

Sandia's Advanced Manufacturing Initiative — Simply Put, It's Just A New Way of Doing Old Business

Sandia entered a new era last summer when it announced the opening of DOE's national Center for Advanced Manufacturing Technologies, headquartered here.

But beware; names can be deceiving. The new "center" is not a new building at Sandia, nor is it another newly created line organization.

The Center for Advanced Manufacturing Technologies is one of Sandia's major technical initiatives, and it represents an area of business that may help shape the future of the Laboratories and the nation, says Heinz Schmitt (2000), the Sandia VP who heads up the Center.

Established June 25, 1992, the Center is expected to widen Sandia's doors to US manufacturers, allowing industry to capitalize on a diverse range of production capabilities and technologies

"Almost every capability we have can potentially help improve manufacturing processes."

developed during the height of the Cold War. It is hoped these renewed partnerships will help strengthen the nation's economy by bolstering the competitiveness of US manufacturers in the international arena.

"Government, industry, national laboratories, and universities have an opportunity to work together on a common national priority," says Heinz. "Sandia must contribute to these partnerships in a major way, not only for the good of US manufacturers, but also for the good of the Laboratories."

Advanced Manufacturing, like other new initiatives at the Labs (such as transportation, biomedical, and space technologies), is a "cross-

cutting" initiative. Line organizations in every division and work sector will be involved in some way, says Bill Alzheimer, Director of Advanced Manufacturing Technologies Center 2900, the

organization chosen to lead Sandia's effort.

"Because we are primarily an engineering laboratory," he says, "almost every capability we have
(Continued on Page Four)



FAST CAST TROUBLESHOOTING — Brian Pardo (2484) brushes excess powder away from a wax part that was solidified using a CO₂ laser. Design problems were first identified and corrected on a 3-D computer-aided design (CAD) drawing. The technique, called selective laser sintering, eliminates certain machining steps and reduces the time it takes to get a finished part. Brian says that for some prototype parts, the sintering machine can reduce manufacturing time from 60 person hours to overnight. Sandia is helping troubleshoot the sintering machine and process for a vendor that is commercializing the technology for use in the manufacturing industry.

Clinton Chooses DOE Secretary

Hazel O'Leary Nominated for Energy Secretary

President-elect Bill Clinton announced last month that he was nominating Hazel Rollins O'Leary to be his Secretary of Energy. The appointment is subject to Senate confirmation, as are all cabinet-level appointments. The following brief profile of Hazel O'Leary is excerpted primarily from information provided by the Clinton transition team, with additional information from other sources.

At the time of her nomination to be Secretary of Energy, Hazel O'Leary was Executive Vice President of Northern States Power Co. (NSP) in Minneapolis. She joined NSP in April 1989 as Senior Vice President, Corporate Affairs. Her NSP responsibilities included management of the public affairs and human resources departments. The public affairs department includes environmental and regulatory affairs, corporate communications, and liaison with federal, state, and local governments. The human resources department includes compensation and benefits, employee development and training, industrial relations, employee
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**Gerry Yonas Gives
Work-for-Others
Sector Outlook —
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LAB NEWS

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SANDIA NATIONAL LABORATORIES

JANUARY 8, 1993

Aim: Understand How Drugs Work

Computational Engineering Center Enlisted in Cancer Drug Research

Researchers at Sandia/California's Center for Computational Engineering (CCE) are deploying the Labs' existing computer power and working to harness the speed of future teraflop computers to help in the development of drugs targeting cancer and other life-threatening diseases.

Their ultimate goal is to help medical researchers skip the laborious and time-intensive method of collecting plant and animal specimens, checking extracts from them for possible effects on humans, then refining results for years in the hope that a useful drug will result.

Even though teraflop computers — capable of performing a trillion floating point operations per second — are still in the design and development stage, the Sandia group hopes to develop codes that, when the computers are available, will allow researchers to design drugs for treating human diseases.

Understanding Cyclophosphamide

The immediate aim, though, is to increase understanding of cancer chemotherapy through massive computer calculations that deal with the fundamental principles of the interaction of atoms

and molecules.

The Sandians' calculation of the binding of phosphoramidate mustard to 10 base pairs of DNA (deoxyribonucleic acid), aimed at developing an understanding of why cyclophosphamide kills cancer cells preferentially over healthy cells, was noted in the April 24, 1992, issue of *Science*.

"Efforts like this are successful because of the teamwork that exists within the CCE," says Bill Wilson (8703), former manager of Program Development (CCE) Dept. 8105 and co-founder — along with Joe Harris (2805) — of the CCE.

Team members include Bob Schmieder of Fusion Research Dept. 8347, Carl Melius of Combustion Chemistry Dept. 8353, and Charles Bisson, Dave Butler, Mike Colvin, Frank Cupps, Donna Edwards, Curtis Janssen, Richard Judson, Roy Lee, Dorothy McGarrah, Juan Meza, Mike Pendley (now CCE manager), Joe Schoeniger, and Charles Tong, all of Scientific Computing Dept. 8117. This group includes chemists, physicists, mathematicians, software analysts, and even a "resident physician" (Joe Schoeniger, who has a
(Continued on Page Three)

This & That

One for Ripley - Sandia/California employee Michael Ferrario (5375) tells about a mighty strange coincidence when he made a Dec. 11 phone call. He wanted to reach Ed Henry, who works at Sandia/New Mexico, so he looked up Ed's number in the Sandia directory. But Michael's eyes wandered down one line too far and his mind instead registered the last five digits (4-3007) for the phone of Ken Henry, who works at Sandia/California. Michael then mistakenly dialed 844-3007, thinking he was calling Ed Henry's number in Albuquerque, but 844-3007 turned out to be the number for an emergency phone in a Sandia/New Mexico elevator. So who answered it? Ed, who just happened to be in that elevator at the time. Needless to say, he was more than a little puzzled about how Michael reached him there. What are the odds of something like this happening, Sandia mathematicians?

Pervasive, But Elusive - Sandia's Advanced Manufacturing initiative is probably the Labs' most talked-about new technical initiative. The basic concept behind it (helping to develop a more flexible, responsive US manufacturing capability) is easy enough to grasp, but exactly what Sandia will be doing and who's going to do what has been as difficult to pin down as a frog in a hot skillet. LAB NEWS Writer John German has been following the goings-on for some time and tries to make sense out of it in a collection of articles that begins on page one. Might be worth your time to read all about it - sounds like it's gonna be a big, big thing around the Labs in the post-Cold War era.

Kudos to the PR Folks - My old boss used to say it's OK to brag about yourself occasionally, but it means more when someone else brags about you. Here's what a DOE/AL official had to say recently in a memo to Sandia's Public Relations Dept. 7161: "In reviewing the 90-day public affairs plans for the Albuquerque Field Office, I was most favorably impressed by yours. First, because of the many different programs which you folks ... have incorporated into your community outreach efforts, and second, the professional quality of your reports. With your permission, I would like to use your plan as an example of what a good public affairs program should consist of and send it on to the rest of the AL facilities." I'm guessing it didn't take long for 7161 Manager Rod Geer to grant that permission!

Looking for Honest Work, Gerry? - We continue our series of articles by Sandia VPs in this issue, with one by Gerry Yonas (9000) about what's happening in the Work for Others Sector. I'm not sure I could afford him, but if his VP job doesn't work out in the long run, I think I could use Gerry full-time as a LAB NEWS writer. I'm betting you can't read his article without learning a thing or two and smiling at least once. Thanks, Gerry, and thanks again to VPs Dan Hartley (6000) and Roger Hagengruber (5000) for their December articles. Due up next issue is my very own VP - Glen Cheney (7000).

Copybook Comments - Before we publish each issue, we produce a LAB NEWS "copybook," containing the edited stories we're going to publish. Managing Editor Charles Shirley and I, plus several other severely dedicated Sandians, review the copy before we start page layout. Our copybook for the last issue was particularly large, and I commented to Charles that it was about as thick as some Hemingway and Steinbeck novels. "You're right," he said, "but the sentences sure are longer." After enjoying a good chuckle, I added that it would probably be a good bet that Ernest's and John's copy didn't contain nearly as many acronyms as our copybook. Like confession, a little self criticism is probably good for the soul. ●LP

Community Focus

Two DOE/Sandia Critics Invited to Address Employees

Sandians will have a chance next week to listen to and ask questions of two environmental advocacy group leaders who have been vocal in their criticism of DOE and Sandia environmental practices.

Michael Guerrero, a field representative for the Southwest Organizing Project (SWOP), and Don Hancock, director of the Nuclear Waste Safety Project at Southwest Research and Information Center (SWIRC), will speak in the Technology Transfer Center (Bldg. 825) auditorium Jan. 14 at noon. The talk is part of the Public Relations Department's Community Focus series. Guerrero and Hancock will give their viewpoints about how Sandia should communicate with the public on environmental issues.

Guerrero has a BA in art from the University of California, Berkeley, and has studied in Mexico City. He has seven years' experience as a student and community activist.

While in Mexico, he was involved with cultural workers who produced art for unions and community groups. He is a graduate of the Minority Activist Apprenticeship Program of the Center for Third World Organizing in Oakland, Calif. For three years, Guerrero has coordinated the SWOP Community Environmental Program, working on "statewide issues of environmental racism and economic blackmail." He is a staff representative on the SWOP board of directors and works with the organization's Child/Youth Development Resources Program.

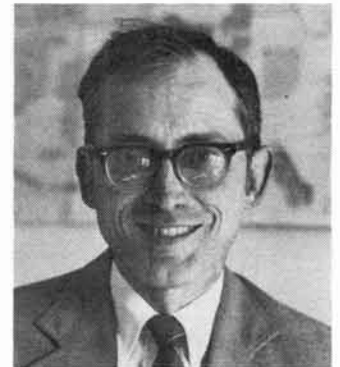
Hancock has been active since 1977 in nuclear waste management issues, including the Waste Isolation Pilot Plant (WIPP), proposed high-level nuclear waste storage and disposal sites, and the DOE nuclear weapons complex. He has been a consultant on nuclear issues to citizens' groups, state governments, and Indian tribes.

Hancock has testified to congressional committees and has served on state and federal advisory committees. His articles about nuclear waste have been published in several magazines. He has a BA from DePauw University in Greencastle, Ind.

Rod Geer (7161) will host Guerrero and Hancock. Rod's phone number is 844-6601. ●



MICHAEL GUERRERO



DON HANCOCK

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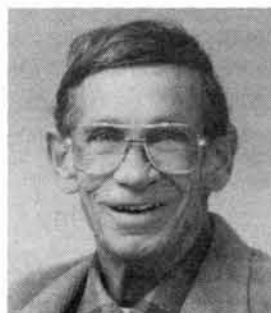
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DOE Begins Sifting Offers For Sandia M&O Contract

Tuesday was the deadline for submission of offers on the new Sandia management and operating (M&O) contract. Although DOE has declined to announce the number of offers or the names of offerors, there are thought to be at least seven.

The seven organizations most widely mentioned in published reports are Battelle Memorial Institute, EG&G, Loral Corp., Martin Marietta, Raytheon, Science Applications International Corp. (SAIC), and TRW.

DOE expects to select the new contractor by Aug. 1.

(Continued from Page One)

Cancer Research

PhD in biological chemistry and an MD).

"Although it is not yet possible to 'cure cancer' on a computer," says Carl Melius, "the strategy of the theoretical effort at the CCE is to work closely with pharmacologists and medicinal chemists at Johns Hopkins University Medical School to relate the computer modeling to chemical and pharmacological experiments."

Mike Colvin zeroes in on one particular drug. "Cyclophosphamide is the most widely used agent against a variety of tumors and is part of several curative regimens," he says. "Understanding its chemical behavior in detail is key to understanding the activity of a cancerous cell."

He says many researchers examining these problems start with experimental results and try to fit the mathematical curves to them. The Sandians' method is different.

"We are taking a quantum chemical approach, starting by solving the full all-electron Schrödinger equation — a computationally formidable task," Mike says. "Because this approach is foreign to people doing drug design, it took a while before we could communicate with the medical researchers. We had to work hard to bridge a sociological gap and speak the same language."

Long, Laborious Process

According to Joe Schoeniger, drugs have traditionally been developed by extracting substances from plant and animal specimens — including deep-sea life harvested from the oceans — and

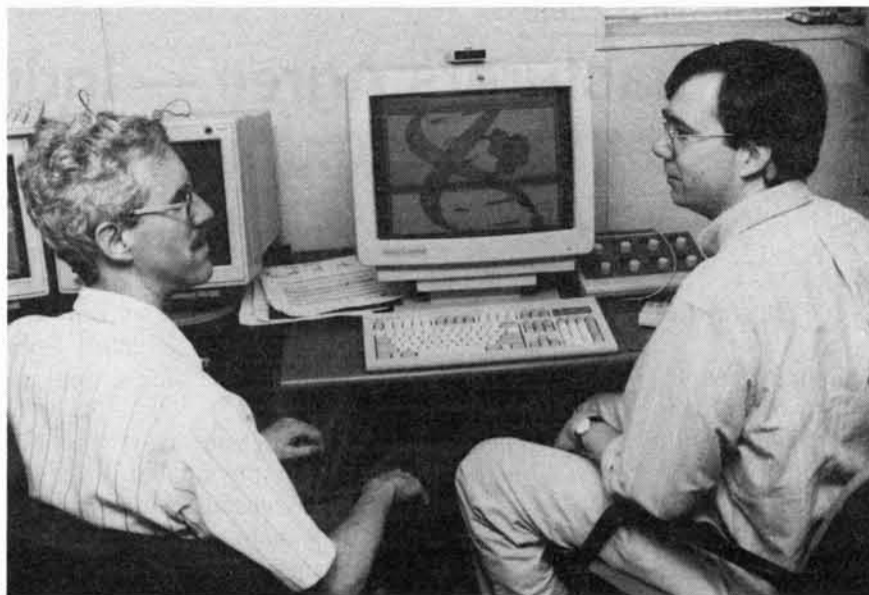
"Only one in 4,000 compounds that start the screening process is considered potentially safe and effective."

then screening them for their killing effect on a cancerous tumor in a cell or tissue culture system. Potential drugs that pass these tests are further evaluated in small and, later, larger animals that are more sensitive to potential side effects.

It's a slow process, says Joe: "Only one in 4,000 compounds that start the screening process is considered potentially safe and effective enough to enter into the next screening stages involving clinical trials in humans."

At that rate, he says, only one new anti-cancer agent will come into clinical use every four years.

Rational drug design, however, incorporates information about the molecular details of a human disease process into the design of the drug. Sandia's cyclophosphamide studies are intended to reveal how a drug works so improved versions can



WORKING ON computer modeling of the DNA of a cell about to bind with an anti-cancer drug (cluster at right on the display in background) are chemists Carl Melius (8353, left) and Mike Colvin (8117).

be developed faster than is possible using the traditional method.

The CCE research required a series of large all-electron quantum chemistry calculations involving 1,500 basic functions to determine the location and chemistry of the guanine cross-linking in DNA. Juan Meza and Charles Tong made major contributions to the numerical algorithm parts of the computer code that handled these calculations.

"The use of novel algorithms creates a computational speedup of orders of magnitude for very large molecules," says Charles. Such computational advancements are laying the groundwork for scientists to study larger problems that previously were too complex.

Not Limited to Cancer

The range of pharmacological problems that might be addressed with this computational approach is not limited to cancer. Richard Judson (8117) has developed molecular dynamics methods for a variety of computer-aided drug design applications. These include modeling the behavior of diagnostic imaging agents and the rapid prediction of molecular conformations of small molecules and polymers. Potentially, the development of drugs to treat any disease for which a molecular target can be identified may be accelerated by applying computational methods to rational drug design.

"The focus on making advances in biotechnology is important because it is a great area for growth and is closely tied to the \$738 billion-a-year health care industry," says Carl. "Our ultimate goal is to make the US marketplace more competitive. Advances in our understanding of large molecules could have payoffs not only in pharmaceuticals, but in agriculture, ceramics, the rubber and plastics industries, and the use of bacteria to destroy toxic wastes."

Future projects may call for studies of other anti-cancer drugs and anti-viral compounds.

"We have just opened the door to a vast new area of research, and we are very excited about the possibilities before us," says Bill Wilson. "We have gathered together a unique group that knows how to ask the right questions." ●



Birnbaum Receives Honor From Cornell Program

Mike Birnbaum (11L) has been named "Supervisor of the Year" by the Cornell University engineering co-op program for providing exceptional work experiences at Sandia/California. Program director Linda Van Ness says Mike was presented with the annual Everett M. Strong Memorial Co-Op Supervisor of the Year award "for exemplifying the dedication we are looking for to help our students get the most out of their co-op experiences."

Pound Is Recreation/Park Board Chairman

Marlin Pound (8501) was recently elected chairman of the Livermore Area Recreation and Park District board of directors for 1993. Marlin has served on the board since 1968 and was elected to another four-year term in November.



DECEMBER RETIREE Dick Jennings (8525) and his wife, Pat, a Lawrence Livermore Lab employee, display their lab loyalties on their new T-shirts. After seeing "The Laboratory" shirts at the LLNL Recreation Association store, Dick suggested "The Other Lab" for Sandia/California. The Public Information Office staff designed Sandia's answer to the LLNL shirt. The idea caught on, and employees ordered several dozen shirts before the year-end holiday break.



SANDIANS DONATED more than 600 wrapped gifts to the Holiday Spirit '92 campaign when asked to select a needy person or family making a specific gift request through one of five area family-support agencies. Campaign coordinator Renee Haynes (left, 8531) and committee member Barbara Demo (5366) show a few of the many contributions that were piled high in the lobby of Bldg. 910.

Several Different Products, One Assembly Line

US Manufacturers Agree — Industry Needs To Get More Flexible, Responsive

It's only a five-letter word that means "flexible." But it's already become a buzzword in US industry, and it promises to overhaul the way US industry manufactures products and the way the average citizen buys goods.

And, according to Bill Alzheimer (2900), coordinator of Sandia's Center for Advanced Manufacturing Technologies, Sandians probably will want to learn the word "agile," because they're

going to hear a lot of it in the next few years.

"Agile manufacturing" is a new *modus operandi* in the manufacturing industry, says Bill. It's a shift away from the century-old mode we know as "mass production," in which one assembly line produces a single product as quickly and as cheaply as possible.

Whereas mass production uses "dumb" machinery to enhance the physical abilities of workers, agile manufacturing instead capitalizes on human intellect and information technologies to create products and improve production processes, getting customized products to the marketplace in record time.

Designed for Longevity

Here's what the world of agile manufacturing might be like:

Production line equipment would have a much higher IQ than it does today. Product inspection and process error correction takes place directly on the assembly line. On-line sensors keep track of the manufacturing process continuously.

Assembly lines are adaptable, each one capable of producing two, three, maybe several different products or versions of a product in a single day, possibly hundreds of different products during its lifetime. In addition, products have modular designs so individual components may be replaced as they are upgraded or become obsolete. This allows products, such as cars, to be made-to-order in a matter of days, with the customer telling the factory exactly what features to include and not to include.

Because of the assembly line's flexibility, lot size becomes irrelevant. Production costs for 10,000 units of one model might be the same as production costs for 10,000 different versions of the same product.

Throw-away products would be a thing of the past, as manufacturers

design products and product families designed for reuse rather than replacement. In addition, a product's environmental costs, from cradle to grave, will be considered during its design and manufacture.

"More and more, customers today are demanding what they want, not what companies are prepared to offer them," says Bill. "Companies willing to provide what customers want when they want it will succeed; others will fail."

Enterprises, Not Plants

As part of the new agile manufacturing era, agile companies called "enterprises" would comprise the key business units. Because they are more flexible than manufacturing companies today, enterprises respond more quickly to market demands.

To accomplish this, enterprises create and sustain cultures of continuous creativity and innovation — conceiving, developing, engineering, manufacturing, and bringing new products to the marketplace immediately, without the traditional turtle's-pace problems of line approvals and "red tape." Employees are empowered to make most decisions.

In an agile enterprise, market research is golden. Customer feedback defines new products and product improvements. "Manufacturers will want to know more about their customers' needs and, based on that information, will be able to adjust what comes off the production line accordingly," says Bill.

Information flow will also be a key to getting new products to the market quickly. All stages of a product's life cycle — design, engineering, development, manufacturing, marketing, and sales — will be included in the manufacturing process and performed simultaneously. Product designers, engineers, and assembly line workers will work together on a product, solving production problems before a new product ever reaches the assembly line.

New information technologies such as design software and video links will allow people to work together much more efficiently. In addition, nationwide info-networks will link people at various factory locations and companies, allowing them to communicate across distances as well as technology barriers. (See "Adding Some ICE to the
(Continued on Page Six)



HISTORY IN FLEXIBLE MANUFACTURING — Two years ago, Sandia helped Pratt & Whitney develop this robotic deburring system that automatically grinds edges of jet engine turbine wheels during manufacture. The system uses computer-aided design (CAD) models and computer vision and force control sensors to match the part to precise specifications. Cliff Loucks (1611) and Colin Selleck (1661, not seen) developed the system. (LAB NEWS, March 9, 1990)

(Continued from Page One)

Advanced Manufacturing

can potentially help improve manufacturing processes. And why not — Sandia's weapons program has been involved in production since the 1940s."

For instance, he says, most current materials research is already aimed at manufacturing problems, and precision casting and machining capabilities at Sandia are attracting the attention of manufacturers.

Staff in Sandia's Research and Exploratory Technology Div. 1000 and in Component Development and Engineering Support Div. 2000 recently developed a fast cast process that reduces the time and cost of fabricating prototype parts (see photo on page one). In addition, says Bill, poor soldering is undoubtedly one of the biggest obstacles in the US manufacturing industry today, and it is an area Sandia has been studying for decades.

Product design is also a hot issue with manufacturers, he says, because the way a product is designed influences how it's manufactured. Com-

puter simulations of part structures and of manufacturing processes can reduce waste material and cut costs significantly. "We are developing software that predicts and corrects problems before you ever cut steel," he says.

Other Labs capabilities that may benefit manufacturers include intelligent machines for hazardous and flexible operations, microelectronics, photonics, concurrent engineering, sensors and

"When the customer calls, we can get the right people at Sandia involved right away."

controls, welding and joining, information technologies, environmentally conscious manufacturing, testing and evaluation, and quality and reliability technologies.

Sandia's purchasing and technology transfer organizations are also integral parts of the initiative, says Bill. "Efficient purchasing processes are very important in the manufacturing industries," he says. "And 80 percent of our CRADAs relate in some way to manufacturing, so technology transfer is a star player in this initiative." (See "Narath

Pledges Labs' Technical Help to Manufacturing Execs" on page five.)

Old Work, New Directions

Also as part of the initiative, the new Integrated Manufacturing Technologies Laboratory was dedicated at Sandia's California site on Oct. 16. The 90,000-square-foot lab will serve as a testbed for new manufacturing processes and technologies, benefiting both DOE and industry. The lab will support R&D in materials research, process simulation, engineering design, and agile manufacturing technologies (see "US Manufacturers Agree" above).

Already, the new lab is housing research projects in metal removal and welding, fabrication of composites, high-speed communication of manufacturing data, rapid prototyping, and on-line monitoring and control.

"The Center for Advanced Manufacturing Technology is not revolutionary," says Bill. "It's just a new way of focusing our work so that our customers — people from industry and government — can access Labs technologies with greater ease. When the customer calls, we can get the right people at Sandia involved right away." ●JG

Into the 21st Century . . .

Narath Pledges Labs' Technical Help to Manufacturing Execs

Labs President Al Narath addressed the Agile Manufacturing Enterprise Forum (AMEF) Dec. 16 in Lake Buena Vista, Fla. The AMEF is a forum of executives from various private-sector manufacturing companies and industries. (See "What's AMEF?" on page six.)

The talk was part of AMEF's Second Annual Workshop/Conference, titled "Agile Manufacturing: A Competitive Leadership Strategy for America." During his presentation, Al gave the audience a taste of the national laboratories' long history in manufacturing and showed how lab-industry partnerships can help move technologies from the lab to the factory to increase US economic competitiveness. Most of Al's speech is reproduced below.

We are living in times of rapid change, requiring drastic adjustments in the way we operate all of our institutions, including our national laboratories. In this time of change, two questions have occupied much of my thinking. First, what lies ahead for the US domestic manufacturing sector — how can it best survive in the face of growing global competition? Second, what role, if any, can the national laboratories of the Department of Energy play in support of US industry?

This second question is significant. DOE's national laboratories are an unmatched research and development resource for our nation. Their budget, approximately eight billion dollars for the nine multiprogram laboratories, supports facilities and scientific expertise that, if lost, could not be replaced. These laboratories contributed significantly to our victory in the Cold War by creating and supporting our nuclear deterrent capability.

Now that the Cold War is over, we have busied ourselves collecting the victor's just rewards, without much visible success. On the contrary, our economy is stagnating and public confidence in our institutions is eroding.

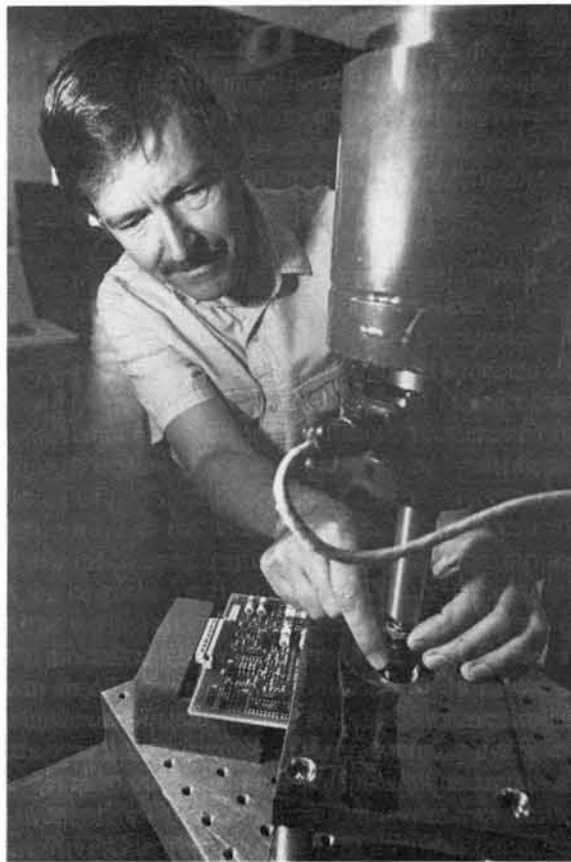
The fact is that a real war, a global economic war, continues, and our national security is still at risk. National security used to mean military security — and large defense acquisition budgets. Today, most of us understand that national security depends not so much on military power as it does on energy security, environmental integrity, and, most important of all, economic strength.

The ultimate measure of a nation's influence on world affairs is *its ability to create wealth*, and we all know that the principal wealth-generating mechanism for any industrialized nation is *manufacturing*. We take great pride in the strength of the US service sector, encouraging the belief that prosperity no longer requires a healthy manufacturing sector. We need to remind ourselves that, in addition to manufacturing, only mining and farming are fundamental sources of wealth — all other human activity simply transfers wealth. We must remember, too, that service-sector jobs tend to be low in value added, and therefore low in wages. Moreover, as free-trade agreements become commonplace around the world, how successful will we be in exchanging our services for imported, manufactured goods?

In short, there is no doubt in my mind that technology-driven industrial innovation is still the key to economic success. Unfortunately, some in our society still seem to believe that our destiny is to walk the economic high ground forever.

Half a century ago, we entered a prolonged period of unprecedented economic growth, taking advantage of our enormous natural and human resources and the fact that the ravages of war had left the rest of the industrialized world in ruins. But the world, as all of us here know, has changed very dramatically. As we approach the turn of the century, our economic supremacy is facing serious challenges from global competitive pressures.

At the same time, our nation is finding it difficult to reach consensus on an industrial competi-



COOPERATIVE RESEARCH among industry, government, universities, and the national labs to solve common problems will be a key to bolstering US national economic competitiveness in the post-Cold War era. Here, Joe Kubas (2761) tests breaking strength of soldered joints as part of a Sandia-Motorola collaboration aimed at eliminating the use of ozone-depleting solvents in certain manufacturing operations. (LAB NEWS, Feb. 21, 1992)

tiveness strategy. We remain suspicious of cooperative efforts, especially those involving alliances between public and private institutions. We seem most comfortable when the federal contribution is indirect, as in defense spending and support of basic academic research. But the impressive successes of our foreign competitors, especially Japan and Germany, have shown that neither passive spin-offs from military hardware acquisitions, nor the spontaneous transformation of basic research into practical applications, can meet the stringent cycle-time requirements of today's dynamic global markets. Instead, these nations have learned to apply their more limited resources in ways that are more strategically focused and more effectively integrated (i.e., more market sensitive, more flexible, and better coordinated).

Challenge and Opportunity

We need to ask ourselves whether we can generate a sufficient sense of urgency to do what's needed to remain a major competitive force in manufacturing. Unfortunately, history suggests that we respond best as a nation when facing disaster, and economic disaster is not yet upon us. We are still the richest country on earth. Our productivity still leads the world — unfortunately, the lead is greatest in the service sector! However, our competitive advantage is shrinking, especially in many strategically important industries. Indeed, I worry that our decline may be too gradual to stimulate public awareness of the danger facing us.

One thing seems clear: we can no longer squander our resources as we have in the past and as we continue to do today. Unless we apply our resources more deliberately for greater effectiveness, future generations may suffer the consequences of our failure. In describing this effort, I want to make a few points very clear:

- I am not suggesting we discourage domestic competition.
- I am not suggesting we abandon our reliance on free-market economics.

- I am urging that the linkages among industrial, academic, and government-supported institutions be greatly strengthened in order to accelerate the flow of technical and managerial innovation into products, as well as services, that can survive the test of global competition.
- I am suggesting that we become more pragmatic — there are countless untapped opportunities to cooperate, while still leaving room for subsequent competition.

The Agile Manufacturing Paradigm

I choose to be an optimist: For every challenge there exists a window of opportunity, and I can point to many signs that we are ready to respond. What excites me most are the opportunities afforded by the inevitable shift in manufacturing away from the current Just-in-Time, mass-production approach to "agile manufacturing." None of us here would be attending this workshop if we did not recognize that shift.

Flexible, scalable, cost-effective production facilities delivering affordable, high-quality, customized products on demand will dominate the marketplace. Technology will move much more quickly from the laboratory to the retail market. Agility will be a necessity in *all* product-realization systems. To be successful, enterprises will have to be able to reconfigure rapidly to address changing requirements. This will require vertical and horizontal teaming arrangements on much larger scales than practiced in the past.

Success in realizing the agile manufacturing vision will depend on the implementation of new technologies, processes, and communication strategies, such as the following:

- Advanced information infrastructures
 - High-speed digital networks
 - Universal connectivity through open standards
 - Distributed data bases
- Robust, flexible, environmentally conscious processes
 - Intelligent, self-certifying process control technologies
 - Scalable, sensor-based system control architectures
 - Intelligent self-configuring process interfaces
 - Integrated and concurrent information systems.

Success will also depend on reversing the growing trend toward irrational regulatory constraints that a poorly informed public has imposed on our society. Government regulations, especially in the environmental and public health and safety areas, must become more sensitive to cost/benefit considerations. Stated differently, regulations must become risk-based if we are to remain in the competitive race.

Let me also emphasize the growing importance of our human resources and the critical role of education and training as we enter the age of agile manufacturing. Unfortunately, as an intellectual challenge, manufacturing has generally not stood high in the pecking order. This is reflected in the relatively low emphasis given the subject by our education system. Stimulating interest in how things work has been considered more important than how things are made or how they fail.

...

We know that DOE's national laboratories have been criticized for having lost much of their former mission relevance — that they are vestiges of post-World War II nuclear imperatives, no longer needed as we approach the 21st century. I believe, however, that our nation will be far better served if, instead of destroying the labs and invent-

(Continued on Page Six)

(Continued from Page Five)

ing new institutions, we encourage DOE and its laboratories to adapt their unquestioned technical capabilities to the challenges of a changing world. We all recognize that creating new, competent R&D institutions will be far more difficult and time-consuming than effectively utilizing existing institutions.

At Sandia, we have invested much effort these past three to four years thinking about the future and how we can maximize our value to the taxpayer. This environmental scan and self-examination have caused us to institute many radical changes in our operating style. The central thrust of our effort has been a shift in self-image from an entitlement role (resulting from the federal government having been both sponsor and end user of our products) to one based on performance — performance increasingly judged by industry rather than by the federal government.

We have committed ourselves to managing Sandia National Laboratories more like a business, with a strong focus on customer requirements and an unwavering commitment to continuous improvement in all operations, administrative and technical.

At Sandia, we are responding [to national competitiveness needs] by emphasizing agile manufacturing as a key technology initiative, taking advantage of numerous "dual-use" applications (technologies of interest to both the defense and civilian sectors of the economy). Toward that end, we have established, with DOE sponsorship, a Center for Advanced Manufacturing Technology, supported by a number of major facilities.

The function of the Center is to coordinate and focus Sandia's broad-based capabilities to support the development of improved production processes, equipment, and materials, with emphasis on industrial participation to ensure that our efforts match

"We have little choice — the stakes are much too high to permit failure."

the needs of real manufacturing environments. Current efforts focus on advanced materials and processes (such as metal casting, plating, and joining), microelectronics and photonics, and related topics ranging from intelligent machines to integrated engineering information systems.

Common themes of our technical development efforts revolve around intelligent process controls and end-to-end process analysis and simulation. The objective is to contribute to manufacturing agility and product reliability through cooperative efforts with industry, academia, and other federal

(Continued from Page Four)

Manufacturers Agree

Advanced Manufacturing Brew," LAB NEWS, Dec. 18, 1992.)

In an agile environment, market opportunities will be fleeting. To take advantage of windows of opportunities, enterprises will learn to work

"We will compete on our ability to react to opportunities and capitalize on rapid changes."

together, sharing corporate assets in temporary arrangements called "virtual companies."

The end result of this new mode of operation, says Bill, will be a flexible US manufacturing industry that is much more competitive in the international arena, introducing products to the marketplace more quickly than ever before. This will be a

Sandian a Loaned Exec

What's AMEF?

The Agile Manufacturing Enterprise Forum (AMEF) is a forum of executives from various private-sector manufacturing companies organized by industry to encourage, guide, and coordinate the national shift to agile manufacturing. AMEF is facilitated by the Iacocca Institute at Lehigh University, with DOE and DoD participation.

Gary Laughlin of Safety Components Dept. 2643 is currently serving as a loaned executive to AMEF. He helps manage operations of AMEF, shares information about the national laboratories with his AMEF counterparts, and brings relevant information about agile manufacturing back to Sandia to aid the Labs' advanced manufacturing initiative.

laboratories. Current activities include the following:

- The establishment of a national Center for Microelectronics Technologies, thanks to a very large equipment grant by IBM [LAB NEWS, Dec. 18, 1992]
- The Semiconductor Equipment Technology Center (SETEC) and the Center for Contamination-Free Manufacturing, both sponsored by SEMATECH
- The Center for Intelligent Processing of Welded Assemblies
- The Center for Ultra-Reliability Engineering.

Much of our initial industrial outreach effort has utilized the CRADA [cooperative research and development agreement] mechanism. Results to date are very encouraging, with approximately 80 percent of some 70 Sandia CRADAs involving a broad spectrum of advanced manufacturing technologies and demonstrating technical achievements that have already earned praise from industry. Although the CRADA process needs significant streamlining if it is to meet industry's time requirements, it is possible that this can be achieved without legislative action. At the very least, we have demonstrated that we can bridge the "culture gap" that has stood in the way for so long — and that our technical capabilities are of real value to both government and industry.

Agile manufacturing is also key to the continued vitality of DOE's nuclear weapons production complex. Agile manufacturing concepts will play a critical role in downsizing and streamlining the complex as the number of weapons in the stockpile

key to US economic security in the 21st century, he says.

"We will compete on our ability to react to opportunities and capitalize on rapid changes in an uncertain marketplace," says Bill. "We must provide ever-higher quality, speed, and customer satisfaction by rapidly converting people's intellectual skills to competitive products and services."

As for the DOE laboratories, and specifically Sandia, their role in this new manufacturing environment will be complex and evolving, says Bill (see "Narath Pledges Labs' Technical Help to Manufacturing Execs" on page five). But you can bet that technologies and capabilities developed during the last four decades of Labs history won't go to waste.

"Sandia and the other DOE labs will play a key role in the success of the US manufacturing industry in the 21st century," he says. (See "DOE Gets Involved at Kansas City Plant" at right.) ●JG



and the number of weapons built each year are reduced to much lower levels over the next several years. I anticipate that the reconfiguration of the DOE production complex will afford many opportunities to prototype agile manufacturing techniques of interest to, and with participation by, the civilian manufacturing sector. In addition to cooperative R&D activities with the private sector, we are actively seeking, with DOE encouragement, strategic alliances with other federal departments, such as the Department of Defense and the Department of Commerce.

Finally, I should mention that Sandia is actively involved in the activities of the Agile Manufacturing Enterprise Forum.

Conclusions

At a time of rapidly changing national priorities, Sandia (like other national laboratories) is taking steps to increase its value to the nation through exploitation of dual-use technologies and increased private-sector collaboration. At Sandia, we are placing special emphasis on agile manufacturing technologies. Much progress has been made, and the prognosis is encouraging. However, the most critical question remains to be answered: How do we apply national laboratory resources in ways that will make a significant contribution to the long-term vitality and profitability of industry?

To answer that question and to make such a contribution, several related questions must also be answered:

- How do we organize and direct larger, more focused efforts involving more extensive teaming arrangements among industry, university, and national laboratory participants?
- How do we ensure politically acceptable fairness of access to publicly supported resources and avoidance of conflicts of interest?
- How do we increase DOE funding to required levels, without necessitating incremental appropriations (and hence undesirable laboratory expansion)? Stated differently, how can we increase the utility of existing program funding without compromising the Congressional appropriation process?
- How do we prioritize available DOE resources for maximum national benefit?
- How do we establish objective measures of performance for the labs as a guide to DOE and industry investment decisions?

I do not pretend to have reliable answers to all of these questions, but I am optimistic that answers will be found. We have little choice — the stakes are much too high to permit failure. In the end, I believe that the national laboratories will make a real contribution to the revival of the US manufacturing sector. ●

DOE Gets Involved at Kansas City Plant

On June 25, the same day DOE Secretary Watkins announced the new national Center for Advanced Manufacturing Technologies at Sandia, he also announced the opening of the Flexible Manufacturing System (FMS) Facility at Allied-Signal's Kansas City plant.

The FMS, a \$15 million integrated manufacturing system, is dedicated to development of flexible, or agile, manufacturing technologies useful to US industry. Controlled by a computer, the system can machine as many as 32 different parts on a given day and inspect them as they are manufactured, reducing manufacturing time from days to hours. The system also shows that parts can be manufactured on a market-demand, as-needed basis.

Sandia News Briefs

Word Processing Study Results Are In, Software Standardized

The Sandia Word Processing Team — formed last spring to study the needs of Sandians who use word processing software — has issued its report recommending a standard set of word processing software for the Labs: Word for Windows, Word for Macintosh, Word Perfect for DOS, Mass 11 for DOS, and Framemaker for UNIX.

Sandians may use other software packages, but they will have no assurance of interoperability with the standard software packages. The standard packages were chosen based on their popularity, common use at the Labs, and interoperability. The set will be reviewed periodically and updated if necessary. An upcoming *Weekly Bulletin* will provide more detail about the study and software. For an extended summary or a copy of the full report, contact Julie Walker (4400) on 271-7802.

Sandia Team Wins Heterogeneous Computing Award

Gerald Grafe, Luis Martinez, and Brian Kast (contractor) of Computer Architectures Dept. 1415 recently won an award for a unique heterogeneous computing application during Supercomputing '92, an annual conference devoted to high-performance computing. Heterogeneous computing research explores ways to use interconnected networks of diverse computers together to solve large computing problems.

The Sandia team's winning application achieved a gigaflop of computing power using 30 different computers supplied by IBM, Silicon Graphics, Hewlett-Packard, and Sun to demonstrate parallel computation of Mandelbrot sets. Machines at the conference and at Sandia's California and New Mexico sites were used in the demonstration.

Various people from Sandia's Center for Scientific Computing 1900 and Computational and Computer Sciences and Mathematics Center 1400 contributed, including Arthurine Breckenridge (1954), who coordinated the Sandia booth at the conference, and Ray Cline (1952), who provided access to computers at Sandia/California.

Labs Mesh-Generation Software May Reduce Industry Design Time

Sandia entered a consortium recently with four US companies to commercialize computer-aided design software, called "mesh-generation" software, that may help US industry reduce product design time. The consortium — with Ford Motor Company, Fluid Dynamics International, PDA Engineering, and MacNeal-Schwendler Corp. — was handled under a series of four CRADAs approved by DOE.

Mesh-generation software helps computer-aided designers define the numerical, mathematical, and geometric features of a part or product before computer analysis of that product can take place. The software, developed at Sandia for weapon design applications, performs this task much more quickly than conventional methods. Consortium participants will either package the new software as a commercial product or service or, as in Ford's case, will use the software to improve design processes for their products.

Two Sandians Named Officers of the Hypervelocity Impact Society

At a recent Hypervelocity Impact Society meeting, Jim Asay of DP [Defense Programs] Technology Transfer Dept. 5602 was named President and Dennis Grady of Experimental Impact Physics Dept. 1433 was named Secretary/Treasurer of the Society. The two were selected by other members of the Society's board of directors. Each is serving a two-year term that began in November. The Hypervelocity Impact Society is an international society with approximately 300 members.

Solar Energy Project Brings Four Sandians Recognition from DOE

DOE recently awarded four Sandians — Hal Post, Mike Thomas, John Stevens, and Rick Chapman of Photovoltaic Systems Research Dept. 6218 — a Federal Energy Efficiency Award. The award recognizes their help in providing photovoltaic power to the Cholla Campground and Boating Site in Arizona's Tonto National Forest.

The project included photovoltaic systems that provide electricity for pumping water from a well, disinfecting groundwater, and heating water for showers. The systems also provide electricity for lighting, ventilation, and evaporative cooling systems. The project cost the Forest Service approximately \$500,000 less than the cost of extending commercial power lines to the site, and is expected to save about \$1,000 a month in electric bills.

Send potential Sandia News Briefs to LAB NEWS, Dept. 7162.

Sandia Employees Invited

E&E Job Fair a 'Window Shopping' Event

The Energy and Environment (E/E) Sector is hosting a job fair for Sandia employees — the first such event at the Labs, billed by its organizers as an informal, friendly way for Sandians to learn about upcoming work challenges.

"Bring Your Energy to Our Environment" is the theme of the fair, which will take place from 12:30 to 4:30 p.m. on Wednesday, Jan. 13, at the Technology Transfer Center (Bldg. 825).

The fair will include information booths, career development workshops, and refreshments.

"The purpose of the fair," says Ken Hanks (6516), project manager for the fair, "is for employees and managers to openly discuss and understand E/E Sector matrixing and job opportunities — about 120 jobs." Ken emphasizes that the job fair is for communication and information exchange. There will be no interviewing there. After the fair, however, jobs will be listed in a special section of the Jan. 18 *Weekly Bulletin*.

"The job fair is just one component of the corporate staffing strategy to get the right person in

the right job at the right time," says Ralph Bonner, Director of Human Resources 7500. "It's important to provide innovative ways to match the talents and skills of our work force with emerging programs and projects."

Dan Hartley, Vice President for Division 6000 and the E/E Sector, points out the benefits to managers: "The job fair will provide an opportunity for Sandia managers to discuss matrixing opportunities in the E/E sector while we demonstrate our upcoming new work challenges," he says. "A workshop on the benefits of matrixing will also be conducted during the job fair, for managers and interested staff."

Jobs offered will be for technical and non-managerial positions at Sandia/New Mexico. As the need arises, there will be future Sandia-wide job fairs at both the New Mexico and California sites.

In the meantime, for this first job fair, Ken says, "Come shop around!"

(Continued from Page One)

Energy Secretary

services, corporate medical, and occupational health and safety. She was also responsible for the wholly owned NSP subsidiary, NRG Energy, Inc.

Before joining Northern States Power, O'Leary had been vice president and general



HAZEL ROLLINS O'LEARY

counsel for O'Leary Associates in Morristown, N.J., and Washington, D.C., since 1981. The international consulting firm specialized in energy economics and strategic planning.

Earlier, she served as presidential appointee in the Department of Energy during the Carter administration and in the Federal

Energy Administration under President Ford. As administrator of the US Economic Regulatory Administration, she managed energy regulatory and conservation programs employing more than 2,000 attorneys, economists, accountants, engineers, geologists, and support staff. O'Leary also presented federal energy policy before congressional committees and through a variety of public media and forums.

She has also served in several government legal positions in New Jersey and as general counsel of the US Community Services Administration.

She received a BA degree, cum laude, from Fisk University, where she was elected to Phi Beta Kappa, and a juris doctorate degree from Rutgers University School of Law.

O'Leary is the widow of Jack O'Leary, who was New Mexico's natural resources secretary in the mid-'70s before they met. They married after meeting in Washington, D.C., while both were working for DOE.

Sympathy

To Peter Mattern (1010) on the death of his mother-in-law in Maine, Dec. 9.

Recent Retirees



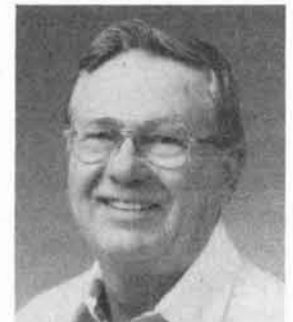
Brick Dumas
9210 36



Billy Duggan
1221 44



James S. Hinson
7400 43



Melvin Johnson
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'Work WITH Others' Is the Key, Says Gerry

What's Happening in the Work for Others Sector?

By Gerry Yonas (VP-9000)

Editor's Note: This is the third in a series of LAB NEWS articles by Sandia's vice presidents, discussing what's happening in their areas. The next, by Glen Cheney (7000), is scheduled for the Jan. 22 issue.

I know the Department of Energy meant well when it selected the term "Work for Others" to represent that work done by the DOE laboratories in support of the missions of other federal agencies and the private sector. Nevertheless, I can't think of a worse name for a sector than "Work for Others" (WFO). It makes about as much sense as calling the Price Club "Stuff for Others." Even worse, the name portrays all the wrong images. Our sector can only exist if there is a strong teaming relationship with the customer, and this label gives the impression that we just take and fill orders.

In most cases, our customers don't really know how to specify the real solution, but they do know they have a real problem. The solution may require a discovery, a new way to integrate technology, or a special team of skilled people using unique facilities. And, our customers cannot just go out and get competitive bids from industry. On the other hand, if they know Sandia, trust us to tell it like it is, and think we have those special capabilities, then they are likely to give us a chance in a precompetitive stage to explore the solution space on their behalf. However, Sandia's deliverables normally fall short

"This label [Work for Others] gives the impression that we just take and fill orders."

of final product realization since that is really the job of industry. If a total solution is to be delivered to the customer, we have to work with industry to ensure that the customer gets the product. The ideal way to do this is with a Labs-industry team.

Another aspect of teamwork in the WFO Sector is the reliance on, and support of, the wide-ranging capabilities within the Labs — everything from algorithms to alloys, from guards to germanium, from lathes to lasers, from synthetic aperture radars to sled tracks. DOE believes that the WFO Sector helps to keep the community pond filled and well-stocked with fish so DOE can afford to "keep on fishing." This works best when two or more agencies share the investment and the benefits from a program. For example, DOE and the Air Force share the investment and benefits from our satellite program, while DOE and the Department of Defense (DoD) share the investment and benefits from advanced conventional weapons.

Unprecedented Teamwork Needed

But this need for mutual benefit will have to be satisfied a bit differently as the nation shifts its R&D attention toward building knowledge and economic power to satisfy dual military and civilian needs. This will require an unprecedented amount of teamwork among multiple federal agencies because the most vital national needs do not fall neatly into separate ponds, but more likely into one big swamp.

For example, health care technology finds itself in the National Institutes of Health, Health and Human Services, Food and Drug Administration, Department of Commerce (DoC), DoD, and DOE. Helping these agencies work together will be the toughest part of dealing with the health care cost crisis.

Within the new administration, health care, job creation, and economic competitiveness will demand increased investments in "infrastructure."



WFO BRAIN TRUST — Seven members of the Work for Others Sector management team listen as VP Gerry Yonas (9000, third from left) discusses Sandia's contributions to Global Positioning System (GPS) satellites. GPS is a system that uses satellites to provide worldwide, three-dimensional location information for a variety of military and civilian purposes. The two other managers standing are Max Newsom (9700, center) and Don Rigali (9800). Those seated are (from left) Bill Alzheimer (2900), Jack Walker (6501), James Kelsey (9600), Tom Sellers (9200), and Ron Andreas (2300). All WFO Program Managers (listed in the box on page nine) meet frequently to share program development ideas and challenges.

These demands will influence Sandia's role increasingly as R&D investments shift toward the nation's non-military needs. But this won't really happen within the WFO Sector if we think narrowly, create artificial boundaries, or fail to see the connections and overlaps. I think we understand the need for flexible Labs-wide teams. Four examples of Labs-wide teaming are transportation, manufacturing, biomedical engineering, and RSTAKA.

Transportation

Our nation's transportation system is a good example of a complex problem that needs a real solution. The Department of Transportation (DOT) wants smart cars and smart highways; DOE wants energy efficiency; the Environmental Protection Agency (EPA) demands clean air; DoC looks for a competitive advantage; DoD needs rapid mobility; and Vice-President-elect Gore wants to use fiber-optic communications so nobody has to go anywhere. All of these commendable goals will have to be linked in what is likely to be our nation's biggest and most long-lasting infrastructure investment in the next 10 years.

Therefore, it should come as no surprise that transportation became a major WFO focus more than a year ago and is now one of Sandia's multi-sector initiatives. Dan Hartley (VP-6000) leads the Labs-wide effort. James Kelsey (9600), the WFO Advanced Transportation Systems program manager, focuses on the DOT requirements, particularly highway-related issues on a local, state, and federal level. One example of a WFO transportation project is our work with the State of New Mexico to create a plan for an intermodal transportation center at the Santa Teresa border crossing. This intermodal transportation center would link air, rail, and roads to facilitate the realization of the recently signed North American Free Trade Agreement.

A new dimension of the transportation program is the DoD need for rapid response capabilities with fewer logistics, in the face of decreased forward-deployed forces. This will demand new lightweight vehicles, power sources, information systems, and routing optimization to carry out reconnaissance and surveillance and then to deliver troops and equipment to the battlefield. The DoD will be investing in multi-use technologies under the banner of "Defense Conversion." The old ideological concerns about industrial

policy will evaporate as we see direct investments in commercial applications that can then spin onto, not spin off of, the military needs.

Manufacturing

Heinz Schmitt (VP-2000) has the exciting task of leading our Labs' advanced manufacturing initiative. This is a perfect match among the needs of the DoD to maintain our defense industrial base, the needs of the DOE to reshape Complex 21, and the needs of our nation's manufacturing community to compete with the rest of the world. All of these stakeholders want to produce high-quality, yet affordable products "flexibly" by continuously introducing new materials, processes, and designs into the production process. Bill Alzheimer (2900) and Joe Polito (9911) are developing opportunities with our WFO customers in several key areas: information, processes, and robots. [Editor's Note: See related article on page one.]

The manufacturing enterprise of the future will link the designers, the factories, and the customers in information networks that couple the stakeholders to product-specific data bases through a common language. Once ideas become designs, it will be possible to convert materials into fabricated forms using computer models of objects. Those objects will be manufactured close to their final shape with reduced waste and then tested in a combination of real and simulated environments. The machines that will produce these parts will be driven by algorithms that allow robots to generate their own programs for specific parts. Sensor-controlled machines will automatically adapt to product-specific changes in the manufacturing process. The manufacturing enterprise of the future is likely to be so flexible that factories can manufacture parts for toys, tanks, and trucks. Sandia will play such an important role in advanced manufacturing that we may have to change our name to "Parts R Us."

Biomedical Engineering

Biomedical engineering is one of the most exciting technology arenas where Sandia can contribute to the "prosperity and well-being of the nation." It will be an uphill fight to convince the skeptics that a "weapons lab" has a vital role to play in helping reduce health care costs, but I am enjoying this challenging aspect of leading this initiative. Fortunately for me, the Labs-wide

interest in the subject is enormous. Sam Varnado (9900), A. Wayne Johnson (9902), and Mary Ann "Med" Zanner (9902) are rapidly showing our potential customers that Sandia has plenty of relevant technology.

One of the first areas we pursued in biomedical engineering was medical imaging to improve the ability of radiologists to spot tumors in mammograms without creating false indications. This was a spin-off from our automatic target recognition work and is likely to become a diagnostic decision-support tool. Another weapons-related technology, chemometrics, is now being used in a non-invasive sensor technology to monitor blood glucose levels without taking blood samples. We expect this to become an affordable product that will improve the quality of life of diabetics.

We are also developing an ultrasonic scanner to define the geometries of prostheses so manufacturing costs can be reduced. We are using our supercomputers to model molecules and the chemistry of drugs to help shorten the time needed

"Labs-wide interest in the subject [biomedical engineering] is enormous."

to bring new pharmaceuticals from the laboratory to market. [Editor's Note: See related article on page one.]

Finally, the most important weapon we can bring to the battle to contain health care costs is to develop a comprehensive understanding of the entire health care system and to identify where technology can have the largest cost impact. This will require a computerized national medical information system based on patient records. The national system will reduce paperwork, provide more efficient use of facilities and capabilities, and allow us to track which diagnostic methods and treatments are really working. In a broader scope, the national system will also increase the efficiency of health care providers, enhance epidemiological studies, and facilitate national health care policy decision making. It is likely that the DoD's medical record system will be the first step toward a



ALAN MORIMOTO (1671) at the controls of an ultrasonic scanner used in a computerized scanning technique developed at Sandia. It can create a three-dimensional map of the residual limbs of amputees showing the precise locations of skin surfaces and bones. Such information can be used for fabricating prosthetic devices. Sandia is working with the University of Texas Health Science Center at San Antonio to develop the technology. This is one of several biomedical engineering projects now under way at Sandia.

national system, and we are working to build a national team involving multiple agencies and medical centers.

RSTAKA

Contrary to popular belief, RSTAKA is not a Yiddish word for mixed fruit (that is *TZIMMES*). RSTAKA stands for Reconnaissance, Surveillance, Target Acquisition, Kill, and Assessment, and defines an integrated approach to dealing with the threat of rapidly emerging regional military conflicts. RSTAKA is really a series of time-phased system architectures linked together by an overarching technology road map. Modeling and computer simulation provide the glue to the sensors, information systems, and weapons to counter such threats as mobile missiles carrying weapons of mass destruction.

Sandia's capabilities in unattended ground sensors, synthetic aperture radar, automatic target recognition, command centers, hypervelocity weapons, and precision guidance are keys to the concept. However, achieving real military capability will take more than technology. It will require multi-service, multi-agency teams to embrace and then develop this time-phased system approach.

For more than a year, I have been trying to convince DOE, DoD, and congressional decision makers to adopt this integrated approach. I am becoming more optimistic that this will happen and Sandia will play a vital role. Part of my optimism is

founded in a belief that the DOE, the DoD, and other agencies will change the way they procure emerging applications of technology. I think the notion of concurrent engineering will catch on and demand strong linkages among the Government, Universities, Industry, and Labs (GUILDS). [The "D" is for Development.] I believe that top-level agreements among agencies will encourage, if not require, the formation of flexible, multi-disciplinary teams to deal with precompetitive technology issues. Team investment in advanced technology experiments reduces technical uncertainties, reduces acquisition risk and time, and helps the eventual buyer of products make decisions from a basis of knowledge, not uncertainty.

I know all of this sounds great, but a lot of Sandians are worried that the new management and operating (M&O) contractor will put a stop to all of this. Here again, I tend to be optimistic based on several factors.

We're Not Broken

First, DOE requested a fixed-fee or no-fee arrangement. I believe this motivates the new contractor, the Laboratories, and government to do what is best for the nation rather than provide a narrow focus on the compliance issues that are prevalent in award-fee contracts.

Second, DOE does not think Sandia is broken. In its request for proposals for a new M&O (Continued on Page Ten)

Work for Others — the Sector

The main article is really about teamwork, but may not satisfy the average, technically oriented reader's needs for mind-rotting details . . . like numbers of people, funding, etc. It also leaves out a great deal of information about ongoing programs and projects, thereby leaving a lot of Sandians feeling left out . . . like, "Okay, but how does that relate to me?" So that leaves me with the responsibility to tell you that the WFO Sector includes 18 programs, 422 projects, 183 customers, \$313 million in funding last year, \$330 million in expected funding this year, a spending plan of \$300 million, and an FTE (full-time equivalent employee) allocation of 826. Now why don't you feel fulfilled? The next obvious question is, "But what does this sector do?" The sector program managers have been struggling with this question, and our best answer is the following statement of our intent: to anticipate national priorities and provide comprehensive system engineering and integrated technology solutions for the nation's most important problems.

I can already hear the grumbling . . . "But what do you really do?" The variety and diversity of what we do is not just mind boggling. Mind boggling, in fact, is at least 10 decibels below what we do! For instance . . . developing

rugged fuzes for nuclear and conventional weapons, modifying a Russian rail car, developing hypersonic reentry vehicles, developing nuclear rockets and launching chemical rockets, developing zappers and then zapping materials with e-beams, detecting clandestine nuclear tests, providing targets for the Strategic Defense Initiative to shoot at, developing new materials, measuring oil slicks with radars, and simulating what to expect when we do almost anything.

Some of our projects provide a service, some deliver a piece of hardware, and others are just another scheduled miracle. We try to focus on linking our analytical and experimental capabilities into valid simulations of reality so we can understand and then help our customers fully appreciate the total implications of what we do. We also support Sandia's core competencies while teaming with industry and universities. Now that all that is clear, let's get on with the list! Here are the WFO Sector programs, initiatives, and leaders, with the FY92 costs (\$ in millions) for each program.

If this list leaves you hungry for more detail, please call any of these people, and I'm sure they have a stack of viewgraphs ready and waiting to enlighten and entertain you.

•GYonas(9000)

WFO Programs	Manager	FY92 Costs
Advanced Manufacturing Technology	Bill Alzheimer (2900)	new
Advanced Transportation Systems	James Kelsey (9600)	0.5
Aerospace Systems Development	Don Rigali (9800)	53.6
Applied Defense Technologies	Max Newsom (9700)	26.8
Command & Control	Mike Eaton (5700)	23.5
Development Testing	Ruth David (2700)	46.8
Electro-Mechanical Components	Ron Andreas (2300)	2.1
Exploratory Systems Technology	Mim John (8100)	new
Fuzing and Technical Support	Bill Nickell (5100)	15.0
High-Performance Computing	Ed Barsis (1400)	2.0
Materials Science & Technology	Bob Eagan (1700)	2.2
Microelectronics and Photonics	Paul Peercy (1300)	9.7
Precision Strike Systems	Carolyn Hart (9100)	10.3
Pulsed Power Technology	Ken Prestwich (1203)	9.3
Radiation Testing	Jim Powell (9300)	7.9
Safeguards & Security	Dennis Miyoshi (9500)	14.7
Remote Sensing & Verification	Tom Sellers (9200)	50.2
Space Nuclear Technology	Jack Walker (6501)	12.5
WFO Sector Support Center	Sam Varnado (9900)	4.0

Supervisory Appointments

LINDA GARCIA BENAVIDES to Administrative Manager of Intelligent Systems and Robotic Center 1601.



LINDA BENAVIDES

Linda joined Sandia in 1980. Organizations she's worked for include Payroll, Purchasing, Accounting, Nuclear Safeguards and Security, Financial Information, and Budget. She has a BBA in accounting and finance from UNM and an MBA in accounting from New Mexico Highlands University. She's a member of the Institute of Management Accountants.

EUGENE MARQUEZ to Manager of Nuclear Material Management Dept. 7445.

Gene joined Sandia in 1977 as a member of the Personnel and Education Systems Division. He's also worked for Technical Library Financial Systems, Common Data Input Systems, Personnel and General Employment, Staff Recruiting and Employment, Materials Process Engineering



GENE MARQUEZ

and Fabrication, Compensation Planning, Computer Sciences and Mathematics, and Material Systems and Security Audits. Gene has a BS in business from the University of Albuquerque and an MA in business from New Mexico Highlands University.

MASON BLAICH to Manager of Quality and Administrative Support Dept. 1301.



MASON BLAICH

Mason joined Sandia in 1989 as a member of the Financial Systems Division. He has also worked for the Microelectronics and Photonics Center. He has a BA in chemistry from Rutgers University and an MBA in finance from Cornell University. He is a member of the American Institute of Certified Public Accountants and the New Mexico Society of Certified Accountants. Mason also is on the board of directors of Sandia Laboratory Federal Credit Union.

MICHAEL ALLEN to Manager of Severe Accident Phenomenology Dept. 6422.

Mike has been a member of the Severe Accident Phenomenology Department since he joined Sandia in 1985. He has a BS and MS in nuclear engineering from Texas A&M University and a PhD in environmental engineering from the University of California. He is a member of the American Association for Aerosol Research.



MIKE ALLEN

PERRY MOLLEY to Manager of Intelligent System Sensors and Controls Dept. 1611.



PERRY MOLLEY

Perry joined Sandia in 1984 as a member of the Command and Control Subsystems Division. Other organizations he's worked for include the Embedded Computing Division and the Computer Architectures Division. He has a BS and an MS in electrical engineering, both from Ohio State University.

LUCILLE JUSTICE to Supervisor of Electronic Fabrication Team A 2412-1.

Lucy joined Sandia in 1981 as a member of the Electronic Fabrication Division. She's worked for the Transportation Safeguards Division and the Transportation Support Department. Lucy is a graduate of Sandia's Electronic Fabrication Apprentice Program.



LUCY JUSTICE

LAURA LOUDERMILK to Supervisor of Payroll Team 152-1.



LAURA LOUDERMILK

Laura joined Sandia in 1981 as a member of the General Accounting Division. Other organizations she's worked for include Safeguards and Security, Budget, and Work for Others Sector Support. She has a BA in psychology from Slippery Rock State College and an MBA in accounting from the University of Texas at El Paso.

LEROY HOLMES to Supervisor of Instrument Services Team 2414-1.

Leroy joined Sandia's Electronics Apprenticeship Program in 1970. He's worked for the Instrument Repair and Calibration Section and the Shop Overflow Department. Leroy served with the Army before joining the Labs and retired from the Army Reserve with the rank of command sergeant major. He is a member of the Non-Commissioned Officer's Association.



LEROY HOLMES

(Continued from Page Nine)

Work for Others

contractor, DOE asked for enhancements, not dramatic changes.

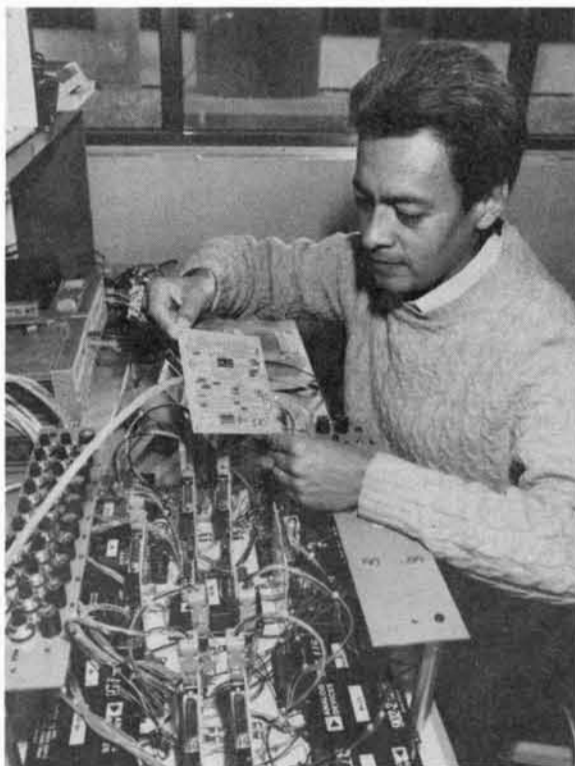
Finally, the multiple breakfasts, lunches, and dinners I have been having with candidate contractors have not been a waste of time (but have enlarged my waist). I am encouraged that next October we will have a very involved, technologically astute, and highly motivated M&O contractor that will open up a wider perspective for everything we do, and after some inevitable start-up trauma, enhance our WFO Sector programs.

By now you realize my key word is "teamwork." In the future, Sandia will be tied to large

"A successful team has a shared vision, and this demands more of a sense of trust than we have now."

national teams, industrial consortia, and universities. They will help to define Sandia's role and evaluate our real value.

But teamwork must begin at home. We still have a long way to go to build the internal trust and communication needed to succeed. Most of my message has been an exercise in "the vision thing," but a successful team has a shared vision, and this demands more of a sense of trust than we have now. We need vision plus teamwork built on improved communication and mutual understanding. I am proud of the progress our WFO leaders have made in team building, and I give a lot of credit to what we learned in the AT&T "Principle Centered Leadership" course (based on the works of Stephen Covey) that we all took.



A "SENSORATIVE" GUY — Project leader Jose Rodriguez (1315) prepares a multipoint, wide-range hydrogen leak detector for delivery to NASA's Stennis Space Center. This "Work for Others" project developed this microelectronic sensor that can detect hydrogen in concentrations as small as one part per million.

Without the driving force of superpower competition, we seem to have lost the focus that united us in the past. I believe our new vision must become achievement oriented rather than threat-focused, or even worse, survival oriented. Sandia's future depends on our ability to serve the nation, not ourselves. That future will be best achieved if we learn to "work with others."

Congratulations

To Lisa and Bryan (2345) Spicer, a daughter, Evv Loeren, Dec. 9.

To Diane (1332) and Norm (2336) Kolb, a son, Kevin Ray, Dec. 22.

To Renae Dietz (6200) and Larry Perrine (7162), married in Albuquerque, Jan. 1.



feed **back**

Q: In publications suggesting reductions in the cost of travel, I never notice any suggestion to use video conferences. I attend two or three such conferences each month. They save several days' travel time and a respectable amount of money for each meeting.

The facilities have greatly improved over the past few years and are an excellent substitute for actually "being there." Does Sandia have any plans to expand the number of video conference facilities and vigorously encourage their use?

A: Yes, Sandia does plan to expand the number of video conference facilities. In case you're not aware of our current facilities, they are (building/room) 910/301 at Sandia/California and 836/110A at Sandia/New Mexico. This secure link is scheduled, maintained, and operated by DOE. These rooms also can connect to other DOE site video conferences (Germantown, Kansas City, etc.).

Three other links (for unclassified conferences only) are dedicated, point-to-point links scheduled, maintained, and operated by Sandia. They are (California to New Mexico): 912/180A to 802/3190; 912/180G to 806/201; and 904 Auditorium to TTC.

In the near future, we plan to upgrade the auditorium facilities and add three more room facilities to each site. These six rooms, along with the four existing unclassified rooms, will be controlled by a switch, so that you may "dial" from any video conference room to any other.

The points of contact for video conference facility planning and information are: Jim Berry (1951), 510-294-2914 in California, and Mark Schaefer (1955), 505-845-8023 in New Mexico.

Dona Crawford (1900)

Q: Why not put a hinged cover on the recycle cages outside many buildings? As presently configured, heavy winds simply redistribute the material all over the tech area.

A: Thank you for your concern regarding paper recycling cages and suggesting a way to con-

Medical Corner

Sore Throat, Aches — Do I See a Doctor?

by Dr. Joe Boyce (7030)

Cold and upper respiratory infection (URI) season is here, with aches, sniffles, sore throats, and other problems. Many Sandians have questions about when they should see a doctor, and how they should treat these common problems. In general, follow this advice:

You can lessen your chances of catching a virus by practicing good hygiene, especially hand washing frequently, at work and home.

If you do get sick — get plenty of rest, don't smoke, and prevent dehydration by drinking plenty of fluids. If your urine is dark yellow, you aren't drinking enough! Take aspirin (except children under 16), acetaminophen, or ibuprofen as needed. Take decongestants or cough remedies if needed, but avoid using nasal sprays or antihistamine-containing cold remedies for more than two days. If you are on other medicines or have another medical condition, contact your doctor before taking any medicine.

Viral Symptoms

Most major viral illness symptoms will pass within 24 to 48 hours, although some may linger a week or more. Common cold symptoms are:

- Runny or stuffy nose with clear drainage initially, often followed by yellowish to greenish discharge,
- Sore throat and hoarseness, with non-productive cough (no phlegm coughed up),
- Low-grade fever (less than 101.5 degrees F) and fatigue, and
- Slight swelling in neck lymph nodes.

Flu symptoms will also include fatigue, body aches, mild headaches, and fever up to 103 degrees F, with fewer upper respiratory symptoms (less coughing, less nasal drainage).

If you're previously healthy and have only the usual symptoms of the common viral illnesses, you can take care of yourself in most cases. Since most URIs are caused by viruses, most treatment is to help relieve symptoms. Antibiotics will not affect viruses and may do more harm than good. If you have more severe symptoms or indications of a bacterial infection, you should see your doctor.

When to See a Doctor

Symptoms that may indicate a bacterial infection or more serious problems that should be seen by a physician include:

- Symptoms for more than a week,
- Large amounts of yellow/green/brown phlegm from cough or nasal drainage, often mixed with blood,
- High temperature — more than 102 degrees F,
- Shaking chills, severe throat pain, or spots on tonsils,
- Steady pain or pressure in teeth or over sinuses,
- Shortness of breath, chest pain, poor color, confusion, or
- Other unusual or more severe problems.

Although Sandia Medical Clinic's main mission is care of work-related injuries and illnesses, medical personnel will provide an initial evaluation and treatment of non-work-related problems such as URIs during walk-in clinic (8-11 a.m. Mon.-Fri.), or by appointment. After the initial visit, you should see your primary care doctor for follow-up. Please call the clinic on 845-8159 at Sandia/NM or 294-2700 at Sandia/CA for further information or if you have questions.

tain the paper. We will consider your suggestion and look into using lids on the cages.

Meanwhile, it would be helpful if the tops of the recycle boxes are taped closed before they are

placed in the cages, to avoid paper escaping to blow in the wind. We hope Sandians will take a few minutes to secure their recycle boxes.

Dick Shepardson (7600)

UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS • UNCLASSIFIED ADVERTISEMENTS

Deadline: Friday noon before week of publication unless changed by holiday. Mail to Dept. 7162.

Ad Rules

1. Limit 20 words, including last name and home phone (the LAB NEWS will edit longer ads).
2. Include organization and full name with each ad submission.
3. Submit each ad in writing. No phone-ins.
4. Use 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 "for sale" or "wanted" item.
9. No "For Rent" ads except for employees on temporary assignment.
10. No commercial ads.
11. For active and retired Sandians and DOE employees.
12. Housing listed for sale is available for occupancy without regard to race, creed, color, or national origin.
13. "Work Wanted" ads limited to student-aged children of employees.

MISCELLANEOUS

EXERCYCLE, Tunturi recumbent, excellent condition, \$200; wrought iron bird cage, large, \$90; English Oak armoire, \$110. Hallman, 899-2336.
HARDCARD DISK DRIVE, 105 MB, \$200; Borland C/C ++ version 3.0, \$60; Kenwood receiver w/Surround Sound processor, \$75. Edwards, 899-8634.

FRAMED PRINT, Gordon Snidow's "Ain't No City Beer" Coors Cowboy, \$450; 1990 Albuquerque Official Balloon poster, framed, \$100. Sackett, 292-1048.

CARTOP SKI CARRIER, Barrecafter, w/key locks, unused, \$25. Burch, 857-0654.

CEMENT MIXER, \$250 OBO; king-size futon, extra thick, \$350 OBO. Bentz, 299-3448.

FURNITURE: coffee table, \$60; end tables, 2, \$30/ea.; all glass top, light colored wood, \$100 for all; lamps, 2, white w/brown design, \$15/ea. Austin, 831-2511.

CHILDCRAFT CRIB, oak, light stained finish, Evenflo coil spring mattress, 1 yr. old, both like new, \$175. Jennings, 268-8789.

AUSTRALIAN SHEPHERD PUPPIES, AKC-registered, black tri-color, \$200-\$275. Douglas, 281-9843.

COMPUTERS & ACCESSORIES: Hewlett Packard, model HP85, \$100; model HP87XM, \$150; model HP9845B, \$200. Davie, 296-3950.

BINOCULARS, Swarovski, 7x42 SL, new condition, firm at \$500. Jimenez, 296-9256.

BURIAL LOT, Sunset Memorial Park, double depth, \$700; golf cart, Kangaroo Katty, excellent condition, \$175. Walker, 821-5938.

EXERCISE STEPPER, new, \$75; wing chair, tapestry, \$50; 4 oak chairs, \$25. Kallio, 299-8837.

HOSPITAL BED, electric, new, never been slept in, cost \$2,000, asking \$1,000 OBO. Bronkema, 271-2389.

OAK ENTERTAINMENT CENTER, excellent condition, 45"H x 54"L x 16"W, smoked glass doors, 3 shelves, 1 drawer, sliding TV door, \$195. Norwood, 266-2717.

PANASONIC VCR, 4-head, remote, stereo, carrying case; JVC video camera w/autofocus, power zoom, excellent condition, \$1,700 new, asking \$400 OBO. Drotning, 294-4807.

TREADMILL, 3 yrs. old, good condition, \$175 OBO. Davidson, 821-0579.

PRINTER, Epson FX-80, hardly used, \$100; Sears console humidifier, \$30; L'il Bell youth bike helmet, never used, \$12; Kawka, 299-1216.

SKI RACKS, locking Barrecafters, for 6 to 8 pr. skis, one rain gutter mounted, one roof mounted, \$50/ea. Brammer, 266-5158.

BOAT CARRIER & LOADER, Eide, for 14-ft. aluminum boat, fits Suburban or camper shell, like new, \$200. Green, 898-3791.

MOTORIZED EXERCYCLE, adjustable seat, heart rate monitor, multiple speed, under warranty, like new, \$100. Hudson, 821-8988.

RIMS & TIRES: 4 sawblade rims, (15" x 6"), 4 tires (205/50s), \$100 for all. Chavez, 831-1502.

SKIS, 180cm Kneissel Formel Noir, w/Look 182 bindings & women's boots, size 6-1/2 to 7, \$80. Hietala, 867-9577.

BAND SAW, 12-in., variable speeds, lots of extras, \$75. Potter, 299-6053.

COMPUTER, AT&T PC6300, Monochrome, dual 5.25", 1 MB RAM, DOS, mouse; printer, Toshiba P1340, 24-pin, manuals; \$150/ea. OBO. Baldwin, 822-1860.

SKI BOOTS, Heierling Firebird, size 4; World Cup Skis, 140cm, w/Tyrolia bindings & 42-in. poles, excellent condition; bike car rack. Wagner, 823-9323.

DISHWASHER, built-in, used, free, you pick up. Farrell, 292-1568.

TRANSPORTATION

'85 FORD RANGER PICKUP, 5-spd., 24K miles, 4-cyl., rebuilt engine. Jimenez, 296-9256.

'65 FORD MUSTANG, restored from the wheels up, 200 CID, 3-spd., \$5,500. Garrett, 296-5908.

'89 TREK 1100 RACING BIKE, 52cm aluminum frame, 21-spd., Suntour components, chromoly fork, quick-release hubs, black/turquoise, w/pump, excellent condition, \$250. Douglas, 281-9843.

'57 CHEVY 210, 4-dr., black/silver, has all chrome, AC, heater, runs great, nice interior, \$5,500. Beer, 275-2557.

BICYCLE: Bianchi "Reparto Corse," Columbus SL-SP tubing, handbuilt frameset, all Campagnolo components, Look pedals, \$1,500 OBO. Garcia, 298-6312.

'92 BOUNDER MOTORHOME, 32-ft., diesel pusher, 10.6 mpg, 2 TVs, VCR, 2 roof ACs, 6.5 KW generator, 23K miles, must sell. Hall, 892-7819.

'91 MERCURY CAPRI XR2 CONVERTIBLE, V-6 turbo, 9K miles, hard & soft tops, 5-yr. warranty, \$13,500. Bentz, 299-3448.

'86 OLDS CUTLASS SUPREME, 2-dr., loaded, 71K miles, below retail book at \$4,300 OBO. Campos, 865-9048.

'69 PLYMOUTH ROADRUNNER, 2-dr. sedan, big block, 4-spd., Grade 3 condition, \$4,900 OBO. Green, 898-3791.

'83 VOLVO DL WAGON, AT, AC, cruise, power locks, AM/FM cassette, 95K miles, good condition, \$3,500. Hass, 299-3506.

'85 HONDA ACCORD LX, 4-dr., 5-spd., white, 61K miles, clean, \$4,800 OBO. Baldwin, 822-1860.

'87 PORSCHE 944S, showroom condition, 17K miles, bright red, loaded, \$13,800, about \$800 under book value. Johnson, 898-8439.

'84 DODGE DAYTONA, gold, 2-dr., 4-cyl., 100K miles, front wheel drive, new tires & struts, tinted, stereo cassette, sporty, one-owner, \$1,990. Gallegos, 899-9004.

REAL ESTATE

4-BDR. HOME, former model in Heritage East, 2,400+ sq. ft., 3 bath, 2 living rooms, dining room, 3-car garage, spa, security, decks, \$188,900. Roper, 828-0955.

3-BDR HOME, Heritage Hills, 2 bath, 2-car garage, La Cueva/Dennis Chavez school district, large lot w/views, \$96,000. Wahl, 822-1261.

WANTED

ROOMMATE, female, non-smoker, to share 3-bdr., 2-bath house, big yard, 2-car garage, \$300/mo. + 1/2 utilities. Lambert, 899-2060.

STUDENT EXPERIMENTER to pick up two 15-watt audio amplifiers, stereo-preamp, AM/FM receiver, & other Ampex tube-type components. Durkee, 255-4211.

NORDIC TRACK, any type. Petraglia, 889-0725.

STUDY PARTNER, anyone interested in studying for the EIT (Engineer-In-Training) exams offered in April 1993. Oscar, 345-7046.

NORDIC TRACK, cross country ski-type exerciser. Noack, 298-3590.

Coronado Club Activities

Dance into '93 with the Poorboys

HEAT UP your January with the Isleta Poorboys' irresistible rhythms tonight, Jan. 8. They'll kick off the Club's 1993 Friday evening dinners and dances — and make you want to kick up your heels, too. You'll also find the menu irresistible: New York sirloin strip (\$11.95), grilled halibut (\$10.95), or the all-you-can-eat buffet, featuring baked ham, baron of beef, and roast turkey breast (\$7.95). Mmmm! Make your reservations now (265-6791).

KIDS' BINGO — Next Friday, Jan. 15, marks the return of Kids' Bingo nights. The buffet line opens (and a movie starts) at 5 p.m., and bingo begins at 7 p.m. Cost for kids to play is \$2.50 for a bingo packet. Any child with a birthday during January gets one free bingo packet, a free hamburger, soft drink, and fries, plus a special reserved table for the whole family (call Chris or Sal on 265-6791 for the birthday special).

HEY, MEMBERS — Guess what? Now you can get up to six Sandia Peak Tramway passes a day, for \$5 each. (The limit used to be four.) They're popular, though, so be sure to call for reservations. Also, remember that members get General Cinema and United Artist movie tickets for \$4.25 each. If you're not a member — you're missing some great benefits.

SUNDAY BRUNCH — One more Sunday brunch this month, and it's Jan. 17. Besides the

Sandia Calendar

The LAB NEWS gathers Sandia Calendar items from various sources, often several weeks in advance of publication. Events could be postponed or even canceled after the LAB NEWS deadline, so readers should confirm times and dates of interest whenever possible.

Friday, Jan. 8 — Sandia Colloquium, "Advanced Transportation Technology at the Federal Transit Administration," Lawrence Schulman, associate administrator for technical assistance and safety at the Federal Transit Administration, will talk about propulsion systems, including alternate fuels, vehicle structural weight, and advanced control and communication systems; 9 a.m., Tech Transfer Center (Bldg. 825); open to all interested employees and the public. Contact: Steve Roehrig, Advanced Vehicle Development Dept. 9616.

Wednesday, Jan. 13 — "Job Fair," an opportunity for Sandia staff and management to discuss Energy and Environment Sector programs and projects, staffing requirements, and potential jobs and matrixing opportunities; 12:30-4:30 p.m., Tech Transfer Center (Bldg. 825); open to all interested employees.

Tuesday, Jan. 19 — Sandia Human Studies Board (HSB) Meeting, review board for Sandia research/contracts involving human volunteers or human data, records, pathological specimens, or diagnostic specimens; Medical Center (Bldg. 831) conference room, attendance limited to HSB members and investigators presenting research. Contact: HSB administrator Linda Erickson (7031) on 5-9171.

Friday, Jan. 29 — "Software Management at Sandia: a Proposed SLI [Sandia Laboratories Instruction]," a presentation regarding policy to ensure a consistent approach to the management of all software being acquired, developed, supported, and used at Sandia; 1-2 p.m., Tech Transfer Center (Bldg. 825); managers and software developers are especially encouraged to attend, but open to all interested employees. Contact: Mike Blackledge (326) on 5-8307.

Mail or fax potential items to Sandia Calendar, Dept. 7162, Fax 844-0645.

plentiful menu, you'll enjoy the music of Bob Weiler and Los Gatos as they play for the tea dance from 1 to 4 p.m. The brunch precedes the dance, from 10 a.m. to 1 p.m.

CARD SHARKS are back in action on alternate Thursdays. That wily ol' dealer Jim McCutcheon says the next few sessions are Jan. 21, Feb. 4 and 18, March 4 and 18, and April 1, 15, and 29. This T-bird retiree group knows how to have fun with the little cardboard rectangles! The sessions start at 10 a.m.

FUSION HOUR at the Cantina takes place Monday through Friday from 4:30 to 6:30 p.m. Come on out and enjoy food, wine, and well drinks — not to mention cheerful company (well, we just mentioned it, but you can enjoy it anyway).

Fun & Games

Skiing — The third annual Telemark Festival will be held Saturday, Jan. 16, at the Sandia Peak ski area. All-day fun includes telemark lessons, tele-equipment demonstration, tandem gate race, T-shirts, door prizes (including skis), refreshments, and a dance afterwards. Cost is less than a full-day lift ticket. For information about events, times, and cost, call the Ski Area Service Center on 292-4401 or Barry Ritchey (2472) on 298-4311.



Sandia in the News

This is a periodic column mentioning print and broadcast news reports about Sandia. It is provided by Public Relations Dept. 7161 and is published to give Sandians a sense of what is being said about Labs work in the national and international media.

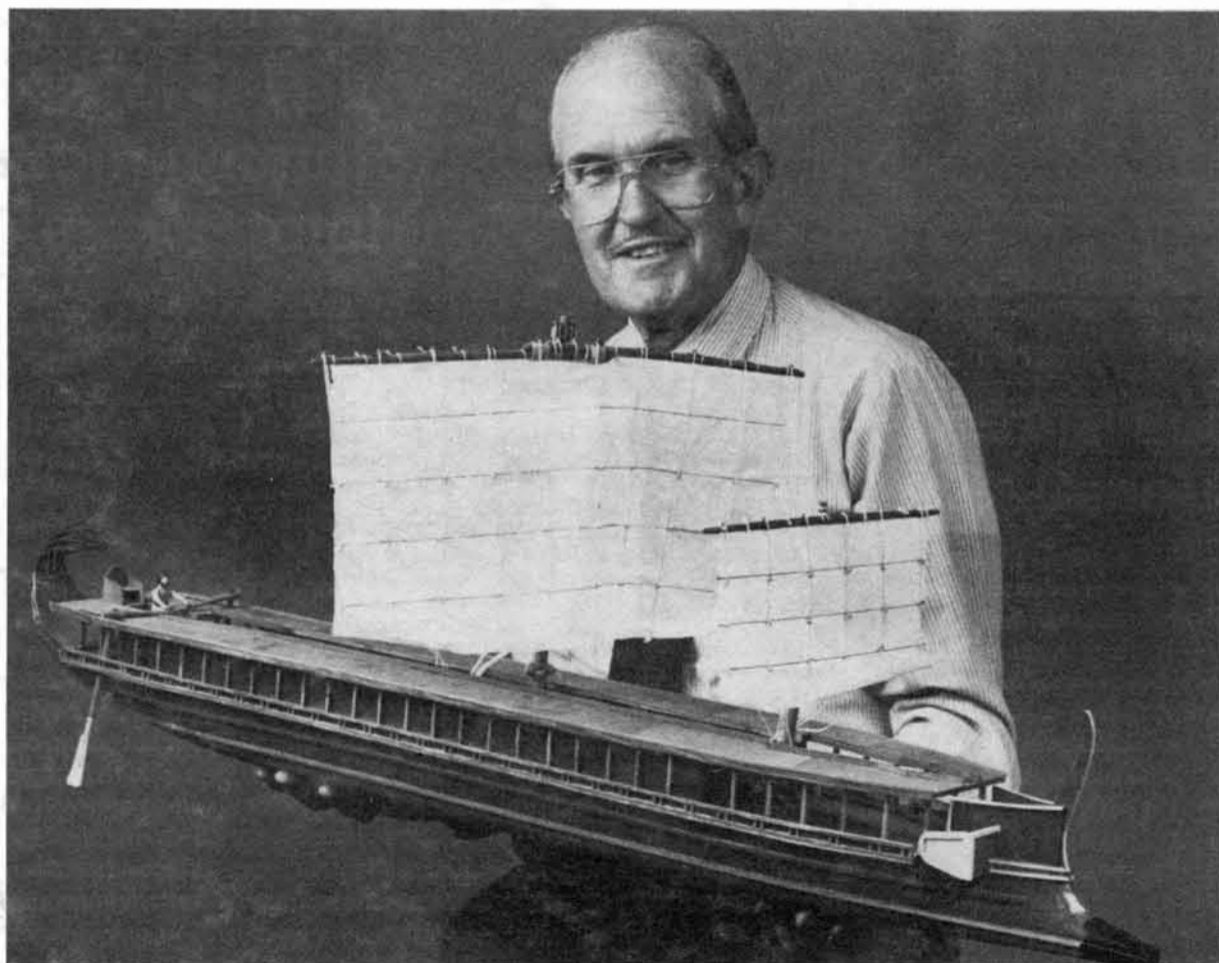
The Oakland Tribune reports that after a 4-1/2-year wait, Sandia/California has been granted a state permit allowing greater flexibility in storing hazardous waste. Kim Shepodd (8642) is quoted: "It means the state approves of the way we are managing our hazardous waste."

In an article headlined "World Still Lives in Nuclear Shadow," long-time San Francisco Chronicle science editor David Perlman tells his readers about Russian railcars recently shipped to Sandia "so they can be fitted with American-designed kits to reinforce the cars against blast and radiation."

Scientific American recently used a color photo by LAB NEWS photographer Mark Poulsen of Sandia President Al Narath presenting President-elect Clinton with a printed circuit board made with environmentally benign processing. It accompanied the magazine's article "National Conundrums: Finding new work for the national weapons labs."

The Business & Marketing section of Medical Device & Diagnostic Industry magazine had a long piece on technology transfer. It reported, in part, that "Sandia has recently been involved in . . . non-invasive analysis of blood chemistry . . . nuclear medicine, robotics, computer sciences, testing instrumentation, and health-care information systems."

Automotive News reported to its readers about Sandia's "instrumented head gasket to keep an eye on engine combustion." The device was developed by Peter Witze (8362) at Sandia/California.



SEAPOWERTO SCALE — Some time back, Bob Woods (1671) became interested in the sea trials of a modern reconstruction of the Greek trireme seen here in model form. After hearing of the full-size replica program and corresponding with the British naval architect who masterminded it with the support of the Greek navy, Bob decided to build a 1:33 model. He cut plywood hull cross-sections, laminated them with styrofoam blocks, whittled the whole thing to shape, and fiberglassed it. He also made the figure holding the twin steering oars, from a product that can be worked like modeling clay then baked in the kitchen oven. The figure lends a sense of scale, but Bob says he has no intention of making 150 more of him to represent the crew of oarsmen. However, he plans to scatter a few oars on the deck to represent a ship out of commission. Bob's early interest in the relationship between technology and society took him to Princeton, where he studied engineering and archaeology. His model is a faithful replica, from the bronze ram below the waterline on the bow — the only offensive weapon built into such ships — to the non-functional tail feathers he speculates are an echo of Egyptian papyrus boats.