

# Sandia: Flexibility, Diversity — And Excellence

*Editor's Note: Continuing a tradition that began with former President John Hornbeck, the LAB NEWS and other members of Public Relations Dept. 3160 recently interviewed President Irwin Welber and Executive Vice-Presidents Orval Jones and Lee Bray on the current "State of the Labs." The series of articles on these pages is a condensation of that interview.*

**SLN:** Before we discuss the kind of year we've had, let's look at the context, the external influences that have affected our past and will affect our future.

**Welber:** One of the obvious influences was Reykjavik in early 1987. Since that time the US and the USSR have agreed on arms limitation and arms reduction measures that will have profound effect on us and on the stockpile. So the external environment has taken a sharp turn from the past, and it's going to have profound impact on the future.

**SLN:** Do you foresee any specific changes in Sandia's mission growing out of those measures?

**Welber:** We know that as we retire weapons, under the INF [Intermediate-Range Nuclear Forces] treaty, for example, there will be greater reliance on the remaining weapons in the stockpile, many of which are older weapons that would be delivered by conventional aircraft. Therefore, Sandia's responsibility for the stockpile will grow. Specifically, our responsibility for modernization and safety of the stockpile will become an even more pressing concern. These external events are going to shift the emphasis in coming years.

**Jones:** We're already seeing that shift — for example, our current program designed to improve the safety of the B53's electrical system. There may be other retrofits of a similar nature.

In our job of weaponizing nuclear explosives, there are three responsibilities: first, the stockpile;

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second, developments for new weapon requirements; and, finally, advanced concept exploration — that is, avoiding technological surprise for the US.

I think we'll likely see treaty negotiations shifting the relative balance of those. The stockpile will be extremely important. I don't see nuclear weapons vanishing from the scene even in the most optimistic scenarios. Why? If for no other reason, because we don't expect the superpowers to give up superpower status in favor of Pakistan or India or whatever other country might have nuclear weapons. So I expect the stockpile to be around. And since Sandia is at the interface with the military services and weapon carrier systems, we expect plenty of work in that area for Sandia.

It's still too early to know how the second responsibility — development of new systems for new requirements — will evolve. However, there will need to be new development work to allow the nation to get rid of the old, very old, systems in the stockpile.

I think the third area — avoiding technological surprise — will be even more important than before. In a situation where the nation has to embrace a less ready posture, surprise becomes then relatively more significant. We need to guard against it.

**SLN:** How are the national laboratories in general perceived by the military? Are the services seeing them as a resource for solving defense problems?

**Welber:** Some parts of the Army are certainly looking upon the national laboratories that way. And Sandia has always been fairly close to the Navy in



SANDIA'S TOP MANAGEMENT — (from left) President Irwin Welber and Executive Vice-Presidents Lee Bray and Orval Jones share their views on the "State of the Labs" with LAB NEWS readers in this special issue.



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some of our reimbursable work, such as on Trident.

**Jones:** I've heard several people outside the national labs refer to them as "national treasures." And, although the labs are always subject to the vagaries of budgets and changing situations year by year, I think there's really a strong appreciation of the contributions made here and in our sister laboratories. I think we enjoy a lot of support.

That's not to say that there won't be ups and downs, but there's a good appreciation of the importance of the national labs in the national scene.

**SLN:** There has been some concern that the DOE is losing influence in Washington while the DoD is coming on stronger.

**Welber:** Well, we're in a time of transition; the present administration will leave office at the end of 1988. A new administration will come in, and there will be new top people in the DOE scene. And therefore there is a period where plans cannot be made for the long term as fully as they might be if there was continuity.

However, there is a recognition that the DOE/DoD budgeting process should be maintained with a certain amount of independence on the part of the DOE — recognizing the traditional "dual-agency concept." There is some tendency to minimize that dual-agency concept — to simply take the DOE budget, combine it with the DoD budget, and look upon the sum as a total defense budget. And there we have to be careful, because the tendency might be to emphasize the operational needs of the DoD, so the voice of the DOE may not be heard as strongly as it needs to be.

**Jones:** I'm concerned about an additional dimension of that potential problem: As we work with the DOE as our sponsor, it's important that we be alert

to larger roles for the DOE to undertake. For example, I'm very pleased to see that DOE is planning seriously to take an aggressive role in treaty-verification technologies. I look forward to a number of areas in which DOE can expand its mission. We need to be alert to those in the laboratories.

I share Irwin's concern about maintaining an appropriate independence — a managed tension, if you please — between the civilian interest in safety, security, and control, and the military's interests in operational capability, survivability, and readiness. That tension was built in long ago in the Atomic Energy Act. One concern (which came out of last fall's budget summit as a result of the Gramm-Rudman-Hollings exercise): If the budget gets lumped into one big military pot, then the Murphy's Law ver-

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sion of the Golden Rule [He who has the gold makes the rules] can apply — DoD's budget is so much larger than the DOE's that there is a real risk of being taken over.

**SLN:** You mentioned that the third responsibility in weaponizing nuclear explosives was to "avoid technological surprise." Is there a formalized way of avoiding surprise? Is it an across-the-board look at a lot of technologies?

**Welber:** The key is a healthy technology base, which encourages looking at the fundamentals —

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chemistry, physics, math — so that we have our tools sharpened. Then we can use them to think and plan and invent, if you will, ideas for new weapons to put before our customers — the DOE and, through the DOE, the DoD as well — and make them aware of what the capabilities are from these technologies. That's avoiding "technological surprise." The key is a good tech base *and* the kind of people who understand what the problems are, creative people.

**SLN:** Do you have problems getting the folks who have the money to understand this concept? Defense that far out in the future tends to be more difficult to find money for, doesn't it?

**Welber:** That's sometimes the case. But we're making some progress along that line. Last November, the three lab directors met with some key Army and DoD officials responsible for procurement and R&D who were looking to the laboratories to give them more support in their traditional Army mission. We talked about what that support might be and — to get to your question — they were most eager for that support to be short-term. They did not really encourage discussion of long-term tech-base support.

I made the point with them that we could accom-

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plish that support from our existing tech base, that we could answer their needs for some specific short-term work in a year or 18 months. I believe that is the way to garner their respect and confidence, and to prove that it is worthwhile to support our tech base. In fact, we've been able to show them that — thanks to our healthy tech base — we have the capability to help them today.

They bought that idea, at least in theory. We are continuing to have conversations, and I think something good will come of them. But such work would represent a new mission, based on our tech base, in support of — I guess it's Orval who noted it's almost an oxymoron — Advanced Conventional Munitions. That is, we will apply our technology to non-nuclear weapons.

**Jones:** I think we are in a transition period right now where the mortgages of the military build-up, the large-scale purchases in a time of declining budgets, put pressure across the board, including the advanced concepts R&D program. But once that gets balanced out, I think thoughtful people both in Congress and the armed services will recognize that the long pole in the tent is support of technology.

**SLN:** You said our tech base is healthy. Are we getting enough support from all our customers?

**Welber:** Well, we are trying to lay out a program to get more support from our reimbursables.

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**We work very hard at protecting [our tech base]. It's healthy now, but it requires continuous vigilance. —Welber**

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Our customers have supported our tech base. But it's the kind of thing that we have to work very hard to protect because, if you're not careful, it's the first target for reduction. We work *very* hard at protecting it. It's healthy now, but it requires continuous vigilance.

**Jones:** Specifically, we have a tech-base charge that's applied to non-MA [Military Application] funds that come into the Labs. And this year and in 89 we're using tech-base funding to support 70 FTEs who have creative, innovative ideas.

**SLN:** Recognizing that it is a long-term approach, do you see any bright ideas coming out of those areas?

**Welber:** Definitely. The folks in 9000 [Exploratory Systems Development] have come up with a whole variety of innovative ideas that have caused the Army folks to be quite enthusiastic. Most of them are based on advanced concepts in electronics, in

radars, in artificial intelligence, and a lot of them grow out of the tech base that we've been nurturing.

**SLN:** So will we get into more of this kind of work with the Army?

**Welber:** Absolutely, absolutely — although the Army's basic funds for things that they consider very important are being squeezed hard. So it's a case of establishing priorities in the Army — in the military, in general — for new ideas like these.

**SLN:** Sandia continues to be very much involved in the national defense scene.

**Welber:** Definitely.

### Last Year's Accomplishments Highlighted

**SLN:** Within the context you've sketched, then, let's look at some of the accomplishments of the last year or so.

**Welber:** Well, from my point of view, the continued excellence of performance in most areas of our activity is notable. Our reputation in Washington, as far as I can tell, is improving; it's even better than it has been. That's very difficult — the easiest thing to lose is a reputation and the hardest thing to regain is a lost reputation. We have achieved what I think is an excellent year through continued excellent performance.

**Jones:** I agree. I take particular pride, moving into some specifics, in our design and test program on the Trident II, on which we've been doing the arming, fuzing, and firing system. The year's series of test flights has been most successful, and the Sandia design of the fuze has proven out very well. I think we can take a great deal of pride in that — Trident II will end up being one of the nation's cornerstones in deterring war.

Another area that pleases me is our involvement in support of the arms reduction treaty negotiations through our verification program — specifically, through our TOSI [Technical On-site Inspection] facility. We've used a model of it to brief President Reagan, and we've helped many visitors visualize the kind of appropriate technology that can be brought to bear on the verification of missile destruction or missile build.

We ought also to mention the support that Stan Fraley [9111] offered in the Geneva talks that led to the INF treaty. His involvement as a technical advisor is a recognition of the kind of expertise that we represent.

I think we've made a lot of progress in the last year in technology transfer. That's a national concern because of the technical competitiveness of today's world. We've got a long way to go, but I think our progress with, to name just two, RAPRENOx and the semiconductor bridge have led to productive interactions among DOE, our Congressional delegation, and Sandia's staff. We can be proud of that.

**SLN:** Let's run through some of the high-visibility programs — SDI, for example.

**Jones:** I think we're pretty well positioned in the SDI area. In general, we have not taken on a large programmatic activity. Instead, we've emphasized the technological aspects of SDI, specifically, countermeasures work and other projects of that sort. So our budget is not as highly leveraged as if we were building a big machine or were part of a big program that might be taken out overnight. I think we're going to see some vicissitudes here, but I don't think they're going to be extreme.

And we have some very special capabilities to offer SDI — for example, our small-rocket capability and our Kauai Launch Facility, which are unique.

**SLN:** Any notable successes in this past year in SDI?

**Jones:** Well, a number of these wind out into classified areas, so it's difficult to describe the countermeasures work. In one sense, it's been too successful because it demonstrates some problems that have to be surmounted.

**Welber:** Countermeasures work does not get you kudos.

**SLN:** But somebody has to do it, right?

**Jones:** I think the thing to say is that we have a

diverse program, many elements of our program are unique, there are not a lot of other people out there competing with us — we're pretty well positioned.

**SLN:** Part of our SDI program is the new Strategic Defense Facility. That brings up some fairly exotic-sounding facilities, such as the reconnection gun [a Sandia-invented, electromagnetically accelerated projectile gun]. What can be said about that?

**Jones:** It's an interesting concept, and several stages have been put in series now and large accelerations achieved.

**Welber:** And I think we've been encouraged by the improvement in efficiencies and the velocities achieved. So there's no reason to think that we shouldn't continue with this research program because today it looks promising.

**SLN:** Related to SDI are pulsed power and beam generation and some of that work.

**Welber:** Our bringing on-line of Hermes III and Saturn in the same year is a real achievement in itself. And we brought them in on schedule and at the cost we predicted. They will give us unique capabilities in aboveground testing, and they will be useful in the DOE community for years to come.

**Jones:** Marvelous successes, both of those. And achieving a spot focus in the ICF [inertial confinement fusion] program, with all the scaling indicat-

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ing that it would get better as we move toward heavier ions and higher voltages — that's another area in which we did very well.

**SLN:** Before we depart our pulsed power programs, let's talk about how our new simulation capabilities could fit into the constraints on underground testing that would be posed by a CTB [comprehensive test ban].

**Welber:** I think the facilities that we've created here will permit us to test our components at exposure levels that we have not been able to achieve up to now. That means that subsequent underground testing will become far more effective in evaluating the impact of a complete exposure to all the environments created by a nuclear explosion. But we don't feel that they're in any way a substitute for full underground testing.

**Jones:** We've come a long way in our testing. We've gone from piece parts to components to subsystems, and now, with Saturn and Hermes, we're at the substantial subsystem area, but, for full-scale systems, we still need larger exposure areas that can be achieved only underground. So a CTB would have an impact on us — albeit not nearly as serious an impact as on the other two labs who need the "underground laboratory" for the development of the nuclear device itself. It's a matter of nuclear-device testing, which is what the other labs do to validate their nuclear designs, versus weapon-effects testing, which is what we do to learn whether our components and systems can withstand a nuclear burst. We are improving our ability to use aboveground facilities like Saturn and Hermes in our efforts. But to the other labs, underground testing is absolutely indispensable.

**SLN:** Earlier, you mentioned treaty verification as being one of the highlights for the Labs this year. What's the future there?

**Welber:** I think we see an expanded role. We're trying to ensure that the DOE plays a leadership role in this activity, and we think that Sandia can support the DOE in a very effective way because of our past experience in this field. There are important proposals being made for joint tests, joint experiments, with the Soviets, and Sandia will play some role in that effort. In addition, there's the question of what kind of facilities will be designed to monitor the manufacture of the weapons limited by the INF treaty. TOSI is just the first possible step in that design.

Sandia will play a key role there.

The Secretary of Defense will, in the near future, ask industry for requests for proposals to participate in the verification program. Sandia will work with the companies that participate, so it's a growing business.

**Jones:** And verification has a whole variety of dimensions — "national technical means" [such as surveillance satellites], for example. Such issues as monitoring mobile missiles are very difficult and very challenging. I'm sure we'll be involved there.

On the other end of the verification spectrum, we've had many years of experience in helping to develop appropriate technologies for IAEA [International Atomic Energy Agency] inspectors, who are charged with enforcing nuclear non-proliferation agreements. They have a limited amount of time on-site, they've got to know what they're looking for, they've got to analyze what's happened. We've been developing instrumentation devices and approaches to help them. I see our work in that arena as another way that we can contribute to verification technology.

In the middle of the broad spectrum called verification is the tagging issue. Can you, for example,

hang a tag on a weapon that says "I am me, I haven't been changed, I wasn't stuck on some other weapon last week"? That's a very challenging area in which Sandia has unique capability, growing out of its history of command and control, PAL [permissive action link] authentication, and so forth.

**Welber:** To give you an idea of the reputation that Sandia has in this tagging arena, the President's science advisor, William Graham, spent a full day here recently because he'd heard from so many folks in Washington about Sandia's tagging capability that he wanted to come for himself and see if it was as good as he had been told. He came away pretty convinced that we do have an exceptional tagging ability.

**Jones:** And it's a tough problem.

### Weapon Programs, Nuclear and Conventional

**SLN:** How about a quick review of the weapon work in-house — Phase 3s, 2s, and so forth?

**Jones:** Well, the big job that is closing in Albuquerque right now is the W88 Mark 5 warhead for the Trident II. Just a week ago, we achieved a Phase 3 [full-scale development] on the NDSB [nuclear

depth-strike bomb]. We're in a Phase 2 [feasibility study] activity on a variety of options on earth-penetrating weapons.

The real emphasis right now is in Livermore. They're working on the SRAM 2 [short-range attack missile] and on SICBM [small intercontinental ballistic missile]. Of course, if you read the press, you know SICBM is uncertain. The decision on it is being held for the next administration. The W82, the 155mm artillery shell, is in development. And Livermore is also pursuing a variety of earth-penetrator possibilities.

At both locations, we're looking at follow-on LANCE concepts and other possibilities. So there's a lot of activity going on and a lot of work to be accomplished. But it's uncertain how many programs will go into full-scale Phase 3 development and, especially, how many will actually be built. Nevertheless, in terms of exploring the options, we have plenty of work on our plate.

**SLN:** Where do we stand with maneuvering delivery vehicles?

**Jones:** Let's just say that SWERVE [Sandia winged energetic reentry vehicle experiment] is a  
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## Manufacturability, New Technologies, and Quality

**SLN:** Are we still able to hire engineers who can deal with the problem of designing a device that's manufacturable?

**Welber:** Yes, but that concern must be put into perspective. Our manufacturability needs are unique. We do not make things by the millions. Our quantities are small, our products are very sophisticated and highly specialized. So we must have people who can design for that kind of product. That's different from the General Motors or Texas Instruments engineer who's designing for their manufacture, where cost is paramount.

Of course, we're quite concerned with cost, but not in the same way — and, of course, we're concerned very much with quality and reliability. But manufacturability in our sense is not the same as the manufacturability involved in making our manufacturers more internationally competitive.

**SLN:** But our relationship with the production complex demands a high level of manufacturability. How are we doing there?

**Jones:** Lee, this is a good place to mention QNOW, something Small Staff has been looking at each quarter.

**Bray:** Herman Mauney [7200] and his folks have instituted the QNOW [Quality News On Weapons] program to help us understand the implications of the data we collect from the design/manufacturing process: What does it say? Are changes good or bad? Have we resolved outstanding problems?

**SLN:** Change orders, for example?

**Bray:** Yes, change-order types of activities. Are they good or bad? I think it's too early to tell where that's leading, but the thrust is all in the right direction. We've got to be sure that the

**It is important that everybody understands that quality is the number-one goal here. It really is. —Welber**

parts we design can be manufactured reliably, that we don't have a series of costly changes, and that changes don't come so late they require retrofit in the field. I'm encouraged by the level of activity and by the interest focused on it.

**Welber:** What we've done is put a renewed focus on the problem. Lee is right in saying that we've yet to see the impact of that renewed focus. But it is important that everybody understands that quality is the number-one goal here. It really is.

**Jones:** Absolutely. Our reputation has been built on quality, and we've got to be certain that

we don't lose sight of that. That concern is what's behind QNOW. Small Staff takes a few hours each quarter to review what we know of current status. We have some design problems — design goofs, if you will — brought in for study. I'm sorry to say that in some cases we haven't done a good job in human engineering, which years ago was one of Sandia's really strong suits, one that we have to be sure we pick up again. And we have to be certain, in our design development jobs, that the development reports come in on time — before the people working on the job have moved on to another job so the reports just never get done.

Sandia's top management is very interested in these areas of design and product quality. We are paying attention, and we'd like to communicate the importance of quality throughout the process to everyone in the Labs.

**SLN:** How do we define success in meeting the goal of quality?

**Welber:** Well, one way to define success is to understand the impact of failure. Our quality people do not treat us with kid gloves. As Lee mentioned, they bring Small Staff graphic examples of how *not* to do it. There are no names associated with these examples; there's no guilty party — just a piece of hardware sitting on a table. And we can see what lack of attention to quality can do. It makes us appreciate our responsibility for quality.

**Bray:** We have to remember that outsiders cannot assess the quality of our weapons — and we hope they never have to. But we design and develop peripheral products too — weapon manuals, weapon testing devices, for example. They become a kind of symbol of the quality of our major products. And poor quality, or design that fails to meet customer need, is easily perceived.

If we don't design excellence into those peripheral products, users might believe that we are not designing excellence into our major products. It's important that the simple, even superficial, things be done just as well as we do the core part of our business. So we're trying to be more sensitive to customer perception, user perception — make sure the product is "user-friendly," make sure that we're listening to what the user has to say.

**Welber:** If test equipment is difficult to use, gives users a problem, well, as far as they're concerned, that's the product. Test equipment is usually the thing we do last and it's not the basic product, but we've got to be very careful to do a good job.

**Bray:** When I was out on the *Nimitz* [LAB NEWS, Sept. 26, 1986], I watched the Navy prepare a JTA [joint test assembly] for a drop test. I watched as they prepared the JTA, loaded it to the aircraft, and launched the aircraft, and I later listened to the debriefing of the pilots — the whole operation. And I couldn't help thinking, "That JTA represents a multimillion-dollar weapon. And yet its success comes down to three or four seamen reading instructions one line at a time and trying to implement those instructions."

So you conclude that our manuals are just as important as everything else. It's the weak-link-in-the-chain theory. Everything we do has to have the same high level of quality. If it's a manual, it's got to be just as good as our weapon design. If it's a piece of test gear, it's got to be as good as the weapon itself.

**Jones:** That suggests a question that has been on the minds of some of our staff and supervision. That is, "in a technology-oriented laboratory like this, shouldn't we at *all* times be

**We need to make sure we don't introduce a new technology until its time is here. —Jones**

pushing new technology into systems as hard and as rapidly as we can?"

In the context of Lee's and Irwin's remarks, we've decided recently that we should not push technology until it's ready. It doesn't help us, it doesn't help the production complex, to be in an absolute crisis mode for several years when in fact we have alternative ways, tested ways, of accomplishing a certain job.

Now, that's a tightrope, of course, because if we took that to the extreme, we'd never make any advances. But we need to make sure we don't introduce a new technology until its time is here, rather than putting a far-out development in its place.

**SLN:** What's an example of that policy?

**Jones:** Oh, a good example was whether we were ready to put the new quartz digital accelerometer into our environmental-sensing device, or whether we should continue with the rola-mite device. We made a conscious management decision that we weren't really ready at this point to put the QDA technology into place, that we should, instead, go one more round with rola-mite. I think at that point the QDA will be ready for us.

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testbed for the broad range of technologies that we're pursuing in fuzing, guidance, and control.

**SLN:** How about extended range bombs?

**Jones:** Hard to say. I think it's an idea whose time should be coming. But it'll all depend on how NATO and Europe finally digest the INF, what they're left with, and what the politicians will be willing to sign up for.

**SLN:** We talked a bit about ACMs earlier. Any particular successes there — FOG-M [fiber-optic guided missile], for example?

**Jones:** The all-electronic FOG-M fuze has passed the DoD's Safety Board. It's the first time an all-electronic fuze has ever made it past that board.

**Welber:** We have a number of other interesting ACM concepts. One is Fire Ant [a remotely operated anti-tank weapon], which we achieved this year in typical Sandia fashion. In a period of about 90 days, our folks took an idea that they have been considering for a year or two, put it into practice, and demonstrated it.

**SLN:** Has it been accepted by the DoD?

**Welber:** Well, it has undergone a few generations — these ants do multiply, you know — and it has seen some further idealization.

**Bray:** It's generated a lot of excitement.

**Welber:** But we don't have a contract at this point. And there's our AROD [airborne remotely operated device] — a very fancy little surveillance aircraft.

**Welber:** The Marines have them in their hands now and are trying them in the field. They're really interested — ARODs are lightweight and cheap, and their capabilities are unique for battlefield conditions.

We've also worked with the Marines on a battlefield sensing device. They want to go out to industry to get it made, and we're cooperating with them on that. So there has been quite a bit of achievement this year in advanced conventional munitions.

**SLN:** To sum up, Sandia is moving onto the traditional battlefield with non-traditional devices designed to enhance the ability of a smaller fighting force by giving it special tools.

**Welber:** Absolutely. And there's more to come. There's the concept of a shell, loaded with electronics, shot from a cannon. As it spins, the spinning enables the electronics to scan the terrain over which it's passing. It radios back that scan so the field forces can see what is underneath the shell over a wide swath.

**Jones:** Moving from the conceptual to the actu-

al, we should mention the MOU [Memorandum of Understanding] pattern established a couple of years ago between the DOE and the DoD. Sandia's work with the Army, which grows out of those MOUs, has steadily expanded. We're up to \$10 million on the first MOU and more than \$3 million on the second. With our success on development of the fuze for the FOG-M, it looks as if we'll be asked to do fuze designs for the AMRAAM [Advanced Medium-Range Air-to-Air Missile] and Patriot missiles, and we've been asked on very short notice to apply our use-control technology to Stinger missiles.

**SLN:** Is that a retrofit to protect us if Stingers fall into the wrong hands?

**Jones:** Correct. I think we're going to see more of that kind of request — where we want to support another country with missiles, but we want to be sure that that equipment couldn't be used to threaten us if it falls into the wrong hands.

In general, we believe in these kinds of innovative approaches — finding new ways of looking at problems, bringing different technologies to bear . . .

**Welber:** . . . in other words, using our tech base — all of these bring new capabilities to an area [ACM] that has not benefited from it in the past.

**SLN:** And our sponsors in DOE are encouraging us?

**Welber:** We've kept them completely informed of what we're doing.

**Jones:** Remember, the MOU is not between us and the Office of Secretary of Defense and the Army. It's between the DOE and the DoD.

### Research, Microelectronics, And Tech Transfer

**SLN:** What about the research end of the business this year?

**Welber:** Well, of course we all know about the breakthrough in massively parallel computation. We're very proud of that. That was a real contribution to the field of computing and is recognized as such by the community. We should point out that this was done by an organization [1400] created only about a year and a half ago. So we've seen some real contributions out of a fairly new thrust. It's very encouraging to see how quickly we can achieve recognition for these contributions.

In addition, as you know, we've had an exciting year working with the Sematech research consortium in the microelectronics area. Our real accomplishment there was to make the semiconductor community — an important constituency — aware of Sandia's

capabilities. I think that effort will bear fruit in the future. We've gained a new respect, and the industry has gained new knowledge about what Sandia can do both in the research area and in our device area.

**Jones:** Two more things have excited me about research this past year. I think we've been a presence in the high-temperature superconductor area. We've had some nice results here, getting into the structure and so forth; we're definitely a recognized player.

In the calculational area, it turns out that Sandia is the organization that has developed a complete picture of the effects of depth of burial of a penetrating weapon — from going off above the surface of the earth to well-buried. Providing an understanding of the energy coupling involved is a very important applied-research contribution.

**SLN:** We've had some problems in radiation-hardened microelectronic fabrication this past year. Do we see a solution there?

**Welber:** Well, I think we are very close to having come through the problem of component manufacture. We're almost to the point where we can say we've solved the problem, but we're not there yet. It's taken the collaboration of the 2000 and 1000 organizations, using all the capabilities that we have available, plus very close work with Allied Signal [formerly Bendix] and Harris Semiconductor to achieve this. In addition, we've received some help from AT&T. So the team has really come together to get us over this rather critical period.

**Jones:** Our problems were at least three. First, a number of radiation-hardened parts that we had initially been unable to get built by industry were required, so we were having to move from building a few parts to building a lot of parts; that turned out to be a tough job. Then the fire in Bldg. 870 hit us late last July; we sure didn't need that. Then we dis-

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**The question is not whether you make a mistake, but how you recover. The good news is the way organizations have come together to resolve a problem.** —Bray

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covered a technology problem — the evaporated metal lines were opening up on the connections. The combination of setbacks made it tough.

As Irwin said, I think we're at the point where we can see light at the end of the tunnel. But we still have to certify several more lots before we feel we're out of the tunnel. It's been a tough job, but I think people have made real progress. Basic chip yields are way up at this point.

**Bray:** You know, looking at that problem from afar, I see some things that are encouraging to me: Number one, a recognition that key organizations can make mistakes. The question is not whether you make a mistake, but how you recover. The good news is the way organizations have come together to resolve a problem. Number two: Maybe we've heightened our sensitivity. Maybe it will help us in the future just to recognize that, as certain as we are at times, we might well "double-check it one more time."

**SLN:** You mentioned earlier that we've made good progress in the tech-transfer area. Is that effort going smoothly?

**Welber:** Well, there's great concern on the part of some of the folks in Congress that the DOE has not been aggressive enough in permitting local rule on intellectual property. This is a very tough issue and is being negotiated now with, I think, a heightened awareness of the need for greater technology transfer. I think we will see a liberalization of this policy in time.

**SLN:** Is our success of last year related to our change in terms of consulting policy?

**Welber:** I don't think that has had a marked effect. I think it's mainly because industry has become more aware of the national laboratories and has come to us for assistance. For instance, [former President] George Dacey sits on the board of W. R. Grace and Company, and he has referred the com-

(Continued on Page Five)

### Coming Soon

## Corporate and Personal Integrity Program

**SLN:** A year ago you talked about increasing the emphasis on safety, quality, and integrity. What progress have we made? For example, what protection does Sandia offer a whistleblower who comes to one of you and says, "Hey, I think we're doing something that has long-term possibility of danger"?

**Bray:** We have not completed it yet, but we're looking right now at a C/PIP [Corporate and Personal Integrity Program], which will provide opportunities for alternate channels of communications. It would be broader, as I see it, than just whistle-blower protection.

Essentially, it would be a person or office, probably in Personnel, that all employees in the company should know is available to hear concerns involving our corporate integrity. We're not talking complaints by second-guessers about our decision-making here; we're talking about any real or potential threats to our integrity and our reputation for integrity.

Employees could be heard there without fear that it's going to get back to the boss or whomever it is they're concerned about, and the matter would be pursued until we're satisfied

either that it's been resolved or that there was not a problem.

**Jones:** We've all read about mismanagement — the newspapers have been full of it in the last few years — problems ranging from time-card charging to misuse of funds and worse. We can be proud that our parent, AT&T, has not been involved in any of that. And we can certainly be pleased with the integrity of our employees at Sandia.

Nevertheless, we're adding C/PIP to augment our Code of Conduct to make very clear management's feelings in this area and to delineate management's responsibilities and all employees' responsibilities to be certain that we handle everything with integrity, with a high level of ethics and behavior.

C/PIP is still being put together, but it has specific provisions to make people feel comfortable with passing along any views they feel aren't getting the right attention or aren't being responded to by their supervision. We'll announce more details later, when the program is ready to implement.

## New Secure Video Link Between SNLA and SNLL Allows Face-To-Face Meetings Without Travel



TRYING OUT THE NEW SNLA/SNLL VIDEO LINK are Dick Schwoebel (1800) and Jim Porter (2648) in Albuquerque (left photo) and Ron Detry (8200) and Frank Bielecki (8234) in Livermore. The video conference rooms — Rm. 110A, Bldg. 836 in Albuquerque and Rm. 108H, Bldg. 912 in Livermore — look much like other conference rooms. There are no bright lights or distracting electronic equipment to annoy users. Except for a tabletop push-button controller for manipulating the camera and sever-

al microphones, all equipment — a video camera, audio-mixing equipment, and a speaker — is tucked away in a single cabinet that sports two color monitors, one for people and one for graphics. "Meeting participants can use a normal tone of voice," says Jim, "and conduct their discussion just as they would in a face-to-face meeting." The quality of the video picture? Almost as good as that on the evening news, but not quite.

Before you make that plane reservation for your next meeting in Livermore, stroll over to Bldg. 836 and inspect the newly installed video conference system in Rm. 110A (in Livermore, Rm. 180H in Bldg. 912).

You may decide to stay home — and have your meeting too.

With the new video system you can enjoy all the benefits of a face-to-face meeting with someone 1100 miles away, including the use of drawings or other graphics — all without the time-consuming hassle of airports and rented cars.

And you won't be trading one hassle for another.

### Easy to Use

"The system is extremely easy to use," says project engineer Jim Porter (2648). "Given about 15 minutes for instruction — even right before a scheduled meeting — I can have a first-time user operating the system like a pro. It's a very friendly system.

"Anyone can learn very quickly how to use the tabletop push-button unit to control the camera's up/down and side-to-side movements and zoom the camera in and out," continues Jim. "With just a little practice, the operator can switch from close-ups of speakers, to group shots, to graphics.

### 'How-To' Video Available

"Secure Video Conferencing Made Easy," a 13-minute instructional video tape produced by Gary Shepherd and Lee Walton (both 2614) can be obtained by calling Betty Straba (2614) on 4-1342.

"Scheduling a conference using the video link is probably easier than arranging a conference to be

held at a distant location," says Jim. "Just give me a call with the necessary information [see "Reserving Video Conference Room"], and I'll take it from there.

"On the day of the meeting," he continues, "come prepared as you would for any meeting — bring charts, drawings, or other graphics that you want to use.

"Plan to arrive at the conference room about 15 minutes early so you can get your materials set up for presentation and get briefed.

"The transmission link will already be established when you arrive. You'll be able to see the people at the other end the moment you walk into the room, and you can proceed with your meeting as soon as you are ready."

### Trial Period

The video link between Albuquerque and Livermore will be operating on a trial basis until about mid-September, says Dave Darsey (2648), whose division worked jointly with Cliff Skoog's division (8234) to implement the system.

On the Albuquerque team were Jim Porter, Rich Brown, Debbie Brunty, Frank Castellucio, and George Rivera (all 2648); the Livermore team included Donna Edwards, Jim Berry, and Frank Bielecki (all 8234).

"We'd like to invite anyone who's planning a trip to Livermore [or to Albuquerque from Livermore] to try out the system," says Dave. "Part of the beauty of this system is that you can convene a meeting very quickly — sometimes within the hour — or you can schedule it days, weeks, or months in advance.

"We'll be soliciting feedback from users to evaluate and improve or expand the system to meet their needs," he continues. "If the response from users is good, the video link will be retained permanently."

"So far," he adds, "we've gotten nothing but very positive reactions from users."

A particularly enthusiastic user is Heinz Schmitt (5100). "In fact," says Heinz, "that conference room was planned with video conferencing in mind almost five years ago. With recent technological improvements in the available hardware — and reductions in prices — video conferencing at Sandia is finally becoming a reality.

"It's a viable way of having meetings, particularly for teams of people in different locations who have a job to do together," he continues. "For example, soon after the video link became operational, we had directors of Allied Signal Aerospace in Kansas City (KC) here to meet with Sandia directors. Due to scheduling conflicts, it was difficult for Livermore participants to get here for the meeting. Rather than delete the item on the agenda that was specific to Livermore, we got the Livermore participants on video and finished our meeting.

"So the real value of video conferencing isn't just a matter of saving the expense, time, and hassle of travel — though it may do that too — its real value is ensuring that the right people are in the right place at the right time."

### KC Link Coming Up

"This becomes particularly important," he continues, "when you consider the number of common discussions that take place, not just between us and Livermore or between us and KC, but among, say, Organizations 2000 and 5000 and 8000 and KC. The secure video link with KC, which should become operational sometime this month, will further facilitate timely interactions among these groups.

"Another benefit of the video link, particularly of the KC link," adds Heinz, "is that hardware

(Continued on Page Four)

### Bye-Bye, Blubber

## New Round of TLC Invites Hits the Mail Next Week

Perennial dieters (the term covers a lot of us) think that losing eight or nine pounds is a major accomplishment. But two tons in two years?

That's what happened — collectively, of course — to the Sandians and DOEans who signed up for Total Life Concept (TLC) nutrition/weight-control classes during the first two years (1986 and 1987) of TLC operation. And people in the classes during the first third of this year continued the good work; they dropped another 759 pounds. (At that rate, another ton — at least — of unwanted weight will be just a memory by the end of 1988.)

If you haven't yet had the opportunity to participate in TLC's weight-control class — or any of the program's nine health life-style classes — your chance may be right around the corner. Invitations to 500 more potential TLC participants will hit the company mail next week, according to program manager Susan Harris (3330).

TLC invitations are sent (at random) to about 1500 employees a year. The one-year program, strictly voluntary, enables participants to enroll in three classes during the year (choice of classes is up to each TLCer). The classes, lasting from 4 to 12 weeks,

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usually meet for 45 minutes once a week. They cover the following areas: fitness/exercise, back care, blood-pressure control, cholesterol reduction, interpersonal communications, smoking cessation, self-care and cancer awareness, stress management, and nutrition/weight-control.

TLC is more comprehensive than many workplace wellness programs, Susan notes. "Some companies concentrate on just one or two areas — for

(Continued on Page Five)

# Antojitos

We're Breathing Again -- Another "State of the Labs" special issue is now in your hands, awaiting its perilous passage to your mind. As usual, I'm much indebted to Dick Craner (3180) and his classifiers, Bob Park (4010), a host of technical people who checked out the nitty-gritty details for me, and, of course, Irwin Welber, Orval Jones, and Lee Bray -- without whose commitment to communication with our community the task could not have been accomplished. Thank you.

\* \* \*

Speaking of Sandia's Major Mission -- which is, of course, what the above-mentioned does, Dan Alpert (6226) sends a full-page letter decrying, among other linguistic lapses, the use of the word "weaponization." So that makes us all weaponizers, notes Dan. And he creates a little scenario: "So, honey, what did you do at work today?" "Not much, just a little weaponizing." Sounds like some naughty act, sort of like womanizing, he adds.

"I submit [Dan goes on] that a better way to describe what the Labs do would be a more legitimate word: 'weaponeering.'" It's a cross, he points out, between "weapon" and "engineering," and it's even in the dictionary.

And he creates another scenario: "Our next speaker is Dan Alpert. Dan is currently a weaponeer with Sandia National Labs."

"Sure beats being described as an MTS," Dan concludes.

\* \* \*

They're the Ones Taking Potshots at Each Other -- Apropos this issue's story on the Community Focus presentation, "Dual-Career Relationships": An article titled "A Call for Higher Educational Standards" in the American Society of Engineering Educators newsletter mentions a report, "Workforce 2000," which, according to the ASEE, "calls for a change in employer policies toward dual career couples" and urges policymakers to provide rewards for "dual career families."

\* \* \*

Speaking of Dual-Career Couples -- The Purchasing Salmens, Dan (3722) and Dannelle (3712), have more similarities than name and organization. Dan's in the first batch of six Sandians selected for the MLS Trainee program, and Dannelle was just picked for the second batch. Both were MA Vs before they entered the program, and both have graduate degrees in procurement management from Webster University. They met in Purchasing four or five years ago, and were married a year ago. "Just a case of being in the right place at the right time," says Dan, apparently referring to job, training program, and marriage.

\* \* \*

A Good Word for Our Parent (Its Child Too?) -- The companies that graduating engineering students most want to work for, as revealed in the fourth annual survey reported in Graduating Engineer, are AT&T, IBM, General Electric, Hewlett-Packard, and Lockheed. Reasons for their choice: nature of the work, technical reputation, attitude toward technical people, advancement opportunities.

\* \* \*

Remember Sandia, Texas? Last issue's photo of the town surprised Jon Bedingfield (3731). His uncle, Tommy Bedingfield, has lived there for several years.

\* \* \*

ILLITERATE? Write LAB NEWS for free help! (Offer good only for those afflicted.) ●BH

## Supervisory Appointments



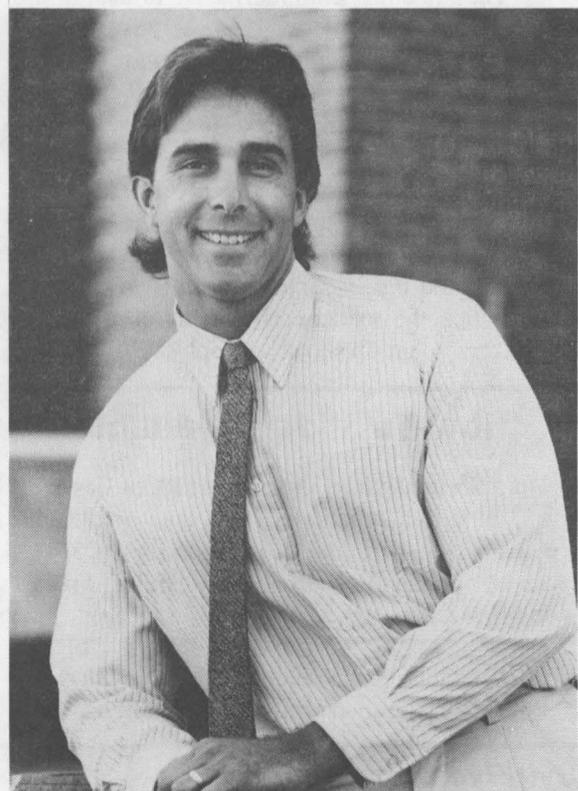
WAYNE POTTER to supervisor of Payroll Section 152-1, effective May 16.

Wayne joined the Labs in January 1981 as a member of the Contract Auditing Division. In January 1984, he became administrative assistant to Microelectronics Org. 2100. From November 1986 until his promotion, he was a member of the Capital Planning and Control Division, where he worked on Sandia's construction budget.

He has a BA in architecture and an MBA, both from UNM.

In his spare time, Wayne enjoys snow- and water-skiing, four-wheeling in his Jeep, tennis, flag football, and camping.

Wayne and his wife Petra live in the NE Heights.



BRUCE FETZER to supervisor of Printing and Duplicating Section 3154-2, effective May 16.

From May 1984, when he joined Sandia, until his promotion, Bruce was a graphic designer in the Technical Art Division. Before coming to the Labs, he was a member of the publications organization at LANL for two years, and with PNM before that. He has done freelance graphic design and illustration in the Albuquerque area and has taught airbrush illustration at UNM.

Bruce has a BFA from Ohio University.

His spare-time activities include hunting, fishing, motorcycle riding, running, and weight training. He is a member of the Police Athletic League and the National Rifle Assn.

Bruce and his wife Rebecca live in the Manzano Mountains.

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## Welcome

### Albuquerque

Frank Nutt (3426)  
Natalie Olague (6415)  
Lucille Ortiz (3426)  
Kay Rivers (3155)  
Dawn Smith (2648)

### Arizona

Sheila Motomatsu (9211)

### California

John Dec (6427)  
Robert Duncan (7242)  
Margaret Van-Yu Meng (2344)

### Colorado

Alan Armentrout (2625)

### Indiana

Lester Arakaki (5248)

### New Mexico

Gary Cable (9114)  
Patricia Wormington (7252)

### Utah

Mark James (3533)  
Kurt Sorensen (2343)

## Tritium Plasma Studies Subject of DOE Briefing

A recent visit by officials from DOE's Office of Fusion Energy centered on Magnetic Fusion Energy (MFE) programs relating to Livermore's Tritium Research Laboratory's (TRL) tritium plasma experiments.

Heading the visiting delegation were John Clarke, Associate Director of Fusion Energy, Office of Energy Research, and Anne Davies, Deputy Associate Director. They were briefed by VP John Crawford (8000) and Walter Bauer (8340), then given a tour of the TRL by Ken Wilson (8347) and Don Putz (8443).

As the briefing indicated, much of Livermore's MFE research has focused on tritium interaction with materials. The main experiments are the Tritium Plasma Experiment (TPX) and the Laser-Assisted Materials Plasma Experiment (LAMPE); both deal with the interaction of tokamak-boundary-like plasmas and candidate containment materials.

In a magnetic fusion reactor (or tokamak), deuterium and tritium ions are guided around a toroidal (doughnut-shaped) device by strong magnetic fields. However, there is leakage from this "magnetic bottle," and these ions impinge on and are absorbed by the surrounding vessel's wall (called the first wall). A reactor typically includes components, such as a limiter, that acts like the iris of a camera. The limiter keeps the plasma away from the wall and hence absorbs a large particle and heat flux.

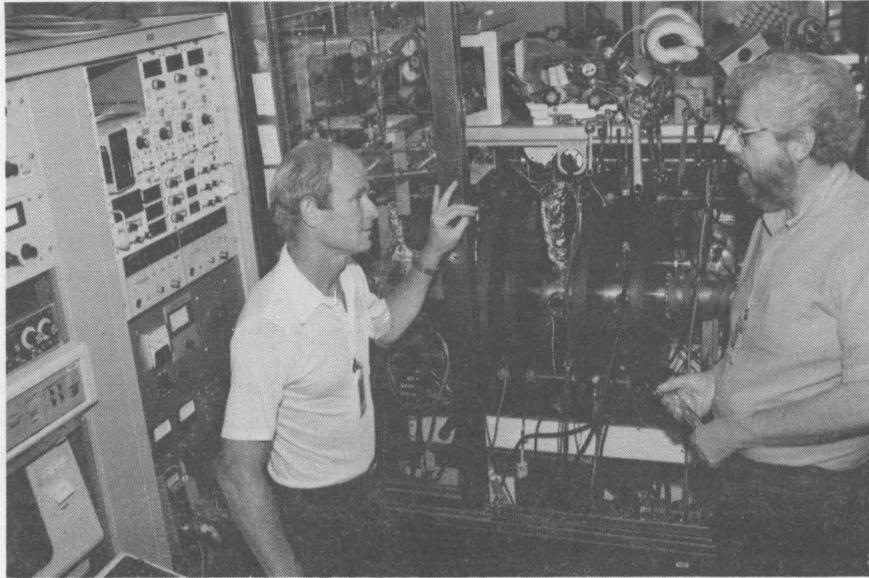
"We do lab studies of fundamental mechanisms — what happens when an energetic tritium ion interacts with a material," explains Ken, "and we do plasma simulations, using small plasma-simulating devices that duplicate the behavior of the edge plasma. Although we cannot duplicate the very-high-temperature plasmas generated in fusion reactors, we can simulate quite adequately the plasma-edge conditions where the plasma, which is much cooler here, interacts with the wall itself."

In their studies of the interactions of tritium and hydrogen plasmas with the first-wall materials, Sandia researchers at both Livermore and Albuquerque work closely with the staff of the Princeton Plasma Physics Laboratory, which is operating the Tokamak Fusion Test Reactor (TFTR). Tritium is scheduled to be used to fuel the TFTR in 1991.

"Because Princeton scientists are dealing with a very stringent on-site tritium inventory, they are concerned about how much tritium will be incorporated into the walls of their tokamak," Ken explains. "They don't want to end up with all their tritium supply trapped in its walls after just a couple of discharges." Sandia's tests on a variety of wall materials are designed to preclude any surprises when the TFTR starts up, and to give the staff at Princeton a better idea of how the tritium will behave inside the reactor.

### International Tokamak

Another project is the International Thermonuclear Engineering Reactor (ITER), which grew out of the Reykjavik Summit between President Reagan and USSR General Secretary Gorbachev. The pro-



RION CAUSEY (left) and Wayne Chrisman (both 8347) are among those who conduct plasma experiments at the TRL.

posed international tokamak would involve the US, USSR, Japan, and the European community. Sandia has begun working with a number of labs around the country to look at some of the issues involved with materials for the ITER as well as the TFTR.

On the ITER project, Ken's division works with the 8310 materials group in Livermore; in Albuquerque the effort is divided between Div. 6248, which is focusing on high-heat-flux materials and engineering component development, and Div. 1111, which emphasizes ion-beam "postmortem analysis" for materials exposed in operating fusion devices.

"We will be using Sandia's unique facilities to examine what happens when energetic ions impinge

on a material as they do in a fusion reactor, and we are doing this research before TFTR operation so we can find the problems in advance and engineer around them," says Ken. "It's also necessary to make sure the materials are appropriate for next-generation machines."

"Looking downstream, we must address issues that pertain to the near steady state of a fusion reactor — where tritium permeation into walls will become a major concern because of the very high heating cycles expected," Ken concludes. "Again, Sandia's expertise in tritium containment and materials research in general will play a major role in making fusion a success."

## Top High School Science Students Win Trip to SNLL

A one-week, all-expense-paid study visit to Sandia Livermore awaits five outstanding high-school science students who won a DOE Special Award in the energy-research category at the recent International Science and Engineering Fair at Knoxville, Tenn.

Some 700 students from all 50 states and several foreign countries competed in 13 science categories at the annual fair in May, which attracts the best in future science talent.

The winners and their teachers, who will arrive in Livermore July 16, will work with engineers and researchers at Sandia, as well as with biochemists and environmental scientists at LLNL during their stay. Gary Drummond (8301) will coordinate the students' Sandia visit.

The students, their teachers, and their winning projects are:

- David Dommert (Brisbane, Queensland, Australia) and his father, a microbiologist. David's experiment exposed 120 plants to various levels of carbon dioxide to determine the impact of the encroaching "greenhouse effect" on plant life and agriculture;
- Philip Baltz (Fayetteville, Ark.) and his phys-

ics teacher, William Merrifield. Philip's project is the development and testing of a tubular solar air heater;

- Clifford Wang (Vero Beach, Fla.) and his biology teacher, Cheryl Domineau. Clifford's project is the enhancement of methane production with the use of different inoculums, transition metals as catalysts, and biomass pretreated before digestion;

- Ariel Lacsamana (Manila, Philippines) and his chemistry and biology teacher, Marion Mallorca. Ariel's project is a microbial fuel cell, induced with methylene blue as a mediator, constructed to offer an alternative source of electrical energy; and

- Khary Bridgewater (Saginaw, Mich.) and his physics teacher, Daniel Sealey. Khary's project is a study of how paints affect the total resistance of ship hulls to water.



DOE OFFICIALS' VISIT to see Livermore's fusion program included (from left) Peter Mattern (8300); Ken Wilson (8347); VP John Crawford (8000); Robert Dowling, Director of the Division of Development & Technology with DOE's Office of Fusion Energy; John Clarke, Associate Director of Fusion Energy in the Office of Energy Research; James Turner, Executive Assistant to the Associate Director of Fusion Energy; Anne Davies, Deputy Associate Director of Fusion Energy; Don Putz (8443); David Crandall, Director of the Division of Applied Plasma Physics in the Office of Fusion Energy; Walter Bauer (8340); and Jeffrey Auchmoody, Energy Research Budget Officer. (Not shown: Steven Eckstrand from the Office of Energy Research's Confinement Systems.)



### Congratulations

To Barbara (8235) and Frank Zaragoza, a son, Vincent Frank, June 9.

To Teresa and Barry (8343) Hess, a son, Spencer Vaughn, June 9.

### Sympathy

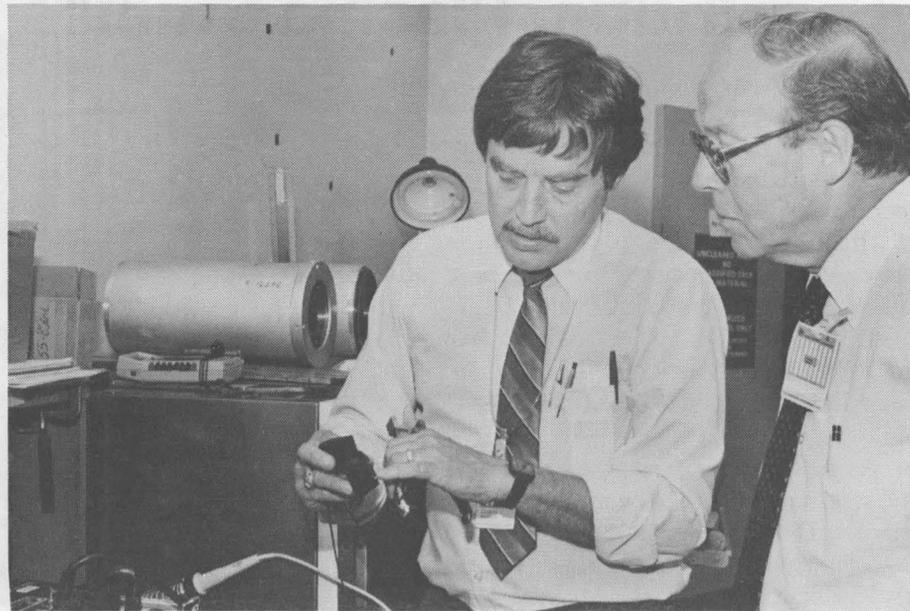
To Ted Sneddon (8164) on the death of his father in Tamaqua, Pa., May 28.

To Dick Cook (8272) on the death of his father in Spokane, Wash., May 28.

To Jim Wright (8150) on the death of his mother in San Francisco, May 31.

To Yon Perras (8272) on the death of his grandfather in Redwood City, Ca., June 2.

# IAEA Director General Visits Labs



HANS BLIX, Director General of the International Atomic Energy Agency in Vienna since 1981, visited Sandia last month for briefings on physical protection, international safeguards technologies, reactor safety, and treaty verification. He also toured the exterior sensor lab, the TOSI (Technical On-Site Inspection) facility, and the international safeguards labs, all of which are staffed by members of Nuclear Security Systems 5200. Blix, a native of Sweden, described current IAEA programs grow-

ing out of IAEA's charter — to assist in technology transfer and to perform safeguards work associated with the nuclear non-proliferation treaty of 1957. In left photo, Blix (left) discusses potential programmatic needs with Executive VP Orval Jones (20). In right photo, Dennis Mangan (5217) shows Blix the Cobra fiber-optic seal developed by Sandia for use by the IAEA.

*(Continued from Page One)*

## Video Link

can be viewed more easily and quickly by all the groups concerned.

"I fully expect that when people realize the value of video conferencing, our conference room is going to be 'saturated' with users," he notes.

Dick Schwoebel (1800) and Ron Detry (8200) concur. They have been exploring the possibilities of video conferencing for some time.

"I first became impressed with video conferencing when I saw it in operation at Hewlett-Packard five years ago," says Ron. "I'm delighted that improvements in the technology and lower prices have finally made it a practical communication tool for Sandia."

"Initially," says Dick, "the driving force behind setting up the video link was the possibility of saving time and travel dollars for intra-laboratory meetings. And such savings may in fact occur. But I think we may also find that reduced travel expenses and improved use of management time will constitute only part of the benefits.

"Some of the benefits may be less tangible — and more difficult to quantify," he continues. "For example, say that the use of video conferencing makes meetings easier to schedule, resulting in faster decisions and shorter, more productive meetings. That kind of result is more difficult to measure.

"And there are other questions. Can video conferencing improve decision-making by involving more people in the decision-making process? Can shorter, more frequent meetings really be more productive than less frequent, longer meetings? And so on.

"Of course," Dick continues, "the whole purpose of this three-month trial is to answer some of those questions and to find out where improvements can be made to support new applications or enhance usage. So we're encouraging people to come use the system and give us feedback on their experiences with it." ●DR

## Two Workers in Same Household: The Problems, the Advantages



Thirty or forty years ago, the traditional household or family unit was neatly categorized: Men were breadwinners, women stayed home to look after the kids and "run" the house.

No more, though. These days, in many instances, *two* people bring home the bacon. This turn of events, while advantageous in some respects (higher income is certainly one), also presents problems that didn't exist for people in the more "traditional" setup.

Albuquerque psychologist Marcia Landau will explore some of the problems of a two-worker household at the next Community Focus program on July 12 at noon in the Technology Transfer Center (Bldg. 825).

Landau's talk, "Dual-Career Relationships," takes a look at the emergence of the two-breadwinner situation and its demographic variables such as what kind of numbers we're looking at, most likely ages of people in dual-career households and where they live, and so on.

### Who Spends What?

The discussion focuses on problems that arise when two people in the same household work: money (examples: who makes what, who spends what?); child-rearing (day-care, who takes Junior to the doc-



MARCIA LANDAU

tor?); job transfers (to move or not to move); conflict resolution (it's your turn to call the plumber . . . or to cook . . . or to clean); and others.

In addition to her private practice, Landau currently serves as a clinical associate in the Dept. of Psychiatry at UNM and as a special-education consultant for the APS East Area Office. She has also worked as a consultant for the Public Health Service (Albuquerque) and for Casa Del Valle (an Albuquerque southwest valley development project).



MORE THAN 100 PEOPLE attended the DOE/AL Personal Property Management Conference recently hosted by Property Management Dept. 3410. Most represented DOE and other DOE/AL contractors from various parts of the country. Don Schubeck (3412, left) served as co-coordinator with DOE/AL industrial property management specialist Joyce Giles. DOE/AL organizational property management officer Ed Pietsch served as speaker and made introductions. Jim Martin (3400) welcomed the attendees on behalf of Sandia. Other Sandians appearing on the program were Vic Chavez (3412-2), G. C. Hollowwa (3411), Shirley Ramirez (3412-2), and Don Gatto (3412).

## Reserving Video Conference Room

In Albuquerque, call Jim Porter (2648) on 4-7640. In Livermore, call Cliff Skoog (8234) on 4-2097 or Donna Edwards (8234) on 4-2253. Provide this information:

- Date and time of your meeting;
- Approximate length of your meeting;
- Name of a conferee at distant site.

(Continued from Page One)

## TLC

example, fitness and blood-pressure control," she says. "Offering nine different avenues to a healthier life-style gives employees an opportunity to pick and choose what they feel will help them most."

"A real program strength is the interrelationship of TLC classes," adds Dr. Judy Ewing (3330), a TLC consultant and instructor. "For instance, participants learn that exercise is a key to reducing cholesterol or weight — or lowering blood pressure, for that matter. So participating in one class related to any of those concerns may take care of several problems at the same time."

Some new wrinkles have been added to the TLC program since it was announced by LAB NEWS on Oct. 11, 1985. Videotapes (1/2-inch VHS format) of class sessions — any of the nine areas covered by TLC — may be borrowed from the Technical Library. So if you miss a class session, or would like to take a peek at another class for which you didn't sign up, it's easy enough to get the scoop. One set of the tapes, non-circulating, is always available for viewing at the library; others may be checked out for home-viewing.

### Keeping Track of Exercise

A new computer logging system for people to keep track of on-their-own exercise is now available. "A person who's enrolled in the fitness/exercise class knows — probably to the minute — how much walking or running or aerobics he or she has done in a week," Susan says. "But once the class is over, the records aren't as meticulous. Unless, of course, someone keeps a faithful diary."

"Many fitness/exercise class 'alums' find that the new logging system makes it easy to keep track of those morning — or evening — runs and walks," Susan continues. "It's surprising how many people stop by during the day in Bldg. T-13 to log in their



TLC SUCCESS STORY: Andy Dumas (2312) lost 80 pounds in a year after he took the nutrition/weight-control class.

time on the computer. Each time, they add points to their individual records — one point per minute of exercise. Accumulating points to various totals results in a few goodies along the way — wrist wallets, tote bags, or T-shirts, for example. It's sort of an on-the-ground frequent-flyer program!" (Pete Egan, 3330, developed the logging-system software.)

TLC participants have responded enthusiastically to the program, according to Susan. "Debi Edwards' [3322] interpersonal communications class is one of the most popular," she says. "The word is out that Debi combines a good sense of humor with a lot of personal examples to get her message across; that's why, I'm sure, her class is always full."

"Getting healthy and staying healthy have obvious rewards," Susan continues. "Some accrue to the company — less sickness absence, lower health

## The "New" Andy

Andy Dumas (2312) is a real loser — a real *weight* loser, that is.

After he enrolled in the TLC weight-control class in January 1986, Andy lost 80 pounds in a year's time (from 280 to 200). He's managed to keep those pounds off with a combination of sensible eating habits and almost-daily exercise.

He reports that his waist size went from 44 to 34, and that he added an inch or two to his chest measurement.

"TLC taught me a lot about what — and what not — to eat," says Andy. "And you know what? I discovered that what I used to call 'rabbit-food' — carrots and celery and all that other crunchy stuff — isn't all that bad. Basically, it's a matter of upping your protein/complex-carbohydrate intake and cutting back on the foods that contain a lot of fat."

Andy's exercise program includes stationary-bicycle riding and weight-lifting — five or six times a week.

"Watching the diet is good for you, and exercising is good for you, but *combining* them is what really gets results," Andy concludes.

care costs, for example.

"But participants benefit too. So they're understandably proud of their accomplishments in the program. We've seen some outstanding success stories along the way [see "The 'New' Andy"], and we're hoping for many more."

"Sandians' enthusiastic response to TLC makes it quite clear that feeling good — about themselves and their life-styles — is a primary objective," Susan concludes. "We feel certain that TLC will continue to further that goal." ●PW

## Events Calendar

July 1 — Zoo Music (new summer concert series in cooperation with the Albuquerque Cultural Affairs Dept.): folksingers Bonnie Bluhm and Lisa Fink, Elliot Rogers and the Ramblers playing new bluegrass music; 7:30 p.m., Rio Grande Zoo, 848-1370.

July 1-2 — UNM Summerfest '88 Festival of New Plays: "Dilly, Dilly," bizarre comic drama (set in the future) that examines greed and revenge; 8 p.m., Rodey Theatre, 277-4402.

July 1-4 — Third Annual Art Windows on Route 66: juried exhibition of storefront art installations in the Nob Hill District (Girard to Washington on Central Ave.); free, 251-2047.

July 1-17 — "Mexico Nueve: A Suite of Lithographs," exhibit of 18 lithographs pulled at Tamarind Institute, featuring original prints by contemporary Mexican artists; regular museum hours, Van Deren Coke Gallery, UNM Art Museum, 277-4001.

July 1-22 — Annual Raymond Jonson Summer Exhibition, selected works from the Jonson Reserve and Estate collections featuring abstract landscapes; regular museum hours, Jonson Gallery (UNM), 277-4001.

July 1-23 — "Under Milkwood," classic play by Dylan Thomas about life in a Welsh fishing village; 8 p.m. Fri.-Sat., 2 p.m. Sun.; Rep East (educational arm of the New Mexico Repertory Theatre at 3211 Central NE), 260-0331.

July 1-24 — "New Traditions: Thirteen Hispanic Photographers," exhibit of works by New York-based photographers from Chile, Cuba, Colombia, Venezuela, Spain, Brazil, and North America; regular museum hours, upper gallery, UNM Art Museum, 277-4001.

July 1-24 — "Born Yesterday," classic play by Garson Kanin about a young woman's rebellion against a domineering man and his political cor-

ruption; 8 p.m. Fri. & Sat., 6 p.m. Sun.; Vortex Theatre, 247-8600.

July 1-Aug. 31 — "Dinosaurs in Action," new exhibit of four mechanical dinosaurs: adult and juvenile triceratops, brontosaurus, and tyrannosaurus; 10 a.m.-5 p.m., New Mexico Museum of Natural History, 841-1374.

July 2 — "Spirit '88," sponsored by KGGM-TV 13 and KAFB, entertainment, orchestra concert, and fireworks display; 11 a.m.-10 p.m., KAFB Flight Line, 844-5991.

July 2 — "Ralf Ralf," mixture of exotic vocal techniques, clowning, and fun; 8 p.m., KiMo Theatre, 848-1374.

July 2 — Summerfest '88: Americana and Native American Night, food, entertainment, and arts and crafts; 5-10 p.m., Civic Plaza, free, 768-3490.

July 2 — "Turning," play presented by La Compania de Teatro de Albuquerque; 7:30 p.m., South Broadway Cultural Center, 848-1320.

July 2-4 — Annual 4th of July Arts & Crafts Fair: Southwestern Native American arts and crafts, food, dances, more; 9 a.m.-5:30 p.m., Indian Pueblo Cultural Center, 843-7270.

July 3 — Fireworks displays: Old Town Optimists Club display, dusk, NM State Fairgrounds, 265-1791; American Legion Fireworks Spectacular, dusk, University Stadium, 243-1901.

July 4 — Nambe Waterfall Ceremonial: Bow & Arrow, Buffalo, Corn, Harvest, and Snake dances by visiting tribes; call for time, Nambe Pueblo, 843-7270.

July 5-28 — "Man's Point of View," art from a man's point of view; 8:30 a.m.-5 p.m. Mon.-Sat. (open until 8 p.m. Wed.); South Broadway Cultural Center, 848-1320.

July 8-9 — UNM Summerfest '88 Festival of New Plays: "Ah, Women . . .," three one-act plays about the lives and loves of women; 8 p.m., Rodey

Theatre, 277-4402.

July 8-24 — "Barefoot in the Park," Neil Simon comedy about a newlywed couple's first two weeks together; 8 p.m. Fri.-Sat., 2 p.m. Sun.; Albuquerque Little Theatre, 242-4750.

July 9 — "Daylilies, Picture That," hemerocallis and daylily show and sale; 1-5 p.m., Albuquerque Garden Center (10120 Lomas NE), 296-6020.

July 9 — Summerfest '88: Korean Night; 5-10 p.m., Civic Plaza, free, 768-3490.

July 10 — Arts in the Parks: music, Ballet Folklorico, and other entertainment; 1:30-4 p.m., Civic Plaza, free, 764-1525.

July 13-14 — UNM Summerfest '88 Festival of New Plays: "Ah, Men . . .," three one-act plays about the male ego and all that goes with it; 8 p.m., Rodey Theatre, 277-4402.

July 15 — Crownpoint Rug Auction: rug viewing 3-6:45 p.m., auction 7 p.m.; Crownpoint Elementary School, 786-5302.

## Take Note

Recent Albuquerque Academy graduate Kevin Kuswa (son of Glenn, 4030) received the National Forensic League award for being the best high school debater in the country. The eight-person Albuquerque Academy team also won the national championship by one point over almost 200 teams from around the country during a week-long competition in Nashville, Tenn.

\* \* \*

Marjorie Whipple (7832) was invited by the Society of Women Engineers to present her paper, "Building Noise Control," at the Society's annual convention in San Juan, Puerto Rico, on June 26.

DAVE GELET (2312) AND KAREN DRAGON (1413) admire the young trees and shrubs at Hardin Field as they stroll along the site of the new footpath.



### Phoenix Rising from Sawdust

## Hardin Field Springs from Parade Ground

Before you bemoan the conversion to sawdust of the poplars bordering Hardin Field (the old Parade Ground), take a moment to visualize their replacements — tall new trees and ornamental shrubs on either side of an inviting walkway circling the field, and new grass filling the open area.

Field-watchers will note that some trees and shrubs are already in place across the south end of the field. That was the Sandia/DOE contribution to the renovation project, a joint effort by the 1606th Air Base Wing, 1550th Combat Crew Training Wing, AFOTEC, DOE, and Sandia.

"In addition to the trees and shrubs, we installed the irrigation system for our section," says Walter Heimer (7831), the project engineer for Sandia. "And we provided the electronic irrigation controller for the entire field."

Like the poplars originally planted on the former Sandia Base parade ground (LAB NEWS, April 22, 1988), the London-plane sycamores replacing them will grow quickly. "They'll make the field look good fast," continues Walter.

"The trees are 12 feet tall now," says KAFB Management Agronomist Bob Dow, who heads the entire project. "With proper care, they'll grow to be 40 to 80 feet tall." (The old poplars are/were 60 to 70 feet tall.)

While the planting continues, the field remains

in use for events like Sandia's Fitness Day and other special events; once the renovation project is complete, use of the field may be expanded.

According to the plans drawn up by landscape architects at Morrow & Company, the two lines of sycamores, Afghan pines, and blue-point junipers around the field will provide a shady arbor for the gently winding footpath of decomposed granite and sand. Baca's Trees is the contractor planting the greenery.

"The initial plan for the renovation project was drawn up three years ago, when the poplars were giving out," says Bob. The project should be finished by October, a time eagerly awaited by noontime strollers.

## Take Note

Jennie Negin (3140) was one of 30 women chosen for the Governor's Award for Outstanding New Mexico Women. Gov. Garrey Carruthers honored the recipients at a banquet sponsored by the New Mexico Commission on the Status of Women on June 25 in Albuquerque.

\* \* \*

Ron Loehman (1840) is the US recipient of the 1988 Richard M. Fulrath Award presented by the American Ceramic Society. Fulrath Awards are granted each year to three Japanese (one from academia and two from industry) and one American. The annual Awards and the associated Memorial Symposium contribute "to development and strengthening of discussions, good relations, and friendship between American and Japanese ceramists." Richard Fulrath was a professor of ceramic engineering at UC Berkeley who established a good rapport and understanding with the Japanese ceramic community. Upon his death, his friends in Japan set up a committee to establish the memorial.

\* \* \*

ASM (American Society for Metals) International recently elected Mark Davis (1830) a Fellow of the Society in recognition of his contributions in the field of materials. His citation reads, "For sustained creative leadership in basic and applied research in microwelding, geothermal, and fusion energy systems, particularly in support of DOE weapons and energy programs."

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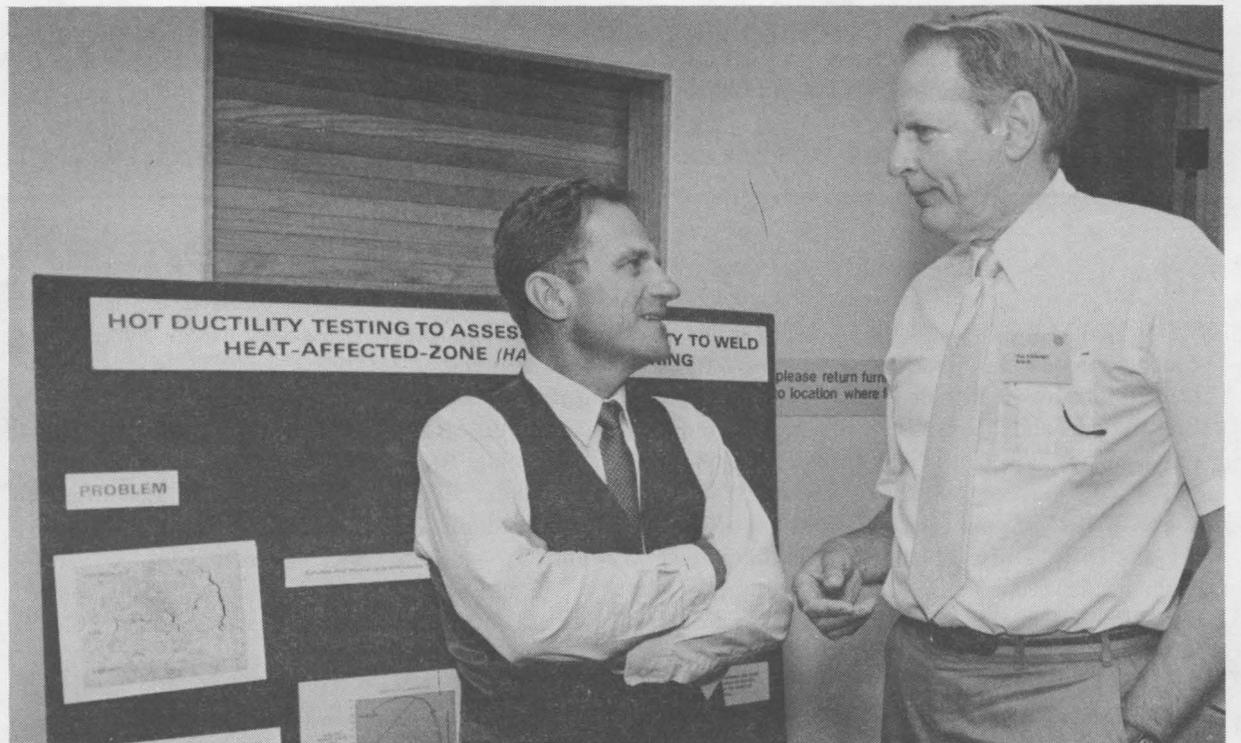
Bill Gardner (7865) was recently selected "Boss of the Year" by the La Luz chapter of the American Business Women's Assn.

### Nobel Chemist on the Complete Education



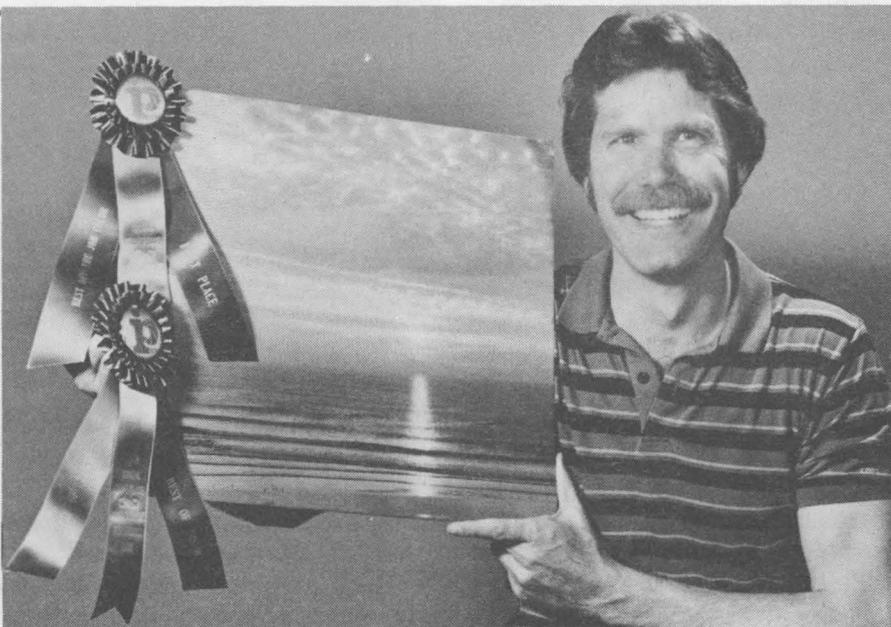
To today's science students, I would say this: "Sure, push ahead in science as much as you can. But in college, you have the first and best opportunity to absorb the great ideas of civilization — the literature, the philosophy, the art, the music — without which we cannot be complete human beings. Don't let yourself be captured just by science. The world is there to be perceived. If you can fulfill an English requirement by reading Chaucer or by reading science fiction, for God's sake, take the Chaucer." Every citizen, whether in science or not, ought to know chemistry, physics, and biology at some level. People should have the right to decide technical questions; with that right comes a responsibility to learn enough science to be able to judge the basic issues. Science is an essential part of our culture. To deal with the complicated, technological world of tomorrow, one needs the lessons of both science and the humanities.

Roald Hoffman, *US News & World Report*



SOME 65 REPRESENTATIVES from the specialty metals industry, universities, and government agencies attended a recent Sandia-hosted workshop to share technology on melting and liquid-metal processing. Here, workshop chairman Frank Zanner (DMTS, 1833), left, talks with Max Schlienger, president of Retech (Ukiah, Calif.), between meeting sessions at the Tech Transfer Center. Workshop activities included tours of the melting and solidification lab (Div. 1833) and the ceramic mold facility (Div. 7476). Other Labs divisions involved in workshop planning and coordination were 1513, 1841, and 2812.

PAUL SEALEY'S (2832) COLOR PHOTO, "Ocean Beam," won Best of Show and first place in the Off the Job Color category in recent competition sponsored by IPSW (Industrial Photographers of the Southwest). The photo, a San Diego sunset scene, bested some 50 others in its category, and was judged overall winner from the approximately 130 entries in the show. Another photo by Phil Apodaca (7556) took second place in its category (Historic Southwest Black/White); the photo, entitled "Queen of Albuquerque," shows San Felipe church in Old Town.



## Fun & Games

**Golf** — SWGA played a nine-hole major tournament at UNM-South Golf Course on June 18. Winners were: A Flight — low net, Sandra Monroe (1845); low putts, Faye Joy; blind draw 9 gross, Carolyn Neugebauer (2854); and blind draw 9 net, Renae Dietz (6410). B Flight — low net, Minnie Shurick; low putts, Marijo Hinrichs (3544); blind draw 9 gross, Phyllis White (5122); and blind draw 9 net, Teresa Mills (3723). C Flight — low net, Peggy Burrell (3543); low putts, Ruth Wright (ret.); blind draw 9 gross, Ginny Moore (3545); and blind draw 9 net, Nina Coe (3718).

The next 18-hole tournament is at Cochiti on July 23. A trip to Pagosa Springs is planned for July 9-10. SWGA's mentor program is well underway. For more information and to join, call Marijo Hinrichs on 6-0464.

# Recertify Class II Dependents by 7/15

All Class II dependents enrolled in the Medical Care Plan before April 1, 1988, will lose their coverage on Aug. 1 if their eligibility is not recertified by July 17.

If they are not recertified, there will be a break in coverage. This means they're not covered by your medical insurance. And if you re-enroll them later, coverage will cost you \$50 per month per Class II dependent.

Therefore, if you have a Class II dependent enrolled, please see Doris Mason, Benefits Div.

3543, Bldg. 832/East, to certify that your dependent continues to be eligible for coverage. (If you live outside the Albuquerque area, call Doris on 505/844-3545, FTS 844-3545.)

Participants enrolling new Class II dependents after Jan. 1, 1987, will continue to be charged \$50 per enrollee. All Class II dependents enrolled before that date and continuously enrolled thereafter are not subject to the \$50 monthly payments.

(Generally, Class II dependents include your

unmarried children over 24, your unmarried grandchildren, your brothers and sisters, and your or your spouse's parents and grandparents. Class II dependents must be financially dependent on you, must have lived in your home or one provided by you for at least the last six months, and must have a total income of less than \$7800 per year. For a more precise definition, see page 8 of your "Medical Care Plan" booklet, dated October 1986.)

UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS

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

**Ad Rules**

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

**MISCELLANEOUS**

POOL TABLE, regulation size, 3/4" slate, new felt top, all accessories, \$300. Gonzales, 296-8138.

FRIGIDAIRE REFRIGERATOR, 15 cu. ft., \$150; white dinette set, 5 chairs w/casters, \$75 OBO. Brewster, 884-8312.

THIRD SEAT for '87 Suburban, new, blue; Quadrajel carb, trunk luggage rack for Firebird. Arnold, 294-7160.

SANDIA CREST CAMPING RESORT MEMBERSHIP, coast-to-coast resorts available, \$4000 negotiable. Peters, 869-2136.

CRAFTSMAN LAWN MOWER, 22", 4-hp, self-propelled, used three seasons, \$150. Guttman, 888-5114.

EARLY AMERICAN LA-Z-BOY CHAIR, \$35; padded Umbreller stroller, \$15; Century Way-to-Go stroller, \$50; car seat, adjustable, w/car hook, \$25. Moulton, 293-0373.

BATTERY CHARGER, dual-rate, 6-12 VDC, 6/2-amp, \$20. Rainhart, 821-3690.

SEARS HEAVY-DUTY WASHER AND DRYER, queen-size sofa bed, teak bar stools, 20" electric lawn mower, TV antenna. Clauss, 266-9319.

MAN'S RACQUETBALL GLOVE, right hand, small, Excellon tackified, used twice, \$10. Barr, 821-5870.

GARAGE SALE: kitchen cabinets, sink, more, 805 Eastridge Dr. NE (south of Lomas), 9 a.m.-4 p.m., June 25. MacPherson, 293-1090.

O'BRIEN SAILBOARD, 6.0 sail, retractable dagger board, footstraps, beginning through intermediate, \$390. Fine, 268-4491.

KANGAROO GOLF CADDY, "Big Joey," new battery, new wide wheels, battery charger included, \$325. Maes, 298-2294.

WINE-MAKING EQUIPMENT, complete, cost \$100, will accept any reasonable offer. Van Domelen, 299-3674.

STUDENT DESK AND CHAIR, wood slat construction, lift top, \$30; Singer treadle sewing machine, treadle missing, you haul. Mauldin, 293-3763.

ACOUSTIC GUITAR, Tachomini, w/case, \$250; Wards sewing machine, \$175. Pryor, 294-6980.

RUGER AUTOMATIC PISTOL, .22-cal., NLB, \$160. Greene, 299-4163.

DINING TABLE, leaf, 6 chairs, \$100; Panasonic video recorder, auto-focus, operates w/portable VCR (not included), \$300 OBO. Alexander, 291-8028.

SOFA, earth tones w/blue accent, \$175; end table and coffee table, \$180; all traditional style and OBO. Garcia, 889-3039.

WOODEN CHEST, 30" x 70" x 16", 9 drawers, \$45; child's maple rocking chair, \$20; white hardwood crib, \$35; metal high chair, \$20. Reid, 268-6506.

TRS80 64K COMPUTER, color computer controller, disk drive, keyboard; cleaning head; 19 unused disks; disk tray and manuals (no mouse); \$500 value, sell for \$300 OBO. Nielson, 294-1281.

DINING ROOM TABLE, ranch oak, 6 chairs, 2 leaves, \$500; German hutch, 9' long, \$395. Opichka, 294-4985.

IGUANA LIZARD, large, green, vegetarian species, w/accessories, \$100 OBO. Trollinger, 884-3834 or 268-3414.

TRAILER HITCH for Mercury Zephyr or Ford Fairmont, \$25. Jones, 843-9645.

MEDICINE CHEST, \$10; vanity w/sink, \$15; towel racks, \$5; 23" x 48" vanity, \$40; 2' x 2' window, \$5. Benton, 877-2473.

MALE ROTTWEILER, 17 months old, \$300; 100' fence, 6' high, \$180. Smith, 275-8185.

"GREAT BOOKS OF THE WESTERN WORLD," complete w/syntopicon ("Great Ideas") and bookcase, \$350 cash OBO. Stokes, 294-4979.

ANTENNA FOLD-OVER TOWER, self-supporting, 31' tall, best offer. Huddle, 881-2971.

GI JOE AIRCRAFT CARRIER, 3' x 6', w/accessories, cost \$100, sell for \$50 OBO. Cook, 293-8805.

TRIUMPH ENGINE PARTS, 1197cc and 1300cc blocks, 1197cc head w/intake valves, pistons, rods, clutch parts, oil pan, more, \$75/all. Skogmo, 294-0133.

FOUR PUPPIES, 50% Doberman, 38% wolf, 12% malamute, born May 12, \$50/ea. Johnson, 296-3431 evenings.

YASHICA 35mm CAMERA, 2 lenses (reg. and wide-angle), flash, case, \$145. Marquez, 344-8455.

CARTOP CARRIER, fits cars with or without rain gutters, \$20. Drayer, 821-4017.

ELECTRICAL FIXTURES: contemporary 10-light chandelier, \$50; gold-color hall and swag fixtures, \$20/ea. Miller, 299-2194.

CAMPER SHELL, low profile for pickups like Datsun or Toyota, fits beds 6' long x 5' wide, red and white, \$75. Cox, 892-2906.

WOODEN WORK TABLE, 30" x 48", \$8; adding machine, w/tape, \$10; oscilloscope, 5" tube, \$20; all prices OBO. Cole, 298-1464.

CAMPER SHELL for Mazda B2000 pickup ('82 model), \$230 OBO. Petruno, 265-1826.

10-GAL. AQUARIUM w/metal stand; metal clothes-storage cabinet; commercial-grade metal shelves; chifforobe. Treusch, 897-3521.

COUCH, 7', cream silk, \$500; child's bedroom set, 3 pieces, dark wood, \$750; full-size viola, \$1100. Jones, 823-1397.

WASHING MACHINE, \$120; Polaroid SX-70 camera, \$35 OBO. Heifetz, 275-2648.

CHARCOAL GRILL w/motorized spit, \$15. Hayes, 299-5832.

CUSTOM LOUVER SHUTTERS, white, double-hung, covers area 70" wide x 50" high, \$75 OBO. Walkington, 842-1938.

BEAGLE PUPPIES, AKC-registered; wooden rocking chair, \$40; maternity clothes, larger sizes; peach ceramic table lamp, \$35. Wilson, 821-5442.

OSBORNE PORTABLE COMPUTER, 64K RAM, two 185K floppy disk drives, software, manuals, and "FOG" magazines. Thompson, 296-1654.

ENTERTAINMENT STAND, solid wood, medium stain, 15" deep, 4' wide, 6' tall, holds all video and stereo equipment. Shortencarier, 292-3575.

COOK TOP, General Electric, yellow, requires 20" x 30" cutout, \$50 OBO. Strip, 292-7490.

TELEPHONE CHAIR, hardwood, \$20; steel casement window, fits rough opening 71-1/2" x 27-1/2", \$15. Trump, 299-5162.

40-GAL. AQUARIUM, with or without fish, all accessories included, w/stand, \$100; 10-gal. aquarium, \$25. Mozley, 884-3453 leave message.

**TRANSPORTATION**

'80 CHEV. MONZA, 4-spd., 2.5-litre 4-cyl., new tires and battery, rebuilt alternator, \$1200. Gonzales, 296-8138.

'77 BAJA SKI BOAT, 15', 115-hp Mercury w/power tilt/trim, carries 30 gals. fuel, travel cover, \$4250. Fine, 268-4491 or 873-1356.

HONDA AERO 80 MOTORCYCLE, 2K miles, red, \$525 OBO. Watson, 281-2691.

'85 OLDS. CUTLASS SUPREME BROUGHAM, V-6, 4-dr., loaded, 21K miles, \$7750. Reavis, 296-0007.

'80 BUICK SKYLARK, 2-dr., PS, PB, AC, AT, cruise, 67K miles, \$1250 OBO. Landrum, 889-3110 after 5.

'82 HONDA 750, \$1500. Riney, 299-1457.

'80 YAMAHA 250; '80 Kawasaki 250, \$400 OBO. Garcia, 823-6630.

'73 VOLVO 1800ES, AT, AC, leather, \$7000 OBO. Micono, 892-0784.

MOUNTAIN BIKE, 24" Shogun Prairie Breaker III, \$225. Pryor, 294-6980.

'83 GMC SIERRA PICKUP, 3-spd., AM/FM stereo cassette, 305 V-8, rear sliding window, dual fuel tanks, book value \$5200, sell for \$4000. Garcia, 839-0316 after 6.

'76 DODGE MAXIVAN, 1-ton, custom interior and exterior, 360 reconditioned engine, new paint, AC, \$3800. Perryman, 281-3020.

'70 VW BUG, 82K miles, \$1500 OBO. Trollinger, 884-3834 or 268-3414.

'85 CHEV. S-10 PICKUP, 4x4, short bed, 2.8L V-6, 17K miles, AT, PB, AC, Tahoe package. Higgins, 293-8624.

'81 CADILLAC FLEETWOOD BROUGHAM, sedan, loaded, CB, one owner, 46K miles, Michelin tires. Davies, 296-6905.

'76 HONDA CB500T, adult-ridden, never wrecked, fairing and trunk, \$600 cash OBO. Stokes, 294-4979.

'73 NEWPORT HT, \$400. Allison, 294-5476.

'86 HONDA ATC 125, electric start, reverse, helmet included, \$750 or make offer. Parks, 281-2634.

'83 CUTLASS SUPREME, white w/ brown interior, \$3500 OBO. Serna,

842-9384 after 5.

5-SPD. SCHWINN COLLEGIATE, 24" wheels, yellow, w/accessories, \$100 OBO. Cook, 293-8805.

'82 JEEP SCRAMBLER PICKUP, 6-cyl., 5-spd., 4x4, w/locking hubs, one owner. Worthen, 869-2027.

'77 BLAZER, 4x4, AC, AT, 350 engine, tilt, lock-out hubs, more. Baca, 831-9414.

GIRL'S BICYCLE, rugged tires, one gear, for 8 to 10 year old, \$25. Rosul, 281-4114.

'76 DODGE ASPEN SE, 25K miles, \$2600. Nelson, 883-9566.

'87 TOYOTA FORERUNNER, 4x4, repo, 5-spd., PS, tilt, AM/FM stereo, 29K miles, bids accepted through July 15, we reserve the right to refuse all bids subject to final sale. Sandia Laboratory Federal Credit Union, 293-0500.

'84 CHEV. K-5 BLAZER, 39K miles, loaded, Silverado package, \$9600. Ross, 821-6366.

'72 DATSUN 510, 4-dr., \$375. Rhoads, 298-6157.

'60 CHEV. PICKUP, rebuilt transmission, new master cylinder, 4-year-old rebuilt engine, \$1200. Drayer, 821-4017.

'84 PONTOON BOAT, 21', w/trailer, 40-hp Suzuki engine, oil injection, Coast Guard Auxiliary patrol boat, fully equipped, \$5000. Morrisroe, 898-2784.

'73 PLYMOUTH FURY, 4-dr., w/trailer-towing package, needs AC/heater switch assembly, \$400 OBO. Houston, 299-4118.

'77 NOMAD RV, loaded, 21', w/campground membership (including free storage and nationwide camping at \$1/night), \$7500. Justice, 822-0505.

'85 CADILLAC SEVILLE, loaded, blue, \$1500 OBO; '82 Toyota pickup, LWB, AT, AM/FM, AC, \$3600 OBO. Gallegos, 294-0233.

'86 KAWASAKI NINJA 600R, 2K miles, garaged, \$2600 OBO. Turner, 877-5649.

TWO DIRT BIKES: '74 CAN-AM, 175cc; '74 Elsinore, 125cc; \$150/ea. as is. Davis, 293-7457.

'79 OLDS. CUTLASS SUPREME, loaded, power everything, 78K miles, \$1750 OBO. Patteson, 836-0140.

'84 VOLVO SW, turbo. Walter, 884-4282.

'78 OLDS. 98 REGENCY, blue, 2-dr., fully loaded, \$1950 OBO. Chavez, 897-1442.

'83 CHEV. 210 PICKUP, extended cab, 4-WD, AC, PB, PS, one owner, \$5900. Padilla, 821-4839.

O'DAY DAYSAILER II, 17', main and jib, motor mount, hiking straps, garaged, trailer w/spare, \$2495. Huguen, 296-2600.

**REAL ESTATE**

MOBILE HOME, '84 Solitaire, 14' x 70', 2 full baths, garden tub, solid oak kitchen cabinets, more, NADA \$23,372, \$17,500. Bonner, 275-9650.

4-BDR. HOME, Sandia Heights, 2-1/2 baths, vaulted ceilings, city and mountain views, natural gas, solar, automatic sprinklers, built-ins, two-way FP, skylights. Gonzales, 294-2060.

2.5-ACRE WOODED LOT, 1.8 miles off S-14, electricity, phone, water system possible, \$19,900. Swahlan, 292-3598 leave message.

20 ACRES MOUNTAIN LAND, within Cibola National Forest boundary, off

So. 14, 35 miles south of Tijeras, trees, water. Zawadzkas, 884-8956.

2.05-ACRE WOODED LOT, utilities available, county-maintained road, 18 miles from Albuquerque, \$20,000. Steinfort, 281-9893.

2-BDR. CONDOMINIUM, Winrock Villa, new carpet and drapes, 3 pools, security guard, \$56,500. Beckner, 296-1729.

1-BDR. MOBILE HOME, '68 Central, 12' x 60', 1 bath, stove, refrigerator, washer, dryer, partly furnished, Wyoming Terrace Mobile Home Park. Hill, 294-7534 or 298-1444.

4-BDR. HOUSE, 1-3/4 baths, 1986 sq. ft., near Tramway and Indian School, landscaped, \$122,900. Yost, 884-9704.

2-BDR. MOBILE HOME, '81 Redman, 14' x 70', 2 baths, family section Shaw Mobile Home Park, \$16,700. Kayser, 292-5659.

3-BDR. HOME, New Holiday Park, 1890 sq. ft., LR/DR, den w/FP, corner lot, within walking distance of schools, \$98,750. Griffin, 298-1174.

2-BDR. CONDO, Spain & Juan Tabo area, 1 bath, 1004 sq. ft., 2 years old, refrigerator included, assumable 9.99% NMMFA loan, \$64,900. Smith, 292-6676.

3/4-ACRE LOT, Skyland subdivision off South 14, trade for motorhome. Foster, 281-3975.

RUIDOSO TIME SHARE CONDOMINIUM WEEKS, one week in May and one week in Oct., \$1500/ea. Sargent, 298-7977.

3-BDR. HOME, NE Heights, 1-3/4 baths, den w/wood stove, 1500 sq. ft., 9.5% FHA with no qualifying, \$8000 equity, \$79,500. Mitchell, 275-1527.

3-BDR. HOME, near Tramway & Indian School Rd., 1-3/4 baths, 1600 sq. ft., landscaping, 9-1/2% FHA w/no qualifying, \$17,000 equity, \$95,500. Righter, 294-5147.

3-BDR. CUSTOM HOME, 2.2 acres, North 14 near I-40, passive solar, spring. DeBey, 281-9745 after 5.

7 ACRES in Manzano Mountains, near Hwys. 217/222, trees and meadow, phone and electricity nearby, \$3750 terms available. Kelton, 281-8224 or 345-3834.

**WANTED**

BABYSITTER for Living Single singles group, for group or individual care, evenings. Lambert, 294-4188 leave message.

BABY ITEMS, need everything. Pryor, 294-6980.

CAMPER SHELL for full-size short-bed Ford F-150. Davidson, 293-9486.

WEIGHT BENCH and weights. Rosul, 281-4114.

MARINE CORPS DRESS BLUES, size 40-42, to rent or borrow, cap size 7 to 7-1/8, for picture-taking. Zownir, 256-3753.

TENNIS PARTNER(S) for intermediate recreational play. Owen, 299-3487.

**WORK WANTED**

MOWING, TRIMMING, watering jobs, by responsible teenager, near Juan Tabo and Indian School Rd. intersection, can provide mower. Perrine, 293-1429.

**LOST**

PRESCRIPTION SUNGLASSES, bifocal, in case, lost June 10 in the TTC. Stirbis, 299-8442.

# Flag-Wavers, Unite! Join Your Patriotic Peers on Monday

PEOPLE parade to the Club next Monday (July 4) for a sizzling Independence Day celebration in the pool/patio area (11 a.m.-6 p.m.). A BBQ buffet befitting this granddaddy of picnic days serves up some all-American alfresco treats: spareribs, steak, burgers, hot dogs, BBQ beef, baked beans, potato and macaroni salads, and more. Sousa marches and other stirring songs from the Municipal Band get you in the spirit from 11 to 2, and the Sounds Unlimited DJ continues the music until 6. Lots of fun and games all day (and lots of prizes). Members get in free (bring the card), and guests pay \$2.50.

WHO wouldn't want to start the long weekend with a barbecue party tonight, followed (8 p.m.-midnight) by the sagebrush-shuffle tunes of Isleta's most famous citizens — the Poor Boys? Dinner includes BBQ ribs or chicken, baked beans, baked potatoes, and an optional salad bar. Kids under 12 get a small portion for \$1.50, so bring the family. Reservations requested by those BBQ-preparers in the kitchen (265-6791).

CAN'T FACE the heat? Come out to the cool pool and pleasant patio on Family Nights, scheduled every Wednesday evening all summer from whenever-you-get-there until 8 p.m. (The first one's next Wednesday, July 6.) Forget the cooking, because the snack bar and grill will be open for your dining pleasure (burgers, hot dogs, pizza, and a salad bar, plus 50-cent beer and other drink specials). Regular admission rates: pool-pass holders, free; Club members w/o passes, \$1.50; and guests, \$2.50.

THE MUSIC will be 40s- and 50s-style next Friday night (July 8), when Roland DeRose and his group put out the Big-Band sounds from 8 p.m. until midnight. Start out with a buffet featuring prime rib or halibut, plus vegetables, salad bar, and beverages. Reservations recommended.

WILL all would-be politicians please step forward? C-Club Board elections are coming up (as usual) in September. Needed are nominees for seven slots on the Board. If you'd like to be a Board member, or know someone who would, please call one of the following: Steve Ross (3437), 4-2372; Al Chavez (3543), 4-2739; or Alice Maese (133), 4-7716. Deadline for nominations is July 11.

NEVER GET TO win anything? Your chance is now. Come on out for Bingo Night on July 7 and add your name to the growing list of folks who are taking home some very nice cash prizes. Card sales start at 5:45 p.m., and the first game begins an hour later. Meantime, fortify yourself with some reasonably priced soups and sandwiches before the action begins.

LEAD the way to good times when you're first in line at the T-Bird card shark wheel/deal session on July 14. Gaming starts at 10 a.m. It's a good deal for everybody: great conversation, cards, and refreshments — all free.

Speaking of T-Birds, the group gets together for its monthly lunch/program meeting on July 11. Following lunch at noon (on the patio), Nick DeLollis will talk about his Elder Hostel experiences at 1 p.m. (Elder Hostel, a year-round program for folks 60 and older, provides travel opportunities and college program participation — in many countries — at reasonable cost.) Check the schedule board in the lobby for program location.

More for Thunderbirds: Plan to attend a defensive driving course sponsored by AARP on July 20-21 at the C-Club from 8:30 a.m. to 12:30 p.m. Course participation may give you a break on your auto insurance costs; check with your agent. Cost is \$9.50. More info from Bernie Brown (281-3608) or Tex Vandt (255-0685).

THE BAND of people signing up for C-Club trips grows by the minute — and no wonder, given the selection of places to go and things to do. Here's a sampling:

*Raft Trip (Aug. 8-15)* — There's still some room in the second boatload, says leader John Shunny (ret.). Travel 280 spectacular Colorado River miles (from Lee's Ferry to Lake Mead). The \$750 tab covers all meals on the river trip and bus transportation back to Lee's Ferry.

*Magnificent Mountains (Aug. 27-Sept. 4)* — This one-of-a-kind trip through the Canadian Rockies provides moments to remember for a long time. The price of \$876/person (double) covers eight nights' lodging, RT air fare to Calgary, ground transportation, and much more. Make a \$300 deposit when you sign up; balance is due July 27.

*Mesa Verde/Durango (July 14-17)* — An invigorating itinerary includes southern Colorado (Mesa Verde, Durango/Silverton narrow-gauge train trip) and northern New Mexico (Chaco Canyon, Chama). Prices start at \$334, and include RT bus fare, lodging, and some meals.

## Congratulations

To Sally Kalembe and Bill Patterson (DMTS, 5165), married in Salzburg, Austria, May 31.

To Ruth and Wilbur (2857) Martin, a daughter, Rebecca Lynn, June 9.

To Kathleen and Ted (1522) Blacker, a son, Bryan Christopher, June 13.

To Judy (5256) Beiriger and Bob Veroff, a daughter, Rachel Lynn, June 14.

To Amanda and Mark (7472) Stavig, a daughter, Ashley Elizabeth, June 15.

To Sabina Erteza (5212) and Doug Jordan (9131), married in Albuquerque, June 24.

## Sympathy

To Claire Evans (3523) on the death of her stepfather in Albuquerque, May 27.

To Jenny Yost (3431) on the death of her grandmother in Princeton, W. Va., June 1.

To Christopher Reiser (1124) on the death of

his mother in Joliet, Ill., June 8.

To Bob Wayland (9122) on the death of his mother and Susan Wayland (3723) on the death of her mother-in-law in Lubbock, Tex., June 8.

## Why Bother Firing?



Marksmen at the US Olympic Training Center are using a specially designed infrared laser to hone their aim. The laser — about as big around as an index-finger and similar to those used in medical devices — is mounted under a gun barrel and fires an invisible beam at a target 54 yards away. A TV screen displays the laser as it strikes the target, so a coach can observe how accurate the aim is before the gun is fired.

Laurie Kretchmar, Wall Street Journal

## Retiring



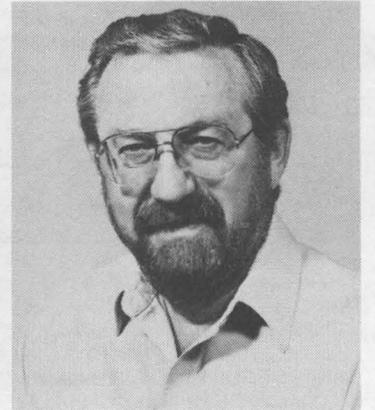
Art Mullendore (DMTS, 1841)



23 yrs. Peggy Cole (3543)



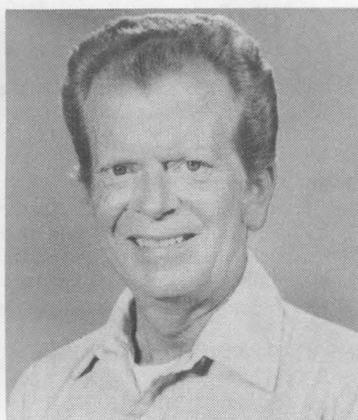
15 yrs. Marshall Tippy (3316) 37 yrs.



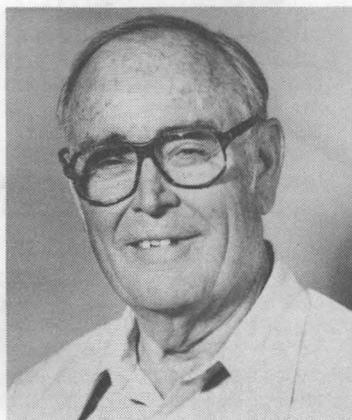
Lee Heames (7556) 21 yrs.



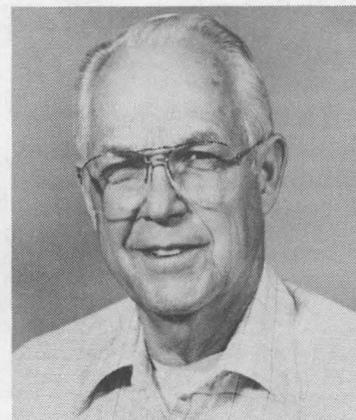
Neal Branson (2833)



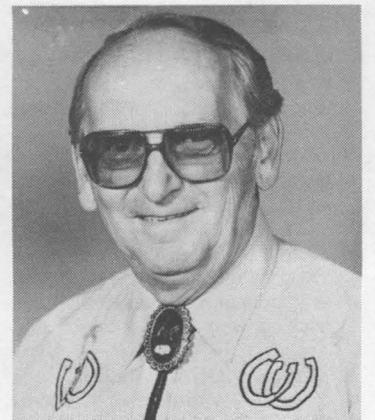
36 yrs. Lenard Wilhelmi (5251) 30 yrs.



Billy Johnson (5233)



31 yrs. Gene Nielsen (2622) 35 yrs.



Myron Pilat (7251) 33 yrs.

**(Continued from Page Four)**

pany to us. They've come in and we've worked with them on certain issues, and this may prove to be very valuable. There's definitely a greater awareness on the part of industry.

**Bray:** Let's clarify our policy briefly. We're really still saying that the intent of our consulting policy is that, when it serves the company's interest for transferring technology, we'll do it. But it's not there just to be used by the individual for his or her own benefit.

**Welber:** That's right — not to increase his or her remuneration. And the policy for part-time work is exactly the same; that is, it must serve the company's interest.

**SLN:** But the major point is that it is in the company's best interest to get technologies transferred to potential users.

**Welber:** That's the point.

**SLN:** Do you recall any examples of a technology coming out of the Labs and into the New Mexico economy?

**Welber:** Bob Bickes [2515] is working with New Mexico Tech and UNM on the transfer of the semiconductor bridge.

**Bray:** I've heard from sources outside Sandia that that activity was going very well.

**Welber:** And Roger Assink [1812] and Rick Givler [1511] are working with Lovelace on nuclear magnetic resonance technologies for use in geothermal exploration and materials research as well as for medical uses. A consortium with UNM, NM Tech, Lovelace, and some of our people to exploit that technology may result.

**SLN:** Isn't there some conflict between the pressure to transfer technology, which certainly includes ideas, and the prohibition on exporting technologies that could affect the competitiveness of US industries?

**Bray:** That's a tough one. So far as I know, that's not been clarified — no guidelines delineated, if you will. We have a tough tightrope to walk.

**Welber:** We have to be careful that the companies we do business with don't have foreign connections that could cause our technology to be exported.

**Administrative Accomplishments**

**SLN:** How about the administrative side of the house? Anything you'd care to single out as an exceptional accomplishment?

**Bray:** I think it's been a good year. We've changed the budgeting process, and it seems to be working better. I believe that most people feel that they had an opportunity to hear and to be heard — to be in on the prioritization. We'll never get to the point that everybody agrees with the result, but at least they're involved in it. I think that's good.

I feel that our team building is good. Administrative computing is a good example — we now have a good administrative computing plan with all the organizations working jointly. The computing organization is working extremely well with the administrative side of the house. Again, that's good.

I see the results of the JIT [Just-In-Time] system as a real accomplishment. Purchasing saved about 44 FTEs. Of those, 15 or 20 became avail-

**We're getting the excellence of staff that results in outstanding promotions.**

—Jones

able for transfer elsewhere in the Laboratories. That's the kind of attitude we're trying to foster — to become more effective and more efficient and to free up people needed in the highest priority programs throughout the Labs.

**SLN:** Do you feel our progress in Affirmative Action is steady and upward?

**Jones:** Management continues to be encouraged by what we see as steady progress toward our Affirmative Action goals, and we'll be continuing along those lines. I think we've had a number of excellent promotions. We're getting the excellence of staff that results in outstanding promotions. I'm very pleased.

**Welber:** And I sense an increased awareness of examination of all candidates for promotion, including Affirmative Action candidates.

**Bray:** I would broaden that a little bit, and say that we're doing an ever-improving job of career pathing — of thinking about the development of individuals. We're working much harder at it and doing a better job of understanding what kind of rotational opportunities would be good for people, understanding what is good for their long-term development. I think that's very positive.

**SLN:** Do you feel we're doing that Labs-wide and fairly systematically, or are we in the very early stages?

**Bray:** Certainly it's in the early stages, because we've been emphasizing it only for the last year or so. But I think that we're doing it fairly broadly. Supervisors are talking about it, and that's encouraging — it means they're thinking the right way.

And, at every Small Staff meeting, something comes up about it — "Why do we still have that

**Certain people need development opportunities that may not exist in their own organizations.**

—Bray

person there?" or "Why don't we move him or her?" or why it's good for them and how did we make that selection. A few years ago, all the promotions just seemed to be organizational — 90 percent of them came from within the organization. Now I see us doing a much better job of looking at cross-organizational movement. I think we're recognizing that certain people need development opportunities that may not exist in their own organizations, so we're looking for ways to get those in other areas of the Laboratories, and to do that we have to trade opportunities.

**Welber:** In any case where a selection is not made for a particular candidate because they don't have the background or experience or exposure, the question is automatically asked "What are you doing to give them the background or experience or exposure?"

**Bray:** Our consciousness has been raised. And as supervisors and managers of the business, we're doing a better job of developing our people on an individual basis. And our training programs are complementing that effort.

**Jones:** I agree. We're enjoying, I think, some growth and success in this idea of career pathing and opportunities for all — majority or minority, male or female.

**Welber:** One other thing I'd like to mention — the standardization of word processing. It isn't a real biggie, but some people worked awfully hard to get it done. And it was tough to get it implemented.

**Bray:** Same thing with PC DAS on the document-accountability program. We're pushing that to

**Our diversity is one of our larger assets. It allows us to focus on fairly specific problems as well as on broader ones.**

—Bray

where it's going to be the standard way of doing business around here. It's a small but significant accomplishment.

**SLN:** The AT&T contract with DOE for the operation of the Labs expires at the end of September. Are contract negotiations proceeding satisfactorily?

**Welber:** Because negotiations are under way right now, all we can say is that they're progressing on schedule.

**Behind the Accomplishments**

**SLN:** We've covered a wide range of accomplishments. In a sense, that's easy. Here's a tougher question: What do you see as the Sandia characteristics, traits, assets that led to those accomplishments?

**Bray:** Our diversity is one of our larger assets. It allows us to focus on fairly specific problems as well as on broader ones.

**Jones:** I agree. Our size and our breadth of capa-

bility — in materials science, aerodynamics, fluid mechanics, computer modeling, solid mechanics, development shops, electronics, and many others — are assets that many labs in the country don't have. Many of the country's federal labs employ 500 or 600 or 700 people; they can't enjoy the diversity and strength that depend on critical masses of the necessary disciplines. I think that capability serves Sandia and the country very well.

**Our position is that engineering is not a reduction to practice; it's an advancement to practice. Make it work in the real world. That's a challenge to all of us, but we have the talent and the desire to do that.**

—Welber

**SLN:** And many smaller labs tend to be more focused on the intellectual think-tank kinds of things — on theory, right?

**Welber:** Yes. Our position is that engineering is not a reduction to practice; it's an advancement to practice. Make it work in the real world. That's a challenge to all of us, but we have the talent and the desire to do that.

**SLN:** Given the policy that we will push no technology until its time [see "Manufacturability, New Technologies, and Quality" story], can we retain the creative people we need if their new ideas are not getting picked up in weapons?

**Jones:** Well, that's why I say it's a tightrope. I think we can.

**Welber:** And if you look at our statistics on losses [people leaving the Labs] and the kind of people we are losing and the reasons for losing them, I would say we're not suffering from the policy. We don't want to get to the point where we are, but there's no evidence that that has been a problem. Our loss rates are quite low.

**Jones:** We may need to go back a little bit to our roots in good solid engineering design/development process.

**SLN:** Does that shift involve any change in recruiting? Are we hiring the right kind of people?

**Jones:** We're looking at that. We have been discussing whether we want to establish some general guidelines for a mix of PhDs, masters, and bachelors [degree holders]. So far we've pretty much let it flow, but we're thinking about that mix.

**Welber:** Bell Laboratories hires some folks at the bachelor's level. It's a new entry level for MTS [members of technical staff].

**Jones:** We've got 300 to 500 MTSs with bachelor's degrees now, but most will be retiring soon. Now, what do we do when they're all gone? How do we want to fill in that capability? That's what we're thinking through now.

**SLN:** Back to our losses. Are we losing any kinds of people that we'd rather not lose, or are we in good shape there?

**Bray:** By and large, we're in excellent shape. I think last year our loss rate was only about four percent; it vacillates between four and six percent. About half of those losses were retirements and the other half "separations" for other reasons. So we lost only two percent of our people for reasons other than retirement last year.

**Jones:** Our separations tend to be low because we're geographically isolated compared to, say, the Boston or the Los Angeles or the Silicon Valley area.

**Welber:** On the other hand, if we look at our loss rate at Sandia Livermore compared to our loss rate in Albuquerque — and we must assume that the folks at Sandia Livermore have far more opportunity for mobility — I don't think we find much difference. As a matter of fact, if we compared ourselves to Los Alamos, where there's even less mobility than in Albuquerque, I think we'd find its loss rate is higher than ours.

**Bray:** I think we've tried hard to maintain stability.

**SLN:** What about the rest of this year and next fiscal year as far as hiring?

(Continued on Page Six)

**(Continued from Page Five)**

**Bray:** We've got a good hiring program this year. Let's put that in context: When we look ahead at the core part of our MA business, we believe that it's probably going to run at constant dollars at best — which means we're going to have to eat inflation. So we see a decline [in terms of FTEs]. Whether we maintain a level laboratory depends, then, on our success in reimbursables. Our objective is to maintain a level laboratory by encouraging reimbursables to grow.

As I look down the road at that, one of the things I think I see is difficulty in maintaining the level of stability in the work force that we've enjoyed in the recent past — because we're going to have a lot more customers with varying amounts of contract work for us to do. And the probability that we can keep everything flat [with the same level of stability] is, I think, small [see "On Change and the Labs" story].

And that says to me that either we're going to have more instability than we've traditionally had or we're going to have to do an outstanding job as a team in accepting business or rejecting business without alienating potential future sponsors.

**SLN:** Can that be done?

**Bray:** I don't know. It's very difficult. But I think we can if all our managers are very skillful at balancing the program view with the corporate view. If they don't have a corporate mentality, then it's not

**Our critical skill in the future: being able to come together as a team, recognize the trade-offs, develop a plan, and — no matter how much we like it or dislike it as individuals — support the plan and ensure that our commitments are honored.**

—Bray

going to work, and we're going to end up being our own worst enemies. And, over time, the impact of that will be to drive the reimbursable business down — not just drive it flat but drive it downhill.

So I think the issue is critical. That's why I said earlier I feel good about the gains we've made in our matrixing capabilities and the teamwork that I see in the management of the Laboratories — because I believe that's going to be our critical skill in the future: being able to come together as a team, recognize the trade-offs, develop a plan, and — no matter how much we like it or dislike it as individuals — support the plan and ensure that our commitments are honored.

**Jones:** I agree. As Lee says, the challenge for Sandia management at all levels, especially for our case managers and program managers, will be to make our matrix system work — as opposed to trying to build up many little individual companies centered on specific customers.

**SLN:** How about an example?

**Jones:** Of why that approach is short-sighted and won't work in the long term? Take the nuclear weapons programs at Sandia Albuquerque and at Sandia Livermore. In the past we permitted them to develop great redundancy — in fact, to be almost two separate weapon-development operations. And

**Organizations may do brilliant work individually, but they have to consider that they work for the Laboratories, not for their own organizations.**

—Welber

as we see the drift Lee mentioned, this "constant-dollar, having-to-eat-inflation" trend, we realize we're going to have to take advantage of flowing work back and forth between Albuquerque and Livermore.

I can't think of a better example to point to in explaining why we can't repeat that approach in our reimbursable, or "work for others," programs.

**Welber:** It underscores the importance of the matrix management concept. That is, organizations may do brilliant work individually, but they have to consider that they work for the Laboratories, not for

their own organizations. They must try to fit their work into the Labs' overall needs.

**Jones:** I agree. We've got to be awfully careful to avoid stereotyping people in other organizations in the Labs. The quick, glib excuse is "Well, it's a small program and we can't bring them [another organization] in, we've got to do it all ourselves, we've got the quick turnaround, and besides they're experts only in right-handed, right-side-up-threaded devices, so they couldn't help us."

We've got to learn that most of those people would be delighted to work on the left-handed, upside-down version or what have you. But you've got to give them a chance, you've got to go talk to them, exercise that talent; we have smart people all through the Labs. They're flexible — they're willing to shift and change and, in fact, they'll probably be delighted.

**SLN:** Given that need for flexibility and given a certain amount of instability, is the Laboratories the right size? And what do you consider a reasonable fluctuation in size?

**Jones:** One of the many excellent tools that have come out of Personnel is a three-year projection of recruiting, retirements, separations, and so forth. It's dynamic — it allows us to see what decisions today mean for the future and what flexibilities we would have in the future.

We think we've got a pretty good mix of critical capabilities in the Labs. We've tested that belief when we've had hard times in years past, when we've been pressed against the wall, and forced to contemplate such things as letting Tonopah Test Range go. Fortunately, we didn't do that, because those capabilities have served us extremely well in the past few years.

Something in the neighborhood of the size we're at seems to preserve the materials science, the development shop capabilities, Coyote Test Complex, all the other pieces that go to make up this very-broad-capability laboratory that we mentioned earlier.

Now, we can accommodate quite a few ups and downs within that. Our separations, for example, are 300 to 400 per year. We can either recruit to fill that in or we can reduce the Labs' size. Our NSAC [National Security Advisory Committee] people can take on more work, or less work. There's quite a bit of flexibility in these areas.

**Welber:** Certainly we can accommodate a downsizing equal to a year's attrition rate. That's a graceful accommodation of attrition. How much we can grow in one year depends on our recruiting program. We would like to keep that selective. We could

**We are at a pretty good level in terms of number of people and breadth of capabilities. Our plan has been to pick out good solid work, good solid customers, not simply to grow.**

—Jones

probably grow a hundred, but that would mean recruiting 400 or more people; that's a very healthy recruiting program.

**Jones:** Of course, we decided in 1986 not to let our on-roll population continue to creep up. We've consciously decided that we are at a pretty good level in terms of number of people and breadth of capabilities. Our plan has been to pick out good solid work, good solid customers, not simply to grow.

**SLN:** Traditionally, we have used reimbursable programs as a way of filling the gaps as the MA and energy programs have fluctuated.

**Jones:** I object to that terminology. "Fill-in" might have been the right way to say it five or six years ago, but I think we now view our work for others as carefully chosen programmatic areas that we have a long-term commitment to and in which we want to build capabilities to perform in a superior way.

**SLN:** But the question is whether there are as many groups soliciting our services as there were a couple of years ago and, if there are fewer, whether that's going to put us into new fields and take us away from the mission we've defined in the past.

**Jones:** We'll have to work hard there. I think

we can do it, but our NSAC members have become a little disappointed lately. Everybody's budget is tighter out there. But that's where our reputation for excellence, quality, performance, timeliness stands us in good stead. We have to preserve those abilities.

**Welber:** This is where our principles get tested. Because if we insist on sticking to the principle of accepting only the work that we feel meets certain standards, then we may be turning away work

**Our reputation for excellence, quality, performance, timeliness stands us in good stead. We have to preserve those abilities.**

—Jones

that doesn't meet those standards and yet that's work that we could take to, as you put it, "fill in" the valleys, the gaps. Boy, that really tests us — how high a price are we willing to pay for our principles? So far we have not accepted any work that we consider the kind of work we'd like not to do, but . . .

**SLN:** That's how we've maintained orderly change rather than face the fluctuations that come with short-term contracts . . .

**Jones:** Some experienced people argue — and we'll be testing this in the next couple of years — that when money really tightens up, the people who have it end up being very choosy about whom they spend with; they want to be certain they get a return. If that's true, it could favor us. Sandia has an excellent reputation for delivering results.

### The Labs and the Future

**SLN:** We're touching on our future already, of course. But let's put it into the context of the FY89 budget, the FY90, if possible.

**Welber:** I think we can look forward to a good 1989. The budget process leading up to 89 has been

**Sandia has an excellent reputation for delivering results.**

—Jones

very constructive and positive; we're entering that period, I think, ready for 1990.

**SLN:** And what does 90 look like from here?

**Welber:** We're concerned with 90 now, and our recruiting plans for 88 and 89 reflect that concern. We're playing it as we did in the past — very conservatively — because we think 90 may bring flat dollars, at best, if things keep going as they are. It may be down. We have to be ready for that.

**SLN:** Flat dollars including reimbursables?

**Welber:** Well, no. Flat dollars from MA.

**Bray:** But, as we mentioned a minute ago, we're also finding that the reimbursables aren't coming in as fast as we forecast earlier — we sort of expected they might not come in as quickly as we were forecasting so we were reasonably prepared for that.

Going into this year, we knew there was a lot of question on the budget so we took a fairly conservative posture then and at the beginning of the fiscal year. Of course, we came out with a little bit more money than we anticipated. Rather than plow that back in across the board, we did a few major things with it. So next year looks a lot like this year — except that this year is really better than we expected because we had the extra money up front. We don't expect the same situation next year.

In terms of FTEs, we're going to go with 8330 for FY89, 20 down from this year. We can handle that comfortably.

**SLN:** How about programs? Any new starts or major increases in existing programs?

**Jones:** Well, I don't see any new starts, but, as we said earlier, the MOUs between the DOE and the DoD are leading to some expanded work in advanced conventional munitions and advanced military technologies for the Army.

**SLN:** Under terms of the INF treaty, a lot of warheads that we've worked on over the years are going to be mothballed or dismantled. What effect does that have on the Labs?

**Welber:** It's too early to say what effect, but

there will be an effect. The treaty, as you know, destroys the carrier vehicles. The warheads themselves are retained by the nation involved. Therefore, the question really becomes "What will the US do with the warheads removed from these weapons? Will we reuse them and how?" The three weapon labs will be working on those questions. Those warheads are the most modern ones we have, so we may play a major role in re-weaponizing them for other applications.

**Jones:** Sandia's best control and safety technologies are in those warheads. As Irwin points out, Sandia is in a very special position if re-weaponization should occur because we work at the interface between the carrier system and the nuclear explosive itself.

**SLN:** *The stockpile in many respects is getting pretty old. Will that be a factor in deciding what to do with the warheads?*

**Welber:** Yes. That would be a motivation to reuse them and maybe retire some of the older ones.

**SLN:** *Is it practical?*

**Bray:** We don't know yet.

**Jones:** That issue is being worked. Everything has been happening so quickly since last fall, and it's still quite dynamic. But for weapons that have passed their thirtieth birthday, you really have to ask "Do we want to have them around for 40 or 50 years?"

**SLN:** *So do you predict increasing work in modernizing the stockpile — safety retrofits and so forth?*

**Jones:** I believe so. I think we and the DOE are trying to take quite seriously our responsibility in this deliberate tension between safety/control and operational needs that we mentioned early on. For a number of years, we've been working on the stockpile-improvement program. That work will continue, and probably expand. The stockpile is not stagnant.

**SLN:** *Speaking of weapon improvements, what about the earth-penetrating weapon? What about revival of the nuclear depth bomb? What about a longer-range "short range" missile for surface-to-surface theater warfare?*

**Jones:** Well, as I mentioned earlier, we have three weapon-related roles — there's the stockpile, there's development for new requirements, and then there are the advanced concepts or technological

changes. It's this second one — development for new requirements — that's the most unsettled. As I mentioned, we very recently received Phase 3 authorization on a nuclear depth-strike bomb. But it had looked as if the NDSB was going to stay in Phase 2A indefinitely.

### The situation in Europe is far from settled. —Jones

One uncertainty is that the situation in Europe is far from settled. As the newspaper articles indicate, the removal of Pershing 2, Pershing 1A, and GLCM [ground-launched cruise missile] systems from Europe means that the nuclear weapons that remain will be the very short-range ones — the artillery, the LANCE, and so on. And that means that a battle would be fought on German soil. That fact's not acceptable yet in the minds of the German politicians. So whether there's a follow-on to LANCE, what happens to the artillery pieces and their production, and what happens to a tactical air-to-surface missile, etc. — I don't think we can predict answers to those questions at this point.

In other words, that middle category — development for new requirements, new Phase 3s — is going to be really up and down. We're going to have to stay loose on that. I think something will happen in the earth-penetrator area. Whether it will be a new or a "re-weaponized" warhead or a modification of an old design is under discussion right now.

**SLN:** *In addition to weapon work, you mentioned treaty verification. Given our history in that area, are we likely to see some expansion of our role?*

**Jones:** All of us [Sandia, Los Alamos, DOE and its predecessors] go back to the late 50s in our verification activities. One of the important dates in the verification business is 1963, following the Soviet breakout from the ban on atmospheric testing in 1961. When the Limited Test Ban Treaty was signed in 1963 in response to that breakout, the VELA satellites were put up to monitor any treaty-banned nuclear explosions in space. VELA soon expanded to look at surface-of-the-earth, or terrestrial, explosions.

So DOE has had a continuing steady presence in this field and certainly ought to maintain a cen-

tral presence as the area expands.

**SLN:** *Any other programs in which DOE responsibilities might be expanded?*

**Welber:** The DOE should really take upon itself a larger role in waste management. Besides the management of transuranic waste generated by the military, commercial nuclear waste and the larger issue of hazardous waste in general are an increasing problem in this country. That would be a new mission

### The DOE should really take upon itself a larger role in waste management. . . . That would be a new mission for the DOE, one that could very well utilize the talents of the national laboratories. —Welber

for the DOE, one that could very well utilize the talents of the national laboratories.

The other one is not a new mission but it has not received the support it deserves — and that's energy. Perhaps it will be recognized as a much more important activity in the DOE as the crisis in the Middle East unfolds.

**Jones:** Nobody's crystal ball is perfect here, but in his talk to us a couple of months ago, [M.I.T. Provost] John Deutch predicted that the nation may have difficulties by 1995. Our systems analysts also say that energy supplies are going to get tight in that time frame.

So we really feel the energy research job needs to be kept alive. Our people in the energy programs are working almost like missionaries to do that.

**Welber:** We've got to. In 1986 some \$34 billion of our trade imbalance was due to importation of oil. By 1995 half the total trade imbalance might be due just to the importation of oil.

What I've been telling some of the folks in Washington is that if we really had a concerted ener-

### The energy research job needs to be kept alive. Our people in the energy programs are working almost like missionaries to do that. —Jones

gy research program leading to the greater utilization of coal — we have close to a 500-year supply in this country — we could become a net exporter of energy rather than an importer. We could turn the economics around. It may take a generation, but there's nothing like starting now with the research needed to do that. A question I left recently with Senator Domenici was, "What do you think, Senator, the Japanese would be doing in energy research if they were running this country today?"

**SLN:** *What do we see as the most pressing of the energy technologies?*

**Jones:** Clearly, we need to try to convert solids into liquids. Transportation depends on liquid fuels, so if something happens to supplies from the Middle East, the nation's transportation system would be impacted heavily. And portions of the Sandia program are clearly targeted in that direction.

**SLN:** *Haven't we had some notable successes there in the past year?*

**Jones:** I think we have — particularly in the "designer catalyst" area. What we've been trying to do in Barry Granoff's group [6211] is to adapt concepts from the development pharmaceutical industry — where you tailor-make a drug for a particular function — and apply that concept to the design of catalysts so that you make the size of a trap just right for an atom to be retained long enough for it to pick up other atoms.

A really large Sandia success so far is that Howard Stephens and his group [6212] have come up with a catalytic process concept that operates at much lower temperatures and pressures than the normal coal liquefaction process. If you can reduce pressures and temperatures, that translates into real bucks in terms of a plant. There's more to be done.

**SLN:** *Can we compete with the coal compa-*

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## Flexibility Is the Word

# On Change and the Labs

**Bray:** To deal with change, you either have to see the need for change before other people see it or you have to be able to assimilate change faster than other people. The probability that you're going to see it sooner than others, and therefore position for it, is slim. And even if you succeed, the rest of the world may not see that you're properly positioned, and so you still lose. So you quickly come away saying, "It's really a long shot."

So then you say, "If we can't see the need for change before others do, then we must be able to assimilate change faster than our competition." To me, that's the reason we value flexibility — and that's why it's so important to develop a team with an understanding of the need to be able to change rapidly and a body of people who can thrive in that environment.

The question is, "How do you deal with change? How can you feel good about it?" I believe that the answer is, "You must see it as opportunity and challenge, not as a threat."

**Welber:** What Lee says is absolutely true, but one thing that makes people in an organization have a good *esprit de corps* and feel good about themselves is stability. What we're talking about here is not stability but change. And I'm afraid change is going to become more of a way of life than it ever has in the past.

**Bray:** We're seeing that in all aspects of life today. In international competition, in worldwide economics, in military power, in everything

you look at, change is occurring so fast that people can't understand what the norms are. And I don't see anything that's going to slow it down.

So you conclude that the people who are going to be successful are going to be those people who are comfortable with change, who can be more comfortable with it at least than others, and not try to put it off.

**Welber:** Unfortunately, change suggests instability, and instability is a pejorative term. We would like to have stability in the work force and stability of the job. We would like people to feel that there's good work here. But it may not be the same work from year to year. It's . . .

**Bray:** . . . ever-changing challenges, opportunities . . .

**Welber:** It's ever-changing work. In one year you may be an expert in some field, and the next year you may be asked to learn about a different role in that field. But as long as people will do that cooperatively and willingly, we will have a full plate. That's the point.

**SLN:** *So your role as managers is to keep the esprit de corps at a high level in the face of, or perhaps stimulated by, the changes, the instability?*

**Bray:** Exactly. And remember, if we had no change, we'd soon be unhappy with that. That's a truism, of course, but without change, we'd have no hope for the future.

**Welber:** Flexibility is the word.

**(Continued from Page Seven)**

nies — and with the oil companies, most of which have vast coal reserves?

**Welber:** We must be very careful that we don't compete with them for funding. That's not our job. We have to show them that the federal government can help them in R&D so that they can become more profitable. It's where there are no resources being applied or the industry cannot afford to do it that the federal government should step in if it's important.

**Jones:** Here are three examples of our success in competing, some of which are old. The first was the drill bit technology using the diamond compacts. Certainly we were able to compete or to assist there in spite of the large companies. The second one was detection of the steam refluxing problem on drill strings, where our knowledge of heat transfer and modeling made the difference. And then, most recently, development of the anelastic strain recovery of core samples for deducing directions of principal stresses in oil fields. This leads to a more efficient layout of an oil field for maximum recovery of oil from an underground reservoir.

A few good ideas can make a tremendous difference here. One of the realities of energy R&D is that often when you're working right there in an energy-related company, you're thinking in a very conventional way based on a certain background of history and knowledge of what you've worked on. Someone coming in from a completely different van-

**I really believe that the name of the game is flexibility and adaptability — how quickly we can move. This is an advantage of our matrix system, which allows us to bring Labs-wide resources to bear quickly on a new problem. —Bray**

tage point with different knowledge, different tools, different insights — such as a Sandian — can often see something different and can really make a great difference with just a few good ideas.

**Welber:** Let's also mention our work in the combustion research facility. It's been widely appreciated and respected, and has had a significant impact

on the automotive industry. For example, the General Motors Research Lab is a renowned facility, as is Ford and Chrysler. Yet they come to us to participate, and we are effective in helping them.

**Bray:** I really believe that the name of the game is, as we suggested earlier, flexibility and adaptability — how quickly we can move. This is an advantage of our matrix system, which allows us to bring Labs-wide resources to bear quickly on a new problem.

This is a strong Sandia advantage: We have a sense of "company," and our people can work that

**If there is any message in here, it's the need for the flexibility that the changing times are going to demand. We're not pushing flexibility for its own sake; we're doing it to stay healthy. —Welber**

way. That attribute is going to be even more important in the future.

**Welber:** If there is any message in here, it's the need for the flexibility that the changing times are going to demand. We're not pushing flexibility for its own sake; we're doing it to stay healthy.

**SLN:** But don't we also want to foster personal commitment to the program that we're working on, rather than a cavalier attitude?

**Welber:** We didn't hire mercenaries who'll do anything for money. We hired people who are committed to excellence and to their program. We've got to balance that.

**Bray:** Good point. The synergisms of the various programs are good enough that if people do move, they're not changing fields professionally. They're going to be changing, maybe, the end product on which they focus, but they're going to use the same skills and knowledge of technology. So I don't see what we're asking people to do as drastic change.

**SLN:** Aren't we talking two complementary goals? One is career development for the employee; the other is the rotation that gives the company some flexibility.

**Welber:** It's obvious that, as a rule, the greater the flexibility employees have, the more valuable

they are. If they can maintain their excellence with greater flexibility, they're more valuable than somebody who's not so flexible.

**SLN:** As a rule?

**Welber:** Here's the exception: If we have a world's expert on something and it's recognized, okay. That person has special value — very deep talent.

**SLN:** Irwin, you have less than a year to go as president.

**Welber:** Yes, I will retire next March. I'm not looking forward to that time; I'm enjoying this job. The people are so qualified and committed. Sandia's a great place to work, and the work is important to national security.

**SLN:** How do you think you'll be remembered, Irwin?

**Bray:** Let me answer that. What Irwin has done for us, and what I'll remember him for, is that he's allowed a management team to develop, to grow. Some styles of leadership are so controlling that people don't grow and develop; they don't feel a sense of responsibility, so they don't assume it.

Irwin has done the opposite. He's done a good job of putting responsibility where it belongs — with organizations, with managers, with committees and so on — and given them the latitude to do the job. They have felt responsible for it. And, because of that, they have done a better job than they would have done otherwise.

I keep coming back to saying that one of our biggest strengths right now is that we've got a good management team. I'd say that's Irwin's legacy. And that's the best thing you can leave behind.

**Welber:** Thank you, Lee. I think it's worked because, by and large, it's an open society, people respect each other and try to do a good job. What more can you ask? ●BH



## Bray on Health Care Cost Containment

**SLN:** LAB NEWS is currently running a series of articles on the "Health Care Cost Containment Conundrum." What insights can you provide on that problem, Lee?

**Bray:** Sandia's health care costs have grown at 21.5 percent, compounded annually, for the last 10 years, which is not unlike the cost growth the nation is experiencing. We're self-insured, which means that we pay for our health care costs directly — and every dollar we spend there is a dollar we don't have available for R&D programs.

**SLN:** How many dollars are we talking about for this year?

**Bray:** We're forecasting \$28 million this year — and that doesn't include our dental and vision plans. So it's very much a significant cost item for Sandia. The problem is not so much the current cost level as it is the rate of growth. At a 15- to 20-percent growth rate, the cost doubles every three to five years, and we just cannot allow that to happen.

**SLN:** Is there a way to control Sandia's health care costs without losing benefits?

**Bray:** The primary factors that influence the cost of our program, or any other, for that matter, are the benefit package itself, the utilization rate, the universe size, and medical inflation. We obviously want to retain the benefit as it's currently defined, and the universe size is driven by our employment level and other factors we'd rather not change. Therefore, utilization rate and medical inflation (or cost) are the

primary control levers.

We want our people to utilize the system when they really need to — that's its purpose. At the same time, the less we use it, the more money we save for other activities. I think that TLC and other preventive programs are helping us find the answers. Perhaps we'll find that as

**We have an outstanding health care system, and our objective must be to maintain the benefits it provides while curbing the escalating cost — I'm confident we'll be able to do that. —Bray**

we become better informed and more responsible regarding our health, we'll be able to lower our costs while being healthier — that's a real win-win situation.

The medical inflation or cost factor is a different story. I believe we just have to find ways to be better buyers. Our current system does not conveniently allow us to aggregate demand — to engage in volume buying, in other words — and thereby negotiate more favorable prices. We all know that aggregation of demand is a fundamental tenet of good buying. We need to explore those possibilities.

We have an outstanding health care system, and our objective must be to maintain the benefits it provides while curbing the escalating cost — I'm confident we'll be able to do that.

## Guide to This Issue —

This LAB NEWS is really two issues in one. The inside eight pages are your "regular" LAB NEWS.

The outside eight pages contain the annual "State of the Labs" interview with President Welber and Executive VPs Orval Jones and Lee Bray.