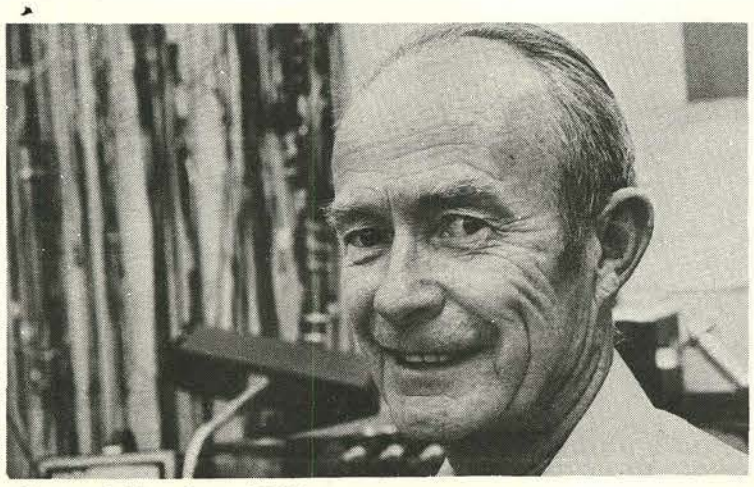


Basilio Villescas - 9714 15



Gayle Cain - 8412 25

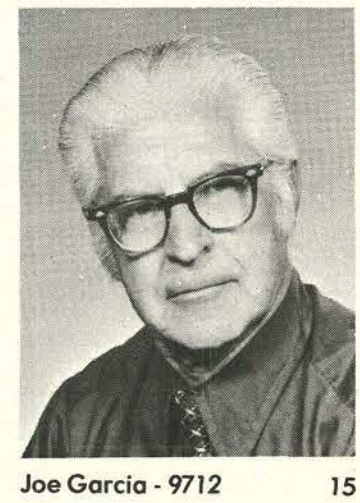
James Kobs - 2336 15



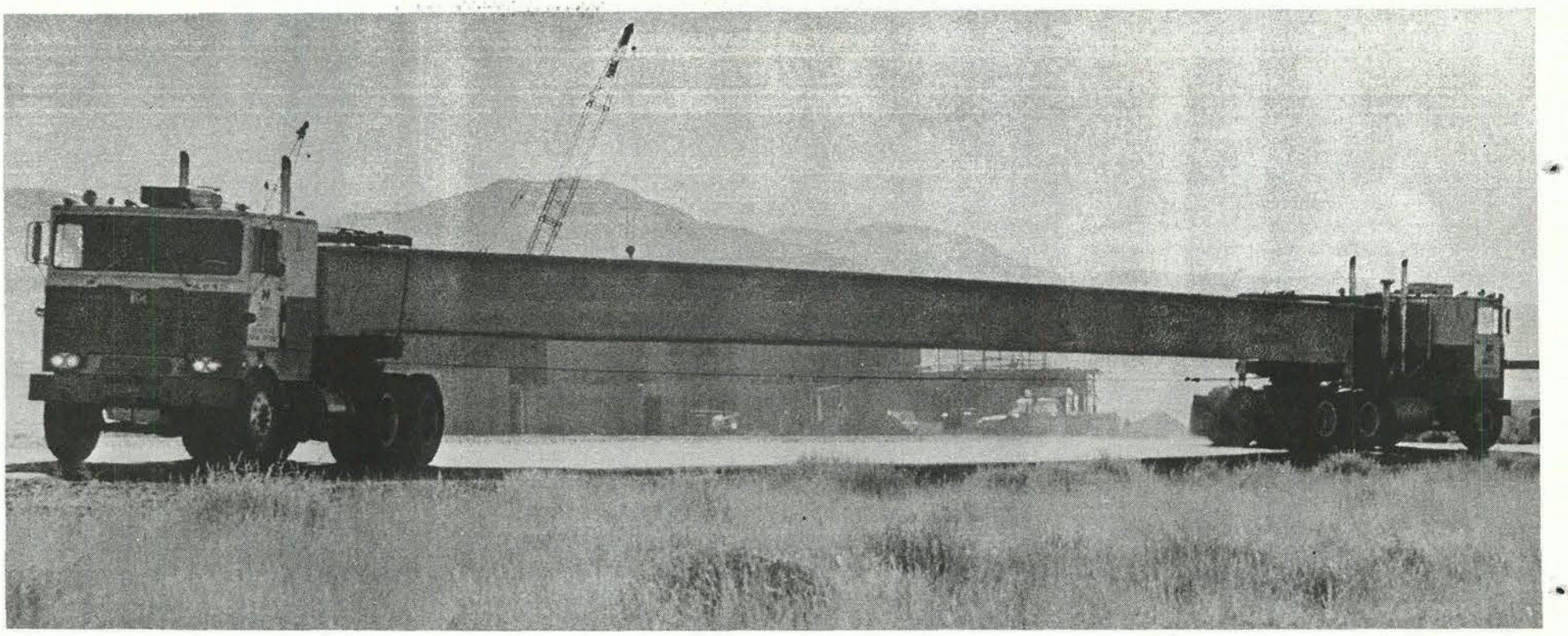
Kenneth Urquhart -2162 30

Bud Brock - 8261 10

Dave Braudaway - 2552 20



Joe Garcia - 9712 15



FULL SPEED AHEAD? To demonstrate the adage that two heads are better than one, this strange looking rig is used to transport the huge concrete T-beams that form the roof of Sandia's new Electron Beam Fusion Facility (scheduled for completion in Fall 1978). The T-beams weigh 37 tons and are 128 ft. long. With both tractors in place, the total length from bumper-to-bumper is 150 ft.—a formidable vehicle to encounter on the freeway. Manufactured locally, the T-beams are delivered with escort vehicles fore and aft to ward off the unwary. With two drivers facing in opposite directions (communicating by radio) maneuverability is excellent and the T-beams can be placed precisely. Despite need for close cooperation, it is rumored that the drivers are never encouraged to pull together.

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MISCELLANEOUS

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KITCHEN AID built-in dishwasher, needs some work; cast iron kitchen sink, complete. Grant, 255-6105.

NAVAJO style lg. blanket, $25; children's '45 records; Spanish '78 record album; Japanese 8mm movie camera, $25. Smitha, 881-1001.

SKIS, tall, Look bindings, $85. Lenz, 298-9121.

AUSTRALIAN SHEPHERD puppies, whelped Sept. 30, 2 merle & 2 b/w males, 2 b/w females, $50 ea. Wladika, 255-9166.

CONN CORNET, gold plated, approx. 75 yrs. old, make offer. Dyckes, 298-8380.

CAMPER SHELL, lwb, $150. Chavez, 877-4312.

MOBILE HOME, 12x46, appliances, AC, 2-bdr. Aragon, 294-0225.

TWIN SIZE innerspring mattress & box spring, $49; G-78-14 Polyester tire w/good tread, $7. Winblad, 898-9762.

ZENITH AM-FM stereo record player, $30; full size rollaway bed, $20; 6x9 shag carpet, gold, $35. Keck, 294-2887.

DRUM SET: Recco, bass, 3 tom toms snare, pedals, stand, clap cymbal extra cymbal, microphone boom stand for drummer, seat, $150. Griego, 821-8447.

SNOW TIRES, studded, E78-13, 1 pr., 20% used recaps, $40 pr. Church, 268-3590.

SCHWINN bicycle, boy's 20", yellow speedster, $30. Kinney, 298-5281 after 5.

GIRL'S 20" bike, $25; child's chest-of-drawers, $15; blond end table, $5; child's desk, $10. Brown, 296-9009.

TIRE CHAINS, bar reinforced, fits 6.40-15, 7.35-14, 7.35-15, 7.00-14, 6.50-15, $12. Carnicom, 281-3421.

LADIES DIAMOND & RUBY cocktail ring, Mindlin Jewelers appraisal $375, asking $225. Bogdan, 293-9304.

3M COPY-MITE copier; ThermoFax copy machine; $100 or make offer. Browne, 881-3772.

POOL TABLE, regulation, heavy 3-section slate, new & still in the crate from Montgomery Wards, $350. Fernandez, 293-6731.

35MM MINOLTA XE-5, auto/manual, electronic shutter, w/28mm f2.5 & Vivitar Series 1 70-210 macro/telephoto, focus to 3", $385. Goodwin, 266-6216.

2 VW snowtires mounted, $20 ea.; 2 Michelin steel belted studded snowtires (175X13) mounted Capri rims, $40 ea; 5 Dodge Ramcharger rims, $6 ea. Hopper, 292-3059.

GUITAR, wide neck, $45. Dalphin, 265-4029.

VIOLIN, ¾ size, w/sturdy case & accessories, $100 or best offer. Daniel, 299-0136 after 5.

SKI RACK, trunk mount, hold 4 pr., fits most cars, used 1 season, $20. Nuttall, 821-2895.

KITCHEN TABLE, heavy formica, metal frame & legs w/11" wide leaf, $28; Ping Pong table, rollaway, folding, metal frame, case & accessories, $35. Dancy, 299-8223.

WHIRLPOOL GAS DRYER, 2 yrs. old, $175; Roper gas range, 3 yrs. old, $185; complete 50-gal. aquarium, $100 or best offer. Wilcoxen, 821-1621 after 5:30.

TWO 1200x16.5 truck tires, 8-ply nylon, 1 good for spare, $5, 1 w/over half tread, $30. Stephenson, 299-3914.

SNOW TIRES, 5:20-13 on 4-hole TR rims, $30; 5 gal. gas can carrier, $5; Coleman and propane catalytic heaters, $20 ea; GM trailer hitch, $5. Lucas, 293-1394.

OUTDOOR UMBRELLA clothes dryer, new line, $16; decorator screens, $10 & $3; traverse rods, $3-$10; metal serving cart, $4; projection screen $20. Collins, 292-0495.

MOBILE HOME, 12x60, unfurnished, includes washer & dryer appliances, $2500 down, take over $74 monthly payments. Martinez, 298-7819.

FOUR WHEELS, 14" 5-hole, $20; four Mustang hubcaps, $10. Snyder, 296-5771.

FIBRE GLASS insulation, 3 rolls R-11 x 23" (107 ft^2), 2 rolls R-19 x 23" (61 ft^2), $13 per roll. Berg, 296-2695.

CAMPER, Travette, 8' cab-over, sleeps 4, $1200 or best offer. Schneider, 296-2487.

HOMELITE super XL chain saw; Ping-Pong table. Wilkinson, 299-8327.

FREE goat manure, you load & haul. Davis, 877-0839.

ORGAN, Baldwin Panasonic w/Leslie speakers, $450. Schindwolf, 897-0470.

5-GALLON glass water bottles (carboys), $3.50 & $4.50 ea.; decorative hollow glass building blocks, 12x12x4, $3 ea. Barth, 345-0172.

TWO crocheted afghans; hand crocheted shawl; new Sears electric knife. Wagner, 881-4840.

HIDE-A-BED COUCH, blue/green, 80" wide, $149; metal gate, 2" sq. tubing, 42" wide, 48" high, $19. Sublett, 298-1004.

CUSTOM CAMPER, 9' cabover, fits LWB, styrofoam insulation, porta-potti, sleeps 4, lots of storage, $1050. Erni, 268-1721.

BRASS FIREPLACE screen, fits opening approx. 30" wide, 25" high, attaches at top, $15. Binder, 299-2937.

19" PANASONIC portable color TV, $100. Person, 877-5858.

BICYCLES: 20", 2 girls, 1 boys, all single speed. Rudolph, 298-0941.

FIREPLACE SCREEN, brass finished w/pull chains, bolt-in type, approx. size 35" wide, 24" high, $20 or best offer. Plummer, 296-4327.

AIR HOCKEY GAME, 6', by Brunswick, $89. Knutson, 299-6183.

VAN SEATS, pair, std. height, from Dodge van, $50. Owens, 881-0815.

WATER WELL RIG, "Wakashaw", complete rig w/tools & accessories, must go to Moriarity to see it. Rupe, 881-2214.

DINETTE TABLE, walnut finish, $40; B&W TV, $35; saber saw, $5; Sutherland, call Monday after 5, 266-1734.

WHEELS, 15" w/mounted lugged snow tires (little wear left), from '67 Ford Galaxy, two, $20 ea. Auerbach, 296-1489.

SCREEN for movies or slides; fireplace grate. Falacy, 293-2517.

COUCH, gold Herculon, $65; '75 Kawasaki Enduro 175cc, $575; 4 15" wheels off '73 Blazer, $10 ea. Lassiter, 298-2461.

TRANSPORTATION

'73 PONTIAC Gran Prix, SJ option, AC, PW, PS, AM/FM stereo, lg. motor, $750 below book. Boverie, 255-1071.

'77 CUSTOM Maxi-Van, extended top, AC + overhead AC, sun controlled windows, capt. chairs, carpet, paneled, insulated, CB, extras, $8850. Reyelts, 299-0932 after 4.

'71 CAMARO Z/28, can be seen after 5 weekdays, best offer. Garner, 883-3054 or 881-4274.

MATCHED PAIR TRAILBIKES, 175cc, street legal, low mileage, $250 ea. or $425 for pr. Minnear, 344-5419.

'74 DODGE COLT, wagon, 4-dr., AC, 4-spd., CD ignition, dbl. sized radiator, steel radials, 30 mpg. highway, more, $2400. Gottlieb, 298-9859.

1947 CHEVY pickup, 216 6-cyl., 4-spd., $475 firm. Armijo, 268-7645 after 5:30.

'69 DODGE Coronet stn. wgn., 8-cyl., AC, PS. Elliott, 869-6058 after 6.

24" SCHWINN bicycle, girl's, single spd. w/thorn-proof tires, $25; men's bike, 27", $10. Lang, 299-8934.

'76 OLDS Omega, 4-dr., V8, 5-spd., buckets, PS, PB, AC, radials, 14,000 miles, extras, $3650. Keck, 294-2887.

MINI MOTOR HOME, '73, 19', fully equipped, 23,000 miles, one owner. Long, 296-4974 after 5.

'65 FORD Mustang; '71 Oldsmobile Delta II, PS, PB, FAC; '75 Yamaha 650cc. Bell, 296-4478.

ELEC. POWER for bicycles, complete kit, includes 1.0 HP motor, battery, charger, controls, $222; elec. moped, 2-spd., complete, $347. Bassett, 898-6243.

PENTON 125cc moto crosser w/trailer & extras, $375 or best offer. Barbera, 299-6045.

'64 BUICK wagon; '65 Olds Cutlass. Lanone, 877-7902.

'76 TOYOTA Corona, 4-spd., 4-dr., fac. AC, AM radio, uses reg. gas, still under warranty. Shaffer, 268-1712.

'67 FORD 2-dr. sedan; '67 Ford Fairlane 4-dr. stn. wgn., 289 engine, $550 either one. Sanchez, 292-3852.

'73 PONTIAC Firebird, blue, AT, PS, AC, $2700. Reynolds, 299-5157.

'73 KAWASAKI 100 G4TR 10-spd. dirt & street bike, less than 4000 miles, nice & noisy, $395. Spencer, 294-3833.

'68 COUGAR 2-dr., std. 3-spd., wide rears, glass packs, buckets, 3/4 cam, new motor, $700. Owens, 881-0815.

450 HONDA '71. Lyons, 296-8866.

NORTON 750cc motorcycle, $900, 1973, fairing, fiberglass bags, luggage rack, back rest, 15,000 miles, in Moriarity. Miller, 832-4788.

'68 FORD 3/4 ton pickup, Camper Special, 390 V8, AT, AC, power front disc brakes, long range tanks. Sutherland, call Monday, 266-1734.

'73 VOLVO 1800 ES, racing green, less than 45,000 miles, Cockelreas, 256-7570 after 5.

'76 JEEP, CJ-5, Levi upholstery, 4-spd., 4-wd, big 6, roll bar, 9000 miles, $4990. Marshall, 281-5821 after 6.

'76 TRIUMPH TR-6, low mileage, HT included, make offer. Krause, 266-0641.

WANTED

LARGE DOG HOUSE in good condition. Wladika, 255-9166.

ANYBODY NEED A RIDE to Minneapolis, St. Paul area; leaving Dec. 22 after work; be back Jan. 2, room for 2. Lee, 294-3002.

WILL BE DRIVING to Chicago Dec. 26 or 27; need passengers to share driving. Simon, 293-6936 evenings.

20 GAUGE single shot shotgun or .22 rifle, major brand names, good condition. Boverie, 255-1071.

GO CART, reasonable condition & price, not racing type. Fisher, 869-2864.

HORSE TRAILER, twin axle, brakes, appearance not important. Baxter, 344-7601.

WATER BED, single-size, w/frame. Keith, 242-2173.

WILL CUT DOWN TREES in exchange for wood, Heights area, no trimming or topping. Weber, 296-9223.

10-15 HP OUTBOARD MOTOR. Falacy, 293-2517.

REAL ESTATE

3-BDR. CANDLELIGHT HOME, DEN w/fp, 1760 sq. ft., sprinklers front/back, professional landscaping, 2 yrs. old, $55,000. Fernandez, 293-6731.

3-BDR., 1 bath, garage, utility room, NE Heights, $35,000. Alcone, 292-2028.

FOR RENT

BALLROOM & private party rooms, wedding receptions. Kiefer, 299-6925.

3-BDR. HOME, fully furnished, all appliances, for 6 mos. mid-Dec. to Aug. '78, modest terms. McHarney, 265-2032.

APARTMENT, lg. 1-bdr., furnished, utilities paid, patio, frost-free refrig., laundry, 541 Espanola SE, adults only, no pets. Aragon, 242-1651.

LOST AND FOUND

LOST—Sandia 5-yr. tie-tac, gold & jade turtle pin, woman's vinyl/knit off-white driving glove, silver heishi earring loop w/1 turquoise bead.

FOUND—Five keys on metal ring, man's brown leather glove, man's contact lens, brass key #267 on green tab. LOST AND FOUND, Bldg. 832, 264-6245.

Super Buffet Scheduled Dec. 10

TONIGHT'S HAPPY HOUR features a roast beef buffet and a group called Different Strokes on the bandstand.

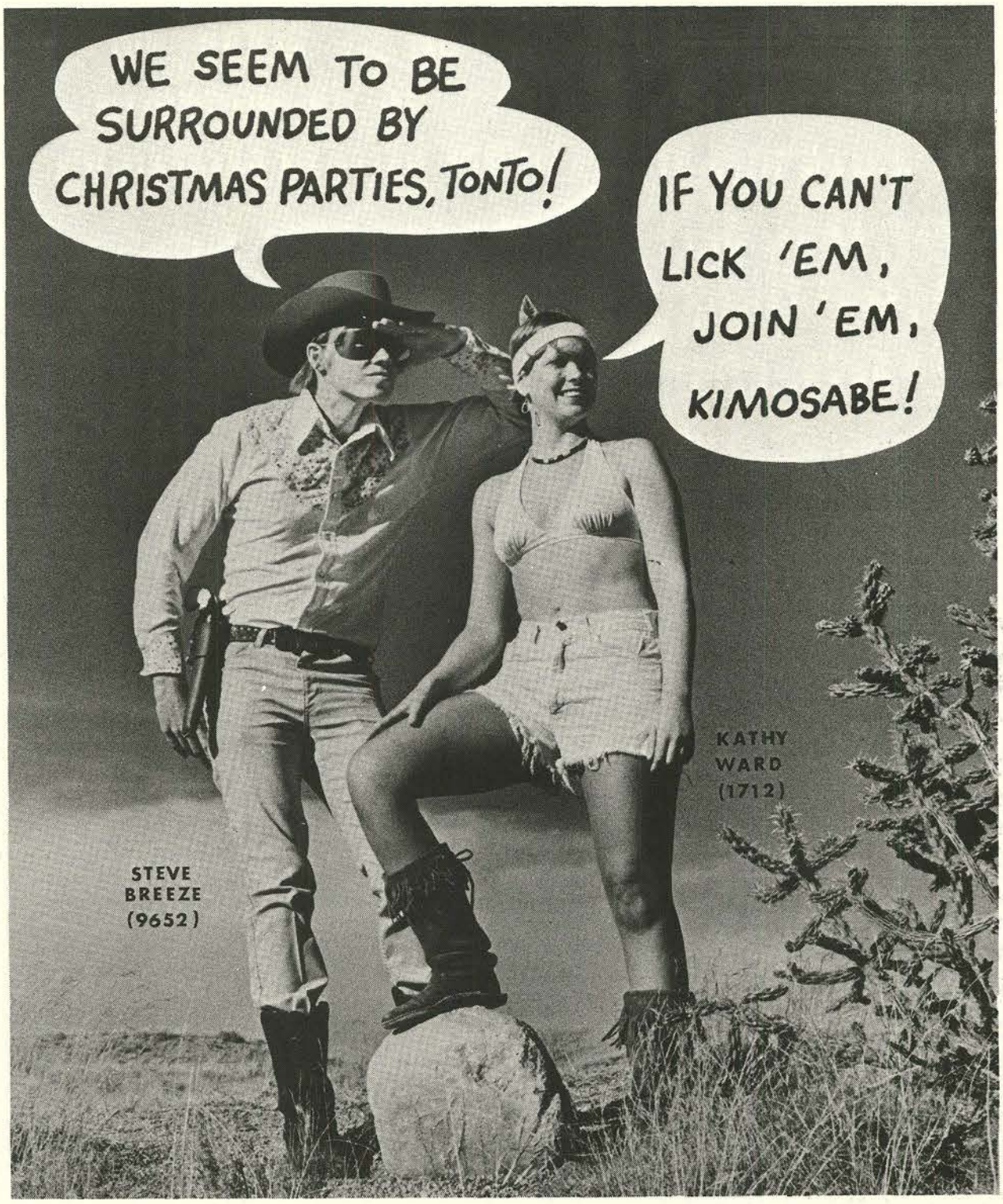
CHRISTMAS PARTIES dominate the Club calendar for the rest of the month—no more Friday night buffets, Happy Hours in the lounge only.

THE SEASON STARTS with the Sanado Magic Christmas Ball tomorrow evening. (Sanado members, incidentally, decorated the Club for the holiday season.) DOE people party Dec. 9, the Ski Club on Dec. 20, singles on Dec. 21.

THE BIG ONE for everybody is the Club's Supper Buffet Christmas Dance Saturday, Dec. 10—roast beef, ham and seafood thermidor on the menu, Mellotones for dancing and Happy Hour bar prices are in effect. The buffet is $5 for members, $6 guests. Pick up tickets from the Club office by Dec. 6.

ANNUAL KID'S CHRISTMAS PARTY is Saturday, Dec. 17, starting at 10 a.m. A puppet show by Ron and Mary Kay Day, carols by the Albuquerque Boys' Choir and an appearance by Santa Claus are scheduled. It's free to kids under 12 and parents, but members only please.

SINGLES PARTY Dec. 21 features a goodie-spread in the El Dorado Room starting at 7 p.m., music by Yolanda and Levy for dancing and singing-along-with, and eggnog. Mistletoe will also be conspicuous. The tab is $3.50 members, $4 guests.



THE NEW YEAR'S BLAST with champagne, dancing upstairs and downstairs and breakfast is set Dec. 31. Tickets ($11 per member couple) should be picked up BY NEXT TUESDAY, Dec. 6.

CORONADO WOLFPACK travels to Tempe to see the Lobos face Arizona State on Jan. 13, moves to Tucson on Jan. 14 for the Arizona U. game. Charter bus, four nights lodging at the Granada Royale in Tempe, breakfasts, beverages, a ball for $135 (dbl. occ.). Non-Wolfpackers pay $10 extra. Call Joe Ruggles (2625), 268-4003 after 5:30 for more info. Deposit ($35 each) due by Dec. 8.

DISCOUNT MOVIE TICKETS ($2.15 each) are available from the Club office; they're good at Cinema I, II, and III and the Wyoming Mall.

KATHY WARD (1712) heads the new Coronado Tennis Club; John McKiernan (1143) is vice chairman; and Dick Kavet (1713), Lloyd Melick (1712) and Lynnie Grace (DOE) are directors. The new courts (directly west of the Club) are now in business.

MEMBERS of the Club's Monday night beginning squaredance class invite experienced dancers from other groups to stop by and help the class—sort of add class to the class, so to speak. Try it at 7:30 p.m. Dec. 5.

Events Calendar

Through Dec.—"Finishing Touches," with Russell Johnson, Barn Dinner Theatre, 281-3338.

Dec. 2-4—Albuquerque Arts & Crafts Christmas Sale, Hilton Inn, 10 a.m. to 10 p.m.

Dec. 3—"Kirking of the Tartans" ceremony with Scottish bagpipes and dancers, St. John's Episcopal Cathedral, 318 Silver SW, 11 a.m.

Dec. 3—New Mexico Symphony Orchestra concert with pianist David Bal-Illan, Popejoy Hall, 8:15 p.m.

Dec. 5—"Les Ballets Trocodero de Monte Carlo," UNM Cultural Entertainment Series, Popejoy Hall, 277-3121.

Dec. 8—Robert Van Lierop, "Social Change in Black Africa Today," UNM Speakers Committee, Woodward Hall, 8 p.m.

Dec. 11—"Cinderella," Albuquerque Childrens Theatre, Popejoy Hall, 1:30 and 3:30, 277-3121.

Dec. 17—"The Nutcracker Ballet," New Mexico Symphony Orchestra and Ballet West, Popejoy Hall, 265-3689.