Winners in Materials Sciences Competition

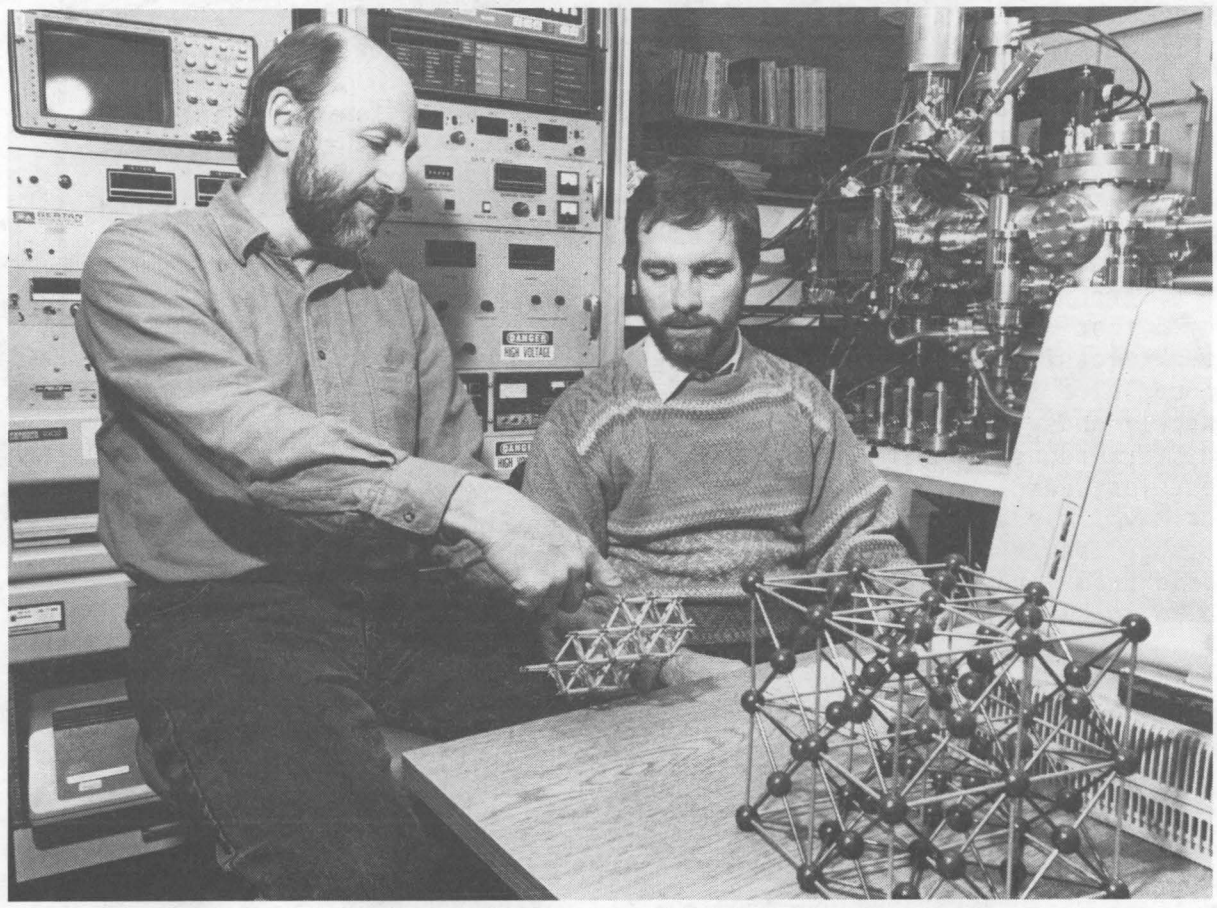
Sandians Show How Atoms Move, Create Super-hard Aluminum

Persuasive blends of experiment and theory were among the ingredients making two Sandia research teams winners in the latest DOE Materials Sciences competition.

Insight into how atoms move on metal surfaces brought the award for "outstanding scientific accomplishments in solid state physics" to Gary Kellogg and Peter Feibelman of Surface and Interface Science Dept. 1114 . Their research was titled "Surface Diffusion by Atomic Substitution."

Creation of a super-hard aluminum alloy, plus a way to accurately measure its strength, earned the award in "significant implications for DOE-related technologies in metallurgy and ceramics" for David Follstaedt and Sam Myers of Microstructure and Defects Dept. 1112 and Roy Bourcier and Mike Dugger of Packaging and Structural Metallurgy Dept. 1832. Their research

(Continued on Page Four)



ATOMS' MOVEMENT — Peter Feibelman (left) and Gary Kellogg (both 1114) view a model of a stepped metallic surface. Stepped or terraced surfaces are the subject of a continuation of research that won a BES Materials Sciences award. On the table is a model representing the face-centered cubic structure of metals such as aluminum, platinum, and nickel. In the background at right is a field ion microscope similar to the one used to verify that atoms move on certain metal surfaces by a process of substitution.

Sandia Leads in Awards

"The Sandia BES Materials Sciences Program has been a successful and growing program," says Fred Vook (1100). "Sandia has won 13 Materials Science Research Competition awards since 1985, more than any other lab. Since the competition began in 1981, Sandia has received at least one award every year except 1982." Fred and George Samara (1103) manage the program. "We especially value these awards," says George, "because they are voted on by our peers at the other national laboratories."

LAB NEWS

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'Super Volunteer' Revisited

Good Deeds Earn Salgado 'Kudos' from Watkins

Some people just keep on giving.

About a year ago, the LAB NEWS recognized Larry Salgado of Process Research Dept. 6212 as one of Sandia's "super volunteers," employees who devote their time and effort to helping and educating people in their communities. Larry's work and the work of volunteers like him made it possible for Sandia to win one of several President's Volunteer Action Awards last year.

Now Larry is being honored individually for his good deeds. On June 4, he will receive the Secretary's Community Service Award from DOE Secretary Watkins in Washington. The award, DOE's highest for volunteerism, recognizes employees nationwide who, in Watkins' words, "make the extra effort to make life better for their neighbors."

Of course, Larry won't take much of the credit for winning the award. Instead, he gives away the

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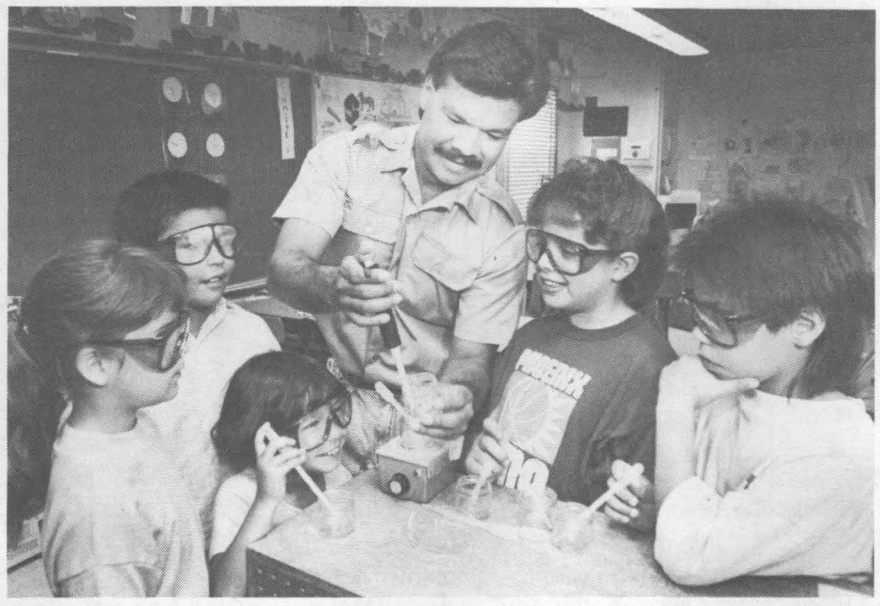

CLEVERLY DISGUISED SCIENCE — These students at Sandia Base Elementary may not realize it, but they're learning principles of math and science from Larry Salgado of Process Research Dept. 6212. Larry will receive the 1991 Secretary's Community Service Award from DOE Secretary James Watkins next week in Washington for outstanding service to the community.
(Photo by Randy Montoya)

67 New DMTSs Named — See Page Eight

Industrial Secrets a Hot Target

Espionage Still Thrives Despite Cold War's End

Times may be great for arms negotiators, entrepreneurs, and map makers, but the FBI's national coordinator for counterintelligence awareness says it's a bad time to be a spy, particularly an American spying for a former East Bloc country.

The reason, says Freddie L. (Rusty) Capps, is that many people who used to work for East Bloc intelligence agencies are trying to start new lives for themselves by providing information to US intelligence agencies, and the US agencies are keenly interested in knowing the identities of Americans spying on their own country.

Capps gave Sandians a glimpse of worldwide intelligence efforts directed against the US government and industry during an overview briefing at Sandia, Albuquerque May 19. He was hosted by Jerry Brown, Internal Security (ISEC) Program Manager for Safeguards and Security Center 3400, who says the briefing was part of ISEC's continuing effort to maintain liaison with

"Intelligence agencies are refocusing, and we find that many who are targeting us are allies."

the national intelligence community and keep Labs employees abreast of changes in worldwide intelligence efforts.

"Today, there are so many out-of-work former Central European and former Soviet intelligence officers who are trying to give us information that we are having difficulty processing them," Capps says. "These are difficult times for Americans who, for whatever reasons, were selling information to foreign services in the past."

Of the 15 republics that made up the Soviet Union, only Russia, Ukraine, and Belarus are still

(Continued on Page Seven)

This & That

The Select Sandia 67 – As Executive VP Orval Jones said to the 67 new Distinguished Members of Technical Staff (DMTSs) in a recent letter, "This is the highest Technical Staff level that a Sandian can achieve, and you should be very proud of your achievement." I'm sure they are, and we add our congrats to them. About half are seen in this issue (see page eight) along with their DMTS citations; the other half (names listed on page nine) will have their photos and citations in the next issue.

* * *

Encouraging Words from High Places – The AT&T announcement on May 5 that it would not seek to renew the Sandia management contract caught lots of us by surprise and even put the Labs into something of a group "blue funk" for a day or so. But Sandians seemed to recover quickly and get back to business at hand. I think that's due in part to the tremendous support that we got from some VIPs. Statements by DOE Secretary James Watkins and Senator Pete Domenici that we published in our May 15 issue, for example, made their continuing support clear. And in this issue (at right), we include some complimentary and encouraging words from Senator Jeff Bingaman. I can't think of three more important folks to have in our corner right now.

* * *

Killing Rumors – Now that we all know that AT&T is "disconnecting" from Sandia next year, the big question is: "Who *IS* going to run the place?" Rumored suitors are many, but our crack LAB NEWS reporters have been nosing around and have discovered two companies that have ruled out the possibility: (1) Bubba's Quality Welding, Inc., has decided not to pursue its initial interest (not sure he could hold everything together, Bubba says) and (2) Bob's Better Bolo Ties (Bob thinks it could be a conflict of interest because Sandians are his best customers).

OK, OK – back to serious stuff. We do have more info in this issue about the transition – a story about what the new Transition Council is up to and some questions and answers from Al Narath's all-employee briefings several weeks ago (see page seven). As promised, we're doing our darndest to keep you informed about what's happening, so let us know what else you want to know.

* * *

The Real Villain? – Change now seems pervasive in most Sandia activities. But change may not be the real mental villain, according to one Sandian attending a "Brown Bagging with Brass" session recently. Sandians have come to accept change, according to the employee, but it's the constant *uncertainty* that's particularly troubling. The Sandia VP who led the session made a valid point, I believe, when he replied that Sandia is simply becoming more like other companies in which uncertainty is the norm. That thought isn't necessarily comforting, but it is one we probably should try to get used to.

* * *

Always an Even Four – Ever wonder how there are always just enough stories and photos to fill an even multiple of four LAB NEWS pages? (Our printer can only print four-page multiples.) Precision planning and writing by the LAB NEWS staff, of course. The last issue was a challenge, though, because we had roughly 15 pages of news and photos. "This page intentionally left blank" somehow seemed inappropriate, so we cut the issue back to 12 pages. Apologies to several folks who were expecting their articles in the last issue, but didn't get them until today. •LP

'Tremendous Capabilities'

Jeff Bingaman Comments about AT&T Decision

The following information is excerpted from a May 5 statement by Senator Jeff Bingaman and a news release from him the next day. Both concern the May 5 announcement that AT&T has chosen not to renew its Sandia management contract after the current one expires Sept. 30, 1993. Statements about this subject from Senator Pete Domenici and DOE Secretary James Watkins were published in the May 15 LAB NEWS.

From the May 5 Statement:

"I am sorry that AT&T has concluded that it must terminate its relationship with the Department of Energy and Sandia National Laboratories. This relationship has served the nation well since 1949.

". . . we need to look forward and work to ensure that the new managers of Sandia are committed to maintaining the viability of the Laboratory and its preeminence in a wide range of fields.

"The tremendous capabilities of the Laboratory reside in its people. I am sure that any new manager will recognize and nurture this unique resource.

"This is an important period in the history of Sandia. The Cold War is over. The Laboratory needs to reorient its resources toward meeting broader national needs. My hope is that the new manager will be skilled in managing this transition."

From the May 6 News Release:

DOE Secretary James Watkins, responding to Senator Bingaman's questions during today's [May 6] Armed Services Committee hearing, stated that he anticipated no changes in the Sandia National Laboratories' mission or capabilities, and praised Sandia as DOE's "premier engineering organization" in both its traditional missions and in new areas such as environmental clean-up and weapons dismantlement.

Secretary Watkins assured Senator Bingaman that DOE officials will work closely with the New Mexico congressional delegation as they prepare a request for proposals to manage Sandia after AT&T's contract expires next year.

"I look forward to working with Department of Energy officials to ensure a smooth transition to new management of Sandia," Senator Bingaman said. •

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NEW MEXICO Environment Department (NMED) officials toured several Sandia facilities last week, including this Solar Detoxification Experiment facility. NMED Secretary Judith Espinosa (center) learns about solar detoxification research from Earl Rush (6215) as Kathy Carlson, Manager of DOE's Kirtland Area Office (KAO), looks on. Espinosa and 11 other NMED employees also toured a Sandia wastewater monitoring station, the continuous monitoring pH Log-in System, and the Hazardous Waste Facility. NMED maintains a staff at KAO to monitor DOE and Sandia environmental activities.

Teamwork Celebration Day

About 400 Sandians gathered in the patio area south of Bldg. 912 on May 14 at the invitation of Vice President John Crawford (8000) for a "Teamwork Celebration Day." Hot dogs and soft drinks were provided for everyone, and John and several other speakers took the podium to thank Sandia teams for efforts during the past year. Speakers included Beth Coleman (8701), Henry Hanser (8007), Jim Wright (5300), Sheila Akins (8441), Subra Subramanian (8611), Denise Koker (8526), Randy Christman (8523), and Cindy English (8522).

John got a surprise when employees turned the tables on him with a special Award for Excellence, presented on behalf of all employees by Judy Tejada (8284). Then a 30-piece local junior-high band surprised the crowd by marching from behind nearby buildings and entertaining at the conclusion of the celebration.

SANDIANS FILLED the Bldg. 912 patio area to hear "thank yous" from team leaders and VP John Crawford for serving on project committees and ad hoc groups during the past year.

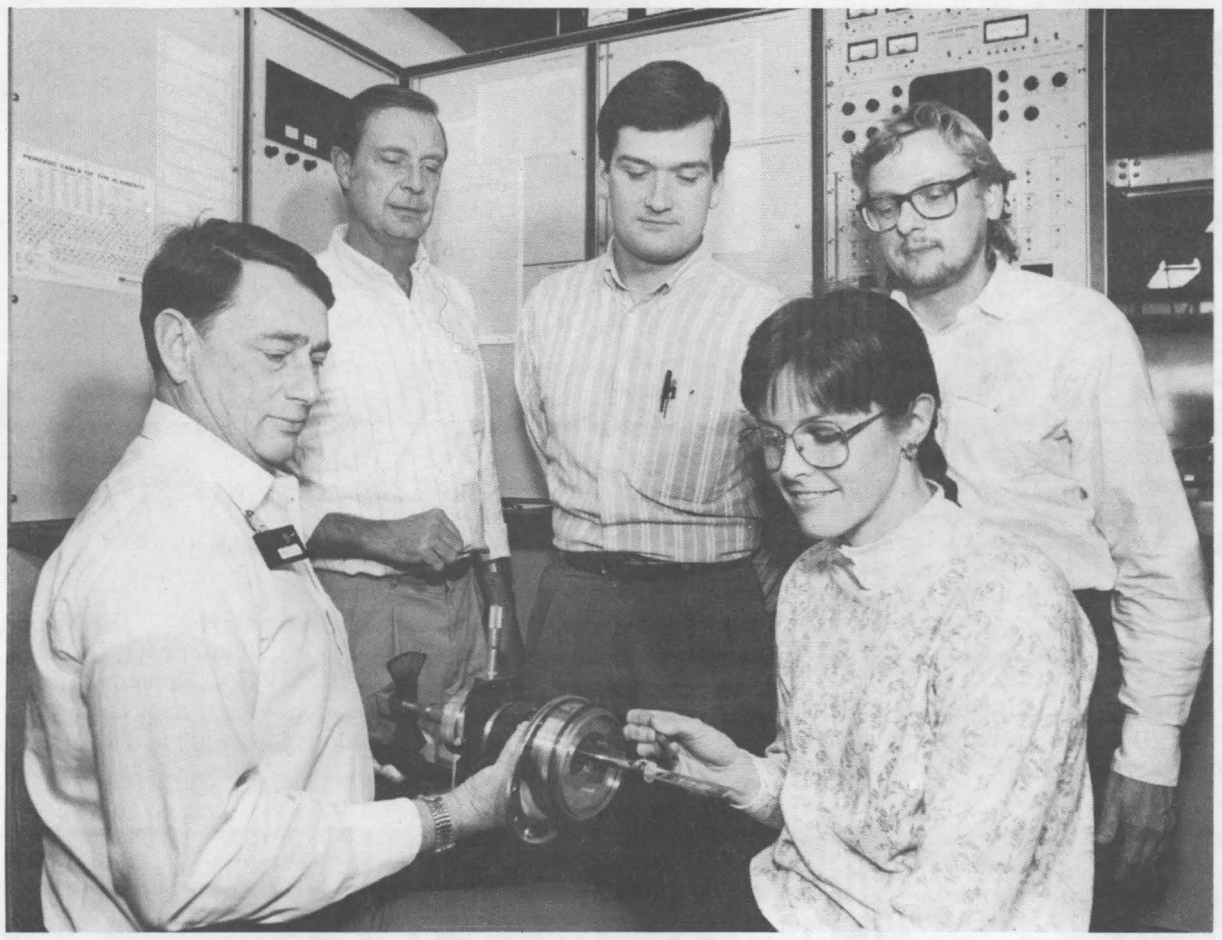
HENRY HANSER (8007) says thanks to F/X (Facilitators) and the "Friday Gang" that wrote the site Quality Plan.

SANDIA LIVERMORE NEWS

EAST AVENUE Middle School Marching Band surprises Sandians with a musical salute and a letter line spelling out "THANKS."

TAKING THE BATON and wearing a lei presented to him by employees, VP John Crawford (8000) takes a turn at leading the band.

SERIOUS COMPETITORS were in the front ranks when the 1992 Sandia, Livermore Directorate Challenge footrace was held May 6. The results included one upset: Frequent winner Jim Reitz (8453) came in second this time, behind John Brockenbrough, a contract employee. But perennial winner Carol Caldwell (8643) again took women's first-place honors. The colorful "Aloha-pede" group from 8500 helped that Center team take first for most participation.



ION IMPLANTERS — Sam Myers (1112) displays a target holder for ion-implantation treatment of samples, while Dawn Bishop (1112) holds an aluminum test specimen to be implanted. Standing are (from left) David Follstaedt (1112), Mike Dugger, and Roy Bourcier (both 1832). In the background is the ion-implantation accelerator used in research that won a BES Materials Sciences award.

(Continued from Page One)

BES Winners

is titled "Exceptionally High-Strength Aluminum Alloys."

The annual competition is sponsored by DOE's Office of Basic Energy Sciences (BES), Division of Materials Sciences. Besides recognition of the team members, each award also includes funds for purchasing research equipment.

Atoms Shoulder Atoms Aside

Through research featured last year in the LAB NEWS (Aug. 23, 1991), Gary and Peter demonstrated that atoms move about on certain metal surfaces by interchanging with atoms of the underlying metal. Peter's theoretical calculations indicated that atoms on a metal surface don't always roll around like marbles. In some cases, it takes less energy for an atom on top of a crystal surface to move down into the crystal, replacing another atom which in turn moves out onto the surface and continues the process.

Gary used field ion microscopy to verify Peter's predictions. A map of the sites visited by moving atoms showed, by the directions of movement, that atoms were in fact moving by substitution, in accordance with Peter's calculations. In later experiments, Gary was able to observe single platinum atoms moving into a nickel surface by the substitutional process. Gary and Arthur Voter of Los Alamos National Lab have recently shown that two- and three-atom clusters also move by substitution.

Atoms on a metal surface don't always roll around like marbles.

Peter is now investigating movement of atoms on surfaces that have "steps" and "terraces," such as on an unfinished face when a crystal is growing. "Learning to control crystal growth is an important element in the synthesis of advanced materials," says Peter. Researchers need to know whether a crystal will finish growing each layer smoothly before starting the next, or whether the surface will grow unevenly. "We need criteria to tell what happens under different conditions," Peter says. "That's what I'm trying to develop."

Surprises after Implantation

The other winning Sandia team discovered some unsuspected possibilities for aluminum. Aluminum alloys are used in aircraft and spacecraft because their strength is high compared to their weight. They're increasingly used in automobiles and other ground vehicles to save fuel. But even high-strength aluminum alloys are much weaker than steel, soften when heated as modestly as 200 degrees C (about the temperature of a medium-high baking oven), and suffer from high friction and wear.

The Sandians found that the picture changes drastically in aluminum that is ion-implanted with oxygen. The implanted aluminum is more than five times as strong as a standard high-strength aerospace aluminum alloy. In fact, it is more than 1-1/2 times as strong as hardened steel of the type used for bearings. It has only a fifth as much friction as pure aluminum when sliding, and it wears away much less.

Because of how implantation works, only a thin layer at the surface is affected — less than a micrometer, or a thousandth of a millimeter. During the implantation process, a beam of ions is aimed at a sample of material. The ions (atoms that are electrically charged by gain or loss of electrons) penetrate a small distance before stopping. The ions can then react chemically with the other material — in this case, oxygen with aluminum.

Conversation Led to Research

Researchers have known for several years that ion-implanted metals can become exceptionally hard. Because of the thinness of the affected layer, however, they usually weren't able to measure the strength accurately. The Sandia project started after a conversation among Sam Myers, Roy Bourcier, and Al Romig (1800) about how to determine the strength of such thin layers. Sam says, "Roy and Al told me that they had developed a new capability to examine the mechanical properties of thin films. They were combining indentation testing in the lab with finite element modeling on the computer."

At that time, Sam was implanting aluminum with oxygen to investigate the trapping of hydrogen by oxide precipitates. David Follstaedt's high-resolution electron microscopy studies had shown that the oxygen reacted with aluminum atoms to form tiny particles, called precipitates, of aluminum oxide. The precipitates were not much more than a billionth of a meter in diameter and consisted of just a few hundred atoms. In conventional alloys hardened by oxide precipitates, the particles are typically a hundred times as big as the ones produced by ion implantation.

"I mentioned to Al and Roy that this fine dispersion of precipitates should produce very high strengths," says Sam. "We agreed to try their new techniques on some samples. Mike Dugger subsequently joined the group to examine friction and

(Continued on Next Page)

Almost Unbelievable Aluminum

One of the Sandia researchers investigating ion-implanted aluminum calls it a "dream" material. Here's why:

- It's more than five times as strong as high-strength aerospace aluminum alloy.
- It's more than 1-1/2 times as strong as bearing steel.
- It has only 1/5 as much friction as pure aluminum.
- It wears away much less than pure aluminum.

Standard Theory on Non-standard Scale

Theory and Experiment Converged To Bolster Credibility of Results

Even when lab testing was combined with computer modeling of oxygen-implanted aluminum, a Sandia research team was still a bit skeptical that the material could really be as strong as their results indicated. But when a separate theoretical study gave a similar answer, the team gained further confidence in their findings.

Doug Polonis, a University of Washington professor working at Sandia for the summer, used electron-microscope measurements of oxide particles and calculated the material's strength by means of a standard metallurgical theory. Conventional alloys don't have particles as small or densely distributed as in the implanted aluminum, so the theory hadn't been applied on this scale before. Nevertheless, the theoretically predicted strength agreed well with results obtained from finite-element modeling of the indentation tests (see main story). The agreement resolved concerns about how the strength could be so high, and it also supported the applicability of the theory at the small size scale.

To the sizable community of researchers who deal with ion implantation, this is valuable knowledge. Sam Myers (1112) says, "Implantation-induced strengthening has been a largely empirical sort of business in the past. People have implanted many things into many other things — usually not aluminum, but metals such as steel or titanium alloys. Typically, they've then done indentation tests and said, more or less, 'Gee, it sure is hard.' I think one reason the Sandia work got the award is that applying these finite-element modeling methods to define the strength of the ion-implanted matrix establishes a quantitative methodology that should apply to many implanted systems."

(Continued from Page One)

Super Volunteer

credit as freely as he gives his time and energy to the community.

Larry says his recognition wouldn't have been possible without the endless support and teamwork of a number of people, beginning with several people in Public Relations Dept. 3161: Al Stotts, who administers Sandia's Volunteers in Action (VIA) program, Celia Arias, and Manager Rod Geer. "They keep me informed about volunteer opportunities in the community," he says. Al nominated Larry for the award.

Larry's work through the VIA program ranges from serving as a court-appointed special advocate for monitoring child-abuse cases in Albuquerque to visiting senior citizen centers and talking with elderly people, especially those who don't have families or who speak only Spanish, he says.

Sandia's management also deserves a lot of the credit for supporting community service, says Larry. "My managers have been flexible and supportive about all my community work. The culture here nurtures volunteerism, and the community benefits from it." In particular, he says, his Manager Howard Stephens (6212), his Director Bill Marshall (6200), and his former project leader Al Sylwester (6211) have all supported his community service work through the years.

In addition, says Larry, Sandia's commitment to education has encouraged several educational outreach programs to spring up at Sandia during the past few years, although he says he's been involved in educational outreach since he came to Sandia eight years ago. He now gives science demonstrations at schools through Sandia's School Partners and Science Advisors (SCIAD) programs, speaks at schools to encourage students to pursue careers in math and science, and teaches cardiopulmonary resuscitation (CPR) classes for civic groups and schools. He also serves as a mentor at a local middle school.

Larry says that although he attributes his award mostly to teamwork among the many Sandians involved in volunteerism at the Labs, he is grateful and humbled by the honor. "I receive a lot of fulfillment and satisfaction from doing these things," he says. •JG

Gift of Charity: It Runs in the Family

Within days of Larry Salgado's (6212) hearing he won the Secretary's Community Service Award from Secretary Watkins, his mother received the Outstanding Hispanic Woman of the Year Award for 1992 in Hobbs, N.M., also for her volunteer work in the community.

And it's not just coincidence that both Larry and his mother were recognized simultaneously for their good deeds. "My parents brought us up in a Christian home with strong family values," says Larry. "We learned that in giving, we receive. Giving the gift of charity comes naturally to me."

A single parent of a nine-year-old, Larry says his volunteer work also allows him to spend time with his daughter and pass along the values he learned from his parents. "When I visit the elderly," he says, "my daughter gives them hugs and they give her hugs. She likes them and they like her."

(Continued from Preceding Page)

BES Winners

wear characteristics of the new implanted material, and David began coordinating the overall effort."

The indentation-plus-modeling technique builds on a natural way of measuring strength: Try to push something into a sample, and the stronger the material is, the harder it resists. That's essentially how an indentation test works — in this case, with an extremely small-load diamond-tipped indenter in an instrument called a NanoIndenter. But because the thin strong layer is on top of the soft aluminum bulk, it's like trying to measure the strength of rubber by pushing on an inflated balloon instead of a solid rubber block.

Roy explains how the new Sandia technique got around that problem: "We took finite-element codes developed by Engineering Sciences [1500] and used them to model the indentation process. The computer modeling let us compensate for having a hard layer on a more yielding substrate." The modeling process used the known properties of the pure aluminum in the substrate segments and calculated the strength of the segments in the implanted layer to match the indentation behavior seen in the lab. The strength determined this way agreed with other theoretical analyses based on the size and distribution of the precipitates (see "Theory and Experiment Converged to Bolster Credibility of Results," page four.)

"It took the total approach of using the low-load indenter plus the modeling to get a number that tells how hard the material is," says David. "Before this work, quantification of ion-implantation hardening just didn't exist."

When Mike Dugger investigated the material's frictional and wear properties — its tribology — he found that the implanted aluminum shows less friction and wears away less than normal aluminum alloys. Because ion implanters are readily available for treatment of industrial components, it's already commercially feasible to take advantage of this improved performance.

"Someone who has an aluminum component that needs to be in sliding contact with something else might be interested in the technique," says Mike. "For some applications, oxygen implantation could replace other solutions, such as cladding with another metal. But it's still expensive. In a satellite or a military aircraft — relatively specialized, high-priced components — the benefit might be worth the cost. I wouldn't look for auto manufacturers to start implanting engine blocks right away."

This research could encourage investigation of how to achieve the same effect in greater bulk. Sam explains: "The uniqueness of this material is that the aluminum oxide particles are very small, very dispersed, and extraordinarily stable. We would like to see if these features can be achieved by other methods. Knowing that a material such as this can exist is important, because it gives an impetus for looking for other ways to make it."

"The ultimate dream extension of the work," Roy adds, "is coming up with a process by which these materials could be fabricated quickly, cheaply, and in bulk structures. Then we could have aluminum alloys that are five to six times as strong as conventional aluminum engineering alloys now available."

Other important contributors to the work were Dave Schmale (1832), who developed an indentation test system; Chuck Hills (1822) and Mike Moran (1112), who worked on the electron microscopy; Dawn Bishop (1112), who did many of the implantations; Fred Yost (1830); former Department 1832 members Frank Vigil (2523) and Ed Martinez (9216); Mike Stone (1514); and Elizabeth Sorroche (1832), who did much of the tribology testing and tester development. •CS

'Gratifying,' Says Fleury

"It's gratifying to see that Sandia has again been recognized for its cross-disciplinary approach to research that extends the boundaries of knowledge about materials science. An impressive array of talent from several organizations came together to make both of these projects successful. The combination of theory, modeling, and experiment resulted in substantial, qualitative improvements in our understanding of materials and processes from the atomic scale on up. Sandians can take pride in the Office of Basic Energy Science's recognition of these two teams' work, as well as in the Labs' unequaled record in the Materials Sciences Competition over the years. Special congratulations to the team members and to all their colleagues who contributed."

Paul Fleury
VP of Research and
Exploratory Technology 1000

ASSISTANT SECRETARY of Defense Colin McMillan (right), a mid-May visitor, is greeted by Labs VP Gerry Yonas (9000). McMillan was here to learn more about the Labs' manufacturing initiatives, in particular Sandia's participation in the Computer Aided Acquisition and Logistics Support program that's intended to make the DoD acquisition process "paperless." As Assistant Secretary, McMillan oversees DoD functions in weapons production, procurement logistics, environment, and other areas. He has long-standing New Mexico ties, and is a former state legislator ('71-'82).

Welcome

Albuquerque — Debbie Chavez (21-1), Jeanette Denaple (21-1), Paulette Jarrett (21-1), Sharon Johnson (7722), Carolyn Marvin (21-1), Virginia Ortiz (21-1), Beth Potts (21-1); *Other New Mexico* — Evelyn Cortez (21-1), Denise Jaramillo (21-1), Gerald Peace (7723), Susan Schear (154).

Elsewhere: *California* — Eric Grose (323), Vern Hermansen (7732); *Idaho* — Yvonne McClellan (7731).

Sympathy

To Ann Murphy (9301) on the death of her mother in Rio Rancho, April 12.

Building a 'Multilane' System

Return Those Word Processing Surveys, Please!

Building a word processing system that's flexible enough to meet long-term needs is the basic goal of a Sandia team that distributed a word processing survey to employees this week as the first step in the process.

"Our emphasis is not just on selecting software, but on designing a total system — one that will last and won't become outdated as soon as the next generation of software or hardware hits the streets," says Larry Bertholf, Director of Information Architecture Center 4400. "With lots of employee input, the team is designing a system that will accommodate several kinds of software and hardware and remain viable well into the future."

Gary Shepherd of Workgroup Computing Dept. 3827 illustrates the concept by comparing the anticipated word processing environment to a multilane highway: "The highway can handle different makes of cars. They can change lanes, new cars can come onto the highway, and old ones can go off.

"We want Sandia's word processing environment to be similarly flexible, accommodating different makes of software, allowing people to freely exchange data regardless of product, and allowing new types of software to come onto the 'highway' and old types to depart it if they become obsolete. 'Vehicles' may come and go, but the 'highway' should remain useful for many years."

Labs-wide Team Involved

The idea is to select a small set of supported products for use at the Labs and to define the process that keeps them viable, explains Gary.

Sponsored by the Information Architecture Center, the word processing team includes employees from many Sandia organizations, working levels, and sites throughout the Labs. Four main groups were formed: Gary chairs the infrastructure group, Chris Morgan (3827) the organization group, Judy Jewell (7000) the applications group, and Mike Norte (5003) the data/information group.

Surveying employees is only the first task in a series of ten in the total process. Subteams have been formed for the first five. These tasks and the subteam chairpersons are: designing and conducting the survey, Renae Dietz (Org. 1); creating and communicating a word processing policy statement, Larry Bertholf; establishing criteria and dividing into functional categories, Bill Wenrich (155); defining basic support/training issues, Mary Courtney (5000); and evaluating word processing candidates against the criteria and creating a supported set, Keith Vollmer (2561).

Tasks to be tackled later involve creating matrices to address product function and cost; identifying special support and training needed for specific jobs; and creating processes and criteria for adding new products, reviewing new versions of supported products, and deleting products.

Employees are asked to return the word processing survey by June 4. If you did not receive one or if you misplaced it, call 845-7962 and the Sandia Line Fax System will telefax a copy to you.

"To succeed, we really need the input of Sandians," says Larry Bertholf, "so return those surveys, please!" •LP

Retiree Picnic Draws 1,500 Despite Weather

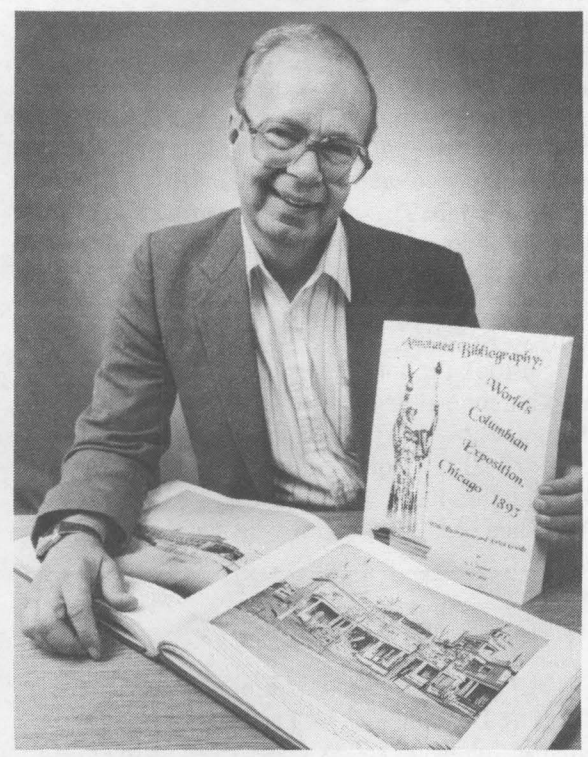
Looking bug-eyed, retiree Charlie Kaspar (at left) and a newfound friend enjoy the annual Retiree Picnic May 21 at the Coronado Club, while old friends share a laugh: (below, from left) Daisy Hay, Doris Rutledge, and Nancy Kersey.

Picnic organizer Linda Stefoin of Benefits Administration and Employee Services Dept. 3543 says more than 1,500 hungry retirees and spouses braved the heavily overcast weather and showed up at this year's shindig. The Bob Weiler Band provided tunes, and members of Sandia's Large Staff joined in the festivities.

"Everybody seemed to have a good time, and we've already received a lot of positive feedback from retirees," says Linda. "Many thanks to all the Sandians who helped organize this year's event. Everyone put in an enormous amount of effort."

Take Note

The New Mexico Zoological Society will hold its 10th annual Saturday Night Wild at the Rio Grande Zoological Park on Saturday, June 20, from 6 to 10 p.m. The event features entertainment, international foods, special events for kids, and a raffle. This year's proceeds will help fund the new royal white Bengal tiger exhibit, the orangutan exhibit, and a lighting system for evening events at the zoo. Advance tickets ($6 adults, $1 children under 12) go on sale June 1 at all First National Bank locations. Tickets will also be available the day of the event at the gate ($7 adults, $1 children under 12). Park and Ride (50¢/person each way will be available at 5th and Lead downtown. For more information, call the Zoological Society office on 842-7212.



GAY DYBWAD (2411) and his wife Joy Bliss visited 27 libraries during a 1-1/2-year period to compile their recently published book, *Annotated Bibliography: World's Columbian Exposition, Chicago 1893*. The volume details more than 2,700 books and pamphlets distributed at and about the World's Fair held in Chicago 100 years ago, which was a quadricentennial celebration of Columbus' landing in the new world. Gay says he has collected artifacts from world's fairs for years. The book on the table is open to a photograph of the territorial building representing New Mexico, Oklahoma, and Arizona during that World's Fair.

From Employee Dialogs

More Questions and Answers about the Labs' Contract Change

The following questions and answers are selected from President Al Narath's employee dialog sessions in Livermore and Albuquerque several weeks ago. Questions and answers are paraphrased for brevity.

Could Sandia Corporation offer a proposal and operate the Labs without an outside organization being involved?

Yes, but it is generally considered most advantageous for an institution such as the Labs to be associated with the technical and management strength of a large, respected organization, such as a corporation, consortium, or university.

What might motivate an organization to seek a contract for operating Sandia?

Whether the contract is non-profit or for-profit, operating Sandia could facilitate professional relationships with Sandia employees and interactions with the Labs' excellent science and technology base. Sandia is also a prestigious institution in its own right, and its operating contractor can benefit from that prestige. In the case of a for-profit arrangement, the profit may be enough motivation.

Will Sandia have any input into the request for proposal (RFP) or the selection process?

Assuming that DOE issues an RFP (there is precedent for choosing a new operating contractor in other ways), Sandia will provide any DOE-requested general technical information needed for developing the RFP. Sandia will not be involved in the selection process.

Will the RFP development and selection process be open, so that Sandians and others can follow its progress?

It may be possible to know when major milestones occur in the process — for instance, issuing an RFP is a matter of public record. Sandia will not have access to internal DOE procedures or discussions. Whatever information is publicly available will be communicated to all Sandia employees. Communications will be one of Lee Bray's important functions as Transition Executive.

Teaming and partnering relationships with industry can be expected to continue and increase.

Will a change in Sandia's contract make a consolidation or other restructuring of DOE labs more likely?

Consolidation is not expected to figure into the complex process of choosing a new contractor to operate Sandia. There has been no indication of such a possibility from DOE. Most likely, a contract will be awarded to operate Sandia in its present form and with its present mission.

Under a new contract, might the Labs be competing with the private sector?

Sandia will still be a national lab, and there are laws that prohibit national labs from competing with private companies. Teaming and partnering relationships with industry can be expected to continue and increase over the next few years. That's how federal investments in R&D can be made to benefit the private sector.

What happens to Sandia's top management when the current contract expires on Sept. 30, 1993?

Corporate officers — essentially vice presidents and above — will resign effective with the contract termination date. The new operating contractor will have the option of replacing these officers or of inviting some or all of them to continue at Sandia.

What will happen to Sandia managers who are AT&T employees on leaves of absence?

This group includes about a dozen people. Possibly some will choose to return to AT&T; possibly some will remain with Sandia. No specific decisions have been made yet. •CS

Transition Council Maps Out Future

As a first step in transition activities at Sandia while DOE prepares to select a new operating contractor for the Labs, Transition Executive Lee Bray (30) and a Transition Council are identifying what's needed for a smooth transition.

"Our first priority is to preserve the ability of the Labs to fulfill its mission through these transition months into the new contract," says Lee. "Among whatever changes may occur, we want our customers and all Sandians to know that we will be striving to achieve the continuity needed to keep the work of the Labs going."

Other members of the council are Paul Stanford, Chief Financial Officer 100; Bob Kestenbaum, General Attorney 200; Herb Pitts, Director of Information Services 3100; Ralph Bonner, Director of Human Resources 3500; John Bode, Associate Director for Strategic Analysis 4100B; Virgil Dugan, Director of Planning and Staff Support 4500; Ed Franzak, Manager of Special Projects Office 4502; Paul Shoemaker, Manager of Strategic Planning Program Office 4524; John Meinhardt, Executive Assistant to Defense Programs Sector Manager 5002; and Jack Hickman, Manager of Advanced System Development 5201.

Project management techniques will be used to carry out the transition. The requirements of customers, employees, AT&T, and other stakeholders are being identified. Development of a work breakdown structure (division of a large job into smaller, more manageable tasks) has begun.

After the initial planning, the Transition Council is expected to remain as a steering group to guide transition-related tasks.

"Of principal interest," says Lee, "is ensuring that the requirements of our employees are understood and that processes are in place for answering their questions and concerns. Herb Pitts is leading a task in which methods of communication with employees and retirees are being investigated. Sandia Line, mail-in, and fax-in channels are being explored as quick-response methods to supplement LAB NEWS coverage, continuing town meetings, and direct management-employee communication."

Transition Council Charter

We will preserve Sandia National Laboratories' ability to provide exceptional service in the national interest. We are engaged in a transition from AT&T to a new M&O [managing and operating] contractor. Our responsibility is to ensure a smooth transition, with as few discontinuities as possible, while protecting the interests of our customers, Sandians (employees and retirees), and AT&T.

(Continued from Page One)

Espionage

considered espionage threats today, he says. Romania is the only country among the former USSR's eastern and central European allies still considered to be a threat. Cuba also is still considered to be an intelligence threat, he says, but it is too burdened with economic problems to pose serious trouble for the United States.

Surprising Spies

There are still spies around, Capps says, but it's somewhat surprising who they are. "With the breakup of the Soviet Union, intelligence agencies are refocusing, and we find that many who are targeting us are allies. They are collecting economic information and passing it along to their companies."

During a portion of an NBC news broadcast shown by Capps, the former chief of the French intelligence service admitted smilingly that he had directed his agents to collect economic intelligence from the United States and pass it on to French companies.

Capps says that although US agencies do not actively seek economic intelligence for American companies, they "do use commercial intelligence defensively, by telling US companies when we discover they are being targeted by foreign services."

The lesson in all this for Sandians, he says, is to be wary of discussing not only national defense issues with foreign colleagues who are not particularly well known, but matters of probable economic importance too.

"We still track [foreign] intelligence officers, but now we tend more to watch their targets, like you," Capps says. "In situations like that, we try to let you know what the threat is to you, because that will make their work more difficult."

Suspicious Joggers

For intelligence services, the end of the Cold War has had some down sides as well as up sides, he says.

"Ten years ago, when Reagan was talking about the Soviet Union as the 'evil empire,' people were coming forth and telling us about things they had seen that they thought were suspicious," he says. "Today they're not doing that."

He relates the story of a woman from Evanston, Ill., who called the police one day in the early 1980s and reported having seen three separate sets of joggers run up to the back of a utility van parked in front of her house and get into it. She said they might be Iranian terrorists.

The police responded and ended up arresting about a dozen members of a Puerto Rican terrorist organization who were heavily armed with guns and explosives and were on their way to a nearby prison to try to free a member of their group.

The woman's awareness of such out-of-the-ordinary activities had been raised by saturation news coverage of the Iranians' capture of American hostages at the US embassy in Tehran, he says.

Capps contrasts that situation with an anecdote about Vaclev Havel, president of the newly independent Czechoslovakia.

To Havel's request for US aid following his country's departure from the former Soviet sphere, US officials complained that while he was asking for aid, his country's intelligence agents were still operating in the United States.

He answered that he would be happy to recall them, but he didn't know who they were. US officials said they did and gave him a list. He then recalled the agents. •HK

New Distinguished Members of Technical Staff: 67 More Sandians Achieve Highest Technical Level

Sixty-seven new names have been added to the list of Sandia's Distinguished Members of Technical Staff. In all, 380 Sandians have been appointed to the DMTS level.

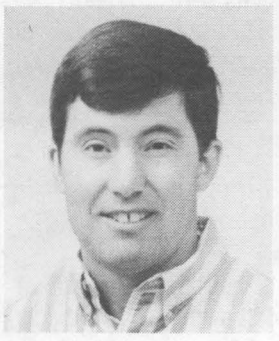
The DMTS program recognizes employees for technical excellence and demonstrated support of Sandia's corporate values. DMTSs are regarded as seasoned experts in their specialties and are, therefore, considered Laboratories resources. All nonsupervisory Senior Members of Technical Staff with five or more years of Sandia experience are eligible. The total number of awards is limited to approximately 10 percent of the technical staff member population in each division (formerly known as vice-presidency).

The program began in March 1983; more DMTSs were named in December 1983, May 1985, March 1987, March 1989, and September 1990. Each DMTS receives an inscribed plaque (citations appear on these pages with each photo), a pin, and a $3,000 lump-sum award.

(Note: About half of the new DMTSs are pictured in this issue. All others will be seen in the June 12 issue; their names and organization numbers are listed in this issue on the facing page).

Ronald Hadley (1312)

For key contributions in numerical modeling of lasers and optoelectronic devices that have led the way in establishing a strong photonics research activity at Sandia.



David Seidel (1241)

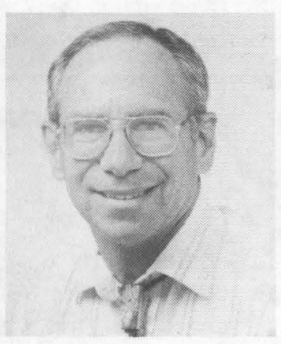
In recognition of sustained theoretical contributions to the pulsed power sciences through the development and application of novel computational techniques.

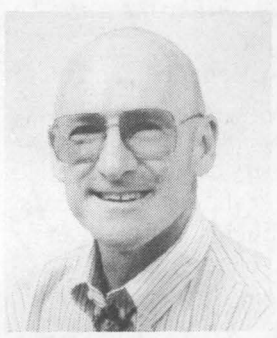
Rena Haynes (1944)

For sustained leadership and contributions in computing and networking software that have made a major impact on Sandia's reputation as a leading-edge computing institution.

Lawrence Tolendino (1934)

In recognition of sustained technical excellence, innovation, significant contributions, project leadership, and teamwork in support of Sandia's voice and data communication systems.



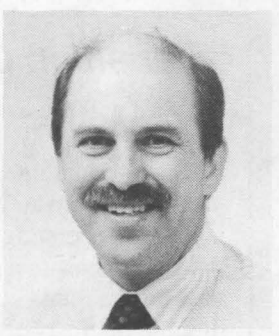


Eugene Church (331)

For distinguished contributions in advancing the quality and technical content of nuclear safety system studies.

Robert Hughes (1315)

For sustained outstanding contributions to research in radiation effects in insulators and in sensor sciences, and for demonstrated leadership in establishing Sandia's microsensor program.



Jeffrey Braithwaite (2525)

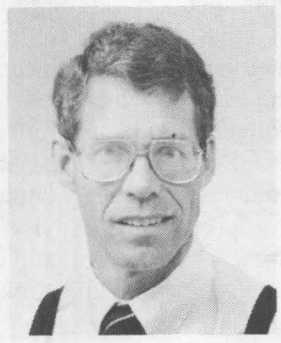
For outstanding technical achievements in advanced battery development.

Floyd Spencer (323)

For excellence in the application of statistical and mathematical methods to important laboratory projects and as a valued resource to customers and colleagues.

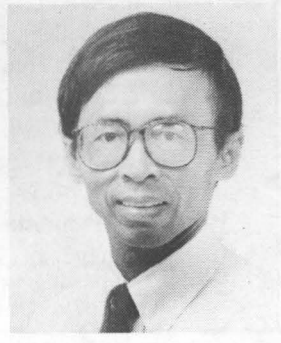
Marlin Kipp (1432)

For sustained contributions in computational solid mechanics that have enhanced the technical strength and reputation of Sandia National Laboratories and for contributions in solving important national problems.



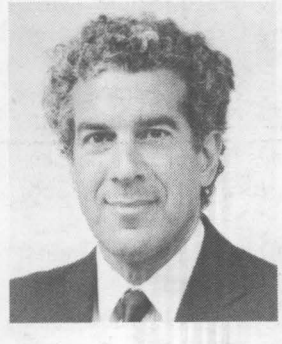
Hsi-Tien Chang (2813)

For his leadership in the development of innovative solutions to complex systems engineering problems.



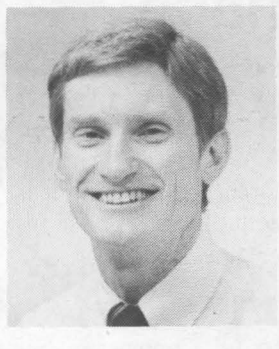
Louise Weston (323)

For excellence and leadership in applying human factors skills to important laboratory projects, especially in the area of safeguards and security.



Barry Marder (1241)

For outstanding and innovative contributions to the fields of numerical analysis, high power microwave sources, electromagnetic launchers, high current accelerators, and lithium ion sources.

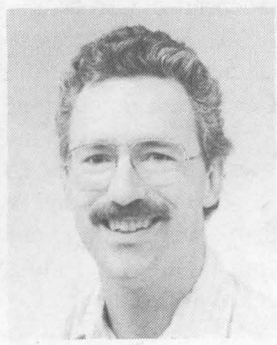


Ragon Kinney (2334)

For sustained contributions to the development of inertial measurement systems and for major contributions to inertial subsystem technology.

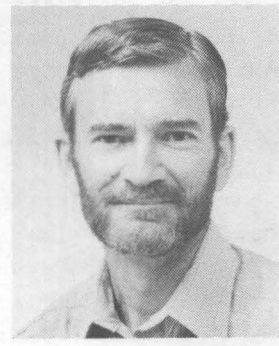
Robert Benner (1424)

In recognition of international leadership and award-winning pioneering achievements in massively parallel computing, and many outstanding contributions to Sandia's mission.



Paul Miller (1128)

For leadership and outstanding contributions in pulsed power and plasma physics research in important Sandia programs, including PBFA and SETEC.

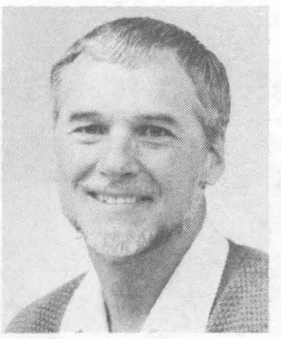


Paul Lemke (2402)

For innovation in supercomputer software development and leadership in Sandia's change initiative to a modern quality culture.

William Sweatt (2756)

For his demonstrated mastery of optical design and optical engineering principles.



Louis Feltz (5941)

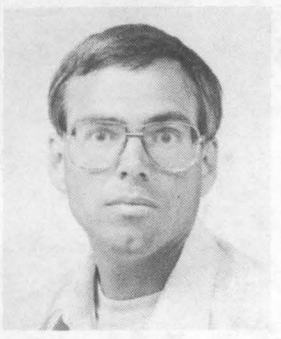
For outstanding performance in supporting weapons, energy, and national security programs. His contributions to rocketry, penetrator, wind turbine, and systems analyses problems have enhanced Sandia's reputation for excellence.

David Sinton (7715)

For leadership and contributions to the Radiation Instrumentation Calibration Program that have been important to implementing and maintaining crucial Sandia ES&H programs.

Larry Warne (2753)

For exceptional contributions to the applied electromagnetics program.



Mark Rosenthal (5161)

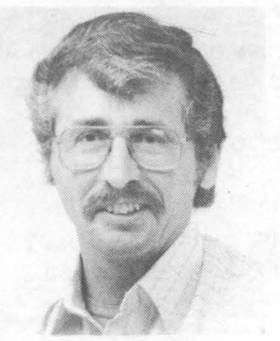
In recognition of his outstanding dedication to technical excellence, hard work, and outstanding quality, and for the example he sets for all who work with him.

James Hickerson (9100)

For exemplary leadership and technical contributions to a variety of crucial national security projects and for inspirational leadership in implementing Sandia's ES&H and quality initiatives.

Manuel Vigil (2513)

For sustained excellence in combining scientific analysis with the design of explosive components.



Melvin Marietta (6342)

In recognition of outstanding contributions to the safe geologic disposal of low-level, high-level, and transuranic radioactive wastes.

Marcella Madsen (9522)

For sustained technical contributions and demonstration of Sandia corporate values in the protection of radioactive materials in transportation and to the security of nuclear weapons.

James Parvin (4114)

In recognition of over 25 years of exceptional service to Sandia and to national security in the design and analysis of advanced weapon systems.

Tze Yao Chu (6422)

In recognition of his continued outstanding contributions to research in heat transfer and nuclear reactor safety.

William Tucker (9722)

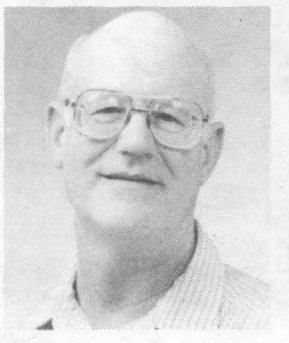
For sustained excellence in technical contributions and project management performed with quality and integrity.

Jennifer Eckwert (5176)

In recognition of her leadership and project management contributions to the success of POC/ET, MIIPs, POET, and MBB technology improvements.

Vernon Duke (7953)

For distinguished fire protection service to his fellow Sandians and the Department of Energy.

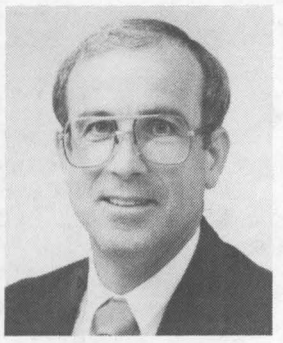


Stephen Dupree (9249)

For his expertise in nuclear radiation transport and analysis, the excellence of his foreign technology studies, and his leadership of treaty verification technology development.

Robert Bradley (5713)

In recognition of sustained, enduring, and nationally recognized technical contributions in the area of Use Control for Nuclear Weapons and Weapon Systems.



Other New DMTSs in Next Issue

As noted on the preceding page, all other new Distinguished Members of Technical Staff will be seen along with their citations in the next issue, June 12. They include: Bennie Blackwell (1553), Er-Ping Chen (1562), Bruce Tuttle (1845), Roger Edwards (2253), Danny Gregory (2761), Jeanne Lewis (2341), Robert Nagel (2252), Paul Pierce (2335), William Tarbell (2514), Jay Chamberlin (4312), Edward Barkocy (5153), Paul Eichel (5912), Freddie Heard (5921), Joseph Morreale (5711), Robert Stinebaugh (5165), George Barr (6312), James Campbell (6613), Gary Carlson (6211), Louis Cropp (6474), John Kelly (6522), George McLellan (7816), Daniel Thompson (7715), Marilyn Warrant (7204), David Chandler (8353), Charles DeCarli (8116), William Even Jr. (8711), Dennis Siebers (8362), Daniel Tichenor (8446), Jesse Allen (9533), Brian Brock (9211), Gerald Hochrein (9818), Jacque Hohlfelder (9351), George Perkins (9321), Paul Phipps (9206), and Arian Pregenzer (9241).

La Cueva, Gunn High Schools Take Honors

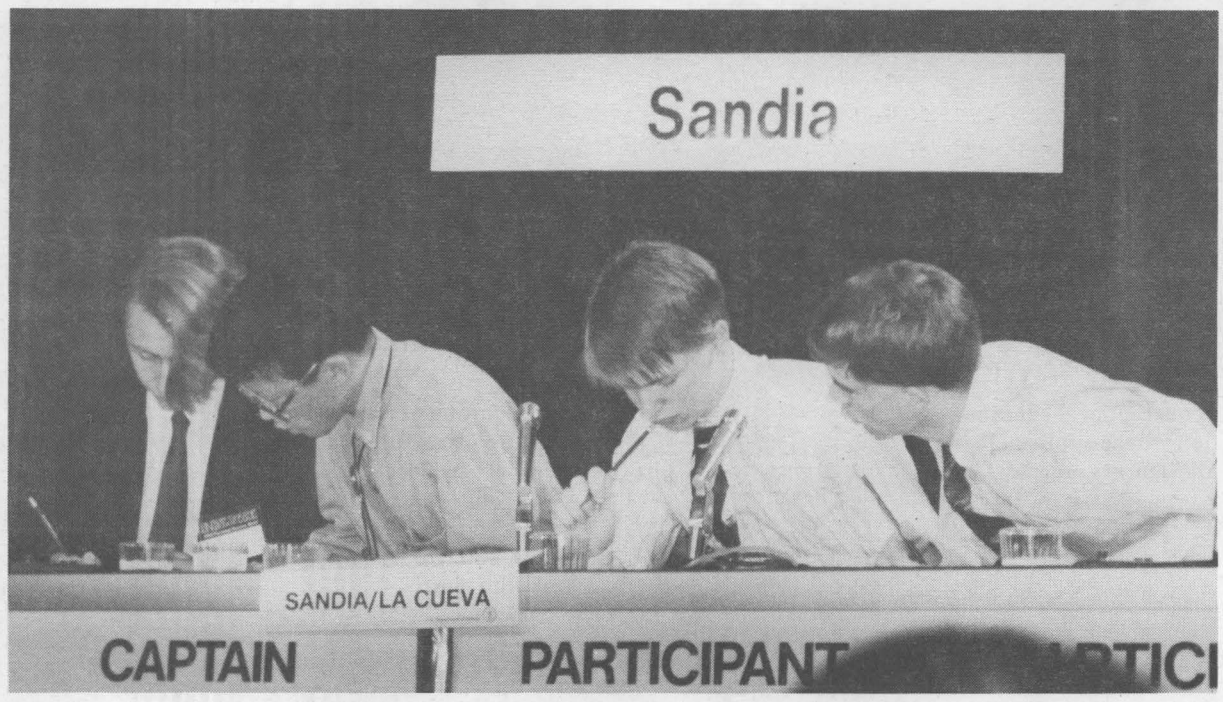
Two Labs-Sponsored Teams Finish Big in National Science Bowl

When the final buzzer sounded in DOE's National Science Bowl recently, spectators, including DOE Secretary James Watkins, were on the edges of their seats.

A team from Lubbock High School in Lubbock, Tex., barely edged out a La Cueva High School team from Albuquerque, sponsored by Sandia, by answering the following question correctly: "What chemical element undergoes a strange transition near absolute zero that permits it to flow as a liquid without friction?"

The correct answer — "helium" — earned the Lubbock team the title of National Science Bowl champion. The La Cueva team finished a close second, and cross-town rival Sandia High School, sponsored by Los Alamos National Laboratory, finished third. In addition, Gunn High School in Palo Alto, Calif., sponsored by Sandia, Livermore, tied for fifth place in the competition.

Juan Abeyta (35), the Sandia sponsor who helped coach and chaperone the La Cueva team, says, "We're extremely proud of both teams sponsored by Sandia. The students demonstrated mastery of science and math subjects as well as a competitive spirit."



LABS-SPONSORED La Cueva High School in Albuquerque placed second out of 30 teams in the National Science Bowl competition held recently at DOE Headquarters in Washington, D.C. Seen here at the competition (left to right) are Nick Lopez, Heyning Cheng, Justin Brown, and Sean Farmer. Bryan Smith (not seen) is the other team member. Gunn High School in Palo Alto, Calif., sponsored by Sandia, Livermore, tied for fifth. To advance to the final round, La Cueva edged out cross-town rival Sandia High School in a semifinal round.

Win at Home, First

The National Science Bowl, sponsored annually by DOE, consists of two days and 11 rounds of competition that tests the science and math knowledge of high school students from across the nation. To advance to the national competition, five-member teams must first win their respective regional Science Bowls. In all, 30 teams participated in this year's nationals, which took place April 26 and 27 at DOE headquarters in Washington, D.C.

During the double elimination tournament, a moderator asks teams questions from chemistry, physics, botany, zoology, math (including algebra, calculus, and trigonometry), computer science, earth science, astronomy, and science history. Each correct answer earns a team points and a chance to answer a bonus question for more points. The winning team advances to the next round of play.

In all, some 1,200 teams competed at the regional Science Bowls. In New Mexico, two regionals were held, one organized by Sandia, Albuquerque and the other by Los Alamos. La Cueva and Sandia high schools were the winners of those Science Bowls. Gunn won the regional hosted by Sandia, Livermore, and Lubbock won the regional hosted by the Superconducting Supercollider Laboratory in Lubbock.

Too Close to Call

Because the final match between Lubbock and La Cueva was so close, Secretary Watkins declared both teams winners. Team members from both schools will receive expense-paid trips to participate in the two-week, 34th London Youth Science Forum in England. In addition, both schools will be linked electronically to the National Education Supercomputer at Lawrence Livermore National Lab, and both will participate in a week-long science camp.

In addition, the top four Science Bowl teams were honored at a reception at the White House Rose Garden, during which they met President Bush, Watkins, and Jaime Escalante, the math teacher on whose career the movie "Stand and Deliver" was based.

Ray Ng (8445), coordinator of the Gunn High School team, says, "Both Labs-sponsored teams did exceptionally well. Everyone had a great time. The National Science Bowl is a good way to recognize the top science and math students in the country as well as encourage other students to pursue careers in math and science."

Juan says he would like to thank the many Sandians who helped conduct Sandia's regional Science Bowls in Albuquerque and Livermore, as well as Cray Research, Inc., the local corporate sponsor for the Sandia, Albuquerque regional competition. •JG

ENLIGHTENING LABS SUPPLIERS — Lynne Rathjen of Supplier Relations 3703 discusses purchasing requirements with Roy Fourr of ICU Holding Corp., a Farmington company, during a recent Sandia Supplier Fair at the Coronado Club. Fourr was one of about 150 vendors and buyers who attended the fair to learn about doing business with Sandia following changes made during the Labs' recent restructuring.

Eleven Win Travel Quiz

Eleven Sandians turned in correct answers to the geography quiz in the April *Sandia Travel News*. Questions, answers, and winners follow.

Q. You're making reservations for the 1994 World Cup Soccer Tournament. To which country will you be going?

A. USA

Q. Which is the eastern-most of the major Hawaiian islands?

A. The Big Island of Hawaii

Q. Name the three European countries in which the Alps cover more than half of the total area of each country.

A. Austria, Liechtenstein, Switzerland

Q. Can you match these languages with the countries where they are spoken?

Malagasy	Madagascar
Maori	New Zealand
Moru	Papua New Guinea
Romansch	Switzerland
Swahili	Kenya
Tamil	Malaysia

Q. The names of nine US state capitals consist of more than one word. Can you name them?

A. Baton Rouge, Carson City, Des Moines, Jefferson City, Little Rock, Oklahoma City, St. Paul, Salt Lake City, Santa Fe.

Winners will each receive an official Boy Scout compass. Winners: Roy Fitzgerald (112), Suzy Wagner (3912), Jerry Letz (6319), Max Harcourt (6218), David Cox (9207), Bill Greenwood (2645), Carl Vanecek (2645), Tom Sullivan (9133), Larry Rollstin (1551), John Tissler (2761), and W. R. Cordwell (4113).

Not Your Usual Crank Project

Space-Age Metal May Suit Ambitious Pedalers

A bicyclist out for a casual jaunt doesn't care whether the crank arms linking the pedals to the gears that drive the chain are the ultimate in bicycle technology. But the most demanding riders, such as racers out to make their mark in mountain bike competition, want the strongest, lightest bikes they can get — right down to the crank arms.

Mike Horan, owner of Bicicletas Corp. in Eagle Nest, N.M., wants to supply those crank arms. In doing so, he hopes to bring the state of the art for that particular bicycle component home to the US.

In navigating the tricky path from ambition to product, Horan is getting technical help through Sandia's Technology-Based Regional Economic Development program, which offers technical assistance to small and medium-sized businesses. Horan's primary technical contact at Sandia is Brian Damkroger of Melting Research and Solder Processing Dept. 1833. Other Sandians involved in the project include Frank Whiston of Computer-Aided Manufacturing Dept. 2483, and Clint Atwood, Gerald McCarty, and Brian Pardo, all of Mechanical Processing Dept. C 2485.

CHECKING THE MODEL: Mike Horan (left), owner of Bicicletas Corp. of Eagle Nest, N.M., and Frank Whiston (2483) check the fit of a Sandia-produced plastic model of a bicycle crank arm that Mike plans to have produced from titanium. At right can be seen a computer image of the crank; at left, another model is being formed by exposing photosensitive liquid polymer to light from a laser. Attached to the plastic model are titanium chain rings that Bicicletas has been selling for about two years.

The highest-quality cranks now available are made of forged aluminum and are imported from Italy and Japan. For a couple of years, however, Bicicletas has been selling another bicycle component, chain rings (the sprocket wheels turned by the pedals), made of titanium, a strong, lightweight metal often used in aerospace vehicles. The company was the first to offer such chain rings (developed with help from Los Alamos National Lab), and Horan is interested in using titanium for the crank arms that attach to the chain rings.

Plastic Model Averts an 'Oops'

At Sandia, the original crank-arm design, from the University of New Mexico's Mechanical Engineering Department, was converted to electronic form so that rapid-prototyping techniques could be applied. Even with a computer, though, it can be hard to study 2-D drawings and visualize a 3-D part. Helping bridge that gap is a plastic model that duplicates the finished crank arm. The model is created by a process called stereolithography, in which a computer-controlled laser traces out successive cross sections of the crank on the surface of a vat of photosensitive liquid polymer. Layer by layer, over a period of several hours, the model emerges in solid form from the liquid.

"The fit of the plastic part is better than the metal part from Japan I'm using now," says Horan, fitting a set of chain rings to the plastic model. "I'm astonished at how precise this is." He points out something not noticed in the design drawings: "Here, the chain would hit this edge. We'll need to increase the clearance." He also demonstrates how the original designer misinterpreted the way the chain rings connect to the cranks. "There's a 1-millimeter ridge that shouldn't be here, a rim around this screw hole. We'll take it out."

"Imagine if a supplier had spent thousands of dollars to tool up for the titanium part, and the problems weren't discovered until the first shipment of metal castings," says Brian Damkroger. "It would be money down the drain. This way, Mike can check the design and make changes much further upstream in the process."

Enter a New Machine

The crank arms are to be produced by investment casting, a process in which a wax model, or pattern, is coated with a ceramic slurry that dries and hardens. When the wax is melted out from inside, the result is a mold the exact size and shape of the pattern. (Thus the traditional term "lost wax" process.) Molten metal is poured in and allowed to solidify, the mold is broken away, and the part is finish machined.

The rapid prototyping facility is supplying Bicicletas with two wax patterns, which have to be slightly oversize to allow for further fabrication steps. Having design data in a computer once again helps. A computer-controlled laser sinters wax powder (heats the powder so it sticks together) and creates the properly enlarged patterns.

"In this SLS — selective laser sintering — process," explains Brian, "we're using a true cutting-edge technology. Sandia is a beta-test site helping the manufacturer develop the SLS machine. If the machine were fully online, we couldn't afford to interrupt our regular programs. But these crank arms are helping us get the SLS machine up and running. If we weren't working with them, we would probably have to familiarize ourselves with the machine's capabilities by making waxes in some geometrical shape such as a cylinder."

Titanium prototypes cast with these waxes will help Horan gauge the marketability of his product. Before committing to production, he plans to display the prototypes at international trade shows and see how much interest they draw. If the cranks go into production, a manufacturer will make quantities of wax patterns in a reusable mold. The cost of making such a mold can be $10,000 to $15,000, says Brian — too much for a small company to invest before being sure of the market.

Brian and other Sandians are also helping Horan communicate with the few US firms that cast titanium and local companies that might do the finish machining. They are also helping Horan, the casting vendors, and the UNM designer make sure that the properties of cast titanium are incorporated in the design, which was originally intended for wrought titanium.

Mountain biking is sure to involve some rough spots. With Sandia's help, the hope for Bicicletas is that the hardest jolts will come in riding, not in developing a new part. •CS

Piggybacking on the Labs' High-Tech Capabilities

Bicicletas Corp.'s new bicycle crank arm is going through several processes that a Sandia design for a weapon or other high-tech hardware might experience. Designers often use rapid prototyping to check a part's shape and ensure that interfacing parts fit correctly. Although Bicicletas has chosen investment casting as a production method mainly because it's less expensive than alternatives, Sandia maintains investment-casting capability because it's excellent for manufacturing high-precision, intricate shapes for high-tech applications.

Wanted: TRED Field Agents

Program Helps Regional Businesses

Sandia's Technology-Based Regional Economic Development (TRED) program helps small and medium-size businesses that, like Bicicletas Corp., have a technology-related problem standing between them and commercialization of a product or service.

"We screen inquiries and try to help where Sandia might lend technical assistance," explains TRED program manager Mark Allen (4212). "If it's strictly a business problem, or if it's outside Sandia's expertise, we refer the inquiry to the STARS program." (STARS — the State Technology Assistance Resource System, in which Sandia and other government, educational, and corporate organizations participate — was recently formed with DOE support to aid New Mexico businesses.

Since the TRED program began in October, about 25 projects have been completed. Another 25 are in progress, and about 40 are in preliminary stages. "We need Sandians to work part time as field agents," says Mark. "The agents spend about eight hours a week in the Technology Transfer organization. They visit interested businesses to learn about their needs, and then they try to match the business with a Sandia organization. With more agents, we could help more businesses."

Brian Damkroger (1833) is the field agent for the Bicicletas Corp. project. He explains that a project normally receives one week's worth of funding, plus other expenses such as travel or lab work if needed. "Several of us are working on this," Brian says, "and we'll each spend a day to a day and a half on it." He has talked with other bicycle-part vendors, but none of their proposed projects has been a suitable match for Sandia's capabilities.

For information about the field agent positions, Mark can be reached on 845-8191. TRED also has an information line for businesses — it's 845-TRED (845-8733).

Feedback

Q: I was somewhat frustrated during a recent visit to Reapplication. I could find no instructions as to how to look for items, how to mark them, or how to arrange for their delivery. Employees there provided no additional information other than what was asked. When I finally found the items I wanted, I had to return to my office to get a move order for their delivery. When I returned to Reapplication, the items I wanted were already gone.

I have the following suggestions to make this system more efficient: Post instructions near the entrance; have move orders and material requisitions on hand near the posted procedures; reduce the signature requirements so a manager does not have to sign for reclaimed equipment that probably could be purchased new with only a staff member's signature; develop a system to clearly mark items that have already been selected by others; and expand the system to provide a description of desired equipment so that Reapplication can call the requester when similar equipment shows up (better yet, have an on-line computer catalog and ordering system).

A: I am sorry you were frustrated during your recent visit to the Property Reapplication Facility. Though customer needs are a primary focus, it sounds like something went amiss. You make some good observations and several of your suggestions are being considered; one is in the planning phase.

Basic procedural instructions are posted in Bldg. 957; we are now also posting a set in Bldg. 996. Besides asking the customer to sign in, these instructions describe the forms that will be required and the kinds of items we handle. We do have Move Orders and Material Requisitions on hand but do not keep large quantities because of budget limitations. We have reviewed signature requirements several times in the last few years, but because the manager of an organization becomes accountable for property assigned to it, the manager's signature is still required for many items. The procedure you suggest for marking items is exactly what we have had in place for three years: the customer identifies the items, the service coordinator applies yellow tape to the items, and the customer's name, organization number, and phone number are written on the tape.

We are now planning an on-line system for items stocked in Reapplication. However, we do not have plans for network capabilities with other line organizations at this time. The best way to find out what is available is to visit our facilities in Bldg. 957 or the Bldg. 956 salvage yard.

Jim Martin (3400)

Q: For about a year, the Pennsylvania bridge leading to Sandia remote areas has been in a state of disrepair. To be specific, large chunks of concrete adjacent to the expansion joints are missing, leaving very jagged concrete edges. We believe this is a safety hazard even at low speeds and could cause a serious accident on this narrow, two-lane bridge. In addition, this condition causes excessive wear and damage to tires. All the Air Force has done to date is lower and raise the speed limit. When does the Air Force plan to repair this bridge?

A: The Sandia Traffic Committee and the KAFB Civil Engineer surveyed the condition of the bridge last August. The Air Force had made several attempts to repair the potholes that had appeared on a regular basis in the concrete surface of the bridge, but the products used failed to provide a long-lasting solution. During the week of Jan. 6, 1992, a new product was used in another attempt to repair the potholes along the expansion joints. The KAFB Civil Engineer will continue to monitor the condition of the bridge surface and use the new product on any new potholes.

Meanwhile, Kirtland officials have determined that the bridge is outdated and should be replaced, and there is a project in the planning stage now to do that as soon as funds can be appropriated.

James Jacobs (7100)

Q: Fifth Street between G and H streets is designated one-way southbound, with a "One Way" sign where you turn south onto Fifth Street from G Street. I have seen some near-misses when people driving eastward on H Street have turned northward onto Fifth Street, heading the wrong way on a one-way street.

Most of these people are probably visitors who don't know they're not supposed to turn that way at that location, because there are no "Do Not Enter" or similar signs to warn them. Wouldn't putting up a couple of "Do Not Enter" or "Wrong Way" signs perhaps prevent an accident from happening at the Fifth and H streets intersection?

A: The Sandia Traffic Committee has investigated the situation at the intersection you are concerned about and agrees with your observation. Although there are existing "One Way" signs posted on each side of Fifth Street at the intersection, additional signs would certainly help clarify to any driver that Fifth Street is a one-way street, southbound. A work order has been initiated to furnish and install two new "Do Not Enter" signs along with the "One Way" signs. Thank you for your concern.

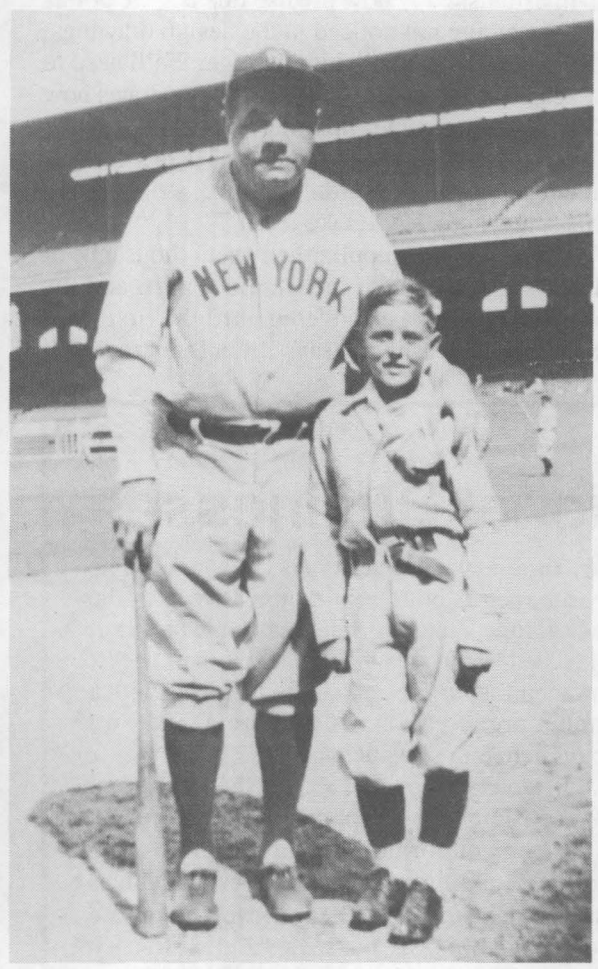
James Jacobs (7100)

Q: It would seem to make sense to have Mutual of Omaha automatically process claims submitted under the medical and vision care programs for Choiceflex eligibility. As it is, I have to resubmit copies of their EOB together with the bill (which I had already sent once) for each Choiceflex claim. If they could process it electronically in Omaha, it would save time, money, paper, and postage.

A: We have approached Mutual of Omaha about transferring medical and vision claims to the Reimbursement Spending Account (RSA) claims department. They are unable to do this at this time, and we have not pressed for a change or requested a quote on the cost to set up these systems for a couple of reasons. First, we do not want to make a decision for an employee about which health care costs are reimbursed because the employee may have planned to use the RSA account for a large dental claim. And second, the medical, vision, and RSA contracts are separate and on separate cycles, and there is no assurance that Mutual of Omaha will continue to administer all these contracts.

Ralph Bonner (3500)

Favorite Old Photos



My father-in-law, Melvin "Pete" Wild, was 10 years old when these photos were taken on an August 1934 day at Comiskey Park. The photo with Lou Gehrig (left) was prearranged, but the other, with Babe Ruth, was a spur-of-the-moment snapshot taken when Ruth walked out for batting practice. Pete says he walked up to the Babe and asked if he could have his photo taken with him. Ruth said, "Sure, kid" and put his arm around him while Pete's mother, Henrietta, snapped the photo. Pete grew up in Kenosha, Wis., just north of Chicago on Lake Michigan. He's in the uniform he wore as batboy for a minor-league team in Silver Lake, Wis. During World War II, he served in the South Pacific with the Marines. After the war, he played on a semi-pro football team with the late Baltimore Colts great fullback Alan "The Horse" Ameche. Pete retired a couple of years ago after a long career with General Motors, and lives with his wife, Jennie, in Hurst, Tex. — Ace Etheridge (3161)

Take Note

Supercomputing '92, the fifth annual high-performance computing and communication conference, will be held Nov. 16-20 in Minneapolis. Program highlights include special sessions on massively parallel vs. "traditional" supercomputers, visualization, and machine clustering. Sessions on pharmaceutical and medical issues relating to supercomputers will also be featured. The conference is sponsored by the IEEE Computing Society and the Association for Computing Machinery Special Interest Group on Computer Architecture. Registration and housing forms will be available in June. To have your name put on the mailing list or for more information, contact Peggy Samide at the Conference Office on 1-303-497-1808.

Sandia News Briefs

NSF Names Sandia a SuperQuest Center

The National Science Foundation has named Sandia a SuperQuest Center, making it the fourth such center for high-school-age students' studies of computational science. SuperQuest is a national competition for students, designed to encourage and involve them in pursuing computational science projects and stimulate the integration of computational science into high school curricula. School teams, usually comprising three or four students and a teacher-coach, spend three weeks of intensive training at a supercomputing SuperQuest Center, then receive a network connection to continue research on their projects at their schools through the following year. Sudip Dosanjh, Manager of Program Development Office 1402, says Sandia staff volunteers — many from Computational and Computer Sciences and Mathematics 1400 and Scientific Computing 1900 — will provide training for four teams from Southwest regional high schools during a three-week period in July. Other SuperQuest Centers are the Cornell Theory Center, National Center for Supercomputing Applications (affiliated with the University of Illinois), and University of Alabama in Huntsville.

Sandia Controller Improves Speed, Capacity

Sandia researchers Bill Drotning and Pablo Garcia of Intelligent Systems Dept. II 1671 have developed a high-performance ultrasonic sensor controller that significantly improves the precision control of the robotic system for which it was designed. The controller, which has been used in prototype robotics systems that demonstrate nuclear waste handling and cleanup, updates sensory information more than 90 times faster than other ultrasonic sensor controllers. It is being used currently for collision avoidance, docking operations, obstacle and surface mapping in unknown environments, and other precision applications.

Bode Cited for Service to Air Force

John Bode, Associate Director for Strategic Analysis (4100B), has received the Decoration for Exceptional Civilian Service from the Air Force in recognition of his distinguished performance on the Air Force Scientific Advisory Board from 1988 to 1992. The citation says John's expertise in systems analyses and air-land battle operations played a key role in several Board activities. He chaired the Space System Division Advisory Group, the Modeling and Simulation study, and a panel of a study on Technology to Support Global Reach — Global Power. John also participated in conventional munitions and hypersonic technologies studies.

Easterling, Colleagues Author Prize-Winning Paper

A paper by Bob Easterling of Statistics and Human Factors Dept. 323, two university researchers, and a Los Alamos National Laboratory staff member has won the 1991 Brumbaugh Award, presented by the American Society of Quality Control. The award goes to the paper judged "to have made the greatest contribution to the industrial applications of quality control." The paper, titled "Statistical Tolerancing Based on Consumer's Risk Considerations," was published in the *Journal of Quality Technology*.

Bob's collaborators on the paper were Mark Johnson of the University of Central Florida, Chris Nachtsheim of the University of Minnesota, and Tom Bement of LANL.

DOE Labs Hosting Symposium on Rock Mechanics in Santa Fe

Sandia and three other DOE laboratories are hosting the 33rd US Rock Mechanics Symposium in Santa Fe June 8 through 10. The symposium and its proceedings are sponsored by the US National Committee for Rock Mechanics/National Research Council, the International Society for Rock Mechanics, and DOE's Office of Basic Energy Sciences. Symposium officials selected 110 papers from more than 270 abstracts covering 16 subjects for inclusion in the proceedings. The other host institutions are Lawrence Berkeley Laboratory and Los Alamos and Lawrence Livermore national laboratories.

Sandians serving on the 14-member Interlaboratory Organizing Committee are Hal Morgan (1561), Larry Teufel, Wolfgang Wawersik (both 6117), Susan Howarth (6119), Darrell Munson, Joe Tillerson (both 6121), and Larry Costin (6313).

Puerto Rican University, UNM Link Engineering Programs

The University of New Mexico and Turabo University in Puerto Rico have signed an agreement linking the two schools' engineering programs. The agreement provides for the schools to accept each other's transfer credits, and encourages student exchanges and sharing of expertise and faculty. Turabo launched a mechanical and manufacturing engineering program two years ago with help from DOE's Science and Technology Alliance, a consortium of DOE laboratories and minority-serving universities. Bill Dawes is on loan from Sandia, the lead institution in the Alliance, as Turabo's engineering dean. His assignment there ends this summer.

Send potential Sandia News Briefs to Editor, Dept. 3162.

Recent Patents to Sandians

Fred Cericola, Jim Doggett (both ret.), Terry Ernest (2761), and Tom Priddy (5500): Multiple Direction Vibration Fixture.

Bob Benner (1424), John Gustafson, and Gary Montry (both former Sandians): Method for Simultaneous Overlapped Communications between Neighboring Processors in a Multiple.

Eugene Kenderdine (2545): Rotary Drive Mechanism.

Jonathan Weiss (9313): Fiber-Optic Liquid Level Sensor.

Greg Frye and Steve Martin (both 1315): Dual Output Acoustic Wave Sensor for Molecular Identification.

Billy Black and Dave Skogmo (both 9543): Beacon Data Acquisition and Display System.

Robert Martinez (5026) and Bob Rye (1114): Selective Protection of Poly (Tetra-Fluoroethylene) from Effects of Chemical Etching.

Carol Ashley, Jeff Brinker (both 1846), Scott Reed (2476), Bob Walko (2231), Bob Ellefson, and John Gill (both EG&G Mound Technologies): Composition Containing Aerogel Substrate Loaded with Tritium.

Bob Rye (1114): Hot Filament Chemical Vapor Deposition of Boron Nitride Films.

Joe Abbin (5100), Chuck Andraka (6217), Larry Lukens (2541), and Jim Moreno (6217): Liquid Metal Electric Pump.

Bob Biefield, Ralph Dawson (both 1154), Ian Fritz, Steven Kurtz (both 1312), and Tom Zipperian (1322): Long Wavelength, High Gain InAsSb Strained-Layer Superlattice Photoconductive Detectors.

Carol Ashby (1126) and David Myers (1141): Carrier-Lifetime-Controlled Selective Etching Process for Semiconductors Using Photochemical Etching.

this month in the past...

Sandia LAB NEWS

40 years ago...The improved Coronado Club pool opened on May 16; *season* swimming tickets were $2.50 for adults and $1 for children. Shoes on credit: Sandians were offered the option of paying for safety shoes over a two-month period through the payroll deduction plan. "Inspection of these shoes [in the Sandia Safety Store] will be a pleasant surprise to many employees," said the LAB NEWS announcement. "In addition to the heavy duty work shoes, there are women's saddle shoes, a modified type boot, ventilated oxfords, and an attractive loafer. . . ."

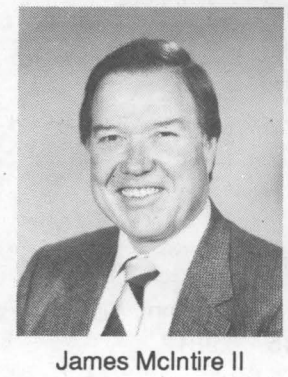
25 years ago...Sandia's 5,000-ft. rocket sled track, completed the previous October, was pronounced a big success after about 75 rocket sled shots had been completed in May 1967. The track was designed to accommodate sleds with speeds up to Mach 5, but one sled had already achieved Mach 5.5, or about 6,000 feet per second. Extended to 10,000 ft. in 1984, the sled track has seen lots of use; more than 1,800 tests have been conducted on it. And from the "It-may-have-been-a-real-bargain" department, the LAB NEWS ads included a *pink* Maytag clothes dryer for 15 bucks.

20 years ago...A Labs-wide clean-out campaign removed nearly 22,000 cubic feet of records, publications, and reference material, reducing record storage by nearly 25 percent; more than 1,300 filing and records-storage cabinets were turned in for redistribution as a result. And from the "Good grief! Has-it-really-been-that-long-ago?" department, Sandians and others on Kirtland AFB were invited to attend a presentation on the development and role of the new B-1 bomber.

Take Note

Volunteers are sought to help with the inaugural production of a new Children's Theatre Troupe at the New Mexico Museum of Natural History. The troupe — directed by volunteer Peter Conway, who has been involved with puppet theater for other museums throughout the US — plans to produce a puppet show titled "Antarctica Nightly News" that will be presented three mornings a week at the Museum. The tentative schedule is June 20 through Sept. 5. Volunteers are needed for all parts of the production, which will share information about various aspects of Antarctica. The inaugural production is related to the exhibit "Dinosaurs, Penguins, and Whales: The Wildlife of Antarctica," on display at the Museum through Jan. 13, 1993. To volunteer or for more information, call Peter on 884-8574.

Employee Death



James McIntire II

James McIntire II of Test Planning and Fielding Dept. 9323 died May 10 after a long illness. He was 54 years old.

James was a senior member of technical staff and had been at Sandia since 1963.

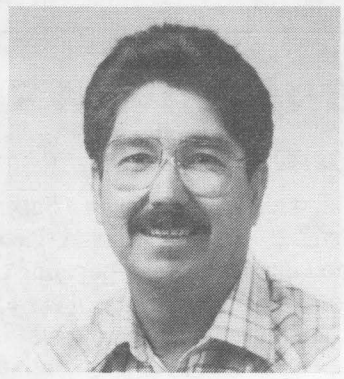
He is survied by his wife, daughter, and son.

MILEPOSTS

LAB NEWS

May 1992

Harvey Morse
9613 35



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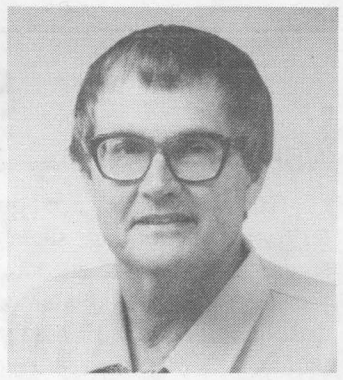

Chuck Hall
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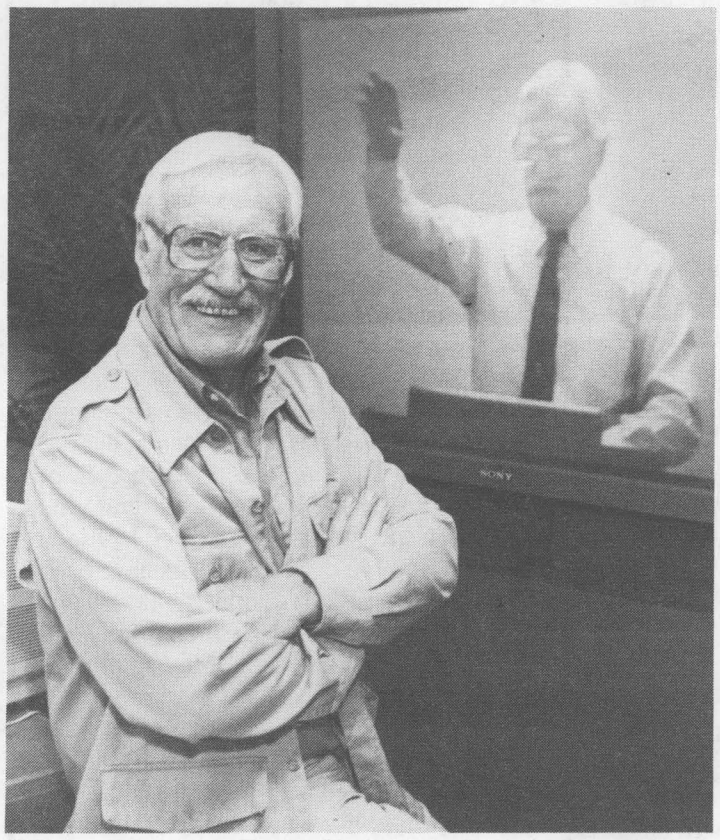

Jack Hueter
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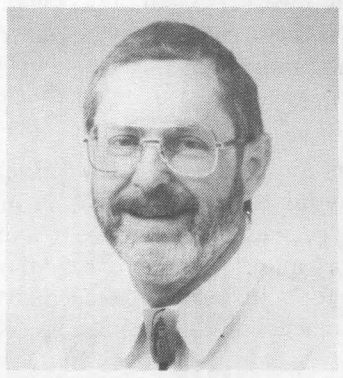

Raymond Berg
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Sandra Hudson
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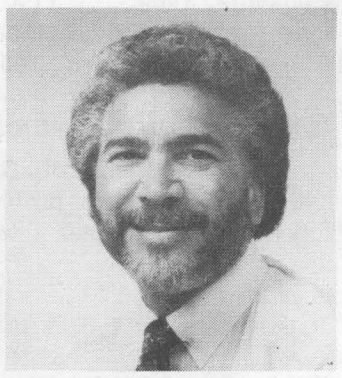

Lacey Learson
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Mary Beth Tidwell
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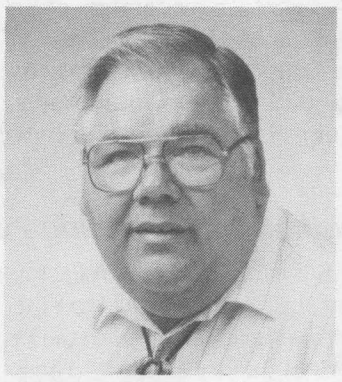

Neil Hartwigsen
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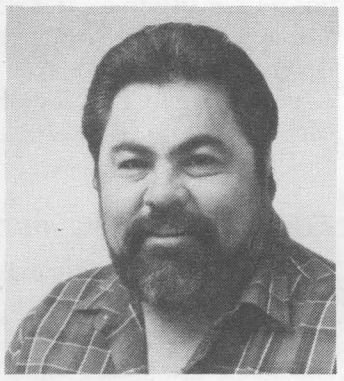

Daniel Luna
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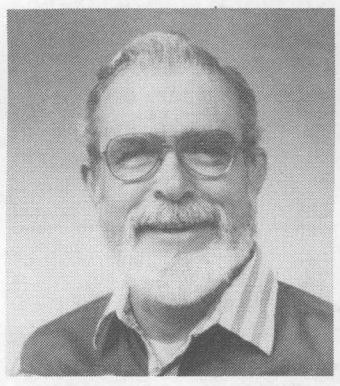

Karl Schuler
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Joseph Deveney
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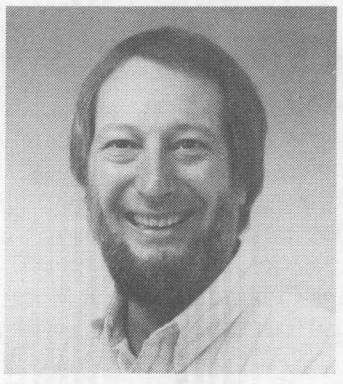

Ric Davis
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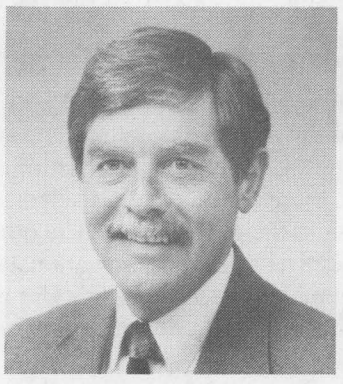

Dennis Mangan
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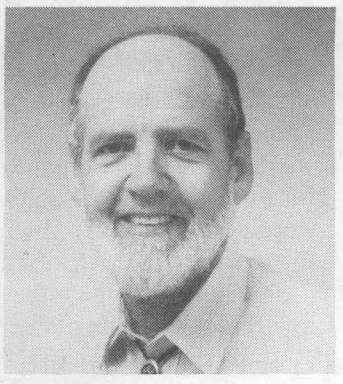

Ben Blackwell
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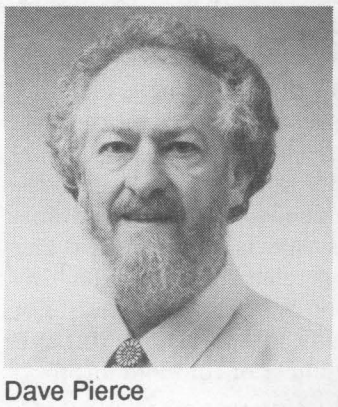

Dave Pierce
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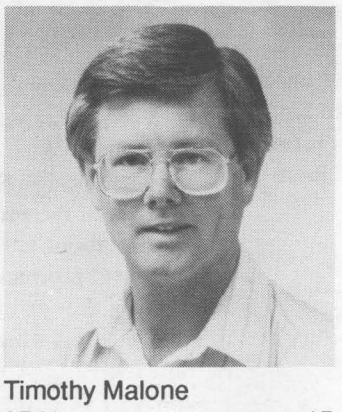

Timothy Malone
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Jesse Pfrimmer
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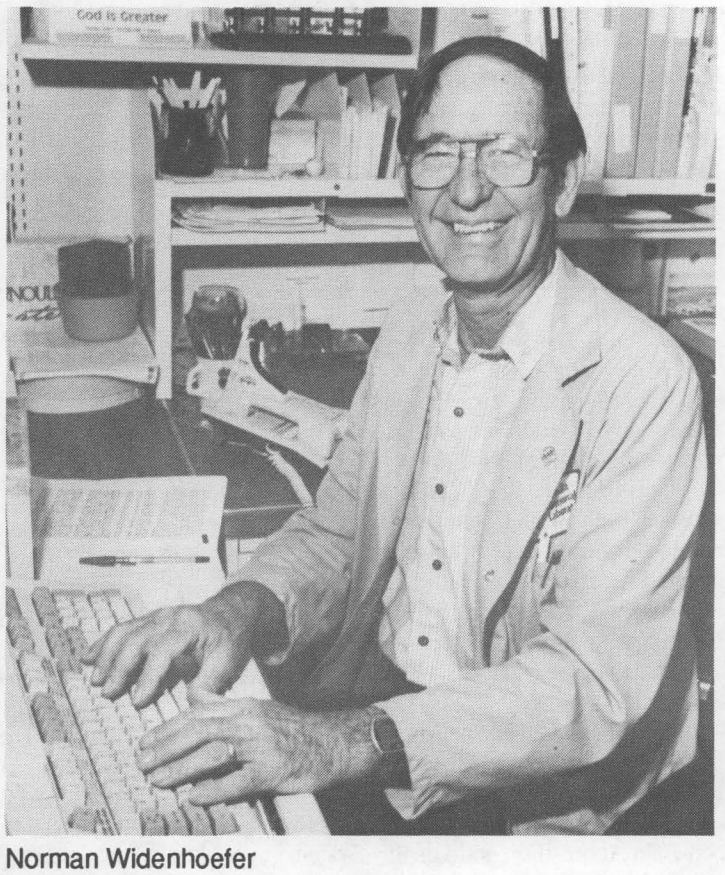

Norman Widenhoefer
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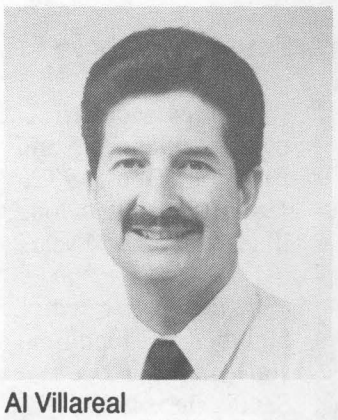

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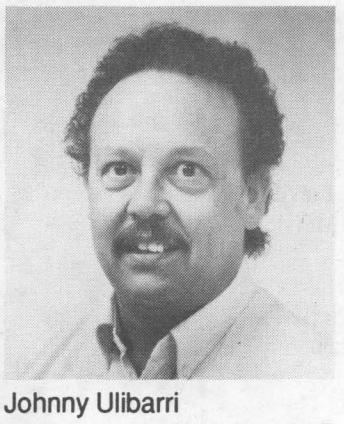

Johnny Ulibarri
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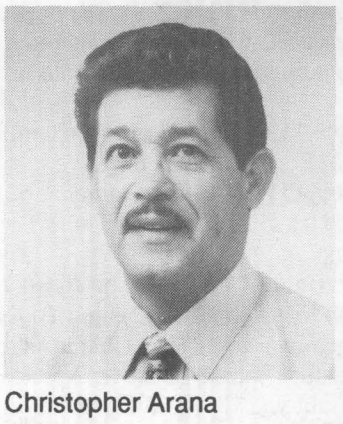

Christopher Arana
4301 15

Domenici, Bingaman Are Joint Sponsors

Senate Committee Approves Bill Expanding Labs' Mission

The Senate Energy and Natural Resources Committee has approved a bill that would authorize DOE labs to enter into research and development partnerships with industry, educational institutions, and other government agencies.

The bill is sponsored jointly by US Senators Pete Domenici and Jeff Bingaman, who also jointly sponsored the National Competitiveness Technology Transfer Act of 1989, which allows the national labs to transfer to US industry technology that could benefit American companies competing with foreign counterparts.

Ari Fleischer, press secretary to Domenici, says the bill was approved unanimously by the committee May 13 and is expected to come before the full Senate this summer.

The National Laboratory Partnerships Act of 1992 goes further in thrusting the national labs into partnerships than the 1989 bill. It not only authorizes interaction, it directs the Secretary of Energy to ensure that such interaction is happening.

"Both Senator Domenici and I have worked for years to make sure that Sandia and Los Alamos, as well as the other national labs, utilize their considerable talents in ways that will best benefit the country," says Bingaman. "This bill is another step we wish to take in encouraging the DOE labs to join with industry to develop technologies critical to America."

"As the world has changed, so too must the labs," Domenici says. "This bill will mark a milestone in the labs' efforts to lend their expertise to such areas as the environment, transportation, computer sciences, health care, and a host of other exciting new missions."

A Bingaman-sponsored provision in the bill would establish a program to encourage scientists and engineers from the labs to work abroad by giving the Secretary of Energy authority to sponsor fellowships and provide help in placing scientists and engineers in foreign research facilities. •

Congratulations

To Wendy and Marty (1332) Shaneyfelt, a son, Nicholas Ryan, May 5.

To Linda and Chris (9543) Robertson, a son, Brett, May 20.

UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS

Deadline: Friday noon before week of publication unless changed by holiday. Mail to Dept. 3162.

Ad Rules

1. Limit 20 words, including last name and home phone (the LAB NEWS will edit longer ads).
2. Include organization and full name with each ad submission.
3. Submit each ad in writing. No phone-ins.
4. Use 8½ by 11-inch paper.
5. Use separate sheet for each ad category.
6. Type or print ads legibly; use only accepted abbreviations.
7. One ad per category per issue.
8. No more than two insertions of same "for sale" or "wanted" item.
9. No "For Rent" ads except for employees on temporary assignment.
10. No commercial ads.
11. For active and retired Sandians and DOE employees.
12. Housing listed for sale is available for occupancy without regard to race, creed, color, or national origin.
13. "Work Wanted" ads limited to student-aged children of employees.

MISCELLANEOUS

SUPER-SINGLE WATERBED, w/bookcase headboard & 6-drawer pedestal, $175 OBO; Farberware convection oven, $50 OBO; baseball cards. McGill, 255-7724.

UTILITY TRAILER, flat bed approx. 4' x 8', full-size tires, $250. York, 828-9505.

MAGAZINES, *Popular Photography, Photographic, Popular Mechanics*, 200 issues, all free. Goodwin, 294-6702.

ALUMINUM WINDOWS, approx. 32" x 48", double-pane. Foty, 260-1747.

CONCRETE BLOCK: 46 @ 2 x 8 x 16, 65 @ 6 x 8 x 16, 10 @ 8 x 8 x 16, 13 @ 4 x 6 x 16, $90; standard brick; patio brick. Vickers, 298-0418.

12-VOLT DC WINCH, 1,500-lb. hitch plus attachment for towing cars; 24" x 24" x 24" refrigerator, perfect for college student. Rael, 884-4778.

TAN COUCH, great condition, $145 OBO; Panasonic microwave, w/carousel, practically new, $180 OBO; king-size waterbed mattress, $30. Gutierrez, 899-1021.

TWO SIDE-BY-SIDE CRYPTS, inside Sunset Memorial mausoleum. Gerwin, 881-0028.

CHEST FREEZER, 15 cu. ft., $100 OBO. Hareland, 293-9011.

EXERCYCLE, DP, speedometer, timer, good condition, $25. Leslie, 299-4159.

ROWING MACHINE, excellent condition, $35. Patrick, 265-4569.

GRAPHITE DRIVER, Daiwa Exceller Whisper, $75; 3 Persimmon steel-shaft drivers, $45/ea.; Mizuno graphite El Turbo, $65. Stang, 256-7793.

MAPLE BUFFET & HUTCH, oval table & chairs, $350. Bäuerle, 294-6025.

MOVING BOXES, large selection, all sizes. Greer, 281-4514.

HEDGE PLANTS (12), you dig, free. Speakman, 299-8831 after 1 p.m.

SWIVEL ROCKER, dark brown, $40; couch, harvest gold, $75; twin mattress, $25. Graham, 293-7302.

KITTENS: 8 wks. old, 2 males, 1 w/6 toes, 1 female, free to good home. Alderson, 293-5112.

NEC 386/SX, 20MHz, 40MB disk, 4MB RAM, 3.5 & 5.25 drives, super VGA, MultiSync 2A monitor, IBM laser printer, software, $1,700. Edwards, 275-7611.

OVERHEAD CAMPER for full-size truck, stove, icebox, sink, & boot, needs jacks, $450. Pryor, 294-6980.

GRACO STROLL-A-BED STROLLER, $40; Commodore 64 computer, w/software & manuals, $50; Mikasa volleyball, $10. Parson, 291-8394.

KITTENS: 3 male, 2 female, 9 wks. old, free. Salisbury, 867-9051.

SWING-AWAY CAMPER JACK MOUNTS, for dually pickups, $60/pr.; camper stabilizers (cab-over shocks), $30/pr. Warren, 294-5250.

ATARI 1040ST COMPUTER, w/color monitor, 1MB RAM, software, games, joystick, $425; 15-in. rims for VW Bug, $10/pr. Levan, 293-0079.

YAMAHA TENOR SAXOPHONE, w/case, 2 mouthpieces, other accessories, like new, $750; Yamaha clarinet, $125. Aragon, 888-3473.

CAMPER, '76 Mitchell Fish Hut, excellent condition, $925. Eisenberger, 877-7041.

FISHER CD/DUAL TAPE RACK SYSTEM, 2 mos. old, paid $1,800, want $1,300 cash firm. Montoya, 265-2926, serious callers only.

KENMORE FROSTLESS FREEZER, 19.5 cu. ft., thinwall, gold, good condition, $120; Eureka upright vacuum cleaner, w/attachments, $50. Torres, 822-8598.

AKC-REGISTERED BEAGLE, female, 9 wks. old, available now, $150. Fitzgerald, 884-4607.

TWO EASY CHAIRS, $30/ea.; twin bed, $60; Norge refrigerator, 13.6 cu. ft., $90. Lewin, 255-0620.

GARAGE SALE, 6 families, antiques, quilts, toys, appliances, more, Sat., June 6, 8 a.m.-4 p.m., 1804 Gretta NE. Nagel, 293-8184.

NORTH FACE TENT, June Bug style w/vestibule, lightweight, sleeps 2, excellent condition. Branstetter, 292-5978.

LAPTOP/NOTEBOOK COMPUTER, Altima 386SX, large VGA screen, full-size keyboard, 20MB hard drive, 2,400bps fax/modem, software, $1,500 OBO. Stroup, 836-6304.

ACCENT CHAIRS, pair, dark walnut wood & wicker accents, cinnamon crushed velvet cushions, $30/ea., $55/pr. Schkade, 292-5126.

GARAGE SALE, 2 families, 8 a.m.-5 p.m., May 29-30, 3624 Mary Ellen NE. Trump, 299-5162.

LAWN EDGER, gas-powered, 2-hp, adjustable-angle blade, good condition, $70. Oberkampf, 292-4366.

GARAGE SALE, new gifts, men's western clothes, appliances, baby items, furniture, Sat., May 30, 9 a.m., 14108 La Cueva NE. Lukens, 299-1271.

MACINTOSH 512 ENHANCED, internal & external 800K drives, software, $375. Wawersik, 275-3670.

CB ANTENNA, 1/2-wave, includes co-ax, ground wire, & chimney mount, $20. Yingst, 884-3812.

JEEP WHEELS & TIRES (4), P205/75R15 Goodyear tires on 5-lug wheels, "Jeep" on black center hubs, chrome inserts, $150. Smiroldo, 898-1699.

CHROMED RIMS (4), 5-hole 8X15 (Ford), w/P265/60 R15 tires mounted, $80/all. Letz, 293-4525.

NINE SHARES AT&T, 3 shares Ameritech, best offer; Delta toolbox, full-size pickup, $75; camper tiedowns, Jeep pickup, $40. Ashcraft, 281-5993.

REMODELING SALE, dishwasher, wall furnace, carpeting, sliding glass door, windows, interior door, traverse rods, drapes, range hood. Kulju, 299-8182.

TRANSPORTATION

'69 FORD GALAXIE CONVERTIBLE, second owner, 44K miles, 429, 4-spd., new tires, clutch, master cylinder, battery, below book, $3,900. Packwood, 255-6644.

'89 BMW 325IX, all-wheel drive, loaded w/extras, spectacular condition, very low mileage, $21,000. Gonzales, 884-8761 after 5 p.m.

'84 VOLKSWAGEN RABBIT GTI, EFI, 5-spd., AC, 81K miles, red, great stereo, Koni suspension, well maintained, $3,075. Jones, 884-8850.

'86 F-150 XLT LARIAT, extended cab, 8-ft. box, shell, sport wheels, sideboards, runs great, $6,900. Normann, 291-1860.

'85 KAWASAKI KX 250 MOTORCROSS BIKE, good condition, $850. York, 828-9505.

MAN'S 12-SPD. BICYCLE, LeGrand, 27-in., $35. Patrick, 265-4569.

'79 LINCOLN TOWNCAR, 23K miles, sunroof, CB, loaded, spare never used, like new, kept inside garage, $7,000. Rael, 884-4778.

'83 BUICK REGAL, needs some work. Lovato, 823-9468.

'72 BMW, 3.0cs coupe, AC, sunroof, Alpine stereo, body in good shape, new Michelin tires, $6,500. Jennings, 266-8893.

'77 VOLKSWAGEN RABBIT, good body, new tires, runs fine, $900 OBO. Miller, 292-5634.

'81 FORD FAIRMONT, 87K miles, AC, AM/FM, good tires, new transmission, radiator, good condition, $1,250 OBO. Kerr, 298-7332.

PUGEOT 10-SPD. BIKE, racing & regular handlebars, carrier, chain & lock, $125. Neiswander, 884-7142 after 5:15 p.m.

REPO: '88 Ford Bronco II, 86,247 miles, brown, 2-dr., AC, PS, PB, AM/FM stereo tape; bids accepted through June 2; we reserve the right to refuse all bids; subject to prior sale. SLFCU, 293-0500.

'76 THUNDERBIRD, loaded, excellent condition, stored, 48K miles, metallic silver, blue leather interior, best offer over $3,500. Klimas, 293-6892.

HONDA CX500 MOTORCYCLE, V-twin, shaft drive, 13K miles, garaged, needs battery, $750. McLaughlin, 881-6455.

'67 DODGE 1/2-TON, AT, booster springs, receiver, electric brakes, 6-ply tires, 318 engine, 73K miles, $2,000. Tippy, 298-3758.

ALUMINUM BOAT, 12-ft., V-hull, $100. Robinson, 865-7787.

'90 KAWASAKI ZX-6 NINJA, 600cc, 4-cyl., liquid-cooled, Kerker exhaust, high-altitude carb jets, $4,200. Weber, 275-3719.

GIRL'S 10-SPD. BIKE, pink/gray, 24-in., excellent condition, $50 OBO; boy's 10-spd. bike, red, 24-in., excellent condition, $50 OBO. Witek, 296-5198.

'70 CLASSIC 650 BSA MOTORCYCLE, good condition, $1,800. Vivian, 294-2360.

'79 FORD FUTURA, 69K original miles, excellent transportation, $2,250. Rodriguez, 296-1751.

'80 NEWMAN BOAT, 16'2", plus extra lifejackets, etc., inboard, $7,000. Puccini, 255-0568.

WOMAN'S 10-SPD. BICYCLE, Schwinn "Sprint," silver, excellent condition, $50. Misak, 892-3033.

'88 CHEV. NOVA, 4-dr., 5-spd., AC, 28K miles, excellent condition, $4,590. Greenwood, 275-8832.

'89 BUICK SKYLARK, 3.3-liter V-6, AC, 40K miles, excellent condition, 26/32-mpg, all service records since new, $7,000. Pantuso, 892-3641.

'80 MERCURY CAPRI, 6-cyl., 2-dr., good condition, $800 OBO. Romero, 247-1858.

'85 THUNDERBIRD, new transmission, new tires, excellent condition, $2,250. Eisenberger, 877-7041.

'82 GMC 4x4, 1/2-ton w/V-8, other extras, runs well, $3,400. Gutierrez, 275-3192 or 865-9542.

'88 HONDA GOLDWING ASPENCADE GL1500, cruise, CB, intercom, AM/FM cassette, hot grips, reverse, extra chrome/accessories, $7,500 OBO. Guffey, 828-2713.

'89 GRAN PRIX, PW, PL, cruise, tilt, custom wheels, 2-tone paint, extended warranty, 27K miles, $8,400. Cordova, 275-3446 after 6 p.m.

'88 MAZDA 626, 4-dr., 42K miles, one owner, like new, AM/FM cassette, cruise, AC, new tires, 5-spd., $6,700 OBO. Blain, 293-3971.

'85 DODGE ARIES, 52K original miles, PS, PB, AC, tilt, white, $2,500, will consider offers. Liguori, 256-3613.

'81 HONDA CX500 MOTORCYCLE, w/windscreen & saddlebags, low miles, excellent condition, $1,000 OBO. Stroup, 836-6304.

'90 MITSUBISHI MIRAGE HATCHBACK, 35K miles, AT, AC, PS, PB, AM/FM, extended warranty, excellent condition, $6,000. Cleland, 299-1263.

'87 & '86 HONDA PRELUDE SIs, both low miles, 5-spd., AC, PS, AM/FM cassette, $7,600 & $6,200. Henley, 821-5457.

'74 VOLKSWAGEN SUPERBEETLE SUNBUG, excellent mechanically, 4 new tires, new brakes & shocks, AM/FM cassette, $2,200. Letz, 293-4525.

'88 BRONCO XLT, 4-WD, AT, 53K miles, 351 V-8, excellent condition, many extras. Tapia, 299-1941.

'89 FORD ESCORT WAGON, AC, AT, 40K miles, luggage rack, excellent mechanical condition, very clean, $4,650. Bunker, 268-2364.

REAL ESTATE

BEAUTIFUL HALF ACRE in Sandia Heights, w/protected city and mountain views, easy build site. Maenchen, 298-9496.

2-BDR. HOME, 1 bath, single garage, hardwood floors, 1420 Hermosa SE, see by appointment only, available June 1, $61,500. Cherb, 255-1891.

4-BDR. HOME, brick, city view, 2,100 sq. ft., 1-3/4 baths, family, living, & dining rooms, patio, 2-car garage w/opener, $149,000. Norwood, 292-0072.

3-BDR. HOME, 2 baths, formal living & dining, den, Dennis Chavez/Madison/La Cueva schools, 1,840 sq. ft., $112,400. Hancock, 823-1369.

4-BDR. HOME, Peralta, 3 baths, 3,000 sq. ft., solar, garage, up to 5 acres, $200,000 to $250,000, will consider trade. Lackey, 869-9333.

3-BDR. HOME, 1,300 sq. ft., 1-3/4 baths, 2-car garage, sprinklers, greenhouse, vaulted great room, NE of Tramway/Central, $92,700. Crowley, 298-8499.

3-BDR. HOME, 1-3/4 baths, country kitchen, 1-car garage, 1,300 sq. ft., large lot, Chelwood & Copper, $75,000. Tuttle, 281-1406.

2-BDR. PATIO HOME, 1-3/4 baths, 1,000 sq. ft., fireplace, solar, security, garage, Morris & Spain, Wood Bros. construction, $83,900. McNabb, 299-3157.

3-BDR. TOWNHOUSE, near Ladera Golf Course, 1,300 sq. ft., 1-3/4 baths, 1-car garage, great backyard, very nice. Brockman, 836-2527.

WANTED

ROOMMATE(S), to occupy 1 or 2 rooms, private bath, NE Heights, $350/two rooms, $250/one, prefer Q-cleared persons. Vickers, 298-0418.

HOUSE OR APARTMENT TO RENT, 2-bdr./2 bath, need by July 1. Guerra, 256-1356.

CAMPER JACKS. Pryor, 294-6980.

LITTLE TYKES "COZY COUPE." Parson, 291-8394.

SCHWINN AIRDYNE EXERCYCLE, w/movable handlebars. Cropp, 296-1877.

SHARE-A-RIDE

CORRALES/RIO RANCHO VANPOOL, openings available for new riders. Kuszmaul (892-4466) or Boatman (892-3570).

Coronado Club Activities

Social Hour This Evening; Poorboys Next Friday

4 U 2-NITE — Ready to socialize? A convivial convocation kicks off after work this afternoon, May 29, in the Cantina, as another of the Club's famous social get-togethers gets under way. From 4:30 until you-decide-when, enjoy munchies, drink specials, and the best company west of the Pecos (or east, for that matter). Come on out!

ISLETA POORBOYS NEXT WEEK — Here come those Club favorites again to get your toes tapping to some mighty good country music. Next Friday, June 5, the Poorboys will be on stage from 7 to 11 p.m. The dinner specialties (served from 6 to 9) are a 10-oz. New York sirloin strip for $11.95, grilled halibut for $10.95, or the popular all-you-can-eat buffet (featuring sliced turkey breast and baron of beef) for $6.95. Don't let someone else get your spot — reserve now (265-6791).

BRUNCHING AND DANCING — Sunday, June 7, the Club features another great Champagne Brunch and Tea Dance. Adults can enjoy the extraordinarily scrumptious buffet for $6.95. For children 4-12, it's only $2.50, and toddlers aged 3 and under eat free. After brunch (served from 10 a.m. to 1 p.m.), the Best Shot Band plays from 1 to 4 p.m. Reservations required (265-6791).

B.O.D.'S WANTED — That's Board of Directors members. The Club is looking for some good folks to serve on the Board and help broaden the representation of membership. Candidates for the board must be active members of the Club who are entitled to vote at the annual meeting. If you're interested in helping make the C-Club even better, contact General Manager Sal Salas for details about nomination.

JUNE IS BUSTIN' OUT — And so is C-Club Bingo. Every Thursday evening is a bingo night, starting with the Early Bird session at 6:45. Card sales and the buffet line open at 5:30 p.m. Just to get the month started right, the "best bingo crew in New Mexico" is guaranteeing a $500 jackpot for Last Chance Bingo on June 4.

BROWN BAGGERS WELCOME — Bring your lunch and enjoy the Club's shady patio, grassy areas, or air-conditioned dining room. Didn't get your lunch made this morning? C-Club members can get a Brown Bag Special at the snack bar, Monday through Friday from 11 a.m. to 1 p.m. It's a deluxe hamburger, fries, and soft drink for $2.75 (must show membership card).

SUCH A DEAL! — Those fun-loving, card-playing Thunderbirds just keep shuffling and dealing. Next dates: June 11 and 25, starting at 10 a.m. and ending around 3 p.m. Between hands, enjoy coffee and cookies.

ROADRUNNERS MOVE OUT — The Roadrunners RV Club's June trip has been rescheduled to June 22-26, at Sierra Bonita RV Park, a private campground 18 miles north of Mora, N.M. For information about the Roadrunners or this trip, call President Tex Vandi on 293-1249 or Wagonmaster John Smelser on 256-3108.

Events Calendar

Events Calendar items are gathered from various sources. Readers should confirm times and dates of interest whenever possible.

May 29 & 31 — June Music Festival: Emerson String Quartet, music includes works by Bartok, Haydn, Dvorak, Schubert, Shostakovich, and Beethoven; 8 p.m. Fri., 4 p.m. Sun.; Woodward Hall, 888-1842.

May 29-30 & June 4-6 — "Egaños," (deception), based on an adaptation of the corrido "La Nueva Senaida" concerning the illusions of infidelity; 8 p.m., South Broadway Cultural Center, 848-1320.

May 29-June 7 — "Focus on Youth," annual juried student photography exhibit by Albuquerque Public Schools high-school students; 9 a.m.-5 p.m. Tues.-Sun., Albuquerque Museum, 243-7255.

May 29-June 7 — "Woman in Mind," a dark comedy by Alan Ayckbourn about a housewife who fantasizes about a new life for herself; 8 p.m. Fri.-Sat., 6 p.m. Sun.; Vortex Theatre, 247-8600.

May 29-June 27 — "Beirut," by Alan Bowne, powerful drama about love and sex in an AIDS isolation camp in the not-too-distant future, Theatre-in-the-Making presentation, show contains nudity and frank sexual content, no one under 17 admitted; 8 p.m. Fri.-Sat., CenterStage (3211 Central NE), 260-0331.

May 29-June 21 — "WFS 17," Western Federation of Watercolor Societies exhibition, includes work of 94 artists in a variety of styles; 9 a.m.-5 p.m. Tues.-Sun., Albuquerque Museum, 243-7255.

May 29-June 30 — "Lola Alvarez Bravo: Portraits of Frida Kahlo," study of Frida Kahlo by one of Mexico's foremost photographers; 9 a.m.-5 p.m. Tues.-Sun., Albuquerque Museum, 243-7255.

May 29-Sept. 6 — "First to Fire, Last to Lay Down Their Arms," exhibit by the New Mexico National Guard Museum, documents the defense of the Bataan Peninsula in the Philippines by the 200th Coast Artillery, New Mexico National Guard; 9 a.m.-5 p.m. Tues.-Sun., Albuquerque Museum, 243-7255.

May 29-Sept. 6 — Exhibit, "Dinosaurs, Penguins, and Whales: The Wildlife of Antarctica," collection of 45 oil paintings by California artist William Stout, exhibit includes fossils, videos, an iceberg scene, and a computer simulation about the ozone hole above Antarctica; 9 a.m.-5 p.m., New Mexico Museum of Natural History, 841-8837.

May 29-Oct. 11 —"Hopi Spirits," exhibit featuring the works of 38 Hopi kachina doll carvers highlights their imaginative carving techniques and innovative use of detail and color, more than 100 photographs documenting kachina doll making; 9 a.m.-4 p.m. Mon.-Fri., 10 a.m.-4 p.m. Sat., noon-4 p.m. Sun.; Maxwell Museum of Anthropology, 277-4404.

June 3 — Line Dance Fest '92, presented by Los Volcanes Senior Center's Silver Fox Line Dancers; 1:15 p.m., Los Volcanes Senior Center (6500 Los Volcanes NW), 836-8745.

June 5 & 7 — June Music Festival: the Buswell/Parnas/Luvisi Trio, performance includes works by Beethoven, Ravel, Dvorak, Mozart, and Schubert; 8 p.m. Fri., 4 p.m. Sun.; Woodward Hall, 888-1842.

June 6 — Concert, Chamber Orchestra of Albuquerque performing Beethoven's Piano Concerto No. 3 in C Minor, Opus 37, and Symphony No. 2 in D Major, w/pianist Elizabeth Paster; 8:15 p.m., St. John's United Methodist Church (2626 Arizona NE), 881-0844.

June 6-7 — 42nd Annual Spring Rose Show, arts & crafts sale held in conjunction on Garden Center grounds; 2-6 p.m. Sat., 10 a.m.-4 p.m. Sun.; Albuquerque Garden Center (10120 Lomas NE), 296-6020.

June 7 — Benefit Concert honoring Albuquerque Meals on Wheels' 20th anniversary of service to the community, featuring the Albuquerque Wind Quintet; 3 p.m., Immanuel Presbyterian Church (114 Carlisle SE), 265-7628.

June 7-Aug. 2 — Exhibit, "Peruvian Photography 1900-1930," Santa Fe resident Ed Ranney traveled to Peru to make prints from early 20th-century photographic negatives of Martin Chambi, Miguel Chani, and the Vargas Brothers (many have never been seen in the US); 9 a.m.-4 p.m. Tues.-Fri., 5-9 p.m. Tues., 1-4 p.m. Sun.; UNM Art Museum, 277-4001.

June 7-Aug. 16 — Exhibit, "Thanks for the Mimbres," an investigation of how anthropologists and tourist promoters have transformed religious images into popular culture icons representing "otherness" of the Southwest; 9 a.m.-4 p.m. Tues.-Fri., 5-9 p.m. Tues., 1-4 p.m. Sun.; UNM Art Museum, 277-4001.

June 7-Aug. 16 — Exhibit, "Our Land/Ourselves," works on paper by Native American artists focusing on the land and its inhabitants through metaphysical, metaphorical, allegorical, and political perspectives (reception Fri., June 12, 6-8 p.m.); 9 a.m.-4 p.m. Tues.-Fri., 5-9 p.m. Tues., 1-4 p.m. Sun.; UNM Art Museum, 277-4001.

June 7-Aug. 28 — Exhibit, "Native Iconographic Influences in Raymond Jonson's Painting," investigates Raymond Jonson's incorporation of Southwestern iconography, drawn from Native American and Hispanic cultures, in his early New Mexico work; 9 a.m.-4 p.m. Tues.-Fri., 5-9 p.m. Tues., 1-4 p.m. Sun.; UNM Jonson Gallery, 277-4967.

June 11 — Explorations in the World Music Series: "Music of Northern India, Raga and Tala," concert-lecture; 7:30 p.m., Maxwell Museum of Anthropology, 277-4404.

June 12 & 14 — June Music Festival: the Tokyo String Quartet, performance includes music by Haydn, Bartok, Beethoven, Janacek, and Schubert; 8 p.m. Fri., 4 p.m. Sun.; Woodward Hall, 888-1842.

June 13-14 — Spring Flower Show, sponsored by the National Council of State Garden Clubs, celebration of various explorers; 2-6 p.m. Sat., 10 a.m.-4 p.m. Sun.; Albuquerque Garden Center (10120 Lomas NE), 296-6020.

PHOTO OP — During a news media introduction to Sandia's Emergency Operations Center, *Albuquerque Journal* photographer Dean Hansen gets a shot of the Mobile Command Post. Members of the media learned that the Labs' emergency response system is designed to deal quickly with problems, ensure worker safety, and provide communication with the media. At the Mobile Command Post, they saw demonstrations of breathing apparatus and equipment for dealing with hazardous materials.