NATIONAL SECURITY — President and Director C. Paul Robinson (right) and Executive Vice President and Deputy Director John Crawford posed recently with this stabilizer from an Air Force F-111 being studied at Sandia's Robotic Manufacturing Science and Engineering Lab. The project is one of many ongoing Labs contributions to US national security. (Photo by Randy Montoya)

State of the Labs 1997

Paul Robinson & John Crawford talk about budgets and burdens, workforce and weapons, a 'premier' national security lab, bubbling ideas, and endless frontiers

Each year the Lab News *sits down with Sandia's two top officials to discuss current issues and concerns, both external and internal. This year's State of the Labs interview with Sandia President and Laboratory Director C. Paul Robinson and Executive VP and Deputy Director John Crawford was their second in that capacity. They were interviewed by* Lab News *editor Ken Frazier and senior editor John German and photographed by* Lab News *photographer Randy Montoya.*

***LN:** You took office almost two years ago, on Aug. 15, 1995. We would like to get your impression, two years later, of how you assess Sandia's status and place in the national and international defense community and in R&D and applications.*

Paul: There is no question that we are still very much into interesting times for anyone who depends on federal outlays for their budgetary support. The budget reconciliation resolution, which Pete Domenici [R-N.M.] led in the Senate last week, sets the course to move toward a zero deficit. I think that will continue to put pressure on every dollar of government funds that is spent. We've certainly seen our budgets squeezed in recent years, and as we look out to the future, notwithstanding a strong commitment to the weapons program, we see others questioning that commitment when it comes to budget time.

John: I think in the defense community the Laboratory standing is still very good. We continue to deliver products on schedule and within budget. But having said that, I believe there is a debate going on in the defense community about the place of nuclear weapons and how that's going to play out in the future. That debate tends to add confusion and noise to the system. In terms of Sandia's reputation for being a laboratory that delivers on commitments, I think that's as good as or better than ever. It's also true, I believe, in the R&D community. Our stature has continued to get better. We have spent a lot of time reaching out to the R&D community — both universities and industry — as well as to our government sponsors. I believe those interfaces are stronger today than they were a few years ago, just because people are working on them very hard.

Paul: I think Sandia's research results have started to expand, and I can attribute much of it to the larger investments in Laboratory Directed Research and Development [LDRD] that we've made. We are starting to see the fruits of that investment. We are spending nearly $70 million a year on LDRD. It was just announced that we've won eight R&D 100 awards [*Lab News*, July 4], which is not a bad record. Bob Eagan [VP 1000] has started putting together a listing of other individual awards. Lots of our folks are winning major medals and awards from the technical societies, another indication of excellence.

***LN:** So we are continuing to perform at high levels, but we are affected by budget pressures and forces a little out of our control at the*

(Continued on page 4)

Sandia LabNews

Vol. 49, No. 14 July 18, 1997

Sandia National Laboratories

Sandia's Mars Pathfinder airbags, now the rage, once had their problems

NASA chief salutes Sandia on ABC News

By Neal Singer

It's difficult to remember uncertainties five years ago about the use of airbags in space — particularly now, during the overwhelming approval that has greeted the July 4 landing on Mars of the space probe Pathfinder, cushioned by airbags designed at Sandia.

A jubilant NASA chief Dan Goldin told ABC News (seen in Albuquerque on KOAT), "This is a 'thank-you' to the wonderful people at Sandia National Laboratories. The first four minutes [of the landing] were on them."

But at the beginning of the Pathfinder program in 1992, many people opposed the use of airbags because of their high risk and the inability to test them in the Martian environment, says Sandia's Carl Peterson (9116), a manager of the project at that time.

By the program's end, "the highest risk system on Pathfinder had been tamed by a combination of weapon-developed parachute technology, sophisticated computational predictions, unique facilities, advanced diagnostics, and an inter-laboratory team of, if I may say so, world-class engineers at Sandia and the Jet Propulsion Laboratory," says Carl. "No wonder Dan was happy."

Airbag cocoon bounced 15 times

The Sandia-JPL designed airbags enveloped the craft about five seconds before landing. According to NASA navigation engineer David Spencer, the spacecraft hit the Martian surface at about 40 miles per hour and bounced 50 feet in the air. Pathfinder's airbag cocoon then bounced at least 15 more times, tumbled, and rolled for two-and-a-half minutes before stopping more

(Continued on page 8)

Launch helps NASA test new high-temp ceramic aboard reentry vehicle

By John German

The sharper it is, the hotter it gets.

For three decades this rocket scientist's rule of thumb has dictated the shapes of space vehicles designed to endure the rigors of atmospheric reentry. Because sharp geometries get hotter when they slice through the atmosphere, reentry craft traditionally have featured blunted edges that minimize heat buildup but also increase aerodynamic drag.

On May 21, a Mk12A reentry vehicle (RV) outfitted with a NASA-designed, Sandia-built payload separated from a US Minuteman III missile 450 miles above the Pacific Ocean and streaked toward Earth like a shooting star. Five thermocouples in the RV's nose kept track of how hot a new, sharper nose tip — made of an ultra-high temperature ceramic — got as the craft descended at speeds approaching 15,000 mph.

Surviving the reentry inferno

The ceramic material and nose tip shape were developed at the NASA Ames Research Center as part of a NASA program to revolutionize flight capabilities of 21st century aerospace vehicles. The program, called the Slender Hypervelocity Aerothermodynamic Research Probes (SHARP), seeks to demonstrate the viability of sharp leading edges for future space vehicles, as well as for passenger aircraft that might one day foray into the fringes of space.

"Because these new ceramic materials [withstand] ultra-high temperatures, we can now build sharp leading edges that don't melt during reentry along trajectories such as those flown by the space shuttle," says Paul Kolodziej, NASA Ames' lead

(Continued on page 8)

This & That

Hot July topics – Paul Robinson's July 28-31 employee dialogue sessions should be interesting. He plans to talk about several subjects – Integrated Job Structure, workforce stability, Lockheed Martin contract renewal status, and more – that are high on my list of interests and probably on yours, too. Paul also promises another short, entertaining videotape about recent Sandia events and accomplishments. (My creative colleagues in the Video Services Dept. did such a fine job putting the last one together that it got spontaneous applause.) For more info about the sessions, including the schedule, see the page 12 story.

* * *

Bagging some far-out publicity – Sandia's technical expertise has received lots of media attention lately, most recently relating to our design of the Mars Pathfinder mission airbags. The bags successfully cushioned against the 40-mph Mars impact of the Sojourner, scientific instruments, and cameras that are providing all those nifty photos. The landing/cushioning concept was considered a high-risk part of the mission, but the bags performed marvelously. Don't miss Neal Singer's page-one article about Sandia's contributions.

* * *

Another "don't miss" – President Paul Robinson and Executive VP John Crawford discuss the "State of the Labs" in this annual *Lab News* feature beginning on page one. I think you'll find it informative, good reading, and well worth your time.

* * *

Computer guys identified – Thanks to Don Robbins (9782), Larry Lane (12326), and John Stathis (ret.), we've now identified all three of those well-dressed computer jockeys in the 1958 photo that ran in the July 4 issue. The photo was taken at Sandia in 1958, when our fastest Sandia computer performed a then-amazing 4,000 operations a second. Our new teraflops "ultracomputer," the fastest in the world, is capable of performing 1.8 trillion operations a second. The three (see page five of July 4 issue) are Tom Fox (deceased), front; Marty Snyderman, back left; and John Stathis, back right. John retired from Sandia in 1990. Marty Snyderman left the Labs in 1961.

* * *

Career path may lead to appropriate facility – I've changed my duties in recent years nearly as often as a snake changes skins (some wags say the similarities don't end there), so I've decided to set my sights on a final Sandia job for the twilight years of my career. It's a job I think I can handle after I get a wee bit more experience – editing the *Porcelain Press*.

For folks who don't see it because you don't visit the right "facilities," the *PP* is the Sandia periodical posted in some restrooms, giving safety and health tips, accident news, etc. This should, in fact, be a particularly fitting job for me since I now have to visit such facilities often and sometimes quickly to *avoid* accidents.

– Larry Perrine (845-8511, MS 0167, lgperri@sandia.gov)

Lab News staff wins five APEX '97 awards

The entire *Lab News* staff won an award for writing — one of five APEX '97 Awards of Excellence the *Lab News* received June 23 in the 1997 APEX Awards for Publication Excellence national competition. The contest is administered by Communications Concepts of Springfield, Va. APEX awards recognize excellence in content, graphic design, and overall communications excellence. This year's contest drew 4,200 submissions in 88 subcategories.

The *Sandia Lab News* staff received an Award of Excellence in the category Magazine, Magapaper, and Journal Writing. The judges cited the March 13, 1996, issue, which contained articles on such subjects as the attempt to use computer simulations to determine the sounds made by a duck-billed dinosaur, the effect of funding cutbacks on partnerships with industry, intelligent micro-machines, VP Dan Hartley's portrayal of management's strategic thinking ahead to the year 2016, a Sandian whose hobby is restoration of classic cars, improved filmless digital imaging, and the control of fusion experiments from afar via a special speedier portion of the Internet. Members of Employee Communications and Media Relations Dept. 12640 and California Public Affairs and Employee Communications Dept. 8802 wrote the articles.

Four *Lab News* staff members and contributors won individual APEX '97 Awards of Excellence:

- Senior editor John German, News Writing, for his article "Media Seek Scientific Perspectives on TWA Flight 800 Crash Questions."
- Staff writer Bill Murphy, Feature Writing, for his article "Seismic Probe Deployment a Sea Change for Sandians."
- Photographer Randy Montoya, Photo Layouts, for his Neutron Generator Facility Photo Spread.
- Columnist Larry Perrine, Editorials and Columns, for his This & That column.

This is the third APEX award in three years for Randy and Larry, and the second for John. It is Bill's first individual APEX award, although he was a major contributor to the *Lab News's* Grand Award for Publication Excellence in 1996.

Sandia LabNews

Sandia National Laboratories

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Sandia National Laboratories is a multiprogram laboratory operated by Sandia Corp., a wholly owned subsidiary of the Lockheed Martin Corp. and a prime contractor to the US Dept. of Energy.

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Published Fortnightly on Fridays by
Employee Communications Dept. 12640, MS 0165

LOCKHEED MARTIN

Sandia earns DOE's first Roadrunner Award for progress in diversity and EEO

Sandia has won the Department of Energy's first "Roadrunner Award for Progress in Diversity" for significant progress in building sound and notable diversity programs.

Sandia was among three DOE offices, laboratories, and subcontractors honored with awards as part of a program run by the Department's Office of Economic Impact and Diversity to recognize organizations that have demonstrated leadership in diversity and Equal Employment Opportunity (EEO).

The awards honor three categories of accomplishments, with the possibility of two award presentations in each category — one to a federal DOE office and one to a DOE laboratory or management and operating contractor. The categories are:

- The Zia Award for Excellence in EEO/Diversity
- The Roadrunner Award for Progress in EEO/Diversity
- The Turquoise Award for Commitment in EEO/Diversity

Margaret Harvey, Manager of EEO and AA [Affirmative Action] Dept. 3611, says Sandia nominated itself for the progress award because the Labs is still in the piloting stage of its new Managing Diversity Progress Index (MDPI), which seeks to quantify and assess progress in diversity using Malcolm Baldrige-type criteria, taking into account Sandia's commitments and action plans regarding diversity management. The MDPI is based on the five managing diversity process phases — advocacy, diagnostic, planning, implementation, and feedback — defined by the American Institute for Managing Diversity.

"We thought we ought to have measures in place before we applied for the Award for Excellence," she says. "At this point we haven't yet established a baseline to compare ourselves to. We expect some results to become measurable over the next few years."

The Roadrunner Award, according to DOE's nomination criteria, is "an advanced award recognizing organizations that have demonstrated significant progress in building sound and notable diversity programs. Results are clearly linked to strong and effective EEO/Diversity strategic plans and policies. Recognition at this level clearly demonstrates results that are directly attributable to a systematic, well-developed approach. These organizations have many practices from which other organizations can learn."

The Roadrunner Award was presented to Sandia during the DOE Contractors' EEO and Diversity Conference in Albuquerque May 27-29. DOE's Albuquerque Operations Office and Lockheed Martin's Energy Systems Division each received Zia Awards for Excellence in EEO/Diversity, as well. *—John German*

Symposium scheduled on safety of high consequence systems

Surety Assessment Center 12300 will host its second High Consequence Operations Safety Symposium July 29-31 at Sandia/New Mexico's Technology Transfer Center.

The symposium provides engineers and analysts a chance to share strategies, methods, and experiences in high consequence systems engineering.

Robert Francis, vice chair of the National Transportation Safety Board and principal investigator for the TWA Flight 800 crash, will give the keynote address. John Foster, Jr., a consultant for TRW and former director of Lawrence Livermore National Laboratory, will give the banquet address.

Other symposium topics include organizational influences on high consequence safety, assessment and analysis processes, lessons learned from high consequence events, software safety, and human factors in safety.

Poster sessions will cover a wide range of high consequence operations safety issues.

For more information about the symposium, click the "High Consequence Operations Safety Symposium II" hot button on the Internal Web home page or visit the symposium's Web site at: http://www.sandia.gov/events/hcoss97.

Lockheed Martin's Nova award presented to Sandians

High-altitude atmospheric researchers are a starring team

By Nancy Garcia

After working with two dozen Sandians for 12-hour days seven days a week for several weeks each year since 1994, Tim Tooman was surprised to get a signed invitation from Lockheed Martin Chairman and Chief Executive Officer Norm Augustine.

As a representative of 24 Sandians involved in the Atmospheric Radiation Measurement-Unmanned Aerospace Vehicle (ARM-UAV) team, Tim is among 50 employees of Lockheed Martin companies invited to an awards banquet at the National Air and Space Museum in Washington.

The team Tim represents received one of 50 Lockheed Martin Nova awards in the third year of this recognition that draws from the corporation's 185,000 employees. The awards merge employee recognition traditions of both Martin Marietta and Lockheed Corp. The awards are presented in four categories: teamwork, exceptional service, leadership, and technical excellence.

The 24 ARM-UAV staff members won in the teamwork category. Tim's manager, Will Bolton of Exploratory Systems Technologies Dept. 8120, nominated the team soon after it won a Sandia Employee Recognition Award this spring.

The team, Will says, "exhibited the highest levels of technical accomplishment and dedication in completing three research flight series in FY96."

Tim agreed. He wrote detailed project plans as Sandia's liaison to a far-flung team of mission scientists and acted as mission controller in charge of flight operations in the field. The grueling hours during three-week-long deployments were tiring, but the team had strong, compatible members, he says.

"Whatever needed to be done, they just jumped up and did it. It was a tremendous team. I enjoyed the people."

The ARM-UAV program is planning a sixth major campaign in Oklahoma this fall to gather more airborne data about the role of clouds in global warming. The project is coordinated between five DOE laboratories, a dozen universities, three NASA centers, and four private companies. Data is gathered by instruments aboard a high-altitude plane that can stay "on station" above remote sites for tens of hours.

A physicist who previously started a successful laser plasma lab at Sandia, Tim says that having participated in earlier test and evaluation work during a tour of duty in the Army was helpful in such a massive coordination effort.

Will is deputy technical director in the overall ARM-UAV project, and Global Climate Change/Remote Sensing Dept. 8102 Manager John Vitko is the technical director, emphasizing scientific issues.

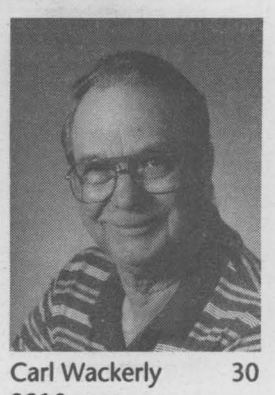
Will says he specifically focused on staff, rather than managers, in his nomination, and that he consulted the team for their agreement to have Tim represent them because Tim's roles spanned the breadth of Sandia's efforts.

BRIGHT NOVA WINNERS — These Sandians are a part of the ARM-UAV project team: Scott Anderson (8416), John Beitia (8534), Tim Berg (8120), Ken Black (8115), Jan Collins (8411 Ret.), Kevin Davidson (8230), Diane Diemer (2211), Mike Ferrario (2271), Jerry Hargiss (8210), Dick Jones (8414), Gary Kirchner (8413), Terry Leighly (ret.), David Like (2663), Mark McConkie (8416), Bob Miller (ret.), Jim Mitchell (2271), Bud Pelletier (8815), Richard Roy (8417), Carl Skinrood (8102), Tim Tooman (8120), Mike Tootle (8712), Dan Trujillo (8120), and Rick White (8413).

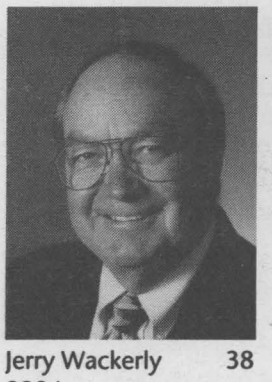
Sandia CaliforniaNews

Recent Retirees

Judy Wackerly 25
8413

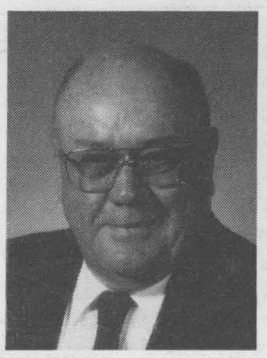


Carl Wackerly 30
8210



Jerry Wackerly 38
8804

Paul Heppner 36
2200



Ken Henry 35
2262

Feedback

Q: Is there a mechanism for employees to communicate to upper management good things about the compressed work week? For example, there are more employees at work now (available to clients) early in the day and late in the afternoon because folks are working longer hours on their days on. Also, the problem with voicemail run-arounds has nothing to do with compressed work weeks. The same problem exists on a Tuesday or Wednesday and not just on Fridays. This problem is related to reduced secretarial support and folks who don't answer messages — not to work schedules.

A: There are several methods for communicating good things about the compressed work week to upper management and you found one of them. The Feedback process works just as well for good news as for bad, although it isn't used that way very often. Paper mail and e-mail also work well for communicating with upper management.

Thanks for pointing out advantages of the compressed work week that are sometimes overlooked. I agree that the problems with voicemail are not unique to compressed work weeks but they are aggravated by substantial absences on Friday, which increases the likelihood of no one answering the phone. You put your finger on a root cause of the problem I was trying to address: people who don't answer messages. I would add to that, "people who don't have useful voicemail messages" that indicate when a return call can be expected and/or refer the caller to someone who is available to help at that time.

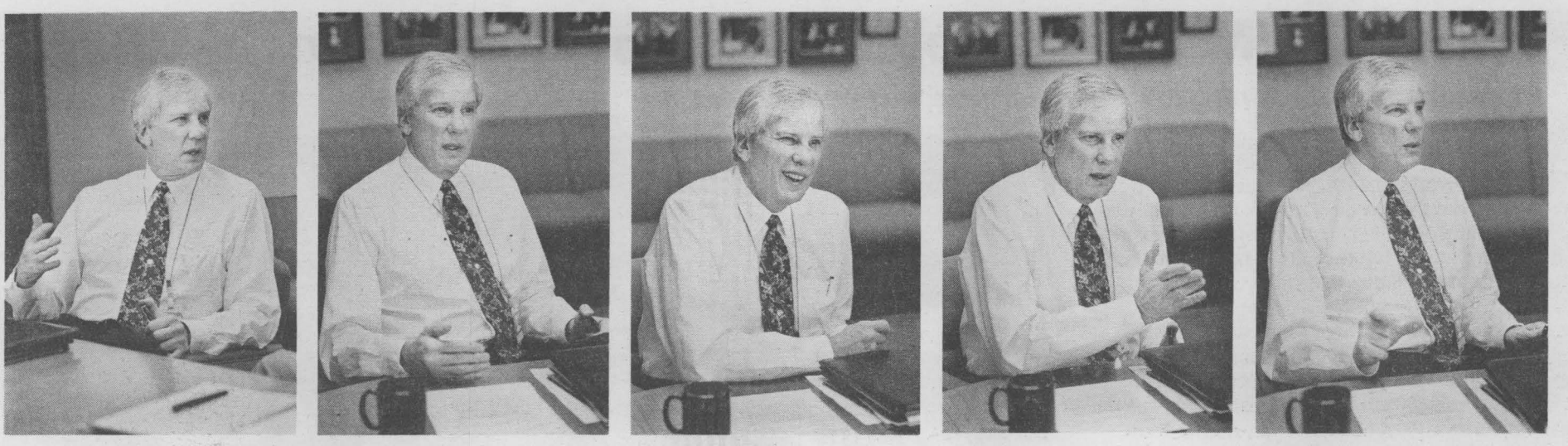
My bottom-line appeal is that we pay attention to our customers and take advantage of the voicemail technology to help us do that. I appreciate your taking the time to write a Feedback to express your concerns and views, and I hope this answer is helpful.

— C. Paul Robinson, Laboratories Director

Q: Since the compressed work week was implemented, vacation can no longer be taken in increments of four hours except on Fridays, resulting in excess hours, which then must be carried over at the end of the fiscal year. Why hasn't Sandia adopted the use of taking vacation in one-hour increments or even half-hours? Other companies don't seem to have any problems with this method. If it's associated with administrative costs, where is the expense coming from? It seems that allowing employees to take vacation in one-hour or half-hour increments gives them more flexibility to use up accrued vacation.

A: I agree that your idea would allow more flexibility for employees to use their accrued vacation. However, the policy is based on labor law. The Fair Labor Standards Act (as interpreted by the courts) prohibits employers from deducting one- or two-hour absences from exempt employee leave (vacation/holiday) accounts. Since Sandia's policy is to treat exempt and nonexempt employees the same whenever possible, Sandia also applies this interpretation to nonexempt employees. In order to accommodate Sandians in a fair manner, Sandia applies the half-day vacation limit to all employees.

— Marlene Vigil (3343), Benefits Planner



State of the Labs

(Continued from page 1)

national political level?

Paul: We continue to do battle to try to keep the Laboratory healthy during this period. The appropriations process, particularly this week's Senate actions — if they are supported by the House and the President — will substantially improve our position. It's difficult to live with a process where the OMB [Office of Management and Budget] budget request comes in below expectations, with the Congress having to plus-up the budget — but this is the third year in a row they have done so — this time stronger than ever before. We do have some strong supporters.

The technology transfer program has really been a roller coaster in terms of both funding activities and political support for it. After several cycles — we're in a down cycle at the moment — the results of previous cooperative research and development agreements have started to yield some fairly impressive outcomes. I think these results will warm up the climate for partnerships once again. We have done some work for a number of folks in the electronics sector; they put Sandia as number one among the laboratories in that business. We have risen to the largest market share in the AMTEX (American Textiles) work, merely by delivering what was needed. The oil and gas partnership has started to yield some impressive new results. Each of these industry groups is going into Congress and telling them how important the work is. We are trying to help that process along. The new [Energy] Secretary, in fact, has been reviewing this effort to see if it's something he should personally get behind. My belief is that he will become a champion, that it just makes far too much sense to have national laboratories joining with national industries.

"One of the things we hear from our advisory groups . . . is, 'the work you do is world class, but nobody knows about it.' "

Sandia Washington event

LN: You were in Washington for the Sandia Washington event, "Revolution in Engineering" [Lab News, July 4]. How did that go and what might the long-term effects be?

Paul: If there was one event that could show the success of our earlier investments — of trying to put more emphasis on research — I think that event was the test. We attracted a large number of people, which I think is a tribute to our Public Relations staff in getting them there. I believe the attendees were enthusiastic supporters of our vision: a revolution in the way engineering is done, using simulation and modeling to produce virtual parts before any hardware is produced. There were people from all parts of Washington who dropped in and went through the various exhibits. The comments were exceptional. For example: "I see what you guys are talking about; this really changes everything."

John: Some of the comments I heard most often were about the quality of the presenters we had there. We had Sandians at each stopping point around the room, and almost everybody said that the Sandians were uniformly good in the clarity with which they were presenting and the depth to which they understood the subject matter.

Paul: — and the enthusiasm for their work.

John: Yes. I think it was a huge success. And for the first time we have ever tried anything like that, I think it made a major mark. Certainly I came home with the conclusion that it's a good thing to do and that we ought to do it again, at an appropriate time. You don't want to do these real often — we'll burn out our people and the audience.

Paul: You should wait until you have something really exceptional to say, and I think the material we presented this time meets that test.

John: One of the things we hear from our advisory groups after they spend some time with the Labs is, "the work you do is world class, but nobody knows about it." So we have taken that seriously. We are going to work that problem as hard as we know how to make sure that the appropriate people know about Sandia and its work. And they can draw their own conclusions.

A fundamental funding problem

LN: How do you see our budget fortunes and our employment levels trending in the next few years?

John: We will close out this year right around 7,500 total people. Our funding has been virtually constant for about the last three years. As we look to '98, we're still working that problem; it could be constant to a little bit up, or it could be a little bit down. There is still a lot of uncertainty. Frankly, the problem we're working hard right now is the '99 problem. The initial projections showed a substantial drop, but in more recent days it is rebounding. There are competing effects.

LN: Why is that?

Paul: There are two forces. One is the general squeeze across the board on federal outlays. Each year of this budget agreement the pressure will rise a little more to reduce spending in order to lower the deficit. However, the biggest problem is within the weapons budget. We think there's a fundamental problem to be worked, and that is, with the loss of nuclear testing, which affects Los Alamos and Lawrence Livermore more than it does Sandia, there is a need to develop some above-ground facilities that can in some way replace the role that underground nuclear tests played. Those labs have asked for a number of major new facilities. Sandia, on the other hand, has been more modest in our requests for such facilities, since Sandia can't justify them specifically for replacing underground testing. But we worry that the price tag for the new facilities at all three labs has gotten so large that it's coming into conflict with the real weapons work that must continue with the stockpile. And we made some points fairly strongly this week that any decision that would sacrifice experienced people in the weapons program in order to build brick and mortar facilities is the wrong choice.

LN: Who did you make those points to?

Paul: To the Department of Energy, and to anyone who would listen in Washington. There was a budget meeting to look at the '99 budget and recast it.

John: There is a real debate and real competition within the DOE and DoD programs now as to how you trade off the needs of the stockpile today and the near future versus the needs of the laboratory in the long-term stewardship of the nuclear deterrent. It is a very fundamental debate, and choices have to be made. It's not one or the other, but an appropriate balance.

Weapons program reductions critical

Paul: I have set my priority fairly clearly, because the reductions we have already taken in the weapons program took us down to what I felt was a critical level in personnel staffing. Stewardship begins with "stewards." If we aren't going to have the stewards around, we aren't going to have stewardship. That's the message we will continue to push. Things have been picking up in some of our other areas — for example, I think we have turned around in the Work for Others, where we now have a substantial number of new agencies that for the first time are putting substantial money into Sandia, including the FBI, the National Transportation Safety Board, the Department of Transportation. But the weapons program is so fundamental to us that even if we had enough money to keep the total employment up, we would still have a problem in carrying out our weapons responsibilities. We must solve this weapons budget shortfall in the '99 budget.

"Stewardship begins with 'stewards.' If we aren't going to have the stewards around, we aren't going to have stewardship."

So it's not a case where we can say, "Well, we will just get more Work for Others to carry the shortfall." I think we're at the fundamental limit of being able to maintain and certify the stockpile. Our stockpile obligations are already beginning to show the effects of aging. Systems have been in there long enough that in our surveillance activities we find problems. These require substantial work and a lot of money to change out major components within systems. Not surprisingly, in the systems we've had problems with, most components are no longer available. So it will involve new designs with modern components, electronic components in particular, to keep the stockpile safe and reliable. That workload is growing, without the adequate budget to compensate for it.

We took on production responsibilities to produce parts for the stockpile and in some sense became a plant, a production plant. The difference between production plants and laboratories in the past has been that laboratories have had a level-of-effort budget. As problems arose, you needed to take the money and the people from somewhere else to fix the problem, but you didn't ask for additional money. In contrast, the plants were paid exactly by the workload. Well, we are sometimes being treated like a lab in our responsibilities in the production program right now. For example, the Senate plus-up for Stockpile Management excludes the labs, even though both we and Los Alamos have major production duties. They're saying, "You guys recognize there are problems, we're counting on you to fix it." And

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as good stewards we've moved in to fix those problems, but the shortfall ricochets into other weapons efforts. I think the area we are probably most concerned about is the core competency weapons support. We have seen some erosion in direct support of that, and that's where we've put our efforts to secure better budgets.

Also, we have had some major investments by industry in terms of funds-in. We have a major CRADA with the electronics companies in extreme UV [ultraviolet] lithography [it is 100 percent funds-in], with very substantial funds. We also signed at our event in Washington a $17 million CRADA with Goodyear [it is 90 percent funds-in]. With such funds-in, our overall research efforts have nearly kept level. But in the process the freedom to look out into the future and fix tomorrow's problems has been harmed by actions we take today for the weapons programs. We feel we could get into trouble in meeting our obligations in weapons over the longer term at this rate. Plus, by their very nature, the industry funds are focused on very much shorter time-scale deliverables.

Communicating the problem

LN: Do you think you will be successful in calling these problems, and this situation, to the attention of the appropriate leaders?

John: I actually think we will. We may not get everything, but I believe the problem is serious enough it cannot be ignored. I think Paul is right. It has gotten to the point that you are risking the staff that you need five and ten years from now for today's programs, and that's a bad trade. I believe that message, once it's understood, will have an impact.

Paul: We were visited last week by a fellow from the White House specifically to try to understand that issue. I believe we were able to communicate what the problem is. I think it's a serious one in planning where the administration should put its effort. The Comprehensive Test Ban Treaty, which has been negotiated and signed but not yet ratified, needs to go to the Senate. Even though everyone has said there is no complete substitute for nuclear testing, Vic Reis [DOE Assistant Secretary for Defense Programs] took the lead in developing a concept — Science-Based Stockpile Stewardship — that could find a route to continue to certify weapons in the future without tests. But, to succeed, it will require a certain level of fiscal support, and we made the point rather strongly to the White House visitor that people have not given enough attention to the issue of where will we be with that strategy if the financial support is not there. I think he took plenty to think about back to Washington, and there are a number of indications that more resources will be supplied.

"To succeed, [Science-Based Stockpile Stewardship] will require a certain level of fiscal support."

Simplifying business practices

LN: When the two of you took office in August 1995 we invited you to publish a letter to employees in the Lab News, *and you wrote a very nice one. You had many positive things to say, but you also said, Paul, "Our biggest problems are colossal. I've never witnessed internal processes as complex, unwieldy, or as taxing as ours. Bringing rationality into our business processes will be my first priority." You also criticized the cumbersome ES&H processes and turf battles that result in "fragmentation and disconnects [that] rob us of business opportunities as well as technical achievements." How have we fared since then?*

Paul: One of the things I've learned is that fixing such problems is just as colossal a challenge if not more so. But I believe we are making some rather substantial progress. First, we are set to go online at the change of the fiscal year to the PeopleSoft software, which is commercial software, its own "best practice." It will do all of our Human Resource databases, financial payrolls, et cetera. We are a little behind but still on track, and after another soul-searching episode this year, still totally committed to put into place by the following September the Oracle commercial software for all of our financial management.

To get into a position to do those, we had to change the entire rate structure for accounting within the Laboratory. Our old system wouldn't have fit any of the commercial software. We did that this year, as you are certainly aware, with no small amount of pain to accompany it. I think we are most of the way through that. In fact, I was just delighted with the report last week of what the new rate structure will be. Our overhead rate had been made artificially high by such things as charging all of our nonbase compensation and overtime charges to Increment, one of the overhead accounts, as opposed to making it a direct labor charge. And so suddenly the multiplier — the wrap rate — on work we propose will go down substantially. It was a great feeling to see that take place, because we have been seeking that for a long time.

"We are a national security laboratory. We define that broadly, but I think it's a vision you can really commit yourself to."

A lot of good things flow from that. First, we start to find out with clarity what things really cost. Second, when we propose work to customers, we are now proposing the real labor cost to them as compared to the past. Nonbase compensation and overtime are very much real costs of doing business on each or our projects.

*LN: We just published a two-page chart of changes to our business practices going into effect this year [*Lab News, *July 4]. So a lot has been happening. There has been progress?*

Paul. That list shows the things that must go into place prior to making the switchover to commercial software, and it's driven by it. I think we are keeping the faith that to make those changes was a "must-achieve" activity.

We are a national security laboratory

LN: After your two years as President, what is it you are most proud of about Sandia?

Paul: The strategic planning we have given very high emphasis to and that John has provided the leadership for in both of our years here has provided a strong vision of what kind of a laboratory we are and want to be. We are a national security laboratory. We define that broadly, but I think it's a vision you can really commit yourself to. I'm committed even more strongly as a result of the efforts to define the vision, understand it, and set some future directions. I hope individual Sandians are as well.

One of the other great achievements we have is the Internal Web, where we have published the strategic plan and objectives. We can find out if anybody's at least opening them. The numbers of Sandians who are reading the plan are substantial, and I think that will make us a lot more cohesive a place — having a shared vision, a shared direction. These are not things John and I as individuals can do. This is about team research. If people have to wait and ask, "What should I do?" there's not enough time in the day to do the communications. But if we can achieve the shared vision with that plan, the force moves forward on its own. Sandians will enrich and improve upon what we've done.

John: I agree with Paul about the strategic objectives and developing a long-term vision of ourselves as truly focused on national security. That's our job. I believe that's what we've been placed here for. And it's what we want to do. In addition, I think we now have in place a complete planning cycle, one that I'm very proud of. In fact, we have a set of strategic objectives that are the long-term view, a set of mid-term goals that give us a tactical framework, and we are now in the habit of putting together a set of annual goals that we sign up to for the whole Laboratory. We sign up to DOE and to Lockheed Martin. Paul and I and the vice presidents are judged on the basis of whether this laboratory meets that set of goals. We do them every year, they're related back to the mid-term and long-term goals. We have developed a complete annual cycle that goes all the way from annual milestones to strategic objectives.

This last year we put into that cycle an annual customer feedback loop, which is a huge step for this laboratory, formalized customer feedback that once a year we will get real input from our key customers [*Lab News*, July 4]. I think it is absolutely dynamite. The people who put that process together did a marvelous job. The other thing we've tied into this, now part of our overall PMF [Performance Management Form] system, is the "line of sight" that everybody is striving to generate, that then feeds back into the process. The last element is the peer-review committees that we have put into place for all the various segments of the Laboratory, from research to operations. Paul has two advisory groups, the Board of Directors and a special presidential advisory committee that operates at the strategic level. In my opinion, we have for the first time a total management planning process in place, defined, and operating.

Paul: The one area I'd like to see us put more emphasis on before I feel we've gotten there is to

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State of the Labs

(Continued from page 5)

make sure our budgeting process is even more firmly planted in that plan. One of the things I observed earlier is that there were lots of processes, and they were mostly disconnected. The process that got the most attention was the budgeting process, whether it matched a plan at that point or not. The budgeting has to be secondary to the plan and support the plan. That's where we will put a lot of emphasis.

Internal fragmentation of work

LN: *Let me ask the flip side of the original question. What things at Sandia are there that you are still not happy with, that you are least proud of?*

John: I worry the most about the internal fragmentation of our work. Both we internally and our customers tend to segment our work into very small pieces. So you end up with people literally working on multiple different projects. Now that's not bad in and of itself. But the financial constraints that we must then impose on people to keep our charges straight are taking a lot of time and energy that is nonproductive. It is probably one of the most consistent concerns I hear from people. To the extent that we can do a better job of making our projects larger with fewer internal boundaries, I think we will help ourselves a lot.

"... the financial constraints that we must then impose on people to keep our charges straight are taking a lot of time and energy."

Paul: Individuals who are doing the work usually have the best insights of what could improve. Yet these financial constraints prevent them from having the leeway to follow their ideas and improve things. Micromanagement is really the disease. We do some of it ourselves. And there is still a problem from DOE's systems. It varies by which part of the Department of Energy programs you look at. Defense Programs is still the best. They give their money in large increments, multi-tens of millions per project, and depend on you to find out the best way to get the work done within that. Some of the others give allocations in tens to hundreds of thousands of dollars only, and that's a very serious constraint to creativity. It's a problem that the Galvin task force noted very strongly. Charles Curtis, in his last act as deputy secretary, wrote an article for a National Academy of Sciences publication, spelling that out as a chief DOE fault. There was a study mandated by Congress referred to as "the 120-day study" that also cited this. So we have identified it, but we sure haven't fixed it yet.

Job structure, flexibility, and stability

LN: I'd like to turn to a few things from employees' point of view, if I might. You both came into office at a very turbulent time here at Sandia. I know it has to have been difficult for you, but it's also been difficult for individual employees. Employees have been through reorganizations, restructuring, and realignment now, with two downsizing VSIP [Voluntary Separation Incentive Plan] episodes in the past 18 months, and now a new Integrated Job Structure that's causing anxiety and some concern about how employees are being ranked against each other. First, what do you have to say about the IJS, and second, a little more fundamentally, don't employees deserve a period of stability where we can just do our jobs?

Paul: Well, I'm going to score myself a C-minus on the IJS. I hope people will give us an A for intent, but in execution we did very poorly. There was a commitment we made to the Department of Energy that we would tie our salaries in a more direct way to the marketplace. We were out of sync with the surveys, but it's turned out to be a changing target because the principal survey we used is now out of business. We decided there were some long-standing problems that ought to be fixed. We created a group, representing the whole laboratory, that put together what appeared to us a very sound basis to define categories for employees that would be consistent for all levels. In particular, technical and administrative were greatly out of sync in the past. I had great trepidation at the start that we would end up with something that was more complicated — entropy rules, right? Things always get more complicated. When they came back with something that was in fact a great simplification — a basic four-level structure across the board — I felt, "Wow, now we've really hit a new direction," and I probably got overenthusiastic for it at that point.

Even though we piloted its implementation for two divisions, I was not prepared for the reaction of individual employees. This was seen as an earth-shaking change to them as individuals. We certainly never intended it to be so. In particular, in each of the categories there was a new category and a new word that had not appeared in the past, called Principal — Principal Member of Technical Staff, Principal Member of Laboratory Staff, etc. We thought that would give some headroom for growth for people in the technical and administrative ranks without their having to aspire to become managers. We don't need more managers. We need more people who are creating and working in the laboratory. And we thought the new approach would provide opportunities for advancement below the DMTS [Distinguished Member of Technical Staff] level, which is limited by very strict percentages. I think more than half of our employees in every category are today unhappy because they weren't put into that category [Principal] at the outset. I have to say that we missed it in that respect.

John: It's clear that we underestimated the impact of this on individuals. I certainly learned a lesson that you don't make major changes in people's designators without detailed preparation. We didn't spend enough time talking with people before it [the IJS] hit the street. Indeed, I believe the IJS has some important positive features — in addition to the fact that we had agreed to do it. It was designed to have enough overlap in the various areas that you can do what Paul said, try to reduce the pressure that the only way a person can get recognized is to become a manager. Or if the person has been a manager and wants to become a technical contributor again, there is enough overlap that we hope it's easier in the future. Frankly, I would like to see people moving into management and out of management as their career desires and capabilities change. You'd like for that to be an easy step to do — and also for there to be multiple steps available for people to progress along their careers.

"I was not prepared for the reaction of individual employees. This was seen as an earth-shaking change to them as individuals. We certainly never intended it to be so."

When I came to Sandia, you started out as an MTS, and unless you became a manager you retired as an MTS. There was one level. It was very simple. But people seem to want visible progression, and I think that's actually very good. It's good for people to see some visible change with regard to their position within the Laboratories, without having to become a manager.

Paul: The one real improvement we made was to change the emphasis that people should not be limited by an artificial ceiling of the job we assigned to them. Growth of individuals is a very natural thing, and the system should encourage and reward that employee, rather than locking them within a job category. I fully expected that the translation of the old system into the new would be easy, and then we would start the clock to watch growth and movement of individuals. People thought, "Uh oh. Why should I be willing to trust that the principles have changed from the past?" There was then much more concern about where they're initially sited in the new system. I hope we'll prove it to them over time that we are focusing on growth and that each of the categories represents a floor, not a ceiling. [See "SQLC gives go-ahead on Integrated Job Structure" on page 9.]

John: The answer to your second question is yes. Don't our people deserve some stability? Absolutely! The answer is yes. Although I don't think we can promise total stability. The world is changing too fast. But clearly both Paul and I understand that we need to have as much stability over the next couple of years as is possible.

Paul: It is certainly true. Stability versus being in a rut is a competition. But we have to look harder at the risk of making changes versus the benefit. I agree.

Employee stresses, paring workloads

LN: The next question is related to the previous one. As a result of the VSIP process, we've decreased the employee levels by about a thousand, which has clearly made us by some accounts more productive or efficient. But the trouble is that in many areas the smaller numbers of people are struggling to achieve the same amount of work as was done before by the larger number. This is putting great stress on certain

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areas. There is a lot of emotional and physical and other work-related stress in just getting more work done with fewer people. Can something be done about that? Is there recognition of it? Is there anything you can say to Sandia employees about it?

John: I certainly recognize that that is one of the impacts of what we've had to do. I would also say that we are confident that people are thinking of new ways to do business such that it is possible to get it done with fewer staff. I hope that we have an atmosphere around here that would allow a person, if they have a thought about how a function might get done, or get eliminated, to do it in a different way. We are open to those suggestions and will make that happen.

Paul: Real reengineering does not have you accomplish the same work volume. You identify some things that aren't necessary, and shouldn't be done, and you stop doing them. We have a few cases where that has worked well. I hope that everyone has realized what an obvious gain the property management change is to everyone. We designed and were able to convince the Department of Energy to approve [a procedure] where instead of going out and surveying every property item every year, we went to a statistical basis and surveyed a very small number. I would have been very pleased had we gotten within a three percent error of the small sample we did survey. In fact, we located a hundred percent of the items. So it was its own proof that sampling is much more efficient. I know about the amount of time spent in previous years by technicians and staff members running around trying to find particular articles. That doesn't advance progress on earth by any amount. And so we've stopped doing that. There are lots of opportunities similar to that of things that don't need to be done. We should stop doing those things.

John: I thought one of the most clever things the computer folks did was when they went to a program to lease desktop computers rather than buying them. Now we lease them and just send them back. We don't have to do anything about getting rid of computers once they're out of date. And it was a very simple thing that actually saves us a little bit of money, keeps us more up-to-date on what's on the desktop, and allows us to be more uniform. It cuts out all this redistribution effort. It's simple things like that that people who are in a position to understand can make happen, and they can have huge impacts on the Laboratory collectively.

Paul: Our government accounting rules had required us to retain the book value of everything we purchased instead of devaluing the equipment over time and writing it off as private enterprises can do. By leasing we're getting the benefit to the Laboratory, or a fair share of that benefit, because the private firm buys the computer and then writes off the decrease in value over time. I'll never quite forget the GAO [General Accounting Office] study which cited that, on a visit to Sandia, they saw millions of dollars of computer equipment stacked outside a building where it could get rained on. Well, the street value of that equipment was $100 or so. And that's the problem of the original accounting system. I think leasing is a much better way to go. I'm not sure everyone understood why we were doing it at the time.

Reengineering without fanfare

LN: You mentioned the word "reengineering." It's a word we really haven't heard in a while. Where are we in our reengineering initiative and what can we expect?

Paul: My hope is that it has spread everywhere, instead of us having only a few people who are "reengineers" — that all employees will understand the principles and apply them in their own areas. I see some signs of our doing that. Example: the commitment to go to commercial software instead of the really complicated programs we've had in the past. They are much simpler. They do require us to change the way we do business. Those are some of the major outcomes of reengineering that are affecting everyone. But there is still a need for every person to look in their own areas of doing business to see how things could be simplified. At the director's conference, the Fall Leadership Forum, in the follow-up spring meeting, and with our managers conference, I have pressed the need to reengineer our basic processes — how we do research and engineering, how we do design, how we do product realization. Great gains can be made if we take advantage of the electronic information systems — to make ourselves communicate much better than running around the site in this hot weather. I think we're lagging behind in the real processes. There's a bigger revolution in engineering yet to come, and that's to change the processes so they affect everybody here who does engineering work, so that they can multiply their powers significantly by working with colleagues through the computer network systems.

John: I think reengineering is alive and well in the Laboratory. As I go around and visit various divisions and they tell me what they do, I see it's happening at the local level. If you go visit the procurement folks, they can tell you story after story about pieces of their business that they've reengineered. And the direction of the service organizations — of the finance and human resources and procurement organizations putting their representatives in the line and essentially putting those functions at the disposal of the line vice presidents — in my opinion that is a reengineering of the way we provide services to the line organizations. What you don't hear is all the noise about it. But frankly, it's going on, and it's going on at the right level. The recent downsizing has helped drive some of these changes. It becomes a necessity. But many folks have been out in front in making these changes.

"If you need a boost, just look around and you'll find really marvelous people and marvelous things going on."

Paul: Reengineering is a subset of the quality process. And one of the most important things internally that I think we've gained — and I want to make sure we pay attention to it — is the perception of internal customers. In the past it was rare for people internally to think of other Laboratory employees as their customers. Now I see that widely accepted, and a natural part of the vocabulary. And if you look at the important changes people have made because they've listened to their customers, that's probably the best reengineering. I think we're starting to reap some benefits and become a more cohesive organization as well.

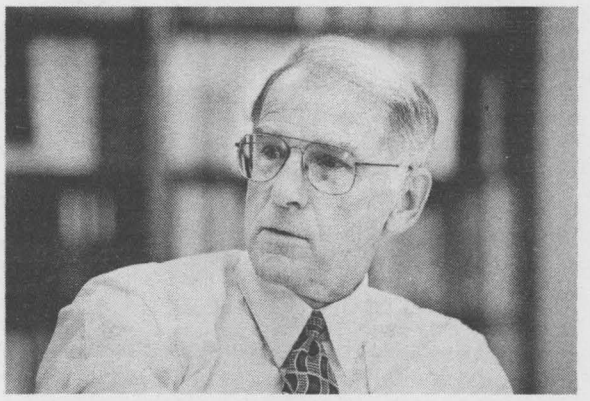
Goodwill, reputations, and frontiers

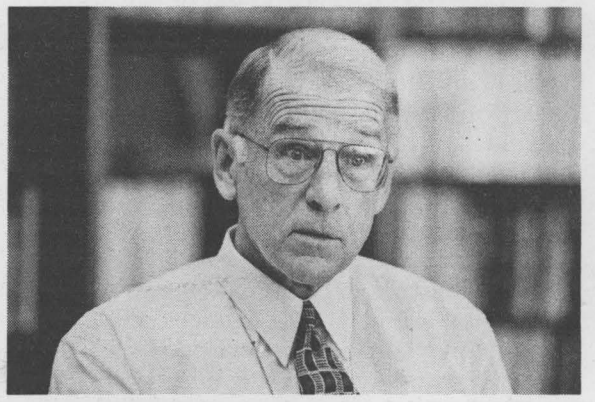
LN: Do you have any final messages, any final thoughts, that you'd like to share with Sandia employees? Any messages directly to them about their lives here, their role here, their mission, or anything else that affects them?

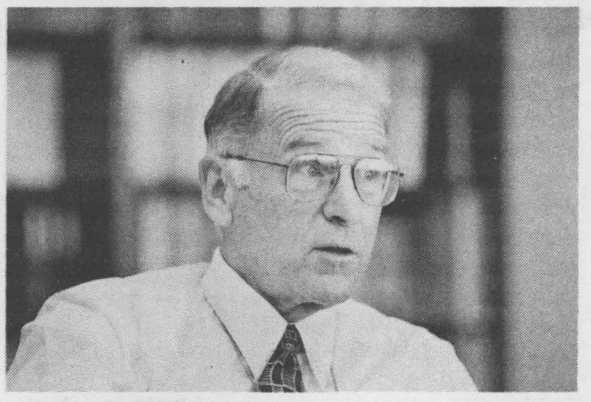
John: Sandia comes from a history of what I'd call "extreme stability." Stability of the institution and the funding was taken for granted and could reasonably be taken for granted for 40 years. And so the turbulent times we've been through for the last five years, which probably will continue for some time, have been a huge shift for the Laboratory. We all tend to focus on the problems, because that's our job — to fix the problems. That can overwhelm you if you're not careful. What I'd like to suggest to people is that there is a lot of really good stuff going on around this Laboratory. If you need a boost, just look around and you'll find really marvelous people and marvelous things going on. One of the things I like to do is take a day every month or so and spend it with one of the line divisions. It's a huge boost, because you sort of sweep away all the noise and look at what people are actually doing and what they're accomplishing. So when I look at the Lab in that way I have a great deal of confidence in its future, even though I know it's going to be turbulent.

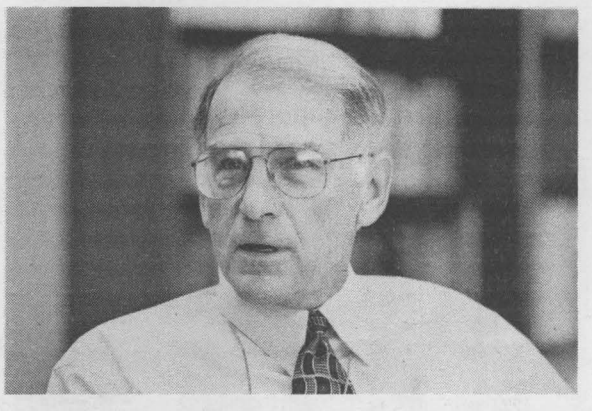
Paul: One of the most important qualities in the success of an organization is whether you have the goodwill of all the employees, whether they really believe in and support the institution. And all the changes and the downsizing certainly assault that goodwill. I still believe Sandia is a premier institution. I have worked at a lot of places to have a fair basis of comparison.

We continue to excel as a Laboratory relative to other laboratories. We continue to enjoy an outstanding reputation among people in government. Now we have expanded that reputation to industry as well. We're not just tooting our own horn. We'd like everybody to be able to feel good and share credit for the reputation that we're building. In the Strategic Plan, we found that there is a lot of important work that probably will get done only if Sandia steps up to do it — in new energy supplies, in counterterrorism, and in information security. In research, there still is an endless frontier. And the future is limited only by ideas, and there are lots of ideas bubbling here. So I would hope that people would step back and take an assessment of the possibilities that are still here at Sandia for the future and that would be sufficient incentive to pour themselves in totally and not hold back. We are each very lucky to have such interesting and important work to do.









Mars Pathfinder

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than a half a mile from the impact point.

The bags were designed to tolerate rocks shorter than 20 inches, and NASA had selected an impact area with a high probability that would be the case. "There was an element of good fortune that we didn't hit any larger ones," says Ken Cole (9115), a Sandia researcher involved in the project.

The "good fortune" was aided by a series of designs and tests carried out in 1993 by Sandia and JPL engineers.

"Sandia's nuclear weapon parachute technology served as the basis for proposing airbag configurations," says Carl. "The airbags had to be light enough to fit aboard Pathfinder, yet strong enough to withstand high vertical velocities, impacts, and horizontal wind velocities expected at the Martian surface."

Scale model prototype tested here

A 3/8th scale prototype (designed to create impacts equivalent to Pathfinder's in Mars' gravity, which is 3/8 Earth's) was designed and built in Sandia's Parachute Laboratory by Larry Whinery, Dan Luna, Richard Brazfield, and Richard Zuni, under the direction of project leader Don Waye (all 9116). The airbag design was guided by Ken Cole's computational model of the pressures and movements of air from bag to bag during impact and bounce.

The strength-to-weight ratio of the Kevlar airbags was maximized using detailed structural computations by Ken Gwinn. (Ken now works for Precision Fabrics Group, Sandia's past CRADA partner with whom Sandia developed light-weight automotive airbags expected to become standard equipment in Fords and Saturns by model year 2000.)

Using Sandia's parachute expertise and computer simulations, the Sandia-JPL team was able to move from concept to prototype in only a few months, culminating in a test of a scale-model lander protected by airbags descending at 45 miles per hour at Sandia's outdoor Sol Se Mete cable facility.

But testing conditions were not sufficient to represent the Martian environment.

"The challenge of simulating the Martian environment in earthbound tests is formidable," says Carl. "How does one design experiments that account for the low Martian atmospheric pressure (one percent of Earth's at sea level)?"

While proof-of-concept tests at Sol Se Mete showed the airbags effective in mitigating landing shock and tough enough to survive rocks in the impact zone, researchers recognized that Mars' lower atmospheric pressure would cause significant differences in the bags' behaviors.

"The bags appear much stiffer when tested in our atmosphere than they would on Mars," says Ken.

Bags on Mars need less gas to inflate because there is less atmospheric pressure to overcome. They would therefore be softer upon impact, causing gentler decelerations, than occurred in the Earth test impacts. (Pressure in a less-filled bag increases more slowly as its volume decreases during impact.)

Data on the effects of deceleration and

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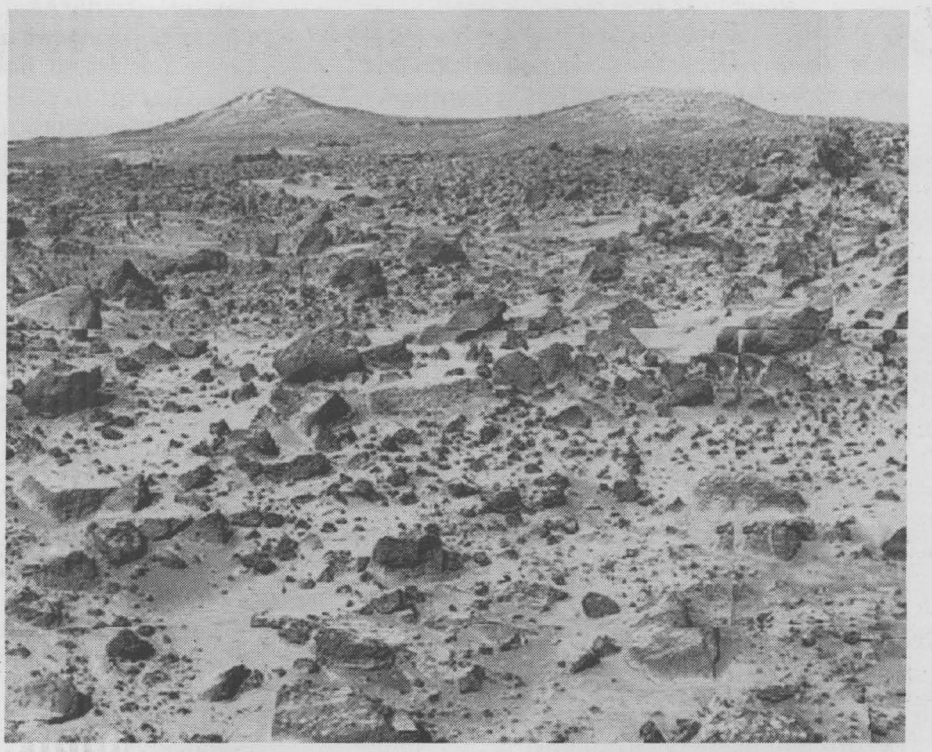


PHOTOGRAPH of the Martian surface, with the "Twin Peaks" in the background, taken by Pathfinder early in the Mars mission. The peaks are one to two kilometers away. (NASA)

NASA nose tip

(Continued from page 1)

engineer for the project.

Supersonic aircraft of the 1940s routinely featured wings with sharp, drag-minimizing leading edges. With the advent of hypersonic flight (Mach 5 and faster) in the 1950s, however, heat buildup on sharp edges often caused wing materials to melt.

Subsequent aircraft designs featured blunt leading edges, which moves the shock wave created during hypersonic flight forward and away from the vehicle and minimizes heat buildup. In similar fashion, manned space vehicles — from the Apollo capsules to the space shuttle — were designed to reenter the atmosphere flat side down, causing a protective layer of air to build up under the craft. As the craft descends, this air pillow absorbs much of the heat created by atmospheric friction.

Most unmanned space objects, including nuclear weapon RVs, also feature slightly blunted nose tips that help them survive the reentry inferno.

Still, blunt geometries increase drag and reduce flight performance. "Sharp body designs are more efficient in nearly every way," says Sandia SHARP project manager David Keese (2412). "Until now, we just haven't had materials rugged enough to cut through the atmosphere."

THREE RVs STREAK toward targets in the broad ocean near Kwajalein Missile Range during the May 21 Air Force operational test.

REENTRY TRIO — Three Mk12A reentry vehicles were used in the May 21 operational test. The experimental ultra-high temperature ceramic nose tip, with a sharper point, rode on the RV at left. The other two RVs had standard blunted carbon-carbon nose tips. The photo was taken at Vandenberg prior to launch.

New material, new capability

NASA's recently developed ultra-high temperature ceramic can withstand temperatures exceeding 5,000 degrees F. That raises the possibility that future reentry objects could feature sharp, heat-resistant leading edges — a capability that might allow next-generation spacecraft to glide into the atmosphere nose first from almost any orbit, change directions readily, and land at any location, more like an airplane.

Such sharp-body designs also offer minimized drag, thereby reducing the size and cost of propulsion systems necessary to put the object into orbit. And the sleeker edge geometries would minimize electromagnetic interference with radio transmissions, which causes "communication blackouts" as blunt-body vessels ply the atmosphere.

NASA first approached Sandia about a possible maiden voyage for its new nose tip design in December. Sandia received the funding in February and delivered the fully integrated RV payload in April — in less than three months.

Sandians machined the modified Mk12A nose cone to match NASA's new ceramic nose tip, integrated sensor and telemetry instrumentation into the RV, and conducted flight-qualification tests on the vehicle. In addition, Labs testing specialists coordinated launch and data-gathering activities with the Air Force. About 10 Sandians from Centers 2400, 2600, and 9100 helped ready the payload and participated in the launch and data analysis.

Data 'til splashdown

The NASA/Sandia experiment was incorporated into a routine Air Force "operational test," during which a US intercontinental ballistic missile (ICBM) is randomly selected from an active silo (in this case a silo at Malmstrom Air Force Base, Mont.); shipped to Vandenberg, Calif.; outfitted with dummy warheads; and launched toward targets in the Pacific. Such tests allow the Air Force to evaluate the ICBM's launch and RV deployment and the RVs' abilities to "score" their targets. The modified NASA RV was one of three Mk12As used in the May 21 test.

David says the experiment was successful. Sandia telemetry systems aboard the modified reentry vehicle provided a stream of "good data" to ground stations at Vandenberg, Kauai, and Kwajalein right up to the moment of splashdown near Kwajalein.

Most important, David says, NASA is pleased. Ames representatives are now discussing with Sandia the possibility of flight testing other ultra-high temperature ceramic configurations for a variety of leading edges on other spacecraft.

"This would be a great opportunity for Sandia to continue to help another federal agency address an important national problem," he says.

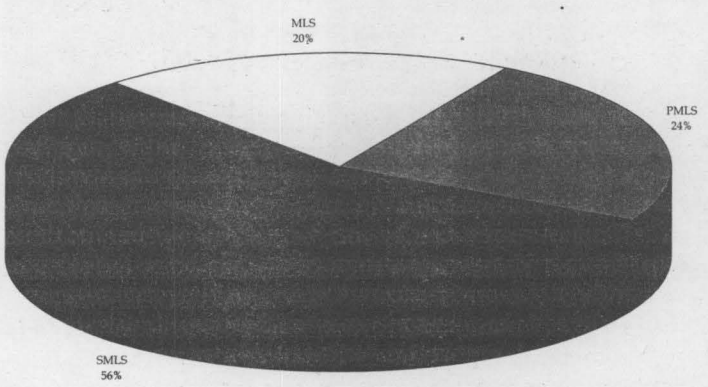
SQLC gives go-ahead on Integrated Job Structure

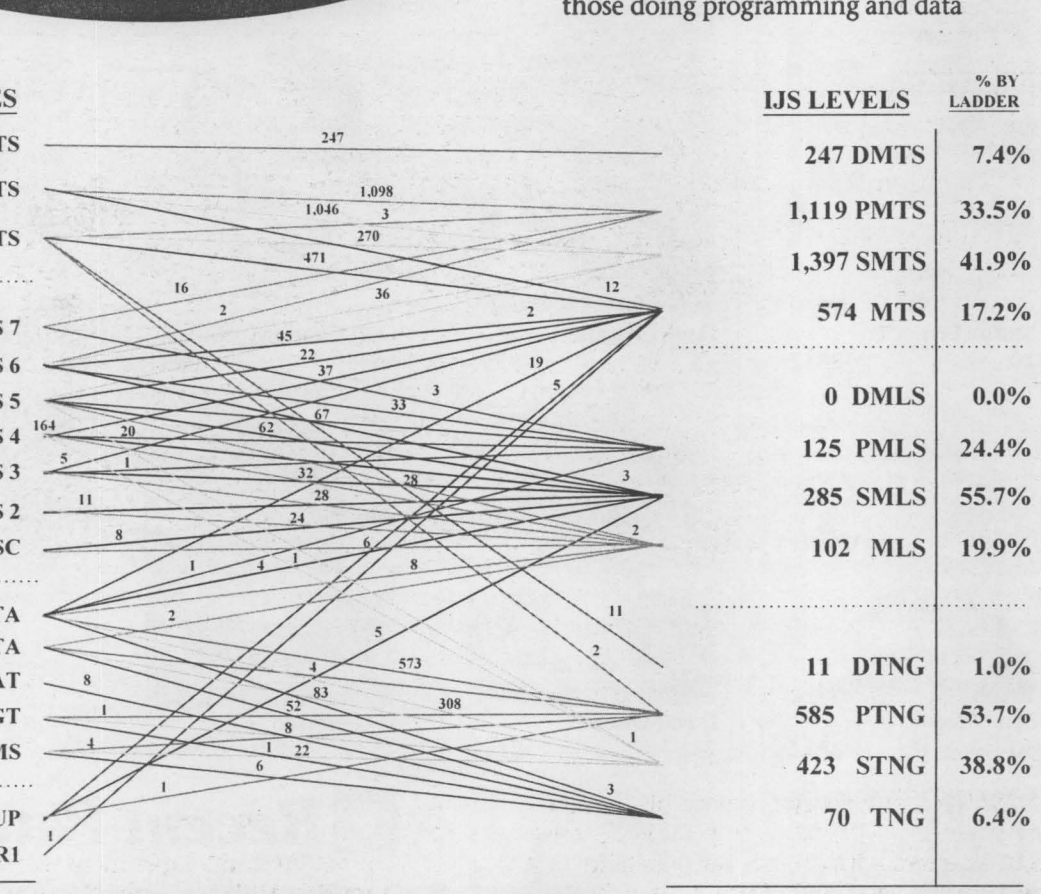
Members of the Sandia Quality Leadership Council last Monday pored over pages of data resulting from the placement of Labs employees into the new Integrated Job Structure and, after more than an hour of discussion, agreed they are satisfied with the new structure and are ready to move forward.

Ed Cassidy, Manager of Compensation and Job Evaluation Dept. 3545, says based on analyses of employees' levels of education, years of experience, previous job levels, benchmarking, and other indicators, the IJS placement data suggest that managers used the stated level criteria to place employees into the three IJS staff ladders appropriately. The data were analyzed by Statistics and Human Factors Dept. 12323.

The illustrations below and to the right show the movement of employees from old job levels into the new IJS levels and the percentages of employees at each level on the Technical Staff, Technologist, and Laboratory Staff ladders.

Laboratory Staff - Post IJS Distribution





INFORMALLY CALLED the "pick-up sticks" chart, this illustration shows the numbers of employees moving from the old job classifications (left) into Integrated Job Structure ladders and levels (right). The figures to the far right show what percentage of employees in a given IJS ladder (Technical Staff, Laboratory Staff, and Technician) are assigned to each level of that ladder. (Sandia managers have not yet been classified into the IJS.)

As part of the process, adjustments were made to managers' initial recommended placements as they were reviewed at the center and division levels.

"That shows that managers, directors, and vice presidents are making these decisions together," Ed says.

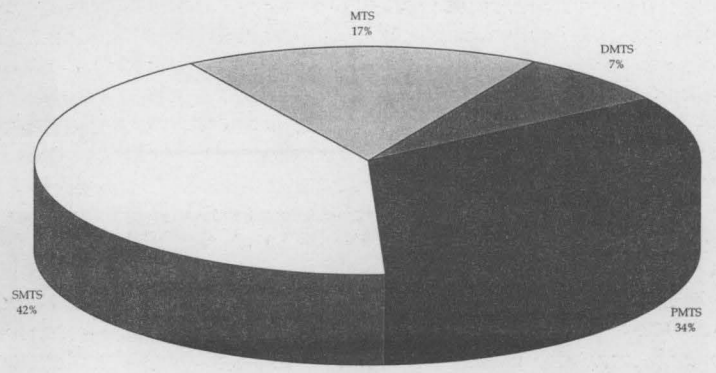
Also as expected, there were statistical variations in the level placements across organizational lines that reflect differences in missions and skills required to perform those missions.

"Based on the nature of work some organizations do, you would expect some to have more staff members meet the criteria at a higher level than other organizations, and vice versa," he says.

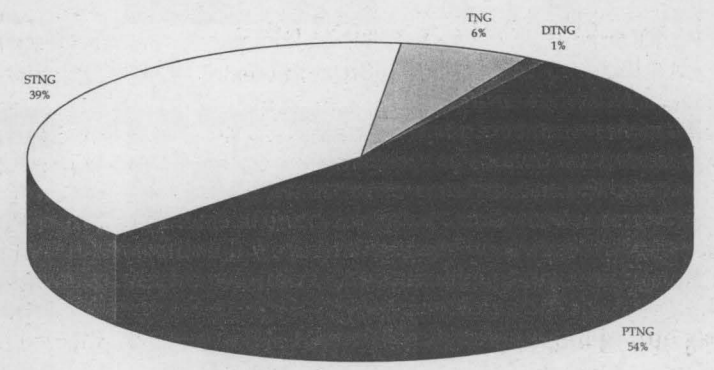
Other observations

- Years of experience was a statistically significant factor in placing employees into levels on the Technical and Laboratory Staff ladders. On all three ladders, level of education was significant.
- 40 percent of employees on the Technical Staff ladder will be placed at the top two levels (Distinguished Member of Technical Staff and Principal Member of Technical Staff), which is consistent with other R&D organizations.
- Approximately 25 percent of employees now categorized as Members of Laboratory Staff (MLS) will move to the Technical Staff ladder, primarily those doing programming and data analysis, computer systems analysis, and database development.
- Placement of protected-group employees conforms statistically to Equal Employment Opportunity guidelines set forth by the US Department of Labor.
- More than 450 Sandians are being placed in project management occupations, which SQLC members agreed reflects the changing nature of Sandia's work.

Technical Staff- Post IJS Distribution



Technologist - Post IJS Distribution



Communication also significant

Ed acknowledges that implementing the IJS was more difficult in some organizations than in others. Although the implementation helped identify some areas for improvement in the process itself, communication appears to be the key, he says.

"If there is a lesson from this," he says, "it's that placements went much better in organizations where managers and directors communicated with employees up front, told them what to expect, and then kept communicating the whole way through."

IJS project leader Kirsten Randolph (3545) adds that the team responsible for the IJS is using lessons learned from implementation to make the IJS better.

"This process was designed to change and grow over time," she says. "This was a starting point."

"This structure should last us well into the next century," adds Ed.

Technical, Technologist, and Laboratory Staff employees should receive formal notification of their IJS placements by the beginning of September. The new levels take effect on Oct. 1.

—John German

(Continued from preceding page)

impact in deforming airbags and varying their internal pressures were crucial to validate the team's earthbound calculations.

While the Martian atmosphere easily could be simulated in a vacuum chamber, Sandia's 27-foot diameter chamber was not big enough to allow a spaceship mockup to be accelerated to 45 mph before impact.

Instead, the researchers devised a 20-foot-tall, guillotine-like structure. The downward stroke of its large striking surface — a horizontal aluminum plate rather than a vertical blade — was powered by four 3/4-inch-thick bungee cords, each winched to a pull of 1,000 pounds.

Researchers used this pull to slam the triangular plate onto the airbag. This created an impact, in 12 feet, equivalent to that on airbags surrounding the spacecraft striking the Martian surface.

Building a ship in a bottle

The impact of the triangle, which extended roughly six feet from its center to any rounded vertex, was the equivalent of hitting a pillow with a very wide plank. "The plate was big enough that the bag couldn't flow around it like a pillow would around a fist," says Ken Cole, who conceptually designed the equipment. Ed Constantineau (2412) helped get it built and installed. Bob Croll (ret.) acquired and installed instrumentation.

Hauling long pieces of the structure through a five-foot-diameter door and putting them together inside was like "building a ship in a bottle," Ken says.

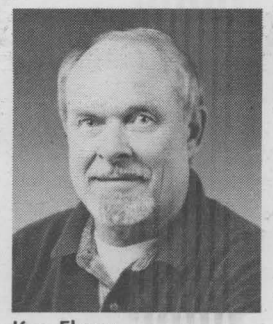
To cut down on bounce, engineers first considered vents that would expel gas from the bags on impact, thus reducing or eliminating a rebound. However, timing the action of the vents proved too complicated. Instead, engineers used a simpler technique involving internal ducts that transferred gas from the impacted bag into other airbags, thus reducing bounce but retaining the gas to pillow the vehicle on succeeding impacts.

Other Sandians who contributed to the effort were Ed Clark (ret.), Don MacKenzie (ret.), John Henfling (9112), and contractor Buddy Lafferty.

The work was part of a joint effort between Sandia and JPL to improve the feasibility of airbags for planetary probes.

Mileposts

July 1997



Ken Flynn
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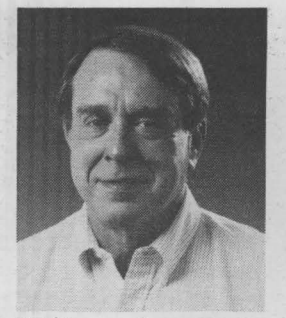

Paul Longmire
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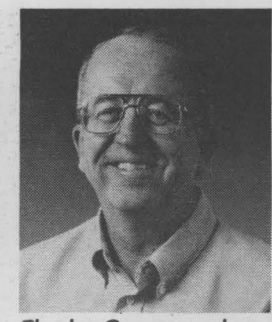

Charles Greenwood
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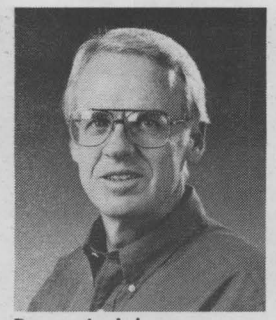

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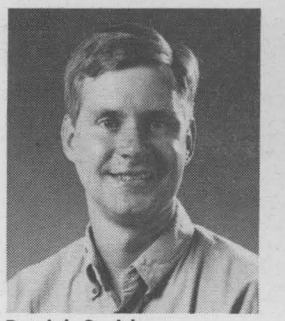

Patrick Smith
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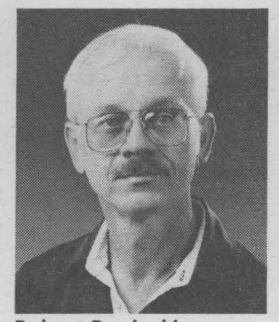

Robert Roginski
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Fred Hartman
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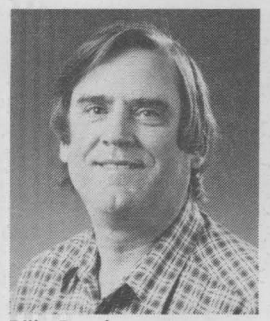

Billy Brock
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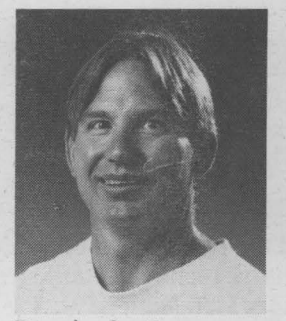

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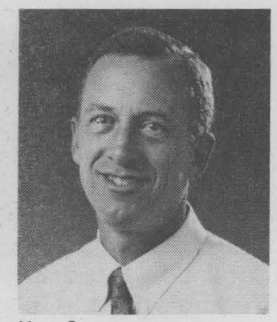

Ken Sorenson
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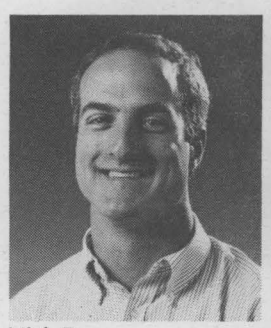

Nick Dereu
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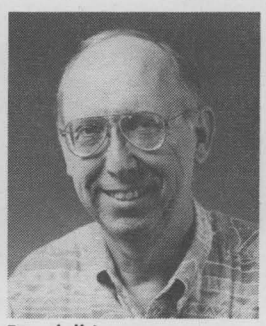

Rondall Jones
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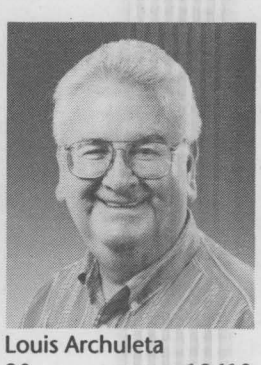

Louis Archuleta
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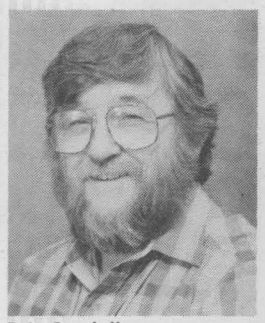

B.J. Cardell
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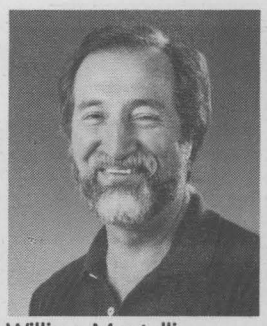

William Mantelli
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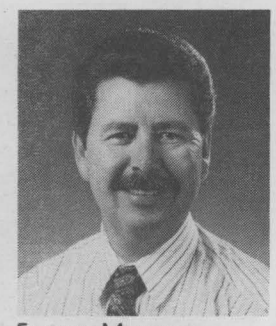

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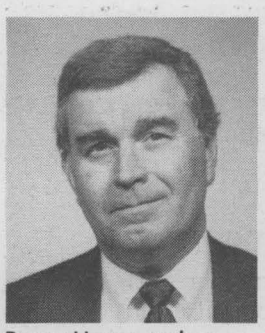

Roger Hagengruber
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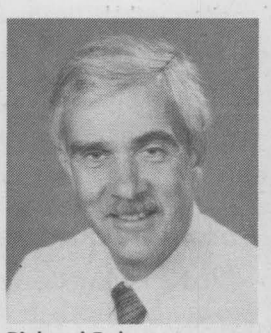

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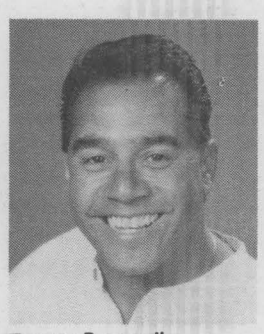

Danny Bernacil
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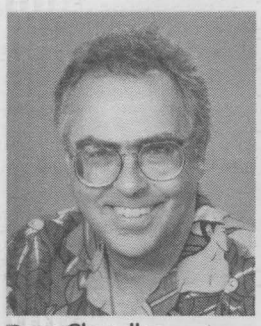

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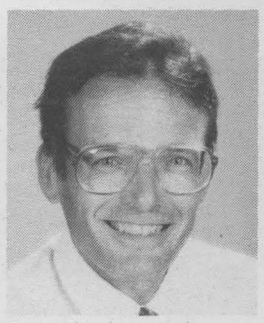

Don Charlesworth
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Suzanne Follett
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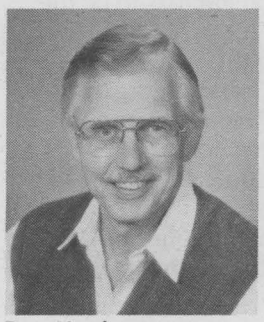

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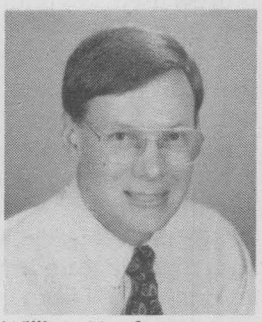

William Houf
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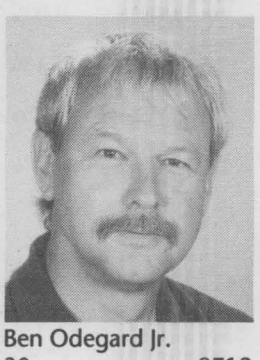

Ben Odegard Jr.
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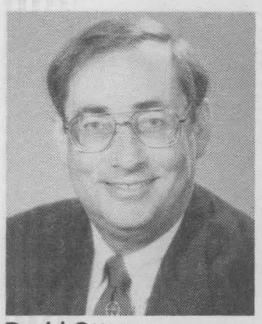

David Ottesen
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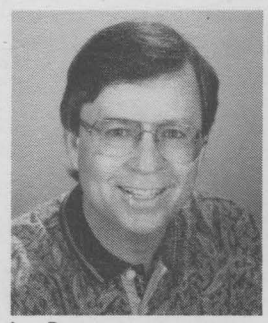

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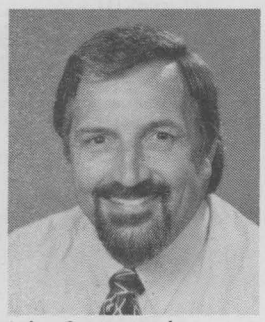

John Smugeresky
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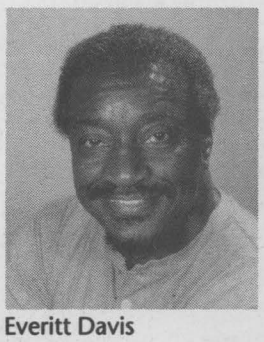

Everitt Davis
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Emily Joiner
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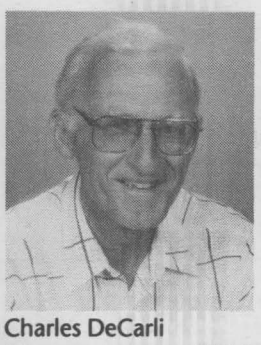

Charles DeCarli
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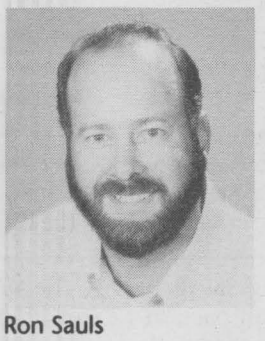

Ron Sauls
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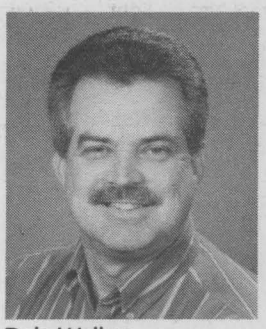

Dale Walker
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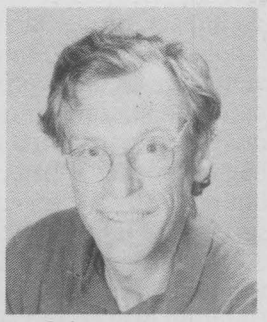

Jay Spingarn
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Sheila Akins
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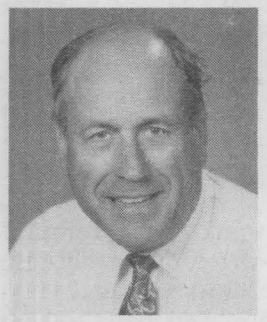


Roger Everett
35 2263

Recent Patents

Paul Gourley (1112): Laser Apparatus and Method for Microscopic and Spectroscopic Analysis and Processing of Biological Cells.

David Skogmo (5838): Quality Monitored Distributed Voting System.

Rodney Williamson (1846) and Frank Zanner (1803): Controlling Electrode Gap During Vacuum Arc Remelting at Lw Melting Current.

Ray Finley and David Zeuch (both 6117): Method and Apparatus for In-Densification of Geomaterials for Sealing Applications.

Steven Kurtz (1312), Kevin Baucom (1126), Robert Biefeld, and Ralph Dawson (both 1113): Infrared Emitting Device and Method.

Randy Shul (1314): Dry Etching Method for Compound Semiconductors.

Gilbert Benavides (1484): Rotary Pin-In-Maze Discriminator.

Ronald Hadley (1313) and Gregory Allen Vawter (1314): Integrated Optical XY Coupler.

Sandia Classified Ads

MISCELLANEOUS

BUTCHER BLOCK, solid oak, 24" x 24" x 36", $75 OBO; 5-piece bedroom dresser set, $450 OBO. Harms, 839-4852.

COUCH, CHAIR, & OTTOMAN: excellent condition, less than 1 year old, must sell, $1,300 new, asking $450 OBO. Sartor 858-2554.

FREE REDWOOD, from disassembled swingset/play fort, pick up by 7/19. Lober, 792-0716.

QUEEN-SIZE WATERBED, 6-drawer pedestal, bookcase/mirror headboard, padded side rails, good condition, $100. Veltkamp, 271-0325.

HEXANGONAL TABLE, 48-in., 4 chairs, solid-maple base & chairs, $125; rollerblades, size 25.5, used once, asking $150. Sturtevant, 275-0170.

GIRL'S BEDROOM FURNITURE, white-dresser w/mirror, 2 end tables, & desk w/chair $100. Nichols, 899-8532.

COOKBOOK, Favorite Recipes from our Families, proceeds will go toward expenses for 2 families adopting from China, $10 & $10.50. Twyeffort, 293-2183.

ROPER ELECTRIC RANGE, good condition, $60 OBO; rear bumper from '96 Ford F-350, good condition, $150. Shelly, 899-4241.

BUNK BEDS, crew's quarters style, including mattresses, $150. Jansma, 294-3524.

COUCH AND RECLINER, attractive light-blue and beige woven pattern, excellent shape, $250 for both. Johns, 858-1403.

ORIGINAL IBM-AT COMPUTER, complete with w/keyboard, color monitor, hard drive, & Epson FX-185 printer, $30. Guilford, 255-6294.

SEALY POSTUREPEDIC BED, queen-size, $275; pair of Volvo wheels, $25; shop vacuum, fits 30-gal., $15. Anderson 281-1560.

WEIDER EXERCISE MACHINE, 4-station w/dual weight stacks, $300; Health Rider, $200; 19-in. color TVs, $50 OBO. Guyer, 299-7651.

GOLF CLUBS, Wilson 1200 irons, 2-PW, new grips, good condition, $125. McCarthy, 296-4490.

PACKARD BELL 386 SX, w/color monitor & printer, $250; mid-size standard-bed camper shell, $100; '69 Montgomery Ward pop-up camper, $200. Conway, 271-0770.

QUEEN-SIZE WATERBED FRAME, w/headboard & top-quality queen-size air mattress, $75. Hibbs,332-4054.

MARCY EXERCISE MACHINE, $300; two Motobecane 10-spd. bikes w/accessories, $100 ea. Brosseau, 286-1969.

NORDICTRACK SEQUOIA MODEL, like new, excellent condition, w/electronic monitor/timer, $300 OBO. Blankenship, 281-2257.

COMPUTER MEMORY, 4 MB, 30-pin, 70 NS, 4 x 9 SIMMS, $20 each. Pelzman, 292-6538.

FORMAL DINING TABLE, w/6 chairs & leaf; elect. dryer, excellent condition; dishwasher, excellent condition; triple dresser; garage freezer. Atencio, 899-8373.

SEARS ARM SAW, 8-in., w/stand, extra blade, shaper set, & surface planer, $150 cash. Kerr, 299-7527.

DUAL RECLINING SOFA, 2 yrs. old, good condition, multicolored, $500; Fit One exercise ski machine, $175. Ferrell, 883-8595.

REFRIGERATED AIR CONDITIONER, Kenmore, window model, $50; refrigerator, 1 cu. ft., Sears, $25. Bright, 884-7864.

DRESSER, $50; entertainment center, $35. Alexander, 865-4238.

TWO STORM/SCREEN DOORS, 36-in., white, $35 ea. Barr, 822-0671.

AEROBIC RIDER 2, by Health Rider, $150. Savage, 890-4796.

WATERBED MATTRESS, king-size, semi-waveless, w/heater, great condition, $25. Lujan, 822-0205.

LITTLE TYKES TOYS, train & race car set, farm, Noah's Ark, baby swing, potty chair, other toys. Luna, 881-6808.

BABY FURNITURE, cherry wood, crib, changing table, dresser, excellent condition, make offer. Wood, 271-9967.

PORTABLE BABY CRIB & high chair, $20 ea. Nowlen, 296-8680.

GASOLINE GENERATOR, 5,000-watt output, good condition; '91 Nomad tongue trailer, 26-ft., excellent condition, w/extras. Chavez, 867-2213.

MICROWAVE, 115-volt, $30; Kenmore window air conditioner, $75; king-size bed, mattress, box spring, headboard, frame, $100. Ewen, 836-3563.

ROWING MACHINE, Precor Model 612, ETA resistance system, $75. Gianoulakis, 828-3911.

BRITTANY SPANIEL PUPPIES, AKC-registered, whelped 6/1, great hunting & family dogs, $150. Kuehne, 281-5446.

REFRIGERATOR/FREEZER, frost-free, side-by-side, Gibson, green, 25 cu. ft., works fine, no ice maker. Philbin, 828-2414.

'59 WALK-BEHIND GRAVELY MOWER, sulky included, manuals, Gravely high-torque engine, 30-in. bush hog, runs, $200 OBO. Krivitzky, 897-9104.

ENTERTAINMENT CENTER, $190; computer hutch, $135; office desk, $85; bookshelves, $65; "For Sale by Owner" signs, $35/both. Orman, 344-5446.

KING-SIZE BEDROOM SET, cannonball poster bed, dresser w/mirror, armoire, dark pine w/brass detailing, $1,500. Larkin, 237-2559.

GOLDEN RETRIEVER/CROSS PUPPIES, free to good homes, good w/children, born May 28. Montoya, 284-3910.

MOVING/GARAGE SALE, furniture, appliances, clothing, Saturday, July 26, 8 a.m.-3 p.m., 3006 Colorado St. NE. Painton, 889-0314.

CAMPER SHELL, fits full-size pickup, white, $100. Chipman, 299-8060.

PORTABLE GENERATOR, '96 Honda EX, 1,000-watt, excellent condition, $650. McMurtrey, 881-0390, after 5 p.m.

TICKETS, 5th Annual Fish Fest, in Eagle Nest, N.M., $15 per person for all 9 days, benefits Eagle Nest Youth Group. Martin, 296-8154.

SPINET PIANO, Grand Consolla, w/bench, oak construction, very nice, $1,200. Kovacic, 256-9867.

THREE-INCH CHLORINE TABS, 22 lbs., $25; small submersible pump, $50; solid wood desk, double pedestal, 22" x 48", $200. Denney, 299-8595.

GOOSEBUMPS BOOKS, 40+, $40; boy's 24-in. Huffy bike, $60; boy's size 8 rollerblades, $50. Kallio, 856-1350.

FULL BAND PA SETUP, antique hutch, maple dry bar, couch/loveseat, exercise bikes, doghouse, ping-pong table. Rhoden, 293-5301.

WEIDER WEIGHT BENCH, w/weights, $100. Walther, 294-6599.

SERVICE MANUAL, for '92 Geo Metro, $15; 16" x 16" aluminum gable attic vent w/flaps, $7. Leeman, 281-7949.

SLEEPER SOFA, $40; entertainment center, $20; Somma mattress, king, $75 or trade for regular mattress. Alexander, 865-4238.

TRUMPET, $200; cornet, $200; queen futon, sturdy wood, mattresses, used little, $200; 2-drawer lateral file, $60. Crow, 821-0956.

SOLAR PANEL, 45-watt, $230; bumper hitch, $12; adult life jacket, $12; deep-cycle 12-volt battery, $13. Horton, 883-7504.

WHEELS & P255/60R14 TIRES, for '79-'93 Mustang LX, four for $60. Beegle, 298-0330.

GUITAR AMPLIFIER, Crate, 60-watt, w/reverb, 12-in. speaker, $100. Lenberg, 266-8988.

SKEET SHOTGUN, Browning Citori 12-gauge, w/case, MEC 600 jr. loader, vest, misc. components, $850. Opichka, 275-3841.

KITCHEN TABLE, w/4 chairs, $100; oak & glass coffee & end tables, $85; white electric stove, $85. Norwood, 266-2717.

STAIR STEPPER, $100; wedding dress, size 7, white, long sleeves, $50. Hardison, 271-2838.

DEADLINE: Friday noon before week of publication unless changed by holiday. MAIL to Dept. 12640, MS 0165, FAX to 844-0645, or bring to Bldg. 811 lobby. You may also send ads by e-mail to Nancy Campanozzi (nrcampa@sandia.gov). Call Nancy at 844-7522 with questions. Because of space constraints, ads will be printed on a first-come basis.

Ad Rules

1. Limit 18 words, including last name and home phone (We will edit longer ads).
2. Include organization and full name with the ad submission.
3. No phone-ins.
4. Use 8½- by 11-inch paper.
5. Type or print ad; use accepted abbreviations.
6. One ad per issue.
7. We will not run the same ad more than twice.
8. No "for rent" ads except for employees on temporary assignment.
9. No commercial ads.
10. For active and retired Sandians and DOE employees.
11. Housing listed for sale is available without regard to race, creed, color, or national origin.
12. "Work Wanted" ads limited to student-aged children of employees.

486 COMPUTER, w/CD drive, sound card, software, w/o monitor, $300. Hardy, 897-9032.

TRASH COMPACTOR, Whirlpool, excellent condition, looks new, easily disposable bags, free-standing, cost $450, sell for $175. Marr, 345-4006.

GARAGE SALE, July 18 & 19, 7-11 a.m., 4541 Lobelia NW (SW Paseo del Norte & Golf Course Rd.), household items, stereo equipment. Rosario, 897-2596.

WARDS REFRIGERATOR, w/ice maker, $200; Sylvania 25-in. console Super Set, $125; lawn mower, $50; dresser, $75. Roherty-Osmun, 293-8127.

EDGING BLOCKS (80), 8-in., right-angle, 40¢ ea.; 4" x 8" x 16" solid cap blocks, 45¢ ea.; wheelbarrow, $15; exercycle, $95. Sparks, 266-5060.

ASHLEY WOOD STOVE, $300. Knecht, 865-0366.

GARAGE SALE, household goods, toys, books, games, Saturday, July 19, 8 a.m.-4 p.m., 7605 Winter Ave. NE. Schreiner, 266-6020.

CANON CAMCORDER, 8mm, like new, all accessories, $350; case, $50. Everett, 268-7818.

TRANSPORTATION

'96 SATURN SL1, AT, AC, ABS, dual air bags, cruise, cassette, 15.7K miles, perfect, below book. Carpinelli, 275-7842.

'62 KARMAN GHIA VW, red, new front end, rear end & tires, 2-yr. old engine, runs great, looks great. Sumruld, 877-0879.

'89 TOYOTA COROLLA, 5-spd., 4-dr, new tires, AC, CD player, $3,650. Chavez, 865-6293.

'92 FORD AEROSTAR XL, AT, AC, cruise, 61K miles, excellent condition, $6,500. Vrabel, 281-7618.

'85 HONDA CRX HF, 5-spd., AC, 45+mpg, AM/FM cassette, 143K, excellent condition, $2,500. Kidner, 831-2868.

'84 VOLVO DL WAGON, AC, rebuilt AT, 180K miles, nice, $3,000 OBO. Coffey, 867-0882, ask for Mike.

'87 DODGE RAM VAN, V8, fully loaded, extras, bench & captain's chairs, excellent condition, 150K miles, $5,000. Colgan, 344-3776.

'93 TOYOTA TERCEL, one owner, 61K miles, AC, 4-spd., $4,500. Hatcher, 839-4726, ask for Kathi

'69 BUICK LESABRE, classic, 4-dr., AT, AC, PB, PS, extras, excellent condition, 125K miles. Wheelis, 298-2330.

'86 FORD F150 XLT, 302 fuel-injected engine, AT w/OD, AC, PS, PB, $4,200. Cox, 865-0123.

'94 JEEP WRANGLER, 34K miles, fuel injection, PS, PB, AC, AM/FM cassette, gold & tan, $14,000 OBO. Wemple, 281-7661.

'85 FORD TAURUS, mechanic's special, $500. Wallace, 293-2210.

'93 TAURUS LX, 3.8, 47K miles, loaded, excellent throughout, teal/green, new rubber & brakes, $8,900 OBO. Underhill, 294-5774, after 6 p.m.

'89 CADILLAC SEDAN DEVILLE, white/blue interior, AC, tint, $7,500 OBO. Cordova, 345-3591 or page 245-2673, ask for Ali.

'86 TOYOTA CELICA GT, red, AT, CD, new tires, all service records, $2,900 OBO. Gutierrez, 867-2298.

'81 SUBARU WAGON GL, Sport Tan,137K miles, run well, body needs work. Meisenheimer, 275-8193.

'89 TOYOTA SUPRA TURBO TARGA, red, 5-spd., excellent condition, $4,700 OBO. Czechowski, 271-0792.

'96 SATURN; '95 Jeep W/Y; '93 Escort; bids accepted through 7/23/97, right to refuse bids, as is. SLFCU, 237-7386, ask for Sandra.

'69 FIAT 1100 SEDAN, original, not running, easy restore, $650 complete; need Delta ticket for Navy seaman. Roberts, 866-5422.

'79 TRIUMPH SPRITE, convertible, new red paint, new top, reworked engine, new seat covers, $4,000 OBO. Sarason, 266-6880.

'95 NISSAN ALTIMA, 4-cyl., manual transmission, 39,597 miles, power windows, stereo/tape player, may been seen at SLFCU, bids taken through 7/23/97. SLFCU, 237-7382, ask for Lisa.

'68 CHEV. 10 PICKUP, 6-cyl., new ball joints, tie-rod ends, brakes, shocks, seat, windshield, & tires, $2,000. Cisneros, 260-1319.

'73 FORD MUSTANG, 2-dr., 351C, AT, PS, PB, AC, needs engine rebuild. Pineau, 268-3693.

'74 DODGE TRUCK, rebuilt 318 c.i. engine, AT, 4x4, body in good condition, $1,500. Sanchez, 873-2058.

'73 BMW BAVARIA, 100K miles, 3.0-6, 4-spd., AC, twin carbs, engine runs, needs work, $1,000. Schreiber, 281-3196.

'95 FORD F150 SUPERCAB XLT, 4x4, 6-3/4-ft. bed, brilliant blue/royal, excellent condition, 48K miles. Leonard, 281-4611.

'73 SAAB SONETT, fiberglass 2-seater, 112K miles, good operating condition, spare parts included, $2,400. Heintzleman, 294-1284, ask for Rick.

'83 OLDS. CUTLASS CIERA, new radiator, alternator, ignition, battery, water pump, hoses, belts, etc., needs overhaul engine, sell for parts, $500 OBO. Rockwell, 884-4206.

'77 FORD F150, LWB w/camper shell, 400ci, AT, 94K miles, $2,595; '76 Shasta fully contained camper, sleeps 6, $3,995. Donald, 332-1446.

'89 SUBARU JUSTY GL, 4x4, low miles, new tires, great gas mileage, excellent running car, $2,500. Kazmierczak, 275-9742.

'85 HONDA ACCORD LX, 3-dr., 5-spd., 30-35mpg, AC, cruise, AM/FM cassette, all records, mint, $2,175 OBO. Ho, 237-2668.

'93 MAZDA MPV, 85K miles, 4WD, AT, AC, cruise, towing package, new tires, $10,000. Haill, 281-2155.

RECREATIONAL

GIRL'S BICYCLE, 24-in. Murray, good condition, $45. Starr, 821-6480.

BICYCLE, 3-spd.; stationary bike; both excellent shape. Burch, 857-0654.

HONDA XLS 185 DIRT BIKE, street-legal, low mileage, original owner, no abuse; 8,000-lb. vehicle winch. Fisher, 881-8072 or 881-8611.

'92 KAWASAKI CONCOURS sport-touring motorcycle, 17K miles, black, excellent condition, Corbin seat, Rifle windshield, $3500. Schwartz, 271-1450.

SKI BOAT, 17-ft., open bow, 120-hp outboard, tilt trailer, $2,000 OBO. Steigerwald, 344-2765.

SAILBOAT, 11-ft. Topper, J.V. Dunhill Boats Ltd., good condition, use for racing or leisure, $450. Fitzgerald, 884-4607.

'70 WHEEL CAMPER, Lodge Wagon-6, fold-down trailer, w/stove, sink, furnace, 2 new tires, excellent condition, $1,200. Emerson, 881-3896.

MAN'S 12-SPD. CENTURION BICYCLE, $55; woman's Schwinn 10-spd., hardly used, cost $200, sell for $80. Barnette, 861-2451.

'94 KIT 5TH WHEEL CAMPER, 18-ft., like new, w/hitch, see south of Coronado Club, $8,500. Spires, 275-3655.

KIDS' SPECIALIZED HARDROCK MOUNTAIN BIKE, $75; rollerblades, size 7, $25; beanbag chair, $10. Andrews, 858-0569.

'79 SUZUKI MOTORCYCLE, good running condition, good transmission & tires, $500 OBO. Lorenzo, 857-9677.

REAL ESTATE

2-BDR. MOBILE HOME, '93, three minutes to KAFB, front LV w/large bay window, ready to move in, must sell, $22,500 OBO. Sisneros, 296-7823.

2-BDR. HOME, 1 bath, 1-car garage, 1,000 sq. ft., new roof, windows, paint, & carpet, large yard, great rental property, one block from UNM law school. Ellis 266-3618.

4-BDR. HOME, near KAFB, 1-3/4 baths, 2-car garage, sunroom, $116,000, less buyer incentives. Tidwell, 275-0966.

2-BDR. MOBILE HOME, '95 Liberty, 16' x 76', 2 full baths, all appliances, new AC unit, low down/qualified buyers. Pierson, 293-9133.

3-BDR. NE HOME, 2,100 sq. ft., 2-3/4+1/2 baths, great area & schools, shady/cool yard, $165K. Kazmicrczak, 275-9742.

2-BDR. MOBILE HOME, 2 baths, 16' x 70', FP, jacuzzi tub, central air, more, across from Eubank gate, $22,000. Chavez, 294-5240.

3-BDR. 2-STORY TOWNHOUSE, in great NE area, 2-1/2 baths, 2-car garage, mature landscape, custom features, $52,000. Jackson, 881-8011.

4-BDR. 2-STORY HOME, large lot, views, great storage, well-maintained, nice neighborhood, 2,500 sq. ft., on loop street. Hall, 299-0009.

WANTED

GO-CART/MINI BIKE, older models, don't need to be in running condition. Stromberg 299-8591.

USED SONY VIDEO CAMCORDER, working or not. Smith, 281-9360.

HOUSEMATE, share townhome in Spain/Moon area, nonsmoker, $350/month including utilities, available Sept. 1. Spear, 822-8982.

CLARISWORKS 3.0 MANUALS, needed for a school. Reno, 296-6290.

COMPACT FREEZER, about 5 cu. ft.; air popper for popcorn. Lauben, 275-7466.

RESPONSIBLE FEMALE college student w/reliable transportation to pick up 12-yr.-old daughter from school and do light house work, approx. 3 hours/day. Fraley, 858-1822.

USABLE ITEMS, furniture, linens, kitchen items, clothes, for non-profit church project to help families in need, will pick up. Parson, 291-8394.

CARPOOL COMPANION from Taylor Ranch area, 9/80 schedule. Daniels, 898-4181.

HOUSESITTER/DOG SITTER, in Cedar Crest, occasional fall weekends and for longer periods next spring and summer. Eagan, 281-9589.

Sandia announces program to help kids learn to read

Labs joins APS, United Way to create the Sandia Literacy Project

Research has shown that children who are not proficient in reading by the end of the third grade have a much greater risk of not completing school. Albuquerque has an 11.2 percent overall drop-out rate, which increases to 25 percent for Black, Hispanic, and Native American student groups. To address this issue, Sandia, Albuquerque Public Schools, and United Way of Central New Mexico have formed a partnership called the Sandia Literacy Project.

Sandia, through Lockheed Martin Corporation, has committed $150,000 and volunteers for three years to help classroom teachers at Wherry Elementary School on Kirtland Air Force Base implement a successful model literacy program. The goal, announced at a news conference sponsored by United Way at Wherry Elementary School on June 30, is to get all children at Wherry reading at grade level by the end of the third grade.

A third of the funding will be used to train teachers, a third to coordinate and train the volunteers, and a third for materials. Ten teachers have already been sent for training this summer. Training of teachers and volunteers will be completed by mid January, and classroom work will begin then. Standardized reading proficiency tests will be used to measure the success of the initiative.

"Sandia depends on highly skilled people," says Don Carson, Director of Public Relations and Communications Center 12600. "Investing in students is money and time well spent because if we don't educate students today, we can't hire them tomorrow."

The project developers hope the program will be independent at the end of the three years and have issued a challenge to other businesses to follow Sandia's lead and get involved with the schools near them.

Sandians interested in volunteering for the Sandia Literacy Project can contact Mariann Johnston, Community Involvement and Issues Management Dept. 12650, at 284-5205 or mjohns@sandia.gov for more information.

— Janet Carpenter

Coronado Club

July 17, 24, 31 — Thursday bingo night. Card sales and buffet start at 5 p.m., early birds' bingo at 6:45 p.m.

July 18 — "Western Night" dinner/dance. $6.95 buffet ($7.95 for guests), 6-9 p.m. Music by Isleta Poor Boys, 7-11 p.m.

July 25 — Kids bingo. Buffet, 5-8 p.m., cartoons, 5-7 p.m., bingo at 7 p.m.

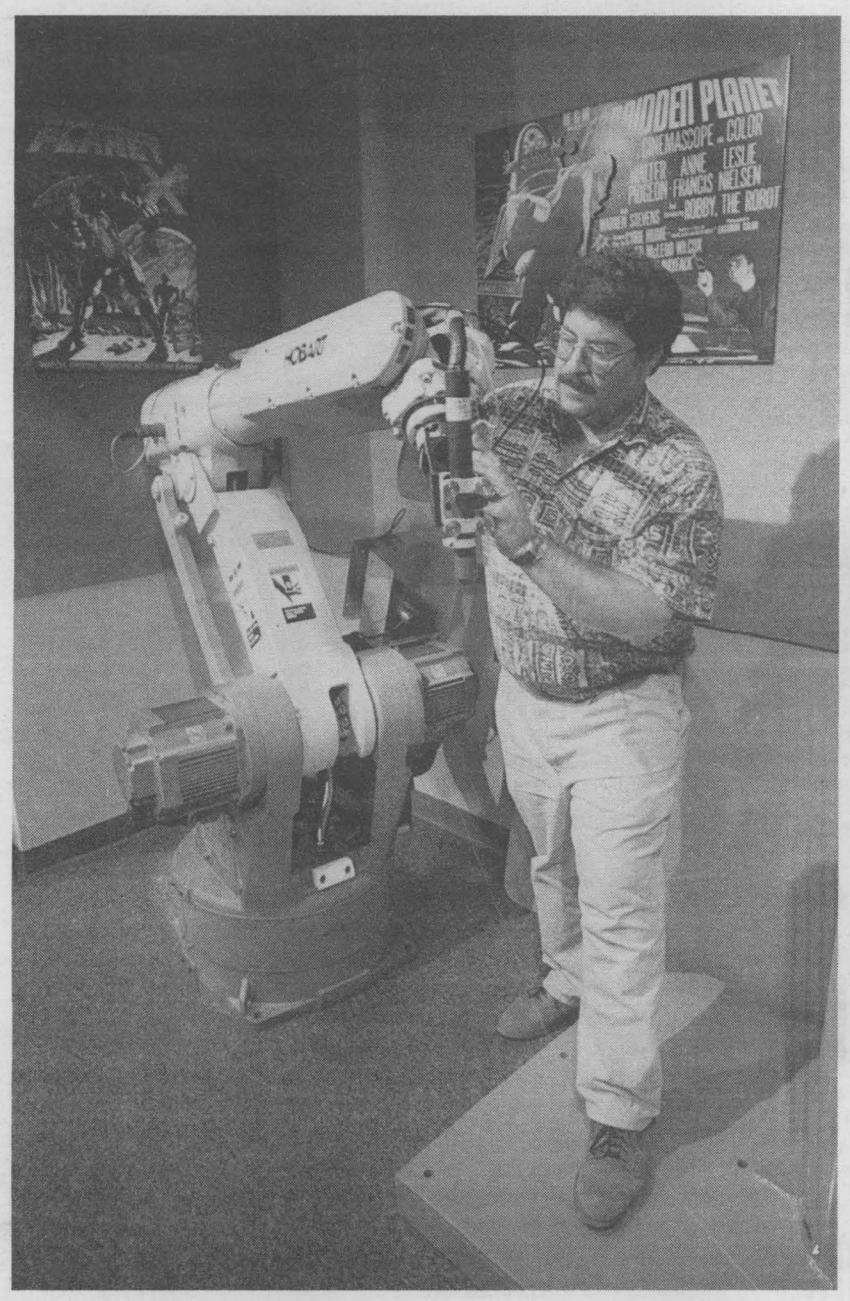
Thursdays and Fridays through August — Summer swim nights. A la carte buffet. Pool open until 9 p.m. (Pool closes at 5 p.m. on July 25.)

July 26, 27, 28 — Sundance championship swim meet. Pool and Club closed to regular activities on 7/26-27; lunch line open 11 a.m.-1:30 p.m. on 7/28.

Aug. 3 — Sunday brunch buffet, 10 a.m -2 p.m. $6.95 all-you-can-eat buffet, kids 3-12, $1, under 3 free. Music by Bob Weiler, 1-4 p.m.

Aug. 7, 14, 21, 28 — Thursday bingo night. Card sales and buffet start at 5 p.m., early birds' bingo at 6:45 p.m.

August 8 — "Western Night" dinner/dance. $6.95 buffet ($7.95 for guests), 6-9 p.m. Music by Isleta Poor Boys, 7-11 p.m.



ROBOQUEST —Tom Salazar (12670) puts finishing touches on a Hobart industrial welding robot, part of the National Atomic Museum's newest exhibit. Called Roboquest, the exhibit features 10 robots provided by Intelligent Systems and Robotics Center 9600 and Advanced Vehicle Development Dept. 5516 for military, manufacturing, environmental cleanup, and other applications. Two of the robots will be operational. One, a large pedestal robot, senses and grips objects in a bin and moves them. The other, a smaller programmable robot, reads cards filled out by museum visitors and translates their ink blots into motions. Roboquest will be unveiled tonight (July 18) during an evening reception (5:30-7:30 p.m., Sandians are welcome). The reception will feature a robot competition between two engineering students from the University of New Mexico. Their robot designs — made from Legos, microprocessors, and infrared sensors — will vie to be the first to navigate a maze and drop a pingpong ball into a basket at the end of the maze. Pat Eicker, 9600 Director, will be the keynote speaker. The exhibit runs through December 1998.

Workforce stability, budget outlook among July 28-31 dialogue topics

What's the latest outlook for Sandia's FY98 budget? How is the Integrated Job Structure (IJS) implementation going and what problems are being encountered? Have we finally reached the end of downsizing at the Labs?

These questions are among the topics that President C. Paul Robinson plans to discuss at his next employee dialogue sessions July 28-31.

Most topics are based on suggestions and questions that Sandians submitted to Paul's office in recent weeks. He began this system of selecting topics with input from employees for the last sessions in February, and attendance was up markedly.

"This system allows me to talk about what employees most want to hear about," says Paul. "Limited time prevents me from covering every subject suggested, but I do try to cover the most requested ones."

Several other subjects that Paul plans to cover:

- Renewal status of Lockheed Martin's Sandia management contract.
- Status of the study of Sandia/California's future roles.
- Sandia's role in stewardship of the nation's nuclear weapons stockpile and the need to maintain a "critical mass" of Sandia stewards.
- Workplace issues involving gay-lesbian employees.
- How changes in Sandia business practices are affecting our rate structure and charges to customers.

As time allows near the end of each session, Paul will also answer audience questions. The dialogue schedule:

- Monday, July 28, 1:30-2:30 and 3-4 p.m., Sandia/New Mexico's Technology Transfer Center (Bldg. 825)
- Tuesday, July 29, 2-3 p.m., Sandia's Carlsbad, N.M., large conference room
- Wednesday, July 30, 1:30-2:30 p.m., Albuquerque BDM Bldg.
- Thursday, July 31, 8:30-9:30 and 10-11 a.m., Sandia/California's Bldg. 904 auditorium

Lockheed Martin and Northrop Grumman to combine by year's end

Lockheed Martin and Northrop Grumman announced July 3 that their respective boards of directors unanimously approved a definitive agreement to combine the companies. Following shareholder approvals and US government regulatory reviews, the transaction will create a leading, broad-based technology company with estimated 1997 revenues of approximately $37 billion and nearly 230,000 employees.

Under terms of the agreement, Northrop Grumman shareholders will receive 1.1923 shares of Lockheed Martin common stock for each share of Northrop Grumman stock. The transaction is expected to close by the end of 1997.

"As our industry becomes increasingly global, we must constantly improve efficiencies to compete in the 21st century worldwide marketplace," said Norm Augustine, chairman and chief executive officer of Lockheed Martin. "In bringing together these two healthy, well-matched companies, we will meet our commitments to reduce costs for our customers, increase long-term opportunities for employees, and enhance shareholder value."

Kent Kresa, chairman of the board, president, and CEO of Northrop Grumman, and two members of the Northrop Grumman board will join the Lockheed Martin board of directors.

Kresa also will serve as vice chairman of Lockheed Martin and will have a strong role in the transition.