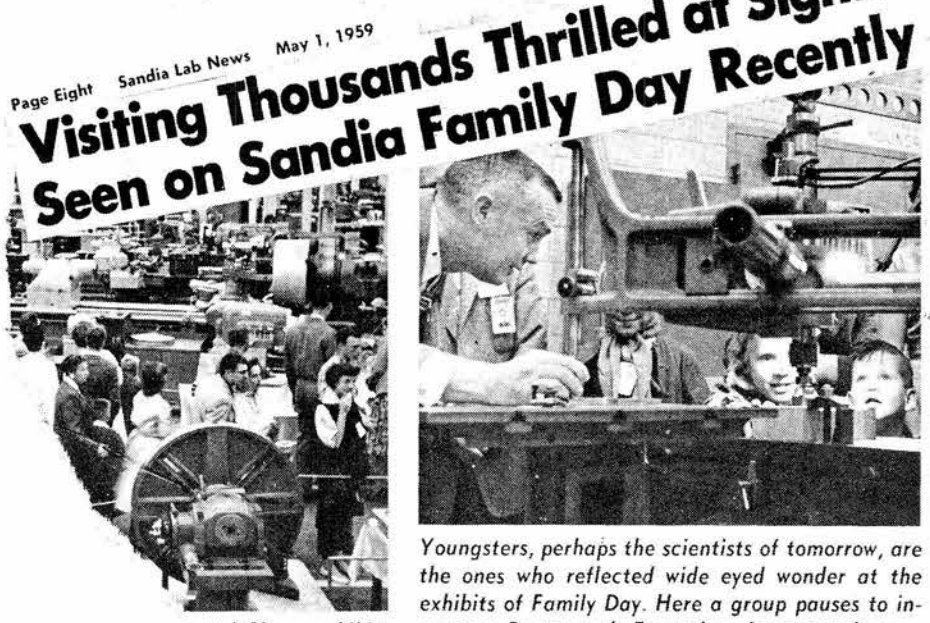


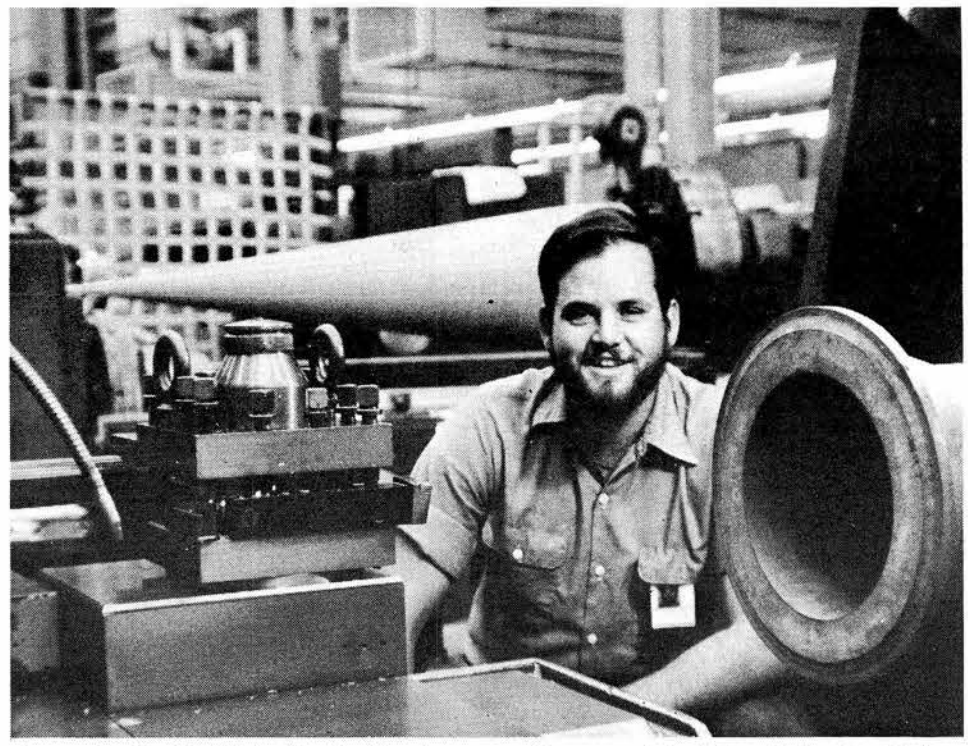
Page Eight Sandia Lab News May 1, 1959

Visiting Thousands Thrilled at Sights Seen on Sandia Family Day Recently

ntal Shops exhibits

Youngsters, perhaps the scientists of tomorrow, are the ones who reflected wide eyed wonder at the exhibits of Family Day. Here a group pauses to inspect a Pantograph Engraving demonstration.

RECOGNIZE ANY of the participants at Sandia's first Family Day in 1959? The Machine Shop demonstration must have made a good impression on the wide-eyed lad, son of Dean Davis (4400). Twenty-one years and a beard later,



Jerry Davis (1483) is back, having recently completed Sandia's Machinist Apprentice Program.

LAB NEWS

VOL. 32, NO. 14 JULY 11, 1980

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

The PLAP

Pulsed Lasers Open New Vistas in Surface Analysis

Long term involvement at Sandia in the fields of surface chemistry and physics has resulted, over the years, in a host of new and improved methods of analyzing the spatial distribution and chemical identity of various kinds of atoms, both on the surface and in the near-surface region of metallic solids. A new technique recently developed at Sandia, the pulsed-laser atom-probe, extends the capabilities of existing surface analytical techniques and may make it possible to study, in atomic detail, the individual steps in a surface catalytic reaction and the effects of ion bombardment of semiconductor materials.

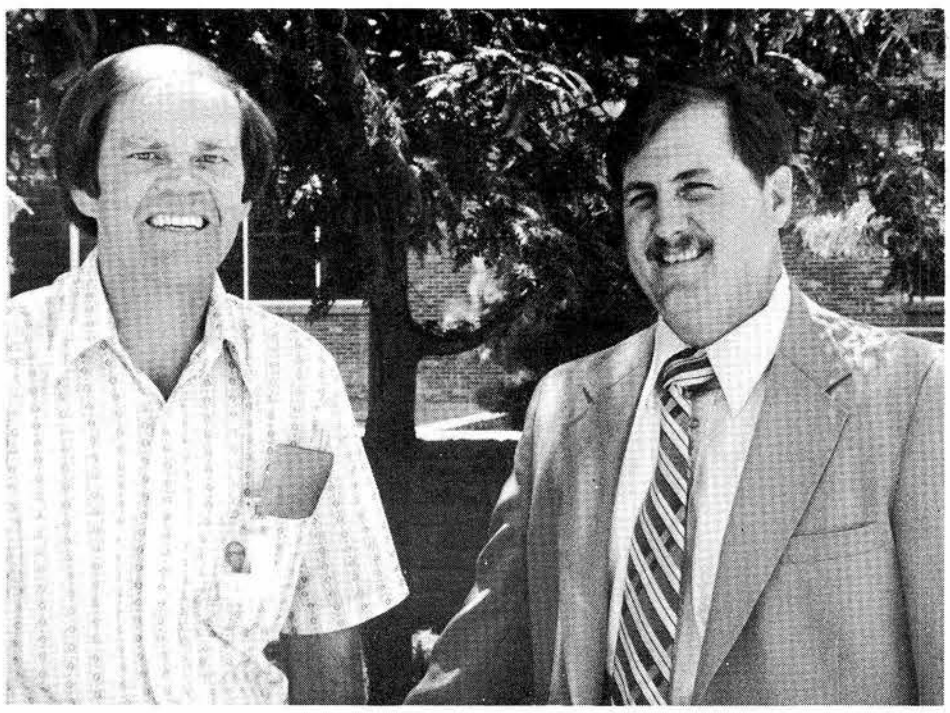
Building on two existing mass spectrometric techniques (the atom-probe field ion microscope developed at Penn State by Erwin Mueller and the imaging atom probe developed at Sandia by John Panitz), the pulsed laser atom probe (PLAP) was developed by Gary Kellogg and Tien Tsong, a visiting faculty member from Penn State. The new pulsed laser technique, in addition to extending the unique capabilities of the existing atom-probes to include semiconductor and insulator materials, was found to have applications in other areas of surface chemistry and physics.

In order to understand the difference between the new pulsed laser atom-probe and conventional atom probes, it is helpful to look at the historical development of single atom surface techniques. We asked Gary Kellogg to explain the evolution of the PLAP from the first atom-sensitive surface instrument.

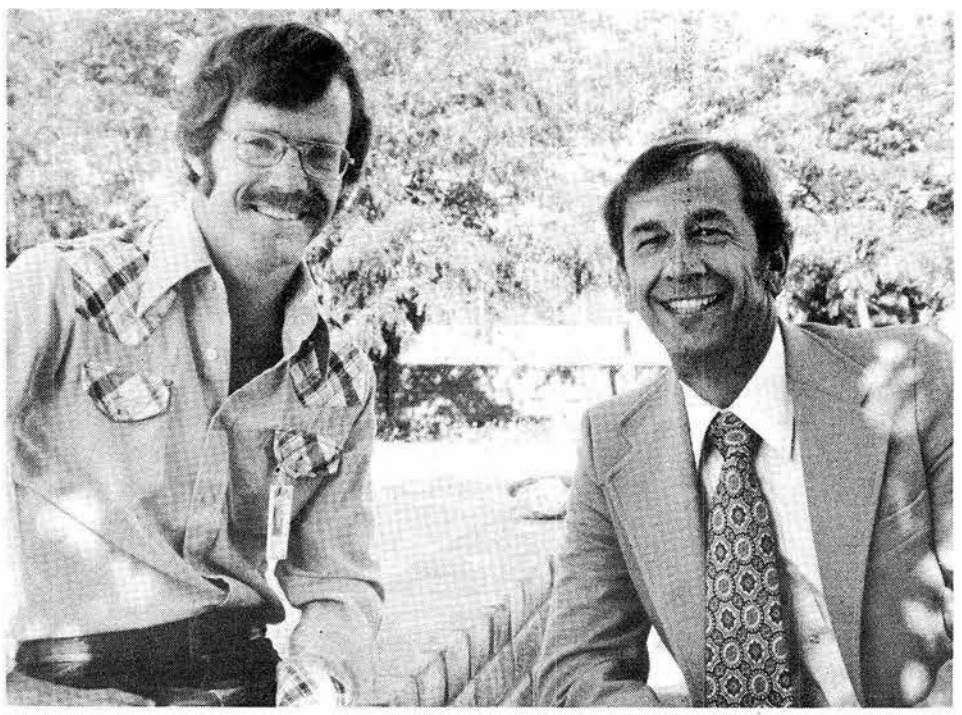
The *field ion microscope* (FIM), invented in the early '50s, remains today the only tool with which a researcher can "see" individual atoms on metallic surfaces. Modern electron microscopes can identify some single atoms, but only very heavy ones on light element surfaces, like uranium atoms on carbon films. Even this limited capability requires complex instrumentation and computers to reconstruct the image. The FIM, by comparison, is conceptually very simple. Positive ions created by a high electric field at the

[*Continued on Page Four*]

GARY KELLOGG (5114), co-developer of the pulsed-laser atom-probe, sends instructions to the computer that determines the chemical identity of atoms or molecules removed from the end of a sample shaped like a needle. The pulsed-laser technique opens new possibilities for studying surface catalytic reaction, the effects of ion bombardment of semiconductor materials and single atom and vacancy motion in atomic detail.



ED BURGESS (4718) and JOE TILLERSON (4745)



RICH SCHMIDT (4739) and GIL CANO (4426)

Supervisory Appointments

ED BURGESS to supervisor of Photovoltaic System Applications Division 4718 (newly created), effective July 1.

Ed joined the Labs in July 1961 as a member of the technical staff in the quality assurance organization. Following an educational leave of absence, he returned to Sandia in June 1966 with an assignment in the space power department. He later transferred to a research directorate concerned with materials and solid state physics studies and, more recently, has been with Photovoltaic Projects Division 4719.

Ed earned a BS in EE from the University of Arkansas, an MS in EE from UNM and his PhD, also in EE, from the University of Arkansas. He is a senior member of IEEE. Ed spends most of his spare time producing a weekly TV program for his church. He also coaches little league baseball and football. Ed and his wife Joyce have two children and live in NE Albuquerque.

* * *

RICH SCHMIDT to supervisor of Geotechnical Engineering Division 4739 (newly created), effective July 1.

Joining the Labs in October 1972, Rich worked for a year on a study of the material properties of polymers before moving into the rock mechanics field, where he carried out research on the fracture mechanics properties of rock, primarily oil shale. For the past two years he has been with Geotechnology Research Division 4732 where his work has been directed toward enhancement of gas recovery through the application of fracture mechanics principles. Responsibilities in his new position include off-shore technology studies and some activity in coal mine subsidence research.

Rich earned BS, MS and PhD degrees in applied mechanics from Lehigh University. He is a member of ASTM and the International Society for Rock Mechanics. His leisure activities include tennis, duplicate bridge and gardening. Rich lives in Bosque Farms.

* * *

JOE TILLERSON to supervisor of Drilling Technology Division II 4745 (newly created), effective June 16. Following graduation from Texas A&M in 1973 with a PhD in aerospace engineering (structural mechanics), Joe performed research for the Texas Transportation Institute, doing finite element simulations of automobile tire response during maneuvering.

In 1974, he joined Sandia and pursued research activities in numerical evaluation of the effects of the impact of a tornado-driven missile on the integrity of nuclear reactor vessels. Since that time, Joe has provided geomechanical and thermal analysis support for WIPP, Seabed, NTS and Eleana shale radioactive waste disposal projects. More recently, he has evaluated cavern integrity and usability questions in support of the development of Strategic Petroleum Reserve storage caverns in Louisiana and Texas salt domes.

Joe serves as chairman of the Rock Mechanics committee and is program chairman this year for the research activities of the Solution Mining Research Institute. He is an avid tennis player and serves as a deacon and preschool teacher at his church. He and his wife Ruth and one son, Jim, live in the NE heights.

GIL CANO to supervisor of Radiation Physics and Diagnostics Division 4426, effective July 1. After joining the Labs in 1964, Gil performed atomic nuclear physics experiments, participating in numerous underground nuclear events at NTS. His next assignment was with the laser fusion program in which he helped develop a four-beam laser system. He then completed a two-year appointment as Scientific and Engineering Advisor to New Mexico's Governor Apodaca.

Returning to Sandia in 1976, Gil conducted nuclear reactor safety research for NRC. Since 1977, he has done research relating to fast reactor safety, developing a means to optically view the response of breeder reactor fuel under hypothetical accident sequences.

Gil earned BS, MS and PhD degrees in physics from NMSU. He served four years in the Air Force. Gil is a member of the American Physical Society and serves on two advisory councils on education in New Mexico. He completed a two-year HEW appointment to the National Advisory Council on Career Education and a two-year stint as a National Institute of Health advisor. He was a member of the state's Life History Programs advisory committee, resulting in the legislature's approval of a Natural History Museum. Gil's hobby is wood sculpture. He and his wife Dolores have four children and live in the NE heights.

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Retiree Deaths

April—June 1980

Clarence Henry [90]	*April 2*
Samuel Lopez [62]	*April 3*
Veronica Dostert [66]	*April 11*
Roy Nix [80]	*April 19*
Nazario Gonzales [69]	*May 24*
Eric Steinig [79]	*May 24*
Sam Apodaca [72]	*May 26*
Juan Jojola [70]	*June 12*
Russell Sheppard [81]	*June 13*
Richard Watkins [67]	*June 14*
John Samuelson [71]	*June 26*

Central California Coast Is 'Steinbeck Country'

AUTHOR JOHN STEINBECK, whose works brought him both the Pulitzer and Nobel Prizes.

"Steinbeck Country" begins in Salinas, Calif. Here John Steinbeck, the only American author to receive both the Pulitzer and Nobel Prizes as well as the Presidential Medal of Freedom, was born on Feb. 27, 1902. His literary works have made famous the central California coast, the locale for most of his 29 books.

Steinbeck had the urge to write at an early age. While in high school he sent off unsigned manuscripts to various magazines, waiting anxiously for his stories to appear in print.

They weren't accepted under such circumstances, and his first published work appeared in his high school paper.

Although Steinbeck attended Stanford on and off for several years, his real education was acquired while working with migrants and ranch hands in the Salinas Valley and enjoying life with the *paisanos* of the Monterey Peninsula. His own life style became as colorful as that of the characters he created.

Steinbeck's first novel, *Cup of Gold,* published in 1929, as well as his two subsequent novels, *The Pastures of Heaven* and *To a God Unknown,* were cooly received by the literary world. After his first marriage in 1930, he lived in Pacific Grove, where much of the material for *Tortilla Flat* and *Cannery Row* was gathered. *Tortilla Flat* (1935) received the California Commonwealth Club's gold medal for best novel by a California author, and this marked the turning point in his career.

He continued writing, relying upon extensive research and personal observation of the human condition for his stories. *The Grapes of Wrath* won him the Pulitzer Prize in 1940.

During WWII, Steinbeck was war correspondent for the *New York Herald Tribune,* and some of his dispatches were later collected and made into *Once There Was a War.*

In 1962, he was awarded the Nobel Prize for literature ". . . for his realistic as well as imaginative writings, distinguished by a sympathetic humor and a keen social perception."

Throughout his life, Steinbeck remained a private person who shunned publicity and moved frequently in a search for privacy. He died in 1968, and his simple gravesite is in the Salinas Garden of Memories near relatives mentioned in his novels.

Although the natural backdrop of Steinbeck country is as vibrant now as it was in his books, and lettuce is still the area's "green gold," the Salinas Valley has progressed and changed. Advanced farming techniques, simplified mechanical harvesting, successes with the experimental crops are all part of this productive agricultural area.

The faces of "Cannery Row" and "Tortilla Flat" have changed, too. While the silver sardine industry is gone, the renovated canneries of Monterey now pack in tourists. Located here, too, are the Steinbeck Theater and Steinbeck Lobster Grotto.

In Salinas, Steinbeck's birthplace and boyhood home (at 132 Central Avenue) has been restored and opened to the public as a restaurant by local volunteers. A two-story Victorian house built in 1897, it was purchased by the Steinbeck family in 1900. The house is described in *East of Eden*, a chronicle of life in Salinas at the turn of the century.

John was born in the room immediately to the left as you enter the front door. To the right of the vestibule was the parlor which gave access through French doors to the larger living room. To the left of the living room had been a bedroom (John's as a young boy). The dining room was adjacent to the living room and beyond were a large kitchen, utility room, bath and maid's room. Authenticity has been maintained in the restoration.

Originally, the unfinished second floor became the children's indoor playground but, as the family grew, it was completed with three bedrooms and bath. John as a boy and young man occupied the room over his parents' room, facing Central Avenue.

The luncheon menu at Steinbeck House features a gourmet entree weekdays, utilizing fresh produce and products from the Salinas Valley fields. Steinbeck memorabilia is on display. In the basement, a boutique features Steinbeck books and gifts. Proceeds go toward preservation and further restoration of the 15-room landmark. For reservations at either the 11:45 a.m. or 1:15 p.m. seating, call 408-424-2735.

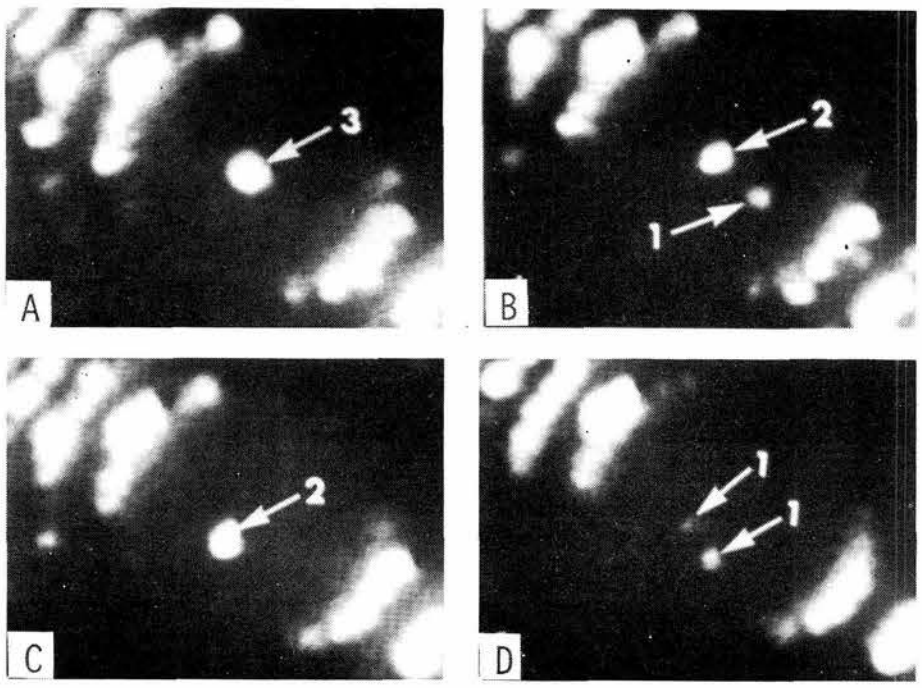
In further honor of Steinbeck, the Salinas Public Library has been renamed and his life-size statue erected on the grounds. The John Steinbeck Room of the library houses a collection of over 30,000 items, inlcuding rare first editions, letters of the author, photographs, and other memorabilia, many of which are on display.

For those interested in the study of Steinbeck country, additional information on various one-day, self-guiding auto tours is available through the Salinas Chamber of Commerce.

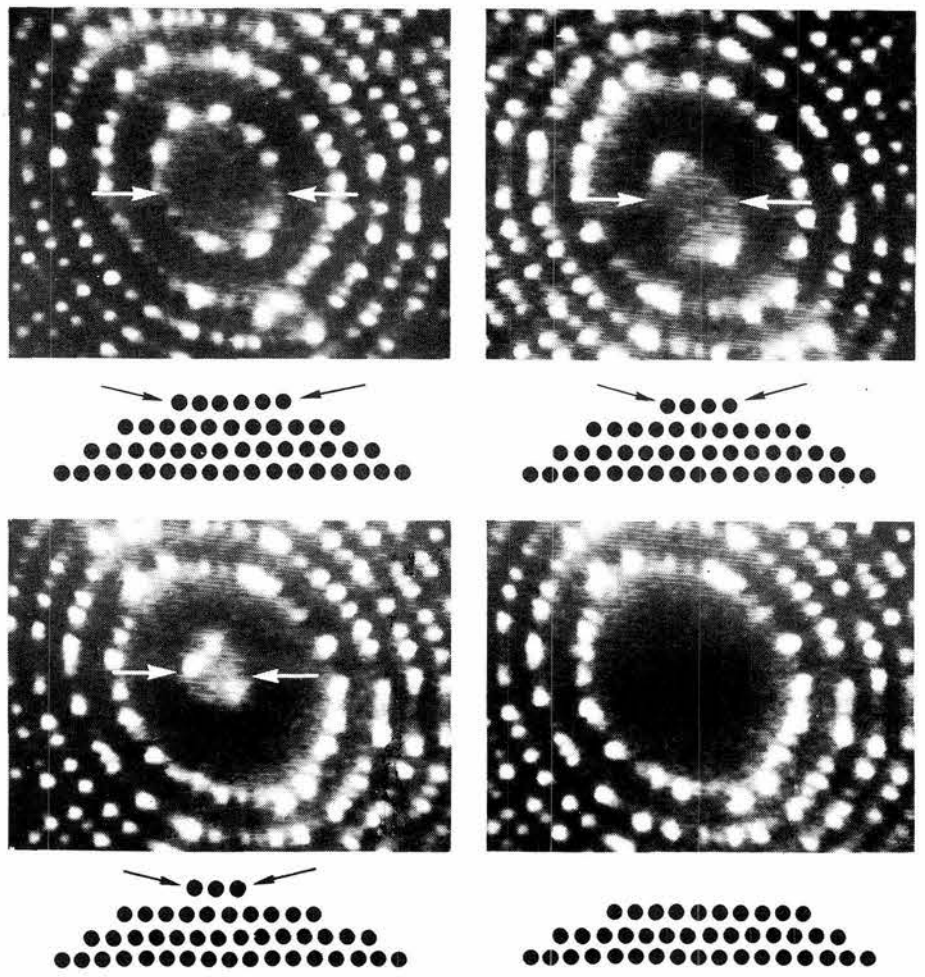
STEINBECK HOUSE, birthplace and boyhood home, has been restored, now includes restaurant and gift shop.

LIVERMORE NEWS

VOL. 32, NO. 14 LIVERMORE LABORATORIES JULY 11, 1980



PULSED LASER HEATING produces surface atomic motion which may be observed directly through a field ion microscope. Photo A shows a cluster of three atoms. One of the three has broken away in Photo B. Additional laser pulse heating causes the single atom to break away from the surface (Photo C). The cluster of two atoms breaks apart in Photo D.



THESE PHOTOS, TAKEN FROM A FIELD ION microscope image, show in atomic detail the removal of surface atoms from the tip of a sample. The dots underneath the photos show schematically how one layer of atoms is removed. The arrows on the schematic and on the photos indicate the ring of atoms decreasing in size and finally disappearing. Atom-probe identification of the removed atoms allows determination of the chemical composition of the surface in extremely fine detail.

Continued from Page One

Pulsed Lasers Open New Vistas in Surface Analysis

end of a sharply pointed needle are projected onto a TV screen where they form a direct image of the protruding surface atoms.

The FIM has been used primarily in metallurgical studies of defects in the near-surface region. These defects may be inherent in the material or caused by mechanisms like radiation and ion bombardment. The FIM has also been used to study the migration of individual surface atoms over flat surfaces to gain insight into the nature of the interaction between a single atom and a solid surface.

The *atom-probe field-ion microscope* extended the capabilities of the FIM to include isotopic identification of surface species. Here, single atoms as observed in an FIM image are removed by a pulsed electric field and their identity determined by measuring their time-of-flight from the metallic surface to an ion detector.

This technique permitted detailed atomic analysis of alloy compositions, precipitation processes, defect trapping and surface segregation in dilute alloys.

The *imaging atom probe* (IAP) is a surface analytic technique that examines, in a single electrical pulse, the composition of an area a thousand times larger than the original atom-probe, an area containing roughly 2000 atoms. Using a technique called time-gating, the spatial distribution of atoms of one species on a metal surface is mapped in atomic detail. Time-gating means that the imaging detector is turned on only when ions of interest are arriving. After all species of atoms contained in a single atomic layer are removed and identified, the process is repeated, layer by atomic layer, allowing one to examine the atomic composition of the near-surface as well as the surface region.

Gary Kellog's and Tien Tsong's *pulsed-laser atom-probe* (PLAP) replaces the high voltage electrical pulses used in previous atom-probes with short-duration laser pulses and a smaller electric field which is applied simultaneously. There are several advantages. For example, pulsed lasers can be used to remove surface molecules from a solid substrate for chemical identification. Pulsed electric fields can also be used to remove surface molecules, but the large electrical field required often caused the molecules to break apart (or "dissociate") giving rise to uncertainty about the original state of the molecule on the surface. Removal of molecules with the pulsed laser technique can reduce or even eliminate this unwanted effect.

The ability to identify adsorption states of molecules has led Gary to attempt to use the PLAP to study the process of surface catalysis. "Trial and error has taught scientists a lot about which metals will catalyze which chemical reactions," Gary Kellogg explains, "but very little is known about the atomic processes that take place on the surface of a solid. If we understood those, we might be able to predict why a certain catalyst is the best for a given reaction—and possibly predict and prevent catalytic poisoning, where impurities in the catalyst impede the desired reaction."

An advantage of the pulsed laser technique (and the initial motivation for its development) is that it can be used to characterize semiconductor and insulator materials. This was previously impossible since the electrical resistivity of such materials is too high to transmit short-duration electrical pulses.

An unexpected application of the pulsed laser techinique resulted when Gary and Tien directly observed the motion of individual atoms and atom clusters on metallic surfaces. Single atom diffusion studies have been carried out in the past with field ion microscopes using dc heating techniques. Pulsed laser heating, in addition to extending these studies to a higher temperature region, also opens up new possibilities—like the ability to study surface vacancy migration and vacancy-atom interactions on the atomic scale.

In the future, Gary plans to exploit this advantage of PLAP in studies of low energy ion implantation into semiconductors. Silicon is a known trap for low energy hydrogen ions, and Gary feels PLAP is capable of insights into the trapping mechanism.

Extended studies of single-atom surface diffusion with the PLAP are also being planned. Recently obtained videotapes, which show the dissociation and migration of one-, two-, and three-atom clusters caused by the instantaneous heat pulses from the laser, have created a good deal of excitement.

"These studies," Gary says, "should help us determine the steps by which single atoms on a surface combine to form an array of lattice atoms and give us insight into the growth process of crystals."

Past this?

Since the first few atomic layers of a solid form a barrier between its bulk and an often hostile environment, it seems certain that surface chemistry and physics will continue to be subjects of widespread interest at Sandia. "The surface physics group at Sandia has made significant contributions to our understanding of this barrier," Gary sums up, "and the new pulsed laser atom-probe should complement the existing facilities in a number of exciting areas of research." •*cec*

Titanium Diboride

Tough Coating Means Less Down Time

Surface Metallurgy Division 5834 has developed and is testing an extremely hard, wear-resistant titanium diboride coating for use on materials that must survive extremely erosive environments. The coating is applied using a specially-developed, low-temperature chemical vapor deposition process.

Sandia scientists began investigating titanium diboride several years ago as part of a DOE project to study the basic mechanisms of fracture and erosion in various chemical and thermal environments and to determine techniques to minimize failure.

Results of characterization work in this project, sponsored by DOE's Office of Basic Energy Science, indicate that titanium diboride, a refractory-hard compound (only diamond, cubic boron nitride, and boron carbide are known to be harder), may have many applications where wear-resistant materials are needed.

Titanium diboride is difficult to fabricate in bulk form, but the Sandia studies quickly demonstrated that coatings of the material could be readily deposited by means of chemical vapor deposition techniques and that these coatings exhibited excellent erosion resistance.

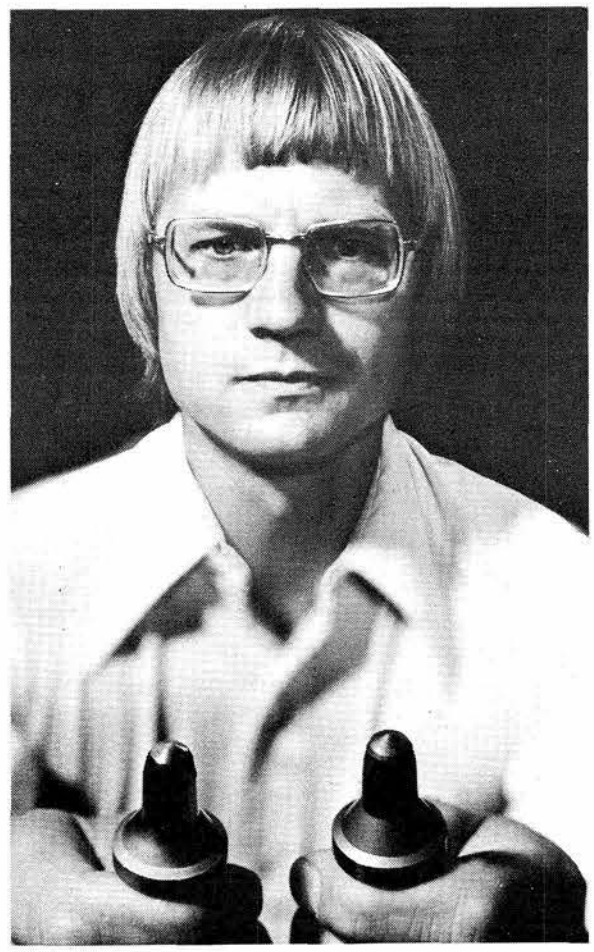
Chemical vapor deposition is a process in which a solid coating is deposited on a substrate by a chemical reaction or thermal decomposition of one or more gases. By varying gas mixtures, temperatures, pressures, and flow rates, coatings with significantly different characteristics are produced.

The Sandia process involves injecting titanium tetrachloride, boron trichloride and hydrogen into a chemical vapor deposition reaction chamber operated at atmospheric pressure. This yields hydrogen chloride gas and deposits titanium diboride on the substrate.

Typically, chemical vapor deposition of refractory compounds such as titanium diboride occurs at temperatures above 1200°C. "Sandia's technique operates in the 900°C range, permitting deposition on structural metallic systems which could not withstand the high temperatures produced in conventional chemical vapor deposition," says Erik Randich of the Surface Metallurgy Division.

Initial laboratory tests of titanium diboride applications at Sandia have focused on its use as a coating for coal liquefaction reactor letdown valves. Erosion of these valves, which control the high-pressure, high-temperature liquid product as it flows from the reactor, has long been a limiting factor in the life of coal liquefaction processing systems. The high-pressure flow of the abrasive, ash-containing liquid rapidly erodes the valves to failure.

Sandia researchers are now testing a new composite valve which consists of a stainless steel shank with a titanium carbide cermet tip brazed to it. Using the special chemical vapor deposition process, the tip is coated with approximately 50 microns of titanium diboride.



SUPERHARD COATING—Erik Randich (5834) holds high-pressure letdown valve like ones being tested in the Labs' continuous flow coal liquefaction reactor. At left, valve coated with titanium diboride that shows high promise in laboratory tests.

Two prototype valves have been opened and shut 1300 times with little degradation while being used as the primary and secondary letdown valve pair in Sandia's continuous flow reactor. Untreated stainless steel valves used in the same manner were severely eroded and failed after 30 opening and closing operations, while wear-resistant alloy (Stellite 6) valves failed after about 100 operations. The new valves are scheduled for tests at a pilot coal liquefaction plant near Allentown, Penn.

Liquefaction involves crushing the coal, mixing it with solvent, and heating the resulting slurry, under pressure, in the presence of catalysts which help convert the coal into liquid fuel. The resulting fuel can be blended into existing refinery crude stock, be used as a fuel oil for industrial or home applications or, perhaps, be used as a chemical feedstock. Present liquefaction techniques yield two to three barrels of oil per ton of coal at costs exceeding those of oil obtained from wells.

Typically, a coal liquefaction system operates at temperatures of about 450°C and pressures near 2000 psi.

"The recent tests at Sandia have shown that titanium diboride appears to have excellent wear-resistance when used in the environments and elevated temperatures common to coal liquefaction operations," Randich says. "However, these thin film coatings have very specialized applications. No one material is a panacea."

Sandia also is studying the use of titanium diboride coatings for fusion reactor applications; elsewhere, studies are underway to examine titanium diboride coatings on cathodes used in the electrolytic reduction of aluminum ore.

Take Note

Want a free medical and lab exam, electrocardiogram and chest x-ray? There's a doctor at UNM Medical Center who is looking for people with high blood pressure to take part in research on a new drug. Dr. Phillip Zager has a grant from Merrell National Labs to measure the effectiveness of the new drug. The study runs over a 12-week period. Zager states he will consult the participants' own doctors before administering the new medication. People with high blood pressure who are interested may contact Dr. Zager or his associate, Lois Farabaugh, at the UNM Med Center, 277-4759.

* * *

Colloquia coming up include a talk, "Inhalation Toxicology," by Yves Alarie of the Graduate School of Public Health, Pittsburgh, Pa., on July 16 and, on July 23, D. J. Ben Daniel, a VP with Exxon, will present "Energy Conservation Through Semiconductor AC Motor Drives."

* * *

As everyone knows, the Republican National Convention takes place next week up in Detroit and a Sandian, Earle Chapman (1759), will be there as an alternate delegate. Earle didn't confide in us his estimate of who will be the winner of the nomination, but at this writing suspense over the outcome appears to be in short supply.

* * *

An advanced first aid course, oriented towards winter sports activities, will start Aug. 19 and run through the beginning of October, three evenings a week from 6:30 to 9:30. The 54-hour course, under Red Cross auspices, will be held at the St. Thomas of Canterbury church on University Ave. NE. Denise Jones, 262-1416 and 822-1194, is the contact.

* * *

Sandia Safety reports that a garden sprayer manufactured by D. B. Smith & Co. is being recalled because the contraption may explode or rupture during use. Injuries have been servere and include broken bones as well as facial and dental injuries. The sprayers, manufactured from June 1977 to June 1978, have been sold nationwide in many retail outlets under a variety of names: Smith, Servistar, PARCO, State Chemical and Metra Chem. If you find your sprayer in this list, then call Safety's Debra Crooks, 4-3876, to get more information about the specific models now under a cloud.

Congratulations

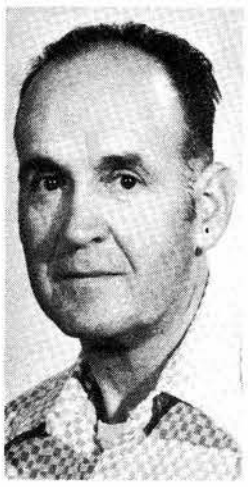
Mr. and Mrs. Phil Rodacy (5821), a daughter, Melissa Jean, June 26.

Mr. and Mrs. Nicholas Durand (1427), a son, June 30.

Sympathy

To Elliot Harris (3153) on the death of his mother in Albuquerque, July 3.

Five Languages Gave Sandian Interesting Military Career



"English was my second language," says Joe Yambrovich, a security inspector at Sandia. "My parents came from Yugoslavia to Illinios—where I was born—and I didn't learn English until I entered school." Since then, Joe has added Russian, German and French to his linguistic abilities.

Joe teaches Serbo-Croatian to a class of 12 students from the Albuquerque Slavic Club. "It's a difficult language to learn," he says, "but my students are doing well and want me to continue the class."

Joining the service in 1943, Joe served five years in the Navy before transferring to Army Military Intelligence; he retired after 24 years' service in 1967. His years with the intelligence group included three years in Berlin and two years in Korea as a Russian interpreter, and one year in Viet Nam as a French interpreter. And he was assigned to intelligence units in Germany for a total of eight and a half years. He attended the Army Language School in Monterey, Calif., and Army Intelligence Schools in Japan and Germany. In addition to the intelligence work, Joe was an interpreter, interrogator, translator and photo interpreter.

Joe remembers those years: "I was once a guest of the Russians for two weeks at the prison in their headquarters in Berlin. On several occasions I had talked with a certain Russian general on the Berlin commandant's staff. One of the general's aides, newly transferred from Russia, identified me to the general as a Soviet infantry lieutenant from Stalingrad whom he had known in 1943. I was immediately arrested by them and imprisoned. It took the U.S. Army two weeks to get me released. As an apology for their mistake, the Russian general presented me with two complete Russian Army uniforms.

"One of the jobs I enjoyed was in Nurnberg where we were screening Yugoslavian refugees. Two of us in my unit were fluent in Serbo-Croatian and we talked with these people to determine if they were true refugees or if they were foreign agents. The Yugoslavians had entered West Germany illegally and had been picked up and detained in a camp for displaced persons. Once cleared, they stayed in the camp until other countries would accept them. I didn't ever meet any of my relatives, but I talked with a lot of people.

"The years in Germany were hard work. I was on call 24 hours a day, often working in civilian clothes, and never knowing what my next assignment would be. There's a 157-kilometer stretch of border between West and East Germany that I've walked, ridden and flown over so many times I could still negotiate it in the dark. After a while, you even become friendly with your counterparts on the other side, unless a real hardhead joins their patrol. We became friendly with a number of Russian guards . . . about half a dozen of them ultimately defected to West Germany.

"I never did get to see a Bob Hope show. In 1948 he was appearing in Berlin. I planned to attend his show that night when my unit was suddenly called out to catch a Soviet captain who had been subverting American personnel. The captain had been using several women in his efforts, and one of them informed on him. We trapped him on a street corner, shots were exchanged, but he escaped. Bob Hope would have been more fun."

BERLIN, 1949 — Joe Yambrovich, U.S. Army Military Intelligence, alias Red Army soldier. Celebrating his release from prison, Joe donned one of the uniforms given to him by the Russians as an apology for his false imprisonment.

In Viet Nam, Joe was assigned to a liaison group as a French interpreter. "I had some close calls that year (1962-63) in Viet Nam. Between snipers and small patrols hidden in the grass, it was a touchy situation. I remember once being the only American on a recon patrol of an area called the Plain of Reeds. I was taller than any of the Vietnamese, and I could see over the top of the grass. I spotted movement in the grass up ahead and motioned the others to stop. Through hand signals, they indicated they wanted to avoid the other patrol and get out in a hurry. But there was an engagement, and when the enemy retreated, they left three dead behind."

Another of Joe's specialties in the service was foreign small arms shooting, and he's carried over that interest into civilian life. He's a member of the Zia Rifle and Pistol Club and, along with another Sandian, Kwok Kee Ma (2331), holds the club record for shooting metallic silhouettes with pistol out to 100 meters.

"I'm keeping up my ability to shoot through competitive shooting," Joe says, "but I'm afraid I can no longer compete in French very well, and my Russian is getting a little rusty. As soon as Sandia begins another out-of-hours course in Russian, I'll sign up. Of course, Serbo-Croatian is my native language, and after living in Germany so long that language should stay with me."

Before moving to Albuquerque in 1978, Joe worked at the General Electric Vallecitos Nuclear Site near Livermore where he was a team leader for their Quick Response Force. He joined Sandia in December 1978 as a member of the extra board guard force (3432). Joe recently became a full-time employee and is working the graveyard shift. •*nt*

Events Calendar

July 11, 15—"Blithe Spirit," Rodey Theater, UNM, 8 p.m.

July 11, 16, 19—Santa Fe Opera: "Eugene Onegin"; *July 12, 18, 23*—"The Magic Flute"; *July 17, 25*—"La Traviata," 9 p.m. Tickets: 982-3855 in Santa Fe, The Broadway in Albuquerque.

July 11-12—Speedway Park: sprints & super modified; mid season championship, 8:30 p.m. Valley Raceway: modified & jr. stock cars, 7:30 p.m.

July 11-13—"The Glass Menagerie"; *July 24-Aug. 10*—"The Good Doctor," Corrales Adobe Theater, 8:30 p.m., 898-3323.

July 12-13—9th Annual Old Timers Reunion: parade, fiddlers' contest, dancing, hot-air ballooning, rodeo and barbecue; Magdalena, N.M.

July 12, 17, 19-20—"Hay Fever," Rodey Theater, UNM, 8 p.m.

July 13—Arts-In-The-Parks: mime, dance, music, magic; free, 2-5 p.m., Old Town Plaza; *July 20*—Bataan Park.

July 13—Santa Fe Chamber Music Festival: classical concerts, Sun., 6 p.m., Mon., 8 p.m., Greer Garson Theatre; Thurs., 8 p.m., Santuario de Guadalupe.

July 14—Lecture Under The Stars: Joshua Fishman, "What's Wrong & What's Right With Bilingual Education"; *July 21*—Derek Swinson, "A Funny Thing Happened On The Way to New Mexico,"—a personal journey from Ireland to NM; Central Mall, 8 p.m.

July 16—Rodey Theater presents Edward Albee, lecturer, 8 p.m.

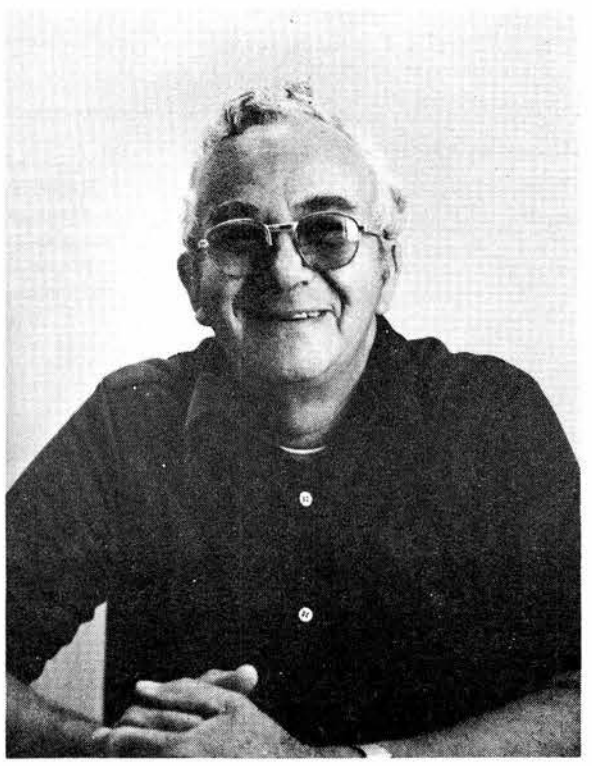
July 18-20, 25-27**—Albuquerque Civic Light Opera, "H.M.S. Pinafore," 8:15 p.m., *2:15 p.m. matinee, Popejoy.

July 19-20—8th Annual 8 Northern Pueblos Arts & Crafts Show; Buffalo, Butterfly, Comanche & Eagle dances afternoons; free, 9-5, San Juan Pueblo.

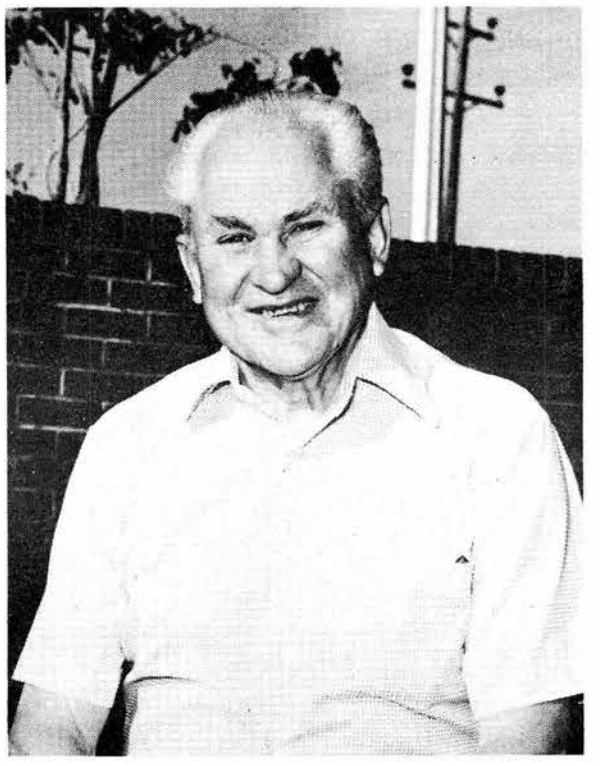
July 25—Navajo Rug Auction, 7 p.m., Crownpoint, NM, elementary school.

It certainly pays to conserve—but not for the consumer. The rules of the new game called "less for more" go like this, according to the *N.Y. Times:* when consumers respond to government pleas to conserve natural gas, electricity and water, their reward is generally higher unit rates and often even higher bills. The reason is simply explained, according to utility representatives. "When people don't use enough (water, gas, electricity)," they say, "the only way we can counteract falling revenues is to raise rates."

Retiring



John Newton (1482)



Lew Hake (2325)

Q. How about some more parking space for motorcycles?

A. Additional motorcycle parking is being provided in several locations. An order has been written to enlarge the motorcycle parking area south of Gate 9. It should be noted, however, that installation of the construction fence for Bldg. 823 will eliminate all parking in this area. The Mardix Booth at Gate 9 will be moved northwest of Bldg. 870, and Bldg. 870 will be outside of Area I during standard working hours. Concrete pads for motorcycle parking have been provided near the main south entrace to Area I (between Bldgs. 821 and 822). Our recent observations indicate that there are unused motorcycle spaces north of Bldg. 880.

R. W. Hunnicutt—3600

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

CLASSIFIED ADVERTISING

Deadline: Friday noon prior to week of publication unless changed by holiday. Mail to: Div. 3162 (M0125).

RULES

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

MISCELLANEOUS

MEN'S watch bracelet, silver & turquoise, $150. Hesch, 881-9874.

STD. stainless steel sink, 33x22", Kholer faucet, used 4 mos., $45; new evap. cooler covers for down draft coolers, 28x28 sides, 34" length, $10 ea. Gorman, 266-6050.

CAMERA, Pentax ME 35mm SLR w/f 1.7 lens, completely auto., w/case, $220. Drury, 293-1929.

UTILITY TRAILER, dble. wide snowmobile, tilt bed, $250; Ruger .357 Blackhawk, never fired, $160. Josephson, 296-7480.

VACUUM CLEANER, Craftsman, shop type, wet/dry, Sears largest w/all accessories & extra hose, $110. Caffey, 296-3320.

ASSORTED sized moving boxes & wardrobes, half price. McGough, 821-7309.

LUGGAGE RACK for VW bug, $10. Klimas, 293-6892.

2 RADIAL TIRES, LR 78-15 mounted on Chrysler wheels, about 15K miles left. Harrison, 881-7938.

CAMPING TRAILER, Starcraft (1966 Constellation) telescoping w/solid roof, equipped for 8 sleeping & eating, elec. brakes, $1700. Donaldson, 298-0092.

24" COLOR console TV, works OK but needs tune-up, $150. Dumas, 268-3403.

GE WASHER, $25; Kenmore vacuum sweeper, all attachments, $40. Sheaffer, 255-9473.

HAM/HI-FI: DX-40 transmitter w/VFO, Balun & mike, $65; Garrard 40B turntable & Mono amplifier, $30. Kiehl, 344-1457.

135MM, 1:2.8 telephoto lens, Accura; 150mm Super-Takumar 1:4 telephoto lens; both Pentax screw mount; set of Schacht extension tubes for Pentax. Campbell, 299-4830.

DOG CARRIER, holds up to 40-lb. dog, $20. Bradley, 293-9586.

POOL TABLE, all accessories, $200; antique console, $200; concert hall stereo system, $35. Rodriguez, 296-3277.

IBANEZ F style mandolin, $500; German violin, $600. Downs, 294-5283.

WHITE std. toilet bowl & reservoir, $10. Hall, 299-3594.

DRAFTING TABLE: wooden, 3'x5', 2 drawers, $50. Roche, 298-9725. after 5.

AQUARIUMS, w/all accessories, 25-gal., $25; 10-gal., $10; golf clubs, 8 irons, 3 woods, bag, cart, $50. Schroll, 299-9142.

FOUR 16" rims w/tires for ¾-ton Ford, 8-hole, $60. Sanchez, 881-1407.

10" LAPIDARY trim saw w/⅓ hp motor mounted on metal cabinet, $135; Graves faceting unit, $135. Campbell, 298-0874.

MARTIN tenor sax, $300. Wade, 268-1287 after 6.

USED, built-in appliances: Hotpoint double self-cleaning oven, $125; dishwasher, $100; range top, $30; hood, $15, harvest gold. Bourgeois, 294-2992 or 298-2346.

DELUXE SHELL for long box Chevy Luv pickup, $325; mini air compressor, 12VDC, $20; motorcycle bumper carrier, $10. Kluck, 294-0803.

CORNER GROUP: 2 day beds & table, $125. McDonald, 298-9364.

REFRIGERATOR, $30; GE trash compactor, $100. Guttmann, 243-6393.

FREE TO GOOD HOMES, kittens, 2 male, 2 female. Kennedy, 299-3580.

KEITHLEY model 130 digital multimeter, new, $85 or trade for small arc welder. Campbell, 294-6000.

FOUR 9.50x16.5 tires/wheels, white spoke 8-hole wheels, 4000 miles; 2 mud tread, 2 highway tread, $350 for all. Lewis, 255-3483.

25" COLOR console TV, new picture tube w/guarantee, $450. Combs, 292-4935.

GERMAN VIOLIN w/case, 100 years old, $400. Krause, 292-4355.

BALER, John Deere, 224 series, $1700. Harley, 898-0594.

12 CUB. FT. upright freezer, $100. Pope, 255-6702.

TRAVEL TRAILER, '65 Aristocrat Land-Liner, 19.5 ft., self contained, tandem wheels, $1450. Bartlett, 299-4861.

REFRIGERATOR, Hotpoint, 11.6 cu. ft., $125; gold, 9x12 carpet, $15; car stereo, FM/cassette w/speakers, $50. Prior, 296-2930 after 6.

USED shipping kennel, medium size, $20 or offer. Griego, 299-0426 after 5.

PORTABLE zig-zag sewing machine, built-in buttonholer & decorative stitches, w/case, $75. Post, 299-6471.

PACHINKO machine, deluxe, 500 balls, stand, $80. Strait, 268-4893.

MOTORCYCLE helmet, Shoei model S-25, full face protection, used once, $45, cost $60. Vaughn, 298-5919.

MAPLE SYRUP, 1 gal. New York 1980 run, $15. Dalphin, 265-4029.

TORO 21" self propelled gas mower, used 1 season, $190; fireplace glass doors, 44"x32" outside, 34"x25" inside, $40; exercise bike, $25. Jackson 265-4562.

FILL DIRT, you haul, as much as you want up to 100 yards. Robinson, 296-2753.

COLOR PHOTOS, aerials of Tech Area, 11"x14", $3.50; 16"x20" presentation print, mounted, $12. LAB NEWS, MO 125/814. S. Hwy. 14 Village Project.

BUNK or twin beds w/maple headboards, $125. Johnson, 298-7020.

WILL SELL $37 merchandise credit at Bell Golf & Equipment (batteries, etc.) for $25. Bickes, 293-4037.

SINGER Touch & Sew sewing machine w/free arm, 3 yrs. old, just oiled & serviced, $125 firm. O'Brien, 266-9308.

WET SUITS, sizes 40 & 42, $50 & $25; skis, adjustable bindings 215, $25; ski rack, $10; Polaroid 210, $35. Wilson, 296-5965.

SEARS built-in dishwasher, $30. Harstad, 298-6551.

TWO French Provincial love seats, custom made, $350 ea.; upholstered maple lounge chair & ottoman, $80. Randall, 821-0388.

RABBITS, miniature Dutch bunnies, 7 wks. old. Spencer, 296-6250.

RANGE, dbl. oven, electric, $150; kitchen sink, $20. Boverie, 255-1071.

FOUR RV tires, Continental 800x16.5 tubeless, 8-ply, good for 10,000 more miles, $50 or best offer. Hochrein, 268-9204.

TWIN BED, frame, box spring, mattress, $40. Marder, 268-9643.

20' ARISTOCRAT trailer, fully self-contained, sleeps 6, shower, air, refrig, $2750. Adkins, 873-2744.

TRANSPORTATION

'74 PINTO stn. wgn., 2000 cc engine, 4-spd., $1500 or offer. Bartberger, 821-9079.

'65 FORD pickup, ½-ton, radials/S & M tires, have all guarantees & repair bills. Rutledge, 281-1155.

TIOGA motorhome, 1973, roof air, cab air, cruise control, PS, radio, stereo, many extras, 18½', trailer hitch, $5500. Foster, 986-2489 NTS.

'76 BULTACO Pursang MX-er, low hours, never raced, best offer above $500. Senglaub, 299-6255.

GIRLS' 3-spd. bike, completely overhauled, $60; '70 Chevy 4-wd Carryall, $1000, AC, radio; '73 Chevy Impala, 4-dr., AC, radio, $1100. Mason, 281-3052.

'74 MUSTANG II, AT, low mileage, newly rebuilt trans., $1600. Mattox, 821-3945.

'70 PONTIAC LeMans, 2-dr., 350 cu. in., $550. Nevers, 881-6365.

FUJI bicycle, 10-spd., $87.50. Alexander, 344-1419.

'79 Z-28 CAMARO, PS, PB, AC, AT. Hunter, 869-2566.

'64 CADILLAC convertible, $2000. Tripp, 266-4626 or 881-5000.

'74 CAPRI, 2 liter, 4-spd. manual, copper w/white vinyl roof, saddle interior, 46,000 miles, 24+ mpg city, cassette/FM, $1900. Barncord, 345-9306.

FISHING BOAT, fiberglass, 13.5 ft., 20 HP Mercury outboard motor; trailer w/spare tire; '72 VW camper, pop-top, sleeps 4, ice box, storage. Scott, 293-2536.

BICYCLE, boy's 20" high rise, single speed Huffy. Hale, 298-1545.

'71 FORD Galaxie 500 2-dr. HT, rebuilt AT, valves ground, radials, AC, $450. Craven, 298-0978.

'70 VW BUG, one owner, complete records, $1900. Esterly, 881-1973.

TWO BICYCLES: 26" wheels, 21" frames; Hercules 10-spd., Penney's 5-spd., some extras, $65 each. Church, 268-3590.

'76 FORD club wagon; '77 Jeep Cherokee, 4-wd; both below wholesale book. Kraft, 299-2157.

18' POWER BOAT, Tahiti, 325 hp Olds eng., 180 total running hrs., Berkely jet drive, HD tandem trailer, $5500. Perryman, 294-6113.

'74 VOLVO 142E, 4-spd., AC, AM/FM, steel belts, new brakes. Lane, 884-4566.

SUPER SNARK sailboat, 11', $200; scuba regulator, $45. Plunkett, 821-7757.

'71 CHEVELLE Malibu 2-dr., 307 eng., AT, radials, $750. Gallegos, 266-8884.

'58 TR3, partially restored, rebuilt engine, new retreads, $1000/best offer. Kepler, 298-5652.

REAL ESTATE

¾ ACRE w/barn, chain-link fence, in Cedar Crest. Gatchell, 281-5008 after 5.

2300 sq. ft. HOME, 126'x90' corner lot, Paradise Hills, assume 5¾% loan, terms or refinance. Skender, 898-5647 after 5.

1½ LOT plus 12'x60' 2-bdr. mobile home, partially furnished, near Elephant Butte Lake, $22,500 for both, negotiable. Cordova, 881-2209.

MOBILE HOME: 12'x70' w/8'x35' extension, 3-bdr., 1 bath, refrig., stove, lg. kitchen w/bay window, utl. rm., lg. LR, Bosque Farms. Hunter, 869-2566.

BRICK, 3-bdr., den, side yard access, wood floors, $85,000, negotiable down w/REC, 10408 Chapala Pl. NE. Barth, 299-2668.

MOBILE HOME, 12'x60', 2-bdr., near base, fenced, skirted, patio cover, storm windows, AC, $8500. O'Meara, 299-1080.

TWO custom brick houses: one in Albuquerque, one in Belen, both have full basements. Wheeler, 265-2187.

FOR RENT

FURNISHED 4-bdr. home, FR, den, playroom, shaded deck, Glenwood Hills, $500 mo., avail. Sept. 1, 5 mos.-1 yr. Butler, 293-7699.

HOUSE, 2000 sq. ft., 1 yr. old, NE, 4-bdr., 2 bath, mod. kit. w/micro, 2-car garage, landscaped, avail. Aug. 9, $530/mo. Johnson, 822-0169.

WANTED

DRAFTING BOARD, 3'x5' adjustable, good condition, prefer w/drafting machine but will settle for board alone. Rodriguez, 294-0403.

FOUR-POSTER double bed. Pope, 255-6702.

TV, B&W o.k., w/remote control. Huston, 262-0627.

USED model airplane engine & 4-channel RC controls. Harley, 898-0594.

20' ALUMINUM extension ladder. Baxter, 344-7601.

SMALL SWAMP COOLER, about 2000 CFM, down-draft preferred. Norris, 299-4717.

WORK WANTED

PAINTING by experienced UNM junior, free estimates, hourly rates or firm quotes. Stixrud, 298-0478 or 292-5002.

LOST AND FOUND

LOST—Black Casio F200 ladies watch; Rx glasses in flowered turquoise case.

FOUND—Rx sunglasses w/green lens (46-20), 4 keys in brown leather case, No. 8792 key made in Mass., silver cufflink, Rx sunglasses w/silver frame in black case, 1 GM key. LOST AND FOUND, Bldg. 814, 844-5677.

Shrimp Peel, Spinning Wheel Tonight

[redacted] for those who persist in frolicking in 90°-plus temperatures, we commend the Harvard Medical School Health Letter of August 1979 and its lead article, "Summertime—When the Thermometer Reads Hot." (All supervisors at Sandia get this newsletter—if yours hasn't routed it to you then challenge him/her... to a run.) Substance of the article is this: hot weather running has a problem potential ranging from small (cramps) to very large (heat stroke). Fluid intake is critical (drink lots), you should acclimate gradually, and if you have a heart or kidney disorder, or are elderly, then you'd better check out your hot weather exercise regimen with your physician. Whatever your health status, take it easy in hot weather.

The National Jogging Association appears to have fallen for a dim promotional scheme under which you, as a member, get to carry around a card entitled "Distance Certification Card" that is calculated to wow your friends and anyone else you can get to look at it. Thereon is one of five stickers characterizing your running prowess: Jogger (10 miles per week), Strider (20), Pacer (30), Sprinter (50) and Marathoner (70). That's the sort of credential I couldn't get enough of . . . back in 6th grade.

The fifth annual Taos Ski Valley-Red River run via Wheeler Peak takes place the weekend of July 26. This is a non-competitive group run in the highest and perhaps most beautiful part of New Mexico. For details contact Pete Richards (5132), 4-6295.

* * *

Arts & Crafts—During July, A&C offers classes in several areas: pottery, ceramics, tole, stained glass and photography. And photo hobbyists from Sandia are eligible to enter the Interservice Photo Contest—get your entry in by Aug. 15. Entry forms and other information about classes are available at the Center, west side behind the bowling lanes.

* * *

TONIGHT is a big one at the old Coronado Club. The buffet is a shrimp peel special. Spinning Wheel presents show-time entertainment and plays for dancing. Gene Corbin entertains in the main lounge. The action starts right after work and runs until midnight or so with special prices (cheap) in effect all evening. Call 265-6791 *right now* and make reservations for the shrimp peel.

NEXT FRIDAY, July 18, Crosswinds plays for dancing, veal a la Oscar is the buffet feature, and Gary Waters entertains in the lounge.

ANOTHER BIG ONE is scheduled Saturday, July 19, with the Freddy Chavez Foundation providing show time and dancing music. Dinner is your choice of prime rib or king crab. Members pay $7.75. Make your reservations early.

TEENAGERS have another summer special on Wednesday, July 23, with a group called Headwind booked for the occasion. Member parents should pick up tickets for their youngsters.

WHERE ELSE, except at the Coronado Club on Wednesdays from 4:30 to 6:30, can you buy draft beer and standard mixed drinks for two bits?

TRAVEL—The Coronado Club has the following tour packages available:

Chaco Canyon-Mesa Verde, charter bus, Aug. 30-Sept. 1, $120.

Western Canada, Sept. 25-Oct. 4, air and charter bus, $941.

Washington, D.C., Oct. 1-5, option A, $592; option B (includes Pennsylvania Dutch country), $632.

Mazatlan, Nov. 3-10 or Nov. 10-17, $299.

Caribbean Cruise, Dec. 13-21, $780.

Anaheim, Calif., (Rosebowl Parade), charter bus, Dec. 28-Jan. 4, $315.

Travel Director Frank Biggs (4231) has details on these trips and discounts available for Europe, Hawaii and Las Vegas. See him in the Club lobby tonight between 6 and 7.

* * *

Tryouts—The Kirtland Little Theater has some 15 male and 15 female roles for their production of M*A*S*H, which will be presented Sept. 16 to 18. If you're interested, tryouts are set for Wednesday and Thursday, July 16 and 17, at 7 p.m. at the Breakaway Rec Center. Call 844-5420 for additional details.

* * *

Gym Thieves—Steve Gossage (2648) called to report that a thief broke into his locker at the gym, presumably with bolt cutters, and made off with his wallet and other valuables. The theft occurred after work. Air Police commented that there has been a series of similar incidents, and they surmise that the thief enters the gym with the bolt cutters concealed. Since the average padlock is no match for a bolt cutter, the Air Police recommend that no valuables be left in the locker.

* * *

Biking—The Sandia Bicycle Assn. has, at last count, 485 members. Two Tech Area gate counts in June came up with 255 (a Friday) and 292 (a Wednesday) bikers passing through the several gates in the morning, indicating that a sizeable percentage of members are commuting. (Since many now work outside the Tech Area, the counts should probably be increased by 10-20%.)

Perhaps once a month or more we get a call from a concerned citizen (or "irritated motorist" if you prefer) exclaiming about derelictions of bikers, with the running of stop signs ("never even slowed down") and riding two and three abreast ("had to go into the oncoming lane to get around") the principal complaints. They call here because of their belief in the power of the written word to rehabilitate. Alas! Would that a word of admonishment could bring reform . . . But if the Air Police were to issue a few citations—the kind that run $10 or so—now that's the written word that transforms outlaws into model citizens. Unfortunately, the Air Police and, for that matter, the city police shy away from giving tickets to bicyclists, probably because we're supposed to be the good guys. Still, we're inclined to believe that the word would get around quickly if citations were given, and the effect would be salutary.

TOP HONORS from the Society for Experimental Stress Analysis recently went to Paul Adams, supervisor of Centrifuge, Climatic and Radiant Heat Division 1531. Paul was named a Fellow in the organization, the highest rank of membership, and also received the Tatnall Award "for long and distinguished service to the society." Paul has been active in environmental testing at Sandia for 33 years.