

Arctic cloud station: Ambitious program puts atmospheric radiation measurement study on ice

Instrument package assembled at Sandia heads for Arctic Ocean

By Bill Murphy

Lab News Staff

North to Alaska! That's the rallying cry of an intrepid band of Sandians and fellow researchers from DOE, other national labs, universities, and a wide range of government agencies as they mount a major campaign to study the arctic climate. The team's research, while focusing on high-latitude climate conditions, is part of a larger effort to understand global climatic changes.

The Sandians are one element of a multi-agency, multipronged, international initiative to scrutinize, with an unprecedented degree of detail, how high-latitude climate works, bringing to the effort the most sophisticated and advanced instruments available.

Some of those instruments, configured into an integrated package at Sandia, are bound for an icebreaker in the Arctic Ocean more than 400 miles north of Barrow in the Beaufort Sea. (The National Science Foundation is currently negotiating for an icebreaker.)

The instruments, to be housed in and around a specially designed shelter, will ride out a full arctic year aboard the icebreaker. The plan calls for a 13-month drift; that means the icebreaker, with its instrument package and crew, will be locked in the ice for months at a stretch during the 1997-1998 winter.

Surface heat budget of the arctic

The instruments will gather data as DOE's contribution to SHEBA, the Surface Heat Budget of the Arctic project, sponsored by the National Science Foundation and the Office of Naval Research to investigate predicted changes in the earth's climate. Sandia is involved in the project through its participation in DOE's Atmospheric Radiation Measurement

Sandia earns A+ on school security program achievements in Belen

A pilot school security program between Sandia and Belen (N.M.) High School is being credited for an impressive decline in the number of incidents that typically distress school administrators and students alike — violence, theft, and drug and alcohol use.

In a recent letter sent to President Clinton, Belen High School Principal Ron Marquez attributed the Sandia partnership with reducing vandalism by more than 75 percent, vehicle theft by more than 80 percent, and truancy by 30 percent. In addition, fights, previously a weekly occurrence, are down to one per month, and what was once a daily false fire alarm is now a monthly incident.

Preparation for the exam

Mary Green (5861), project leader for the Belen pilot program, said the procedures and technologies that were applied to the school were developed after first looking at the whole picture of Belen High through Sandia's systems engineering glasses.

"Our first priority last spring was to identify vulnerabilities, problems, and issues the school was facing," explains Mary. "Then, right from the beginning, with the help of retired DOE employee M.G. Martinez, we involved students, teachers, parents, and the community in the process to find out their concerns and to make them part of the solution.

"This was really a 'right place at the right time' situation. Belen High was starting to see increases in truancy, theft, vandalism, and drug use, and the whole community was eager to put a stop to this misconduct before it got out of hand. Sandia came

(Continued on page 4)



CLOUD WATCHER — Mark Aguilar (6612) makes adjustments to a cloud radar instrument in the Portable Arctic Atmospheric Radiation and Cloud Station — or PAARCS — during predeployment testing and integration at Sandia. The PAARCS will be stationed aboard an icebreaker in the Beaufort Sea north of Barrow, Alaska, for a 13-month drift amidst the arctic ice. (Photo by Mark Poulsen)

(ARM) program. ARM is supported by the Environmental Sciences Division of DOE and is a major part of the US Global Climate Change

Research Program.

Although SHEBA is a stand-alone project, its data are integrated with information collected through related climatological studies, including ARM.

The SHEBA/ARM data, says Hugh Church (6612), associate site program manager of ARM's North Slope of Alaska/Adjacent Arctic Ocean project, will be used to help develop better computer models of global climate change. Current models, he says, do not have adequate data to effectively simulate the arctic climate. The high-latitude climatic region, in turn, is believed to have a profound effect on global climate. As such, the more accurate the arctic modeling, the more accurate the global modeling can be.

Improving computer models

Why SHEBA? As explained in project documentation, a primary goal of SHEBA is to "develop, test, and implement models of arctic ocean-atmospheric-ice processes that demonstrably improve simulations of the present day arctic climate, including its variability, using general circulation models (GCMs)."

Climatologists consider current GCMs to be less than fully satisfactory because data on which the models are built do not provide a sufficiently realistic picture of what is really going on in the complex interactions among sea, ice, air, sunlight, and clouds. SHEBA, seeking to establish a kind of "ground truth" through rigorous observation and analysis during its 13-month sea/ice drift, aims to narrow the uncertainties, improve the quality of data, and so improve circulation models.

One of the biggest uncertainties in current models, notes Hugh, involves what happens to the regional heat budget (the difference between

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Sandia National Laboratories

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Annual 'State of the Labs' address highlights community involvement, technical achievements

Sandia "made history" during 1996, Labs President and Director C. Paul Robinson told an audience of state government and community leaders, Sandians, and DOE officials in the annual state of the labs address, this year called "Sandia Labs: Today and the Future."

"This was an exceptional year for Sandia," Paul said to the audience of 200 at the Technology Transfer Center in late February, noting that Sandia, working with DOE and the Intel Corp., recaptured the world supercomputer speed record from the Japanese. The Sandia/Intel teraflops computer — that means it is capable of a trillion math operations per second, Paul explained — reasserts the nation's lead in high-performance

computing and "sets the standards that enable all nations to solve problems previously considered impossible."

Paul shared the stage with Executive Vice President John Crawford to deliver an upbeat assessment of the Labs' technical achievements and interactions with the community during 1996.

"We all have a strong stake in the financial health of Sandia Laboratories and its future," John said. "We just completed fiscal year 96, and during that year we actually put about \$800 million into the economy of New Mexico and Albuquerque, including \$400 million in salaries and

(Continued on page 5)



8 Sandia shows off VR capabilities at Albuquerque symposium

9 Info Day '97 to showcase information technology tools, networking trends

This & That

Why do I have so many former friends? - I saw my old buddy Roger Hill (6201) and his wife Kim Denton-Hill (5951) several weeks ago as Roger was driving a red Porsche in the Coronado Club parking lot. He stopped to say they'd loaned their minivan to a neighbor to take on a ski trip and the neighbor loaned them the Porsche in return.

Roger wanted to know how they looked in the flashy car, but I found that honesty just isn't valued these days. He sped off in a huff when I told him Kim looked great, but he somehow reminded me of a mixed-breed stray at the AKC's annual Westminster Kennel Club Dog Show.

* * *

I must've had a fever - Speaking of friends, my wife (Renae Perrine, 6000) and I were dining out with two of our few remaining friends, Jerry (1564) and Karen Smith (6600), several Fridays ago, and I'm pretty sure I got insulted. After Jerry checked the bill and ciphered up how much he and I both owed, I commented that it didn't sound like I was paying quite enough and I didn't want that on my conscience. "I'll tell you what that doesn't sound like," he said. "That doesn't sound like your conscience."

* * *

Family service records coming soon - In the last issue, I said Jerry Meloche's (9735) family has 81 years of Sandia service and wants to know whether this is a record. Sorry, Meloche clan, but several Sandians have already sent messages saying their families can top that considerably. I'll list the "winning" families and runners-up in two separate categories (see next paragraph) in the next issue.

Any record, of course, depends on how we define family, so I'm dividing the competition into two parts: (1) immediate family, which I'm defining as you and your spouse, plus both of your direct bloodline ancestors and descendants and their spouses, and any of your or your spouse's full brothers/sisters (do not count service of uncles, aunts, cousins, or in-laws in this category). (2) completely extended family, including all of the above, plus aunts, uncles, cousins, and in-laws - anyone you and your spouse can honestly count as a relative.

To enter this friendly competition, make sure I receive your information via regular mail or e-mail by no later than Wednesday, March 19. (See my addresses at end of column; please, no phone calls on this.) Provide full names and their years of service for both categories; also provide everyone's organization numbers or the fact that they are retired or deceased. To ensure fairness, count service only for regular, full-time Sandians. And don't include ex-spouses and such; I know one fellow who could run up big numbers if we allowed them! Note: Your family will need well over 100 years in either category to be a serious contender.

* * *

New vacation policy? - I can't vouch for this, but rumor has it the Sandia Quality Leadership Council is increasingly concerned that many of us are too overloaded these days to take all of our vacation. The rumor is that SQLC is thinking about granting us special permission to take vacation days on Saturdays and Sundays. What a benevolent bunch!
- Larry Perrine (845-8511, MS 0129, lgperri@sandia.gov)

Brian Swartzentruber wins Young Scientist Award from DOE

Brian Swartzentruber, the Sandia scientist who recently earned a Basic Energy Sciences (BES) Award for his development of the atom tracker, has another accolade to add to his growing collection of recognitions.

Brian was among 11 young investigators from DOE national laboratories and several college and university partners to be selected recently for two new special recognitions: the Young Scientist Award of the Office of Energy Research and the Young Scientist and Engineer Award of the Office of Defense Programs.



BRIAN SWARTZENTRUBER

Brian's development of a modified scanning tunneling microscope that enables scientists to watch individual atoms as they move about on a material's surface created quite a stir of excitement among surface scientists. The work, which advanced the state of the art in observing atoms on a surface from the equivalent of still photography to video, earned Brian a 1996 BES award for the "Outstanding Scientific Accomplishment in Solid State Physics."

Brian's Young Scientist Award citation states, in part, "for pioneering studies of atomic scale, kinetic, and thermodynamic aspects of the morphology of silicon surfaces and significant innovations in scanning tunneling microscopy that make such measurements possible."

Creative, young talent

In a letter announcing the awards, Martha Krebs, Director of DOE's Office of Energy Research, and Vic Reis, Assistant Secretary for Defense Programs, said the Young Scientist Awards "reflect, above all, the Department's active interest in and dependence on creative young scientific and technical talent. Specifically, they recognize distinguished personal accomplishments through the highly creative ideas and innovations which this group has brought to Departmental programs."

Brian credits the Sandia work environment with creating an atmosphere that encourages leading edge research. "The most satisfying part of my job," he says, "is the quality of the scientists in our department with whom I interact. It is a pleasure to have stimulating scientific discussions with, and to learn from, these exceptional surface scientists in a noncompetitive environment."

"Another very important aspect of this job is the support that we receive, all the way through the management line, for the type of long-range, basic science that we are pursuing."

Brian received a BA in physics/mathematics from Goshen College (Indiana). His research career began with a stint as a senior technical associate at Bell Labs, after which he attended the University of Wisconsin and earned his PhD in physics in 1992. At the University of Wisconsin, he was honored with the Nottingham Prize and the American Vacuum Society's Varian Award.

Although Brian's atom tracker represents a huge step forward in science's ability to observe an atom's movement on a surface, Brian certainly doesn't intend to rest on his laurels. He already knows where he wants to go next with his surface research.

"As far as something to shoot for," he says, "I would love to be able to observe and measure individual, isolated chemical reaction processes on a surface. This type of capability would enable us to gain a better fundamental understanding of the factors governing the reactivity and stability of surfaces and interfaces."
-Bill Murphy

although the volunteer judges and donations amount to a sizable contribution, many more Sandians contribute behind the scenes, mentoring and helping with student projects at local schools.

"They are the unspoken, unheard contributors," he says.
-John German

Labs provides vital support to Northwest New Mexico Regional Science Fair; more judges needed

Chaos theory. Decomposition of plastics. Neural networks. Rainbows. Hemispheric dominance in the human brain.

These are just a few of the 700-plus topics

Sandia LabNews

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LOCKHEED MARTIN

being explored in science fair projects by Albuquerque-area middle and high school students participating in this year's Northwestern New Mexico Regional Science and Engineering Fair, March 20-22 at the University of New Mexico.

Sandia has traditionally supported the regional fair by supplying volunteer judges and other in-kind contributions. Fair Director Randi Buck estimates that in recent years, as many as one-third of the 300-plus technical judges needed each year have been Sandians. This year, more than 100 Sandians are scheduled to judge.

Help wanted

More judges are needed for next weekend's event, however, particularly in the fields of chemistry, microbiology, life sciences, behavioral sciences, and zoology. (Judges need not hold degrees in the fields they are judging, says Buck, but a general knowledge of the field is helpful.) Interested Sandians should call 277-4916.

Lockheed Martin is donating \$4,000 on Sandia's behalf this year; the money will provide stipends to each of the 102 regional winners so they can attend the New Mexico State Science and Engineering Fair at the New Mexico Institute of Mining and Technology in Socorro April 11 and 12.

Larry Dalton (2615), the Sandia representative on the regional fair's advisory board, says

Sandia sponsors Bay Area's Regional Science Bowl

Regional winners will vie in Washington in May

By Nancy Garcia

California Reporter

Thigmotropism — the response of plants, such as the Venus fly trap, to touch — was one answer Lowell High School senior Colin Warner knew, but could not recall, even as his advanced placement biology teacher and Science Bowl coach looked on from the audience at the Bay Area's Regional Science Bowl competition last month.

His team won the Sandia/California-sponsored competition anyway, scoring in the final two rounds against Homestead High School 72-88, then 162-42. Under the rules, Homestead (Cupertino, Calif.) would have had to win both rounds to emerge victorious, since Lowell (San Francisco) had not yet lost a round that day. By achieving first place regionally, the Lowell team has advanced to compete nationally in Washington, D.C., May 2-5.

Schools from as far north as Novato (Marin County) and as far west as San Mateo (west of San Francisco Bay) competed. It was the only regional Science Bowl in the Bay Area this year.

A young team

Homestead's coach, advanced placement chemistry teacher Gareth Wong, said he was honored to be in the running with this top San Francisco public school.

"We have a freshman and sophomore on our team and only one of the seniors competed last year," Wong says. "Our team won one earlier round by two points and had to win a tie-breaker to get here [the finals]. For the team to finish second is amazing."

About 19 students attended tryouts to be on the Homestead team. Freshman Xijia Chen became the team's biology expert when she walked in (looking for a place to study), picked up an extra buzzer, and just started answering questions.

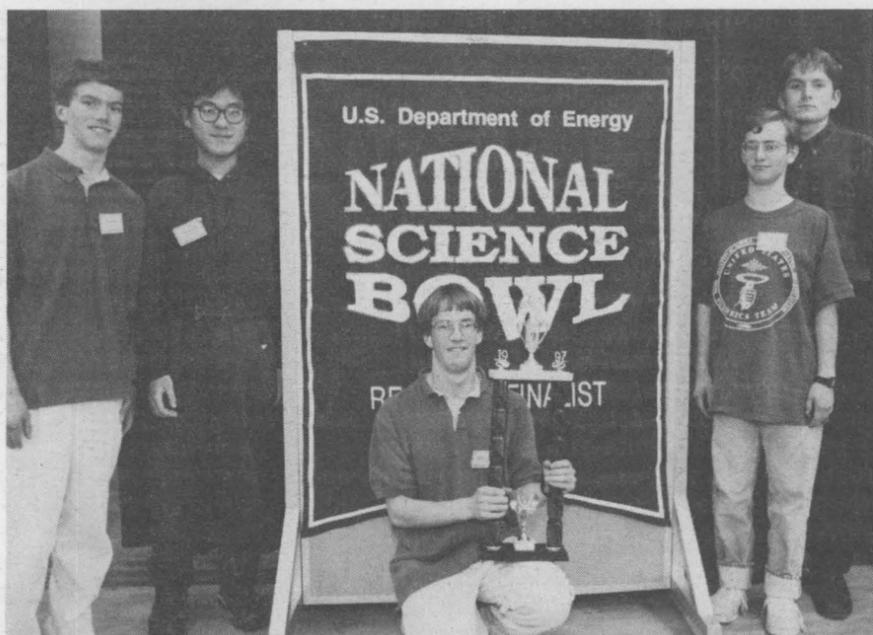
Sophomore Lee Pang joined the team, as his sister had two years ago, because he is "very, very quick in math," said team member John Ying, a senior who competed for the first time this year.

Team captain John Loo is a senior who competed last year. Matt Azuma, also a senior, was an alternate panel member whose interests range from general science to astronomy. He said listening to the questions without being able to answer was less difficult than the pressure the students faced on the panel.

In a format similar to the "College Bowl" competition of television yore, panelists respond to quiz questions under strict time limits. When the time for a round is up, the panel with the most points wins.

Wong had the students practice for two weeks. Some of the questions touched on material that his theoretical chemistry course doesn't cover — such as the color of different chemical compounds.

Lowell coach Ray A. Hill, PhD, an advanced placement biology teacher, had the team practice 90 minutes weekly since the fall. The team used a borrowed buzzer, and said familiarity with the procedure for answering questions was the greatest benefit of the practice sessions.



VICTORS — From left to right, Ben Reichardt, Chak Lam Kwok, Christian Reichardt, Ben Newman, and Colin Warner of Lowell High School in San Francisco pose with the trophy they won at Sandia's regional Science Bowl in Fremont.

"It's trivia; either you know it or you don't know it," said Ben Newman, a senior who has been admitted to Swarthmore College. He added that team members also used the process of elimination to make educated guesses in multiple-choice questions.

Team captain Christian Reichardt, a senior who is choosing between acceptances at MIT and Caltech, said he had just learned some of the competition's astronomy material during the last month or so at school. His favorite subject is physics, like Newman and teammate Chak Lam Kwok. Kwok is a senior on the hand-picked team who attended the competition last year as an alternate.

The Lowell team captain's younger brother Ben Reichardt, also a senior (he's been moved up a grade) was an alternate with Warner this year. Ben Reichardt may also attend Swarthmore (he has received an encouraging letter), while Warner, who said he likes all sciences and English, has been accepted to Stanford.

Busy with various sports and music activities in addition to homework, the team members said they didn't mind devoting Friday afternoons to Science Bowl practice. "We do four hours of homework in one hour," Newman joked about the academically inclined students at his school, a "magnet" campus that attracts students from across the city.

The team will continue to practice for the national competition now. Coach Hill said he has received assistance from other science "sages" on staff, such as the physics faculty member and school's computer expert.

Sixth Sandia Science Bowl

For the second year in a row, Sandia held the regional Science Bowl at Mission San Jose High School in Fremont, which had winning regional teams in 1996 and 1995.

"We feel it's a great way to recognize excellence in math and science," says Karen Scott, Manager of Science & Technology Outreach Dept. 8818. "Many people came up to us during the day to thank us."

Some 60 Sandians and their family members volunteered to organize the event in which 23 schools had teams of four students and alternates participate. About 140 students took part.

This is the sixth year that Sandia has offered the regional Science Bowl. Nationwide, Karen says, just four DOE facilities offered the competition this year due to funding cuts in the seven-year-old program. Other government agencies also offered regional Science Bowls around the country, however.

Three Sandia volunteers in particular helped make the Bay Area event a success: coordinator Iris Morris (8818), Dean Williams (8970) (who used A-280 volunteer time to prepare for the event), and Ray Ng (8414).

Sandia California News

Feedback

The Feedback Program provides a communications channel to management from employees who have questions and comments about Sandia policies, procedures, benefits, and work environment. If you have an unclassified question or comment you'd like answered, contact the Feedback Administrator by interoffice mail at MS 0165, by e-mail at jacarpe@sandia.gov, or through the Feedback page on the Sandia Internal Web at <http://www-irm.sandia.gov/corpdata/feedback/fbindex.html>. Answers to topics of general interest may be published on the Internal Web Feedback page or in the Lab News. Include your name and return address to receive an answer to your question from the Feedback Administrator. Submitters' names are never published and, unless otherwise requested, are kept confidential by the Feedback Administrator. If you do not include your name with your Feedback, you will not receive an answer nor will your question be published, but your Feedback will be forwarded to the appropriate director for his or her information only. For information about Feedback, call Janet Carpenter (12640) at 844-7841.

Q: I would like to see employees with 30 years of service be eligible to retire at any age with no penalty. I know of several employees who haven't reached age 55 but who have more than 30 years service who are delaying retirement to avoid the penalty. I, myself, will be only age 49 when I reach 30 years of service so I have a personal interest in this policy. I understand that represented employees can retire at 30 years and any age. Any chance that a change will be considered to allow 30

years/any age retirement with no penalty at all?

A: As you noted, employees with at least 30 years of service covered by the Pension Security Plan (PSP) can retire before age 55 without any early retirement penalty. On the other hand, employees covered by the Retirement Income Plan (RIP) have their pensions reduced by .25 percent for each month of retirement before age 55 if they have at least 30 years of service. This difference has existed since the two plans were separated in 1980, and is the result of Sandia's adoption of the AT&T pension benefit structure at that time. The difference was negotiated between AT&T and its unions and was subsequently negotiated with Sandia's unions for the PSP. The early retirement penalty for employees retiring under age 55 with less than 30 years of service represents an adjustment to cover part of the cost of paying those benefits over a longer period of time. Since employees the same age with at least 30 years of service are charged a smaller penalty, they are receiving a better early retirement benefit (than those with less than 30 years of service), with the cost of that improvement subsidized by the Plan. Relative benefit value surveys indicate that Sandia's current pension benefits, particularly its early retirement benefits, are very competitive. According to survey information, Sandia's early retirement provisions (both in the RIP and the PSP) are more generous than industry standards that typically calculate reductions for early retirement beginning at ages 62 or 65.

— Ralph Bonner (10500)

Arctic study

(Continued from page 1)

incoming solar radiation and outgoing infrared radiation) when so-called leads, or gaps in the ice, open up in the Arctic Ocean.

"There is certainly an effect on the overall [heat] budget," Hugh says. "How much of an effect? We haven't measured that very well [up to now]. That's one of the key questions SHEBA will be seeking answers for, and the answers are very important for our models."

Atmospheric radiation studies

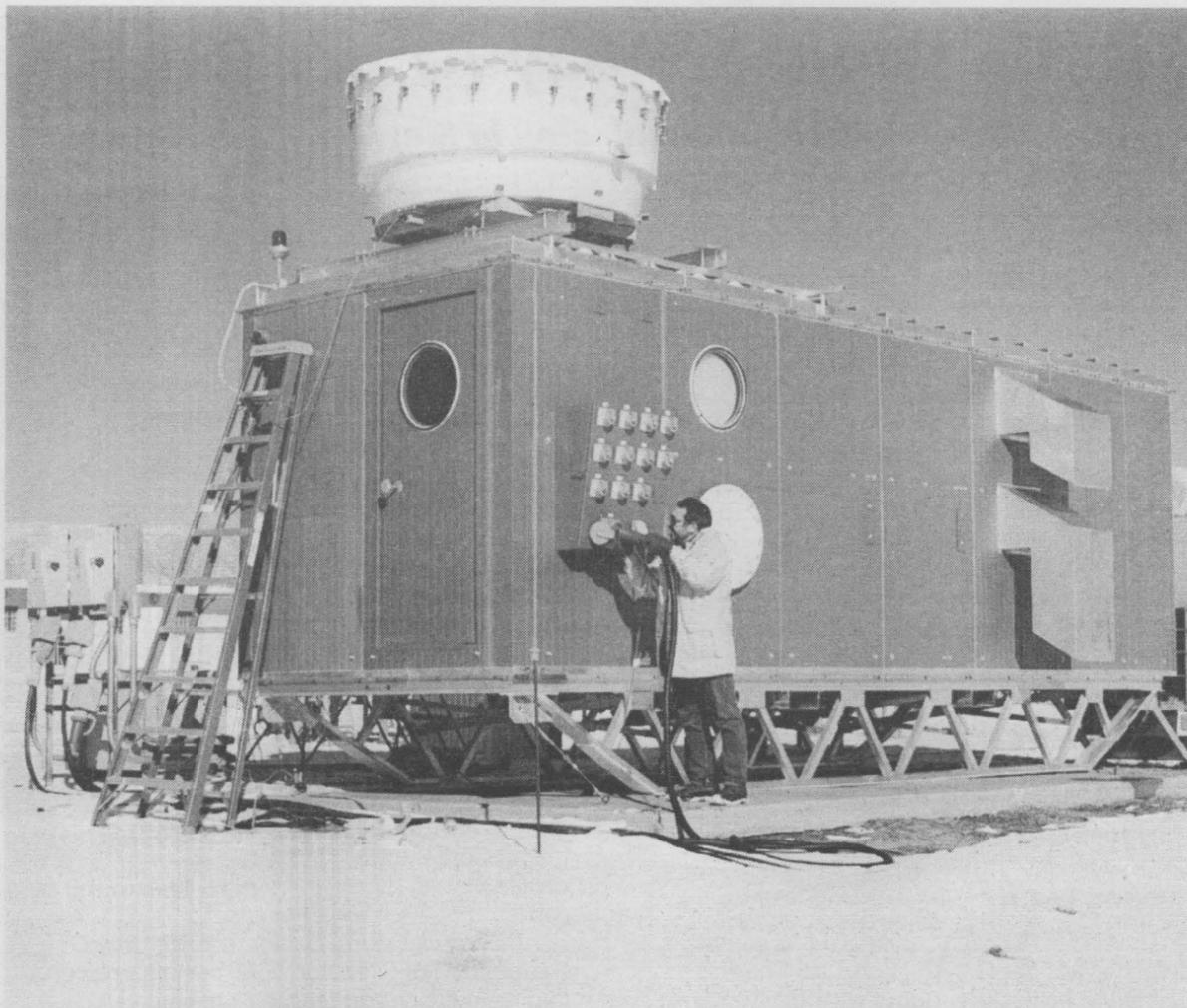
Meanwhile, SHEBA will not be alone in studying the arctic climate with a new level of sophistication. DOE, through its ARM project, is turning its sights on the region as well. The ARM project is seeking to understand how sunlight and infrared radiation interact with clouds and, in particular, whether varying levels of atmospheric carbon dioxide and moisture will influence Earth's radiative energy budget to the point of causing long-term, worldwide climate changes. To gather data on cloud/sunlight interactions, ARM is establishing near Barrow a Cloud and Radiation Testbed site similar to sites already set up in the Tropical Western Pacific (TWP) (*Lab News*, April 26, 1996) and the Southern Great Plains in Oklahoma (*Lab News*, Nov. 22, 1996). The three ARM sites were selected to provide the opportunity to observe a wide range of climatologically important meteorological conditions.

While several DOE labs and other agencies are involved in the ARM project, Sandia plays an important role as an integration center for instrumentation and supporting hardware for use at the project's far-flung sites. Sandia worked with ARM team members from Los Alamos National Laboratory and other organizations to integrate and package the heavily instrumented Atmospheric Radiation and Cloud Station (ARCS) modules used at the TWP site and a similar modular facility that will be used at the North Slope of Alaska/Adjacent Arctic Ocean site.

The SHEBA instrument package, in fact, is based on the ARCS model — the SHEBA version is called the PAARCS, the "Portable Arctic Atmospheric Radiation and Cloud Station."

The instrument and support shelters used at

(Continued on next page)



POWER IT UP — Mark Aguilar (6612) checks out the power systems on the Portable Arctic Atmospheric Radiation and Cloud Station (PAARCS). Mark was part of a team that prepared the PAARCS for its deployment to the waters off Alaska's North Slope. (Photo by Mark Poulsen)

Atmospheric study asks key questions

While scientists are poring over data from the SHEBA mission, they also will be folding the results into data gathered at the ARM site near Barrow, Alaska. According to project documentation, here are the basic science questions ARM seeks to address:

1) What are the direct effects of temperature and atmospheric constituents — particularly clouds, water vapor, carbon dioxide, and aerosols — on the radiative flow of energy through the atmosphere and across the Earth's surface?

2) What is the nature of the variability of

radiation and the radiative properties of the atmosphere on climatically relevant space and time scales?

3) What are the primary interactions among the various dynamic, thermodynamic, and radiative processes that determine the radiative properties of an atmospheric column, including clouds and the underlying surface?

4) How do radiative processes interact with dynamical and hydrologic processes to produce cloud and surface albedo (reflectivity) feedbacks that regulate climate change?

Belen H.S.

(Continued from page 1)

along with the expertise and interest in applying some of its extensive work in security technologies. The match was perfect."

Other members of the core Sandia team were Tim Malone and Charles Ringler (both 5849) and Paul Brannan (5841).

Approximately 150 students helped develop the school security blueprint. Key points:

- All students now are required to carry ID cards on campus. This process helps ensure that only authorized people are on school grounds and at school functions.

- Tamper-resistant cameras are positioned to monitor areas known for incidents of fights, drug and alcohol use, smoking, and vandalism.

- A hand-held metal detector, loaned to the school by Sandia, is used to search for weapons in rare but threatening situations.

- Areas prone to graffiti vandalism received coats of antigraffiti paint, designed so graffiti wipes off easily.

- Better lighting is being installed at strategic outdoor locations thanks to the Public Service Company of New Mexico.

- Microdots, air scribes, and indelible and invisible paint are used on equipment and other assets to deter theft by providing a unique identification.

- Hair-analysis test kits were provided to the school for parents to use in instances of suspected

drug use by their children.

- A portable breathalyzer unit was supplied to the school and is used in instances of suspected alcohol use by students or employees.

The result, according to the message relayed to President Clinton, has been a "successful effort to make our high school safer." The letter said Sandia's goal was "to make our high school as safe as possible without making it seem like a prison, and doing it in a cost-effective manner that other schools could learn from." Several Belen community leaders as well as a teacher and student representative also signed the letter.

Mary is absolutely thrilled by the results of the pilot program and points to the integrated approach as key to the project's success. "When students returned to school last fall, things had really changed," says Mary. "They were issued ID cards, saw surveillance cameras positioned throughout the school, noticed that school property was tagged to deter thefts, and knew of the capability to detect drug and alcohol use. In addition, the school had instituted a closed campus, which complemented the things introduced as part of the school security program. The success of the program is due to many facets working together."

Mary says she would like to do this sort of partnership with a few more schools and eventually gather the data into an "expert system," perhaps



SAFE SCHOOL — Mary Green (5861, center) shows Belen High School students the components of a motion sensor. Standing behind Mary are New Mexico State Rep. Fred Luna (left) and District Judge John Pope. The demonstration was part of Sandia's pilot school security program. Students, teachers, community leaders, and parents were involved in finding solutions to security concerns and developing a school security plan.

accessible via the Internet. She envisions other schools being able to tap into this electronic resource to address their school security concerns, looking initially at the whole picture to identify unique situations and needs. A detailed program would step educators through the system, leading them to security options relevant to their particular schools.

The Department of Justice is considering funding this work in the future.

—Kathy Kuhlmann

Arctic study

(Continued from preceding page)

the TWP site are really just modified shipping containers, with separate modules for power and instrumentation. The PAARCS unit, although it looks like a shipping container, was actually designed and built specifically for the arctic mission. The whole shelter is ultramodular, composed of prefabricated 80-pound panels. The unit is designed so that two arctic-garbed crew members can assemble or disassemble the entire thing without a hitch.

The bear facts

According to Hugh Church, crews will be rotated off the SHEBA vessel about every six weeks, with at least one ARM technician aboard at any given time. ARM technicians will also rotate through the ARM site at Barrow, monitoring and maintaining the instrument packages. And while the biggest challenge the researchers will face will probably be the arctic climate itself, Hugh notes that project personnel have been prepared to deal with another potential threat unique to the arctic region: polar bears.

In fact, Sandians and other researchers involved in SHEBA/ARM have already received arctic survival training on the Alaskan tundra — "The coldest night I ever spent in my life," says one participant — and firearm training at the Kirtland-based DOE Central Training Academy.

While the field portion of SHEBA is expected to last just 13 months, the ARM project is slated to last 10 years. Hugh notes that ARM was conceived from the outset to be able to integrate the findings from shorter-term studies, such as SHEBA, into its climatological database.

By the time the current studies are completed, Hugh says, climatologists should have a much better picture of what drives the global climate engine and how much of an influence human activities have on that engine.

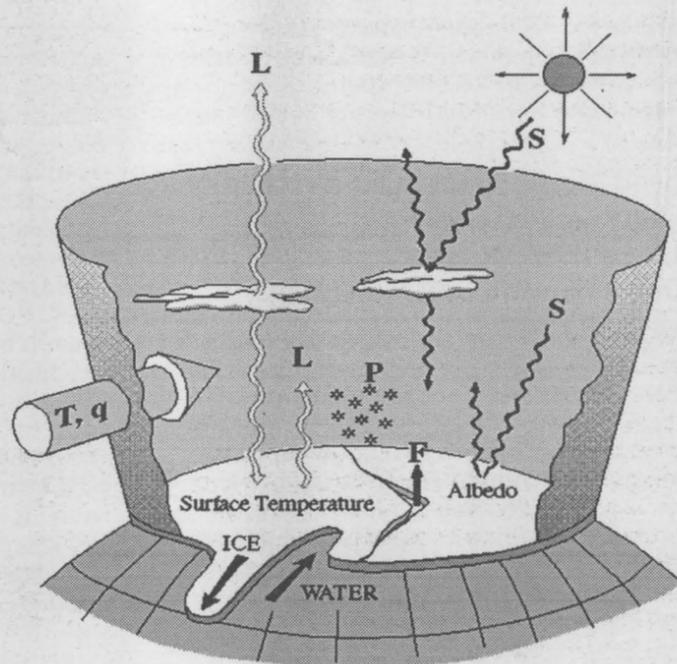
Many organizations form high-latitude team

Here's a list of Sandians and others involved in the SHEBA/ARM North Slope of Alaska/Adjacent Arctic Ocean (NSA/AAO) studies:

Mark Aguilar, Jean Burstein, James Chavez, Hugh Church (NSA/AAO associate site program manager), Fred Helsel, Mark Ivey (AIS manager), Larry Yellowhorse, Bernie Zak (NSA/AAO site program manager), Jeff Zirzow (all 6612), Rose Marra (6610), and Kevin Widener (site engineering task leader, Pacific Northwest National Laboratory)

Other DOE laboratories involved in the arctic effort include Pacific Northwest, Los Alamos, Lawrence Livermore, Argonne, Brookhaven, Oak Ridge, and the National Renewable Energy Laboratory. Other agencies involved are the National Science Foundation, Office of Naval Research, National Oceanic and Atmospheric Administration, the National Weather Service, National Aeronautics and Space Administration, and US Air Force.

Universities associated with the project include: Clark Atlanta, Colorado State, Dalhousie (Canada), North Carolina State, Penn State, Scripps Institution of Oceanography, State University of New York (Albany, Stony Brook), University of Alaska/Fairbanks, UC San Diego, UC Santa Barbara, and the universities of Colorado, Denver, Maryland,



HEAT BALANCE — Schematic mean annual energy balance of the arctic atmosphere and ocean. The arrow labeled T, q represents the net advection of moist static energy into the arctic atmosphere by eddy and mean motion. Also shown are the solar and thermal infrared radiation fluxes (S and L), the turbulent heat transfer through openings in the ice (F), and precipitation (P).

Massachusetts, Michigan, Miami, North Dakota, Oklahoma, Utah, Washington, and Wisconsin.

International participants representing agencies from Australia, Japan, Canada, United Kingdom, and Russia are also involved, as are a number of private sector science-oriented companies.

State of the Labs

(Continued from page 1)

\$270 million in purchases — it's a major piece of the economy of the city, and we're very proud of that fact."

Over the past three years, John noted, Sandia has been through a "financial transition," during which it dropped costs about \$100 million, from \$1.4 billion to \$1.3 billion.

"The good news is that our projections indicate that there is a degree of stability in the 1998-and-beyond years that we have not had over the past few years," he said. "If our projections are right, I think we're through the transition and can look to a more stable environment over the next couple of years.

"Now, that will not happen without a lot of hard work on our part, on the congressional delegation's part, and on your part, but that is indeed the way we look at the future."

Although touching on some key technical accomplishments and new partnerships, Paul focused primarily on the many ways that Sandia and Sandians work to make Albuquerque a better place to live, while John provided a more detailed description of the Labs' technical work during 1996.

Paul said 1996 was a milestone year in Sandia's long-standing relationship with General Motors. In a tangible demonstration of the progress that partnership has made, a team of GM engineers drove from Michigan to New Mexico in Saturn automobiles equipped with new wear-resistant engines developed through joint research efforts between the Labs and the industrial giant.

Sandia's world-class work in bomb defusing and disarming techniques led in 1996 to a new relationship for the Labs: Sandia was named a satellite facility of the National Institute of Justice, and in a \$500,000 partnership will evaluate a wide range of technologies for law enforcement

and corrections.

Exclamations of impressed surprise rippled through the audience when Paul showed a video demonstrating the capabilities of a Sandia "black box," which could be clearly seen destroying a "terrorist" bomb without detonating it.

"There is a pop from the pressure as the bomb is disabled, but no fire, no property damage, and



JOHN CRAWFORD AND PAUL ROBINSON

most importantly, no injuries," Paul said as the audience watched the video. "Maybe for next year's State of the Labs," Paul added, "we can arrange to do something like this [demonstration] live."

Later this year, Paul noted, Sandia and the Albuquerque Police Department will use some of the funding from the NIJ partnership to host the third Operation Albuquerque, a special training program for elite bomb squads from all over the world that has become one of the premier sessions of its kind.

A tradition of community service

While Sandians pride themselves on the Labs' technical accomplishments, Paul said, "we also have an outstanding tradition of community service, working with our neighbors to solve problems affecting us all."

Paul offered the audience a summary of the ways in which Sandia and Sandians made a differ-

ence in the community in 1996, including making record high levels of contributions to United Way and Sandia's own Shoes for Kids program. More than 1,000 Sandians, Paul added, volunteered time to community projects such as the annual "Week of Caring," during which some 250 Sandians donated 2,000 hours of time to the Martineztown House of Neighborly Service, a nonprofit Albuquerque organization dedicated to reaching youth at risk.

"We cleaned, painted, tutored, donated and bound library books, and did whatever we were asked to do," Paul said.

All of this effort has not gone unnoticed. Locally, the United Way recognized Sandians for their long-standing role as the leading contributors to the program. At a national level, the Thousand Points of Light Foundation in 1996 recognized Sandia as having one of the five best volunteer programs in the nation, along with American Express, Eli Lilly, Goldman Sachs, and Texaco.

"That's impressive company for a government-owned laboratory," Paul said.

Because of the nature of its work, Paul said, it comes as no surprise that Sandia places an extremely high value on education and support of programs that improve educational opportunities. For example, he said, Sandia teams with the local community and the University of New Mexico to increase the awareness of science, math, engineering, and medical careers among Native American students. And Sandia is a member of the Science and Technology Alliance, which provides research opportunities to minority students and their instructors. "Students influenced and inspired by these programs are our scientists and engineers of tomorrow," Paul said.

Sandians also serve as mentors and judges at local and regional science fairs and provides hands-on science kits that teachers can use in the classroom.

Sandia received an award this year from the American Society for Training and Development

(Continued on next page)

State of the Labs

(Continued from preceding page)

for its workforce diversity program. Sandia also is a founder of the community-based Diversity Leadership Council, in which the Labs teams with community leaders to establish strategies for encouraging greater cultural diversity in the workplace.

Lockheed Martin helps build community

Paul also cited a number of programs supported by Lockheed Martin, which manages Sandia for DOE, including its recently announced



C. PAUL ROBINSON

\$1 million grant over the next five years to the New Mexico Museum of Natural History and Science. Lockheed Martin also contributed \$100,000 for the main tank at the new Albuquerque Aquarium and donated funding to the Albuquerque Symphony, the Santa Fe Opera, and the Rio Grande Zoo. Lockheed Martin has also been a major supporter of

education in the community, making major contributions to the Albuquerque Math and Science Academy and providing key sponsorship for the annual Thunderbird Program, which awards scholarships to students who have overcome adversity to achieve academic success.

An awesome responsibility

Even after going through a transitional period for the past three years, Sandia remains the largest of DOE's national laboratories, and retains "an awesome responsibility" for the nuclear weapons

stockpile. And despite a process of staff reductions (with no involuntary separations), he said, Sandia has continued to hire people with critical skills to meet that responsibility.

"Skills mix is a major issue for Sandia; we are hiring people with critical skills in computer science, computer engineering, and the engineering and science disciplines that carry with them computer modeling skills. Those are the kind of skills we are after. They're in very short supply. We're competing with everyone across the country to attract those kinds of people to Sandia. We're also involved in a partnership with the University of New Mexico to redirect the careers of some of our existing staff into computer science and computer modeling."

The Labs' primary mission, John said, remains nuclear weapon stewardship with associated missions in dismantlement of part of the stockpile as the nation reduces the stockpile down to levels agreed in the START negotiations. The primary mission also embraces technical work in arms control and nonproliferation of weapons of mass destruction around the world, and in antiterrorist technologies.

"These technologies are based on a solid world-class scientific base at the Laboratories," he said. That base has made it possible for Labs scientists and engineers to achieve significant technical progress in a number of areas that have application beyond those required in the primary mission, he said.

Notable achievements abound

John discussed a number of significant technical achievements during 1996, noting that almost all were achieved through partnerships between Sandia and industrial or university partners. Accomplishments cited included Sandia's work with Precision Fabric Group on a new automobile airbag and advances in micromachine technology — "an amazing new paradigm for mechanical devices," John said.

Other accomplishments noted by John included:

- Achievement of record-high energy outputs

using the Particle Beam Fusion Accelerator in z-pinch configuration.

- World's first use of extreme ultraviolet light to fabricate a working microelectronic device.
- Commercialization (with Northwest Airlines) of a technology to examine wing structural members.
- Collaboration with Japanese industry to study nuclear power plant safety and cooperation with Russia on treaty verification issues.
- Opening of the Robotic Manufacturing and Science Engineering Laboratory.
- Advancing the use of synthetic aperture radar (SAR) to detect extremely small changes in landscape.
- Completion of the fourth successful launch as part of the STARS strategic missile defense system development program.
- Selection by DOE of Sandia's Annular Core Research Reactor to become the US source for the medical diagnostic isotope molybdenum-99.
- Development of a "smart gun," an explosive detection portal (in cooperation with the FAA), and a technique for dramatically extending the life of stone sculptures (with the Metropolitan Museum of Art).
- Work to improve security at Belen (N.M.) High School, which, as attested by letter, has resulted in a much safer environment for learning.

Intellectual money in the bank

"As we look at these accomplishments from our partnerships," John said, "we always ask ourselves, 'Where will the next accomplishments come from? Where does the next partnership come from?'" He noted that all of the Labs' accomplishments are based on years of research that form the basis of a new commercialization or a new partnership.

"So, we take a great deal of pride," he said, "that this past year, Sandia's accomplishments have been recognized with national awards. These awards confirm that we are still putting money in the intellectual bank for partnerships for the future."

— Bill Murphy

Lockheed Martin E&E President Al Narath discusses 'state of the sector'

In his first-ever "State of the Sector" address, Lockheed Martin Energy and Environment Sector President Al Narath said there are tremendous business opportunities for the sector in cleaning up "legacy wastes" from the Cold War. He spoke to Sandians recently in the Technology Transfer Center auditorium.

Narath, a former Sandia President, pulled no punches, however, in pointing out the problems the sector has faced in its first major privatized cleanup contract with DOE, remediating the so-called Pit 9 site at the Idaho National Engineering and Environmental Laboratory (INEEL).

The E&E Sector manages three national laboratories for DOE: Sandia, Oak Ridge, and INEEL. In addition, the sector is partnered in the management of the Nevada Test Site (through Nevada Technologies Co.) and is a partner in the M&I (Management and Integration) contract for cleanup work at the Hanford site in Washington state.

Great M&O market share

Narath said the core of the sector's business — and the foundation upon which it must build for the future — is related to its M&O (management and operation) contracts with DOE. M&O contract opportunities, though, may have just about reached their limit, Narath said.

"Our market share in terms of M&O contracts amounts to some 27 percent," he said. "Given such innovations as contract reform and increasing competitive pressures, it's very hard to imagine that that part of our business has any opportunity to grow significantly."

"When I think about where the sector might go in terms of creating shareholder value for the corporation, it has to be in activities that are related to our M&O work but move beyond those types of contracts. That's where environmental

remediation work comes in."

Narath, who left his position at Sandia in August 1995 to assume the E & E Sector helm, touched on many sector-wide bright spots in 1996:

- Winning the M&I contract at the Hanford site (in partnership with Fluor-Daniel).
- Making significant progress in improving ES&H performance at all sector facilities.
- Making significant progress on the labor relations front.
- Gaining two-year extensions on management contracts at Oak Ridge and Y-12.
- Making good on production commitments at Sandia for Defense Program sponsors.

Remediation challenges

On the other hand, Narath said, the Pit 9 problems in Idaho were "bad news" during 1996. Indeed, Narath made it clear that the Pit 9 problems are by far the Sector's biggest headache. "We're working very hard to make sure the business doesn't get lost in this pit," he said.

The Pit 9 cleanup is being done by Lockheed Martin Advanced Environmental Systems (LMAES), created by the sector last summer to take over the Pit 9 work from Lockheed Environmental Systems and Technologies (LESAT), the Lockheed legacy company that held the original cleanup contract. With the LMAES management team, headed by former Sandia Executive VP Jim Tegnelia, in place, Narath said, "in technical terms and management terms, things [at Pit 9] are really looking good."

The fact that DOE and Lockheed were breaking new ground, Narath suggested, led to unanticipated problems in terms of costs, regulatory concerns, and technology.

Also disappointing during the year, Narath said, was DOE's announced decision to compete (when the two-year extensions run out) the con-

tracts at Oak Ridge and Y-12. "That's a great concern to me," Narath said, adding that the sector will "continue to work to achieve a happy outcome in both those cases."

Regarding the sector's priorities for the next year, Narath said that "right at the top of the list is to deal with Pit 9 and to find and negotiate with DOE a path forward that completes the job, because I don't think anybody gains if we have to stand down and admit failure — it is DOE's first major privatization effort and I don't think anybody would like to see it fail."

A solid base

Narath said the sector's M&O contracts with DOE provide a "very solid base" from which to grow.

"Almost any way that I look at it," he said, "I score the companies that hold these [M&O] contracts as having met or exceeded expectations in 1996. That is an important factor in maintaining the sector's 'market share' in managing DOE facilities."

"Clearly for us to succeed in maintaining our market share," he said, "we need to serve this customer [DOE] and be regarded as second to none. We need to add value in the management of DOE facilities and, from my point of view, not only manage each individual entity the best way we know how, but seek synergies in the management of multiple facilities."

Narath said he remains optimistic that the environmental market represents a tremendous high-tech business opportunity.

"If you look at the situation, both from a financial perspective and in terms of contributions to the national welfare," Narath said, "there are just enormous opportunities [in ER] and we all intend for Lockheed Martin to play a major role."

— Bill Murphy

Prosperity Game explores how technology can confront population-related problems

More than 90 people representing the interests of industry, government, the national labs, and academia gathered at Albuquerque's Holiday Inn Pyramid Hotel last week for a two-day role-playing exercise that explored an emerging scientific field: industrial ecology.

The exercise, conducted March 5 and 6, was the latest Sandia-designed "Prosperity Game" — an adaptation of move-countermove war games in which teams of military strategists play the roles of opposing forces in imaginary battle scenarios. In Prosperity Games, teams of government, industry, national laboratory, and university officials explore complex technical and policy issues surrounding particular industries. One goal is to develop strategies and relationships that enhance US economic competitiveness.

Industrial ecology is an emerging field that views industrial activities and the environment as an interactive whole. It employs a systems approach to the complex interrelationships and long-term trends among businesses, the economy, the human environment, and natural resources. The goal is to develop processes that help industry and government leaders determine the most efficient use of resources with the least impact on the environment.

"Industrial ecology treats industries as if they were biological systems," says Marshall Berman, Manager of Innovative Alliances Dept. 4271, who facilitated the game session with the help of dozens of Sandians. "It accounts for system inputs, outputs, material and energy flows, the costs of waste, and recycling, among other things."

He says the game and follow-up activities

"Industrial ecology treats industries as if they were biological systems."

help the players "develop a greater understanding of industrial ecology and explore how the approach might simultaneously reduce the environmental impacts of industrial activities while increasing profits."

Technology vs. overpopulation

"That takes technology," he adds, such as new methods for processing and storing hazardous wastes, techniques for reusing waste heat, better recycling systems, and alternative materials that are inexpensive and environmentally benign. It also requires expertise in systems engineering, materials, energy, and other capabilities found at the national labs, he adds.

During the game, participants were challenged to employ industrial ecology methods to solve some of the problems faced by a variety of stakeholders: the public, government, industry, foreign countries, and R&D organizations. They were given a choice of three scenario scales: the world, the nation, or the US-Mexico Rio Grande border region (which harbors some of the western hemisphere's worst environmental problems).

"The challenge is to determine how to use the power of technology to confront the power of population and the desire for an improved quality of life," states the game's Player Handbook, which details the world's, nation's, and region's situations with regard to population, economics, energy consumption, agricultural capacity, waste production, and natural resources.

Small teams were created to play various roles in the effort: Congress, local governments, foreign governments, DOE, other federal agencies, the national labs, universities, the US public, and the economy. Then the players set out to plan strategies and goals based on each team's interests. They worked to achieve those goals through interaction and negotiation with the other teams, all against the backdrop of real-world considerations such as money and political influence. A decade, beginning with the present, was compressed into about 12 hours of actual negotiating time.

Players included representatives from Sandia, Los Alamos, and Lawrence Livermore national labs; UNM's Anderson Schools of Management; the New Mexico Environment Department; the Albuquerque Fire Department's Hazardous Waste Management Unit; and various local businesses.

D.C. game prologue

Last week's game was the prologue to a national-scale industrial ecology game to be played this May in Washington, D.C., during which Congressional staffers, government regulators, CEOs of major corporations, national lab officials, and university representatives are to participate. Sandia, Lawrence Livermore, and Los Alamos are sponsoring both games.

The Prosperity Games model was conceived in 1993 by former Sandia Director for National Industrial Alliances Pace VanDevender. The first game, involving representatives of the US electronics industry, was played in January 1994. Since then, Sandia has facilitated 16 games exploring a variety of issues, from diversity to the US health care system. Pace left Sandia in 1995 to launch a venture company, the Prosperity Institute, that applies the Prosperity Games model to industries and problems worldwide.

The game this May will be the fourth time Sandia has taken the Prosperity Games model to the nation's capital. The last time, in May 1996, top DOE lab offi-



"SEWAGE: It's one hell of a problem," began an article in the Oct. 1, 1976, *Lab News*. The article (accompanying photo above) discussed a Sandia project to test whether small doses of gamma-ray irradiation could rid municipal sewage sludge of disease-causing pathogens so that the treated waste could be used as a soil additive, crop fertilizer, or animal feed supplement. The two in the photo are (left) Willis Whitfield (ret.) and Jack Sivinski (ret.), seen inspecting a plot of sorghum fertilized with irradiated sludge. The sorghum grew just as well as an identical plot fertilized with commercial fertilizer (behind them). "The pathogens are killed, there is no residual radiation, and the sludge becomes fit for general use," explained Willis. "The cities can probably sell it for more than processing costs. In other words, they'll turn a profit." The project led to creation of the Sandia Irradiator for Dried Sewage Solids, dedicated in October 1978, a pilot facility that could handle several tons of dried sludge daily. Public acceptance of the technology floundered in the early 80s, however, amid debate over radiation dangers.

(Photo courtesy of Corporate History Archives)

cialists focused on the future of the DOE laboratory system. Marshall says that game resulted in labs' leaders forging significant partnerships and helped form the National Coalition for R&D.

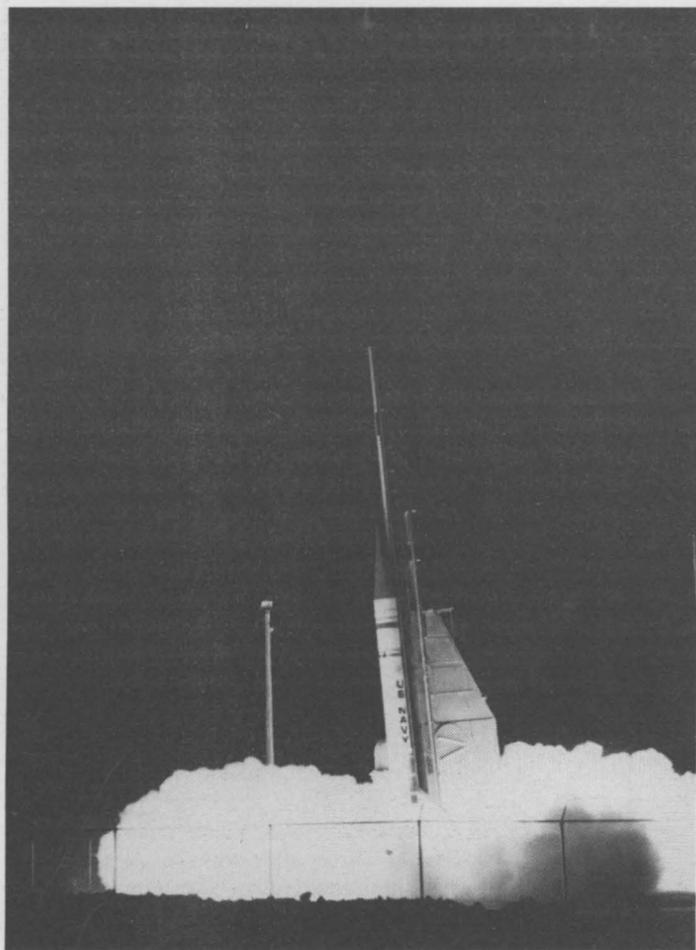
"In that Prosperity Game, we engaged the country's 'movers and shakers' to help solve problems on a national scale," he says. "We hope to achieve the same level of success in May."

—John German

! Take Note

Hollywood film stars Goldie Hawn, Sally Field, Ted Danson, Mary Steenbergen, Beau Bridges, and JoBeth Williams are scheduled to appear at New Mexico's first International Family Film Festival May 29-June 1 at the 24-screen Century Theatres complex at 4901 Pan American Freeway NE (formerly the site of the Albuquerque 6 Drive-in) in Albuquerque. The festival is being produced by and will benefit Futures for Children, an Albuquerque-based nonprofit organization that has helped thousands of people in five countries. During the festival, more than 40 new, retrospective, international, student, and short and animated films for and about families will be shown. Many of the screenings will feature pre- or post-film discussions led by a volunteer moderator. Three separate panels have been scheduled to discuss issues such as how to watch a film with your family and how editing affects a film's message. Celebrities, many of whom have supported Futures for Children, will participate. For more information, call the International Family Film Festival office at 332-FILM, toll-free at 1-888-FLM-FEST, or e-mail at FLMFEST@aol.com.

Futures for Children was founded in 1961 to improve the well-being of children and communities by fostering self-reliance, education, and economic growth. In its three decades of service, Futures has helped people in five countries and more than 20 American Indian tribes through its community action and leadership programs. Futures for Children is funded completely by private corporate and individual donors.



A STRYPI ROCKET lifts off on the morning of Feb. 9 from the Nevada Test Site (NTS) — the first launch from Sandia's new Wahmonie launch facility there — on its way to a target at Sandia's Tonopah Test Range (TTR). The launch was sponsored by the Navy as part of its Reentry Body Impact Fuse Flights (RBIFF) program designed to test reentry vehicle subsystems. The payload was developed jointly by Sandia and Lockheed Martin Missile Systems. Launch support for the test was supplied by Sandia personnel associated with the Kauai Test Facility, TTR, and NTS.

(Photo by Diana Helgesen, 9732)

Sandia simulation offers practice in retrieving hostages

It's hard to distinguish between hostage and hostage-taker until you turn and see one of the four people in the room raising a gun and pointing it at you. You wheel, seeing the muzzle of your own 8 mm Brixia pistol at the bottom of your vision, as in a bad dream, too slow, following behind your turn. . . .

Wait a minute. Who ordered this? Is there a chip implanted in your brain, playing out some kind of excitement vacation video? It's not real enough to be the Star Trek Holodeck. . . .

What it is, is VRaptor, Sandia's virtual reality assault planning, training, or rehearsal simulator, designed to give law enforcers more realistic practice in rescuing hostages.

Participants grip guns, don virtual reality glasses, and burst into the harsh environment of hostage-takers and their victims. The job: determine who are hostages and save them, take prisoner those kidnappers who surrender, and shoot those who fire at you. The characters can drop, attack, or run.

Unpredictable outcomes

VRaptor's images are not fancy — no glowing lizards with spinning kicks and trampoline-style leaps, for example — because it's not a preprogrammed video game, says Sandia researcher Sharon Stansfield (5913), leader of the project. "The graphics are computed in real time rather than prearranged, there's no higher 'level' to which to progress, and there's no way to get familiar with the game and its outcomes."

Outcomes are unpredictable because interactions are preprogrammed for each bout by a human trainer, who varies roles, moves, and placements of the characters for each training session.

The prototype system was demonstrated for the first time at the IEEE's Virtual Reality Annual International Symposium, held in Albuquerque in early March and chaired by Sharon.

Another advantage of the system is that several rescuers can be represented at the same time in the virtual reality system as they enter a

hostage situation.

"The advantage is that multiple human participants can appear in embodied forms within a common, shared virtual environment," says Sandia researcher Dan Shawver (5913). "Security and emergency forces can safely experience situations in which they otherwise would have no opportunity to practice effective responses."

The four virtual reality characters — two men, two women — are sitting, standing, or lying in a room when a law enforcement team with you on it breaks in through a wall or door and delivers a concussion grenade.

Your motion, monitored by sensors on your back and your hands, determines the perspective from which you see events, through the now-familiar virtual reality viewer placed over your eyes.

A typed message reminiscent of the old silent movies interrupts the action to inform you, "You've been shot."

(Your gun's a little slow on the turn because its position is determined by a small computer that's temporarily not quite up to speed in calibrating inputs from sensors.)

"We feel our model represents an improvement over current law enforcement training methods in 'shoot houses,'" says Sharon. "Shoot houses allow agents to use real guns to fire on mannequins, but the mannequins don't do anything, they're just there." Some cardboard cutouts do pop up, but



KOAT-TV reporter Jeff Martinez experiences what it's like to be a lawman rescuing hostages, through the prototype Sandia VRaptor simulator on display at the IEEE's Virtual Reality Annual International Symposium in early March at the Hyatt Hotel in Albuquerque. The characters on screen, whose personas and actions vary with each training session, change perspective as the player moves. (Photo by Randy Montoya)

that's all they do.

Like a flight simulator

The VRaptor scenarios, constructed with input from the FBI, have a setting common to many apartments — kitchen table, chairs, living room couch, arm chair, and so on — but without gaudy trappings or extensive details.

"Think of this less as a video game than as a flight simulator," says Sharon. "It familiarizes teams with scenarios they're going to encounter." As flight simulators do not distinguish between types of trees lining a runway but do offer clear horizon lines, VRaptor sacrifices detailed images to provide more important visual cues — a prone body, raised arms, an outthrust weapon.

A more complicated virtual reality system that permits a greater variety of behavior is under consideration, says Dan. The more complicated system could be used in planning an assault, accessing other plans of attack, monitoring and logging a trainee's performance, and evaluating improvements in system or trainee performance.

A team of other Sandia researchers contributed to the work. These include (but are not limited to) Denise Carlson, James Singer (both 5913), Ron Hightower (5905), Nadine Miner (9621), Jim Pinkerton (a former Sandian now at Silicon Graphics), and Monica Prasad (5913). Wade Ishimoto (5500) and FBI special agent Jim McGee served as unofficial advisors on the project.

The work is funded by Sandia's Laboratory Directed Research and Development program.

— Neal Singer

Redd Eakin selected to participate in President's 'Summit for America's Future'

Redd Eakin of Community Involvement and Issues Management Dept. 12650 has been selected as one of 11 Albuquerque delegates to the President's Summit for America's Future in Philadelphia next month.

The three-day conference, convened by President Clinton and headed by Gen. Colin Powell, has as its goal the mobilization of millions of citizens and thousands of organizations to ensure that America's youth have access to five fundamental resources: an ongoing relationship with a caring adult, safe places and structured activities during non-school hours, a healthy start, a marketable skill through education, and an opportunity to give back through community service.

During the summit, delegations from 100 American cities will develop strategies for achieving those goals in their communities.

"I can't think of another person with as much experience as Redd in true volunteerism," says Bruce Fetzer (12680), a member of the local steering committee that helped select the delegation.



LONGTIME VOLUNTEER — Redd Eakin, seen here with a pair of youngsters during Sandia's Week of Caring last April, has been selected as an Albuquerque delegate to the President's Summit for America's Future in Philadelphia April 27-29. (Photo by Randy Montoya)

A major criterion for selection to the delegation was each candidate's ability to mobilize volunteers. Dept. 12650 administers the Sandia volunteers program. Redd has been an active volunteer in the Albuquerque area for more than 30 years, serves on the boards of various volunteer-intensive organizations, and has received numerous awards for her efforts.

Berweida Learson (3612) also was among the 56 New Mexicans nominated.

Trinity Site tour April 5



The National Atomic Museum is sponsoring a tour of the Trinity Site, where the world's first atomic bomb was detonated, on Saturday, April 5.

Trinity Site facts:

- The Trinity Site on White Sands Missile Range is open to the public only twice a year.
- The 21-kiloton explosion on July 16, 1945, marked the end of the Manhattan Project and the start of the Atomic Age.
- Visitors can see "ground zero," Jumbo, Trinitite, and the Schmidt-McDonald ranch house.

How to get tickets:

Tour buses leave the National Atomic Museum at 6:30 a.m. and return by approximately 4 p.m. Cost of the tour is \$25. Tickets are available at the museum store; call for more information: 284-3242. All profits go to further the museum's educational goals.

Info Day '97 has information for everyone

Moving toward a collaborative environment

Information Day '97 is actually two days this year, March 19 and 20, and there will be something for everyone who wants to use information technology to improve job performance: engineers, managers, application developers, and novices

This year's event at the Technology Transfer Center (Bldg. 825) and Sandia/California Bldg. 904 auditorium (through videoconferencing), will showcase collaborative efforts among Sandia's Integrated Information Services (IIS) and Labs organizations.

A shared vision

"Info Day '97 represents a shared vision and a shared commitment with our line of business," says Mike Eaton, Chief Information Officer. "This mutuality for Sandia means having the right information at the right place and the right time."

Presenters will highlight some of the latest information technology tools. Discussion group sessions will focus on trends in networking and Internet technologies, current collaborative Labs-wide efforts, and future information technology directions Sandia is looking to.

The agenda at right is available with complete descriptions on the Internal Web. Click on the Info Day icon on the Internal Web home page or go directly to the Info Day page at <http://www-irm.sandia.gov/infoday/infhome.htm>. Info Day organizers advise registering because some of the discussion tracks are being held in limited-seating locations.

Exhibits

Info Day exhibits in the lobby will provide information about CSUs' support for Sandia's distributed computing, the Sandia Web, current and advanced applications (such as time cards), the Technical Library's Horizon online catalog and home page, awareness of year 2000 problems that Sandia may face, component selection system and simulation models, partner works and agreement reporting, interactive media stations and other communications products, and more.

Day One, Wednesday, March 19

- 8:30-9:30 a.m. Keynote address, Lee Love, Director of Strategic Marketing at Netscape Communications Corporation
- 9:30-10:45 a.m. "What Will the Future Look Like? A Tour," Mike Eaton (CIO), Heinz Schmitt (VP 2000), and Gary Beeler (VP 14000)
- 10:45-11 a.m. Break
- 11-11:45 a.m. "Sandia's Enterprise Information Plan as a Strategic Asset," Kathleen McCaughey (Director 9700), Jack Jones (Director 4600), and Doug Weaver (4601)

Discussion Track I: Collaborative Environments at Work (concurrent with Track II)

- 1-2 p.m. "ASCI, Helping Build the Infrastructure," Pete Dean (8910), Paul Yarrington (9232), and Melissa Murphy (Director 4900)
- 2-3 p.m. "Collaborative Manufacturing Systems," Mike Tebo (4012) and Lew Butler (14300)
- 3-4 p.m. "Knowledge Preservation," Carmen Ward (14713) and Keith Johnstone (14713)

Discussion Track II: The Developer's Perspective (concurrent with Track I)

- 1-2 p.m. "A Developer's Toolbox," Ernest Friedman Hill (8117) and Pat Milligan (4612)
- 2-3 p.m. "The Computer-User Interface," moderated panel, Ray Shaum (10502), Jennie Negin (4817), Jeff White (4817), Sue Swanback (4815), Bev Ortiz (4817), and Chris Forsythe (12323)
- 3-4 p.m. "How Secure is Secure?" Doug Brown (4621) and Pete Dean (8910)

Day Two, Thursday, March 20

Discussion Track III: An Engineer's Perspective (concurrent with Track IV)

- 8:30-9:30 a.m. "An Engineer's Toolbox," Duane Lindner (1809) and Fran Current (4612)
- 9:30-10 a.m. "The Tools at Work: Strong Links, A Case Study," Marcus Craig (2643)
- 10-10:30 a.m. "The Tools at Work: Need to Know, A Case Study," Karen Current (4012)
- 10:30-11:30 a.m. "What Tools Exist? What Tools are Missing? An Interactive Discussion," John Mitchiner (6614) and Fran Current (4612)
- 1-2 p.m. "Engineering Information Systems," Eric Thulin (9709) and Del Klinetobe (9781)
- 2-3 p.m. "Internal Secure Network Engineering-Based Applications," Joe Schofield (4612)
- 3-3:30 p.m. "Component Information Systems," Catherine Rosul (1252)
- 3:30-4 p.m. "Visualization as an Engineer's Asset," Jeff Jortner (8920)

Discussion Track IV: My Computer as a Life Source (concurrent with Track III)

- 8:30-9:30 a.m. "The ABCs of Your Computer," Jim Hamilton (4616), Bruce Bower (CSU), and Todd Kuzier (CSU)
- 9:30-10:30 a.m. "Your Electronic Secretary: Independent Computing," Jackie Van Loh (4800), Marie Garcia (4612), and Sam Cancilla (4813)
- 10:30-11:30 a.m. "Hunting, Gathering, and Sharing: Sandia's Research Options," Al Zelicoff (5336) and Julie Kesti (4415)

Recent Retirees



Joe Kerr
18 10244



Frank Arellano
32 7511



Steve Ross
29 7523



Duane Dewerff
33 5931



Wayne Cook
37 9322



Bob Cranfill
39 5512



Ron Ewing
37 6643



Ron Haines
33 2425



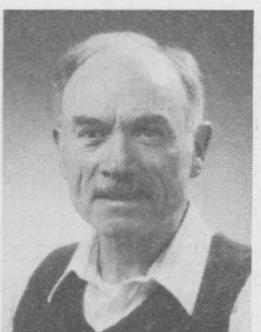
Elaine Buck
27 6219



Dave Braudaway
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Warren Windle
35 1235



Chester Claghorn
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Federal streamlining leads Sandia Procurement to commercial-like buying practices

Business-style approach promises best value for tax dollars

Best value, best practices, and benchmarking are words that could be considered "business-speak." But in Sandia's Procurement organizations, this terminology is translating into better products and services for the Labs and better communication among line organizations, Procurement, and Labs suppliers.

In the past, DOE spelled out how a contractor's purchasing system had to operate in order to be acceptable to the government. Over the years, the purchasing system for management and operating (M&O) contractors became increasingly like the federal system, as more efficient and effective commercial business practices were replaced with inefficient layers of noncommercial systems and practices.

As part of the changes from former DOE Secretary Hazel O'Leary's Strategic Alignment effort, congressional budget cuts, and other regulatory reform, however, DOE eliminated the "federal norm" for its M&O contractors in June 1995. As a result, Sandia was granted permission to establish its own source-selection procedures.

"The objective of our new commercial-like procurement practices is to minimize cost, complexity, and cycle time," says Don Larrichio, Manager of Procurement Policies and Procedures Dept. 10217. "The federal source-selection process was characterized by a mechanical-like approach, and we wanted to move away from rigid rules and obtain the best value for Sandia."

Going commercial

Sandia and other contractors were given the choice to either develop commercial-like practices or follow federal procurement methods based on Federal Acquisition Regulations (FARs) and DOE Acquisition Regulations (DEARs). Sandia chose to "go commercial" and worked extensively with DOE/HQ, DOE/AL, and DOE/KAO to come up with strategies for streamlining its processes. DOE Deputy Assistant Secretary for Procurement and Assistance Management Richard Hopf supported Sandia's conversion to commercial-like, "best-value" procurement practices.

"We're not eliminating all FARs and DEARs," says Don. "If it makes good business sense, we want to use those that are value-added. There are still subcontracting statutory requirements that Sandia is subject to, such as EEO/AA [equal employment opportunity and affirmative action]

and Service Contract Act requirements."

Best-value procurement involves methods and strategies for selecting contractors that will provide Sandia with the best value.

"It encourages open communications, involves commercial competition techniques, introduces a variety of evaluation factors, can include oral presentations, and provides trade-off methods, which are used as source selectors to determine which proposal offers the best trade-off between price and performance capabilities," says Don.

"Sandia may rank the offerers from best to worst by making a series of paired comparisons among them and trading off the marginal differences in capability and price," he says. "Cheapest is not always the best bargain. However, the concept of price reasonableness has not gone away."

Shared accountability a key element

Sandia Procurement benchmarkers took the best practices for choosing suppliers found at Chrysler Corporation, Motorola, Intel, Hewlett-Packard, and others and incorporated them into a set of purchasing guidelines for Sandia. "We found that there's a lot of teaming and partnering in the companies we benchmarked," says Don. "Shared responsibility and accountability will play a more significant role at Sandia."

Fairness will be preserved by the ethical conduct of the Procurement team and by a selection process that results in the most advantageous business relationships for Sandia, he adds. "Ethics will play a very significant role in the procurement process for both the line and buyers," says Don. "There are two very basic rules of conduct — act ethically, and no arbitrary or capricious decisions. The Sandia Code of Conduct will be changed to include this emphasis.

"We're new at this," Don continues. "It's going to be a learning experience for all of us, a cultural change."

Dept. 10217 has provided training to Sandia contracting representatives and has briefed some divisions and centers. Procurement wants everyone involved in the procurement process to know how it works. Training information will soon be available on the Procurement home page under Sandia Business Schools.

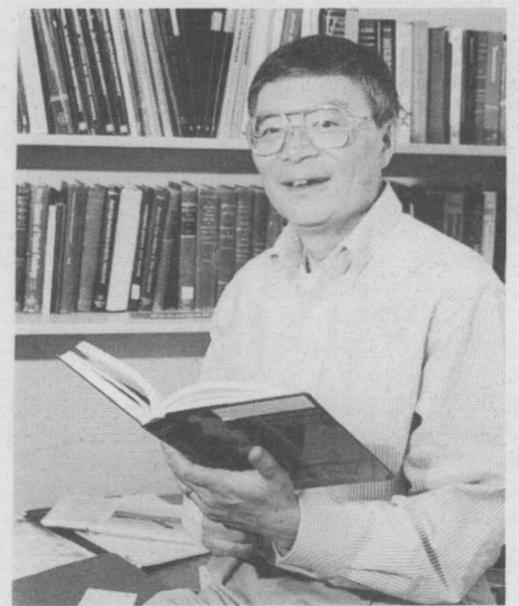
There are four suggested nonprice evaluation factors other than technical elements in procurement selection — past performance, experience,

total life-cycle costs, and financial capability of the provider. "In the past, we used mostly technical elements to procure products or services," says Don. "In addition, we are no longer locked into predetermined weighted evaluation factors. We have a lot of flexibility in how we define those factors. The source-selection process allows for the fact that in some cases the defined requirements may only lend themselves to very broad criteria. In those cases, best-value may be determined based on the contents of an offerer's proposal. Proposals will no longer be evaluated against the award criteria in the Request for Quotation [RFQ] but against each other."

Best-value source selection is one of many initiatives taken on by Sandia and DOE. A Best Business Practices Team meets monthly to discuss new and innovative approaches to procurement. DOE members on this team, both KAO and AL, are involved in planning, developing, and implementing best business practices to be employed by Sandia Procurement. The team reviews progress to date, analyzes issues, and maps new strategies for adopting commercial practices.

— Janet Carpenter

T.Y. Chu named Fellow of ASME



Tze Yao "T.Y." Chu of Mechanical & Thermal Environments Dept. 9735 has been elected to the grade of Fellow in the American Society of Mechanical Engineers (ASME).

T.Y. joined Sandia in 1977 and has worked in nuclear reactor safety and geothermal energy. He led the team that developed the Sandia Large Melt Facility for core-melt material interaction experiments, and the CYBL Facility for ex-vessel boiling experiments. His work in geothermal research includes geothermal well production stimulation and magma energy extraction.

T.Y. has a BS from Purdue and an MS and PhD from the University of Minnesota, all in mechanical engineering. He was named Distinguished Member of Technical Staff in 1992 in recognition of his continued outstanding contributions to research in heat transfer and nuclear reactor safety.

The ASME Board of Governors confers the Fellow grade on candidates to recognize their outstanding engineering achievements. Nominated by their peers, these Fellows have had 10 or more years of active practice and at least 10 years of continuous active corporate membership in ASME.



POLLUTION PUPILS — Franz Lauffer of Water Quality Dept. 7574 shows Inez Elementary School students how groundwater moves with the help of a model (various soil materials between two sheets of Plexiglas) of the underground environment. As Franz poured water tainted with colored dyes into wells in the model, the kids learned how groundwater gets polluted and cleaned up, and how monitoring wells work. The demonstration was one of many by various Albuquerque businesses during a week-long Science Expo at the school Feb. 28. (Photo by Randy Montoya)

Fun & Games

Archery — Start practicing your archery skills now. The Manzano Archery Club's annual membership drive will be held Saturday, March 22, at 8 a.m., at the KAFB archery range. Membership is open to all people working on Kirtland Air Force Base; however, range use is restricted to club members only. Call Dewey Reed at 883-2816 after 6 p.m. for more information.

Golf — The Sandia Women's Golf Association is holding its annual membership meeting on Thursday, March 20, 5:15 p.m., at the Coronado Club. Leagues, tournament play, and group lessons are offered for all levels of golfers. SWGA is open to all Sandia and DOE employees, retirees, spouses, dependents, and associate members of

SERP. For more information, contact Beth Connors (2111) at 891-0310 or Shirley Lopez (5799) at 821-2246.

Softball — The 1997 Sandia Softball Association summer season is just a few weeks away. Deadline for registration is March 21. Call Dewey Berry (9781) at 888-0381 for information about forming a team or getting on a team. Call Dewey if you are also interested in scrimmage games before the season.

Bowling — SANDOE Bowling Association January Bowlers-of-the-Month are: Scratch — Judy Hansen (10234), 557 scratch and 662 handicap; and Fred Gunckel (ret.), 61 scratch and

Take Note

Retiring and not seen in *Lab News* pictures: Maria Chacon (1481), 33 years; Robert Courtney (5391), 33 years; Frankie Crutcher (6525), 35 years; Gary Samlin (1235), 28 years; and Dorothy Stronach (9781), 19 years.

677 handicap; Handicap — Pat Bellino, 534 scratch and 675 handicap; and Fidel Perez (1471), 619 scratch and 676 handicap.

Winners of the Four-Person Team No-Tap Tournament held at Holiday Bowl Feb. 15-16 were Dora Gunckel (6400) and Fred Gunckel and Cheri and Sam Ortega with a 3,102 team handicap series.

Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads

MISCELLANEOUS

KEROSUN DIRECT-VENT FORCED-AIR FURNACE, programmable TC control, \$175. Crafts, 831-5234.
TRUCK BUMPER, heavy-duty, painted, fits late model GM, \$30. Wilde, 281-7027.
TWO GUINEA PIGS, cage, accessories, \$30 OBO. Poulter, 291-0607.
COMPAQ 486/50 PC, 8MB memory; 240MB, 5-1/4-in. & 3-1/2-in. drives; SVGA monitor; Windows 95, Internet ready, \$625. Schofield, 292-7220.
FIREPLACE TOOLS, brass w/marble handles, \$40+ new, only used a couple of times, \$20. Dwyer, 271-1328.
DINETTE TABLE, whitewashed wood, round glass top, 4 chairs, very good condition, \$125. Vigil, 271-1328.
KOFLACH MOUNTAINEERING BOOTS, plastic outer shell, insulated inner boot, Vibram soles, size 10-1/2, \$75. Shapnek, 281-5913.
ENGLISH BITS SNAFFLE, 5-in. rubber "D", \$12; "D" copper roller snaffle, \$13; woman's size 32 stretch-denim schooling britches, \$10; leather running martingale, \$14. Baldo-Pulaski, 345-0432.
EXERCISE EQUIPMENT, Air Gometer Bike, Gravity Edge, \$50 OBO. Strother, 281-5699.
SOFA/SLEEPER & LOVESEAT, good condition, light brown/off white, 80-in. sofa; 56-in. loveseat, \$200 OBO. Silva, 898-9115.
ANTIQUE OAK LARGE DRESSER, "Bear Claw" feet, \$400; full-size mattress & box spring, \$50 for set. Garcia, 298-9554.
TWO STUDENT DESKS, includes bookshelf & chair, \$30 ea. Garrison, 292-8973.
ENTERTAINMENT CENTER, light oak, glass doors, video & CD storage, \$100. Hebron, 281-2901.
NORDITRACK SEQUOIA, new, \$350; couch, w/hide-a-bed & loveseat, \$450; Panasonic KX-P1124 printer, \$75; Bissell rug cleaner, \$125. Dunham, 828-1755.
CANON TYPESTAR 5, compact, portable, lightweight electronic typewriter, \$50. Stermer, 255-1083, ask for Derek.
PIANO, Gulbranson studio, excellent condition, inspected & appraised by professional technician, \$1,000. Keck, 237-0392.
FLY FISHING OUTFIT, w/Hardy Marquis reel, rod, 2 spools, floating & sinking-tip lines, flies, \$300. Torrez, 869-7820.
GARAGE SALE, March 15-16, furniture, baby items, kitchen items, books, 12105 Rosemont NE (Juan Tabo/Mountain Rd.), 8 a.m. to 5 p.m. Marks, 298-2237.
'92 SONY COLOR TV, 27-in., w/remote, very nice, \$300 OBO. Green, 898-3791.
BICYCLE, 12-spd., 21-in., blue Nishiki Sebring, \$75; trainer, \$50; \$100/both; 3 high-back swiveling bar stools, \$50. Hesch, 352-2843.
QUARTER THREE-SECTION VENDING MACHINES, 36 plus 10 spares, cost \$11,500, asking \$5,000. Goodwin, 294-6702.
NSA AIR FILTER (Hepa), covers 2,000 sq. ft., \$300; metal gun cabinet, double doors, \$175; both new condition. Epperson, 271-9880.
CONTEMPORARY BEDROOM SET, headboard, frame, mattress box spring, nightstand, chest, dresser, large mirror. Underhill, 237-1395, after 5 p.m.
SANTANA TILE, white, 325 sq. ft., \$300; wall unit, oak, \$300; '79 Fiat, needs work, \$500. Garcia, 861-2477.
TWIN MATTRESS, excellent condition, \$30; galvanized gutters, down spouts, \$30; car jack stands, two, \$10. Koenig, 294-2264.

MOVING SALE, March 15-16, 9 a.m. to 5 p.m., waterbed, Sunbeam gas grill, weight bench, refrigerator, microwave, 503 McCloskey Dr. SW. Lauben, 275-7466.
SOFA, light blue/white stripes, excellent condition, \$350. Spear, 822-8982.
COMPUADD 386 COMPUTER, \$35 OBO; two legible-but-not-pretty VGA monitors, 14-in., \$15 ea. Larsen, 823-0196.
SPEED QUEEN XL CAPACITY HD WASHER, Kenmore XL electric dryer, good condition, \$75 ea., \$125 both. Cocain, 281-2282.
FERRET, male, desecrated & neutered, sweet & loving, great pet, w/cage & accessories, \$100. Wickham, 898-7601.
BASKETBALL GOAL, \$75; rototiller, \$150; sailboard, \$150; treadmill, \$200; entertainment center, \$150; chest freezer, \$100. Schroeder, 856-1825.
TROY-BILT ROTOTILLER, 1 yr. old., 7-hp, used once, \$1,000. Sorley, 866-0813.
FIRST FLIGHT GOLDEN EAGLE GOLF CLUBS, irons 1-9, 4 woods, pitching wedge, sand wedge, putter, \$150. Eaves, 268-0461.
ROTARY PUSH LAWN MOWER, 20-in. Sears, excellent condition, bags or mulches, spare parts, \$120. Van Domelen, 299-3674.
QUICK-SNAP DISPOSABLE CAMERAS, by Fuji, 24, plus 3 exposures, outdoor use only, \$5 ea. or \$40 for 10. Wagner, 823-9323.
CHIPPER/SHREDDER, electric, 1.5-hp, extra set cutters, power cord, paid \$450, asking \$185. Bray, 292-2410.
FERRETS, 2 young, healthy guys, friendly, w/large metal cage, many accessories, \$250 OBO. Molecke, 265-6449.
DOG RUN, chain link, 6'W x 10'L x 6'H, you disassemble & move, \$100. Krause, 858-1289.
SKI BAGS, heavy-weight, \$16; light-weight, \$8. Horton, 883-7504.
GOLF CLUBS, Macgregor, 9 irons, 4 wood, leather covers, bag & cart, \$125. Colgan, 344-3776.
PC GAMES: Hockey, NHL 96, EA Sports, CD ROM & manuals, \$15; Football Pro, Front Page Sports, 3-1/2-in. disks & manuals, \$8. Lagasse, 298-0977.
CAMPER JACKS, for small camper or heavy-camper shell, hand-operated cable type, \$50 OBO. Kepler, 296-0402.
CRAFT FAIR, April 5, 9 a.m. to 4 p.m., La Cueva High School Band fund raiser. Ekman, 296-3758.
YORKIE/WESTIE, male, 6 months old, all shots, neutered, \$75. Benton, 275-2602.

TRANSPORTATION

'84 CHEV. C-20, 3/4-ton, custom deluxe, heavy-duty, 350 AT, AC, \$4,950. Sanchez, 293-7246.
'95 SUBARU LEGACY L WAGON, AWD, ABS, power everything, CD, all records, 35K+ miles, priced below book, \$17,500. Edwards, 897-6535.
'83 MAZDA RX-7 GSL, 112K miles, 1 owner, \$1,900 OBO. Lucero, 296-2473.
'92 FORD MUSTANG GT, red w/black interior, 5-spd., power everything, alarm, AM/FM cassette, w/detachable face, bra/cover, \$11,000 OBO. Valdez, 880-0629.
'96 PONTIAC SUNFIRE, purple, 2-dr., 5-spd., tint, tilt, AC, AM/FM cassette, 26K miles, 3 yr./45K mile warranty, excellent condition, \$12,800 OBO. Riley, 843-9698.
'81 HONDA CIVIC 1300, manual-5 spd., 2-dr. hatchback, AC, 33+ mpg, \$950. Potter, 869-4716.
'88 NISSAN STANZA WAGON, light blue, 63.5K miles, 5-spd., new alignment, recent brakes, must sell, \$5,300. Schkade, 292-5126.

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

Ad Rules

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

'92 DODGE SPIRIT LUXURY EDITION, 80K miles, 25-mpg, new transmission, excellent condition, \$7,200. Rogers, 286-2143.
'88 DODGE CARAVAN, 4-cyl., 5-spd., runs/looks good, \$3,500; '94 Ranger, extra-cab, 4x4, V6, 5-spd., 31K miles, \$14,000 OBO. Bailar, 865-1518.
'91 NISSAN MAXIMA GXE, 1 owner, excellent condition, pearl white, tinted windows, 6-cyl., AC, 4-dr., AT, 104K miles, \$9,500. Erdman, 275-7755.
'47 STINSON VOYAGER 108-1 AIR-CRAFT, low-time airframe & engine, '97 annual inspection, \$16,500. Patterson, 865-4140.
'93 NISSAN PATHFINDER SE, V6, 4WD, loaded, 39K miles, \$17,900. Mauth, 821-5911.
'94 CHEV. STARCRAFT CONVERSION VAN, 3/4-ton, 5.7L, towing pkg., seats 8, bed, 2 AC, 2 stereos, 22,700 miles, \$20,900. Hall, 298-6856.
'93 CHEV. CAPRICE CLASSIC, V8, fuel-injected, AT, F.A.C., \$8,100. Martin, 343-9719.
'72 VW BUG, 100K miles, dependable, code alarm, AM/FM stereo, sunroof, \$1,495. Gorman, 268-8782.
'85 FORD E150 CONVERSION VAN, excellent condition, 51,400 actual miles, \$5,500. Sorley, 281-1191.
'82 OLDS BROUGHAM, 325 engine, 4-dr., cream, mint condition, \$2,800. Montoya, 896-4252.
'96 PONTIAC FIREBIRD, 15K miles, AT, excellent, well equipped, w/warranty, \$14,200. Phillips, 298-0814.
'91 DAIHATSU ROCKY SX, 4x4, 5-spd., AC, power pkg., sunroof, gray/maroon, excellent condition, \$7,000. Boyes, 281-1171.
'93 TOYOTA PICKUP DX, 4x2, extended cab, red, AT, AC, AM/FM, bedliner, anti-theft, tilt, tint, 45K miles, excellent condition, \$10,000 OBO. Sanchez, 873-2058.

'60 WILLYS JEEP CJ-6, w/camper-type shell, many extras, 3-spd., 4WD, \$2,995. Wiseman, 299-7089.
'86 CADILLAC COUPE DEVILLE, dark blue, leather seats, new transmission, approx. 26-mpg/highway, 100K miles, AC, PL, PW, PS, cruise, \$4,200. Singer, 298-5141.
'90 FORD AEROSTAR EXTENDED VAN, 4.0L, V6, AT, cruise, dual AC, only 60K miles, original owner, immaculate, \$7,995 OBO. Miller, 323-2610.
'92 FORD F150 XL, 4x4, 5.8L V8, super-cab, loaded, captain chairs, camper shell w/kit, 48K miles, must see, \$14,500. Salazar, 275-9991.
'90 MAZDA MPV 2WD, V6, dual AC, alloy wheels, fully loaded, excellent condition, 58K miles, \$9,500. Ottesen, 292-7147.

RECREATIONAL

TRADE '79 RV, 22-1/2', dual wheels, AC, 48K miles, 460 engine, for trailer of comparable value. Freeman, 268-6235.
VACATION: 1 week vacation, total of 3 days cruise, 4 days luxury hotel suite, Orlando & Florida Keys, \$500 ea. person. Phung, 925-1905.
'94 FOUR WINDS BOAT, 17' 6", 135-hp, OMC/COBRA, 3.0 liter, 4-cyl., 40 hrs., many extras, \$11,000 OBO. McRee, 294-6091.
TWO ADULT DISCOUNT PASSES, all day, Wolf Creek, redeemable at lift ticket office, good this season only, regularly \$30, value \$25 ea. Rieker, 294-8216.
'89 MOTORHOME, Georgia Boy Encounter, 34-ft., basement model, 460 Ford, oak pkg., excellent condition. Cunningham, 344-9841.
'81 PACE ARROW, 32-ft., 2 AC, self-contained, 454 Chev. motor w/headers, 45K miles, \$13,500. Friday, 296-1652.
'82 SUZUKI GS1100G, shaft drive, just overhauled, touring/sport wind screens, luggage rack, back rest, new Speedo, guards. Hickerson, 281-2329.
'84 3-WHEELER HONDA 200S, mint condition, \$1,000. Marquez, 294-9014.
WONDERFUL RCI TIMESHARE, red week, Tahiti, selling due to death in family, \$1,350. Ludwig, 856-5111.
'95 HONDA VFR750, Corbin seat, Kerker slip-on, 8,100 miles, perfect condition, \$6,900. Curtis, 281-8364.

REAL ESTATE

3-BDR. HOME, 1-3/4 baths, LR, DR, FR, 2-car garage, mature landscaping, light, Taylor Ranch, \$129,900. McKenna, 899-4218.
3-BDR. EAST MOUNTAIN HOME, 1,800 sq. ft., 2 baths, 2-car garage, 2-1/2 acres. Putman, 286-1151.
2-BDR. ANGEL FIRE CONDO, furnished, 2 baths, listed w/realtor, but will sell direct w/o his commission. Howard, 268-8471.
3-BDR. HOME, 1,280 sq. ft., plus 2-car garage, 2 baths, 1 acre, quiet location, horses okay, \$89,500. Freeman, 833-2928.
2-BDR. MOBILE HOME, 1 bath, porch, 1-car garage, in trailer park, east mountains. Wackerbarth, 281-3928.
3-BDR. BRICK HOME, less than 2 yrs. old, large lot, 2-1/2 baths, 2-car garage, fully landscaped, Unser exit, north of I-40, \$129,900. Jean, 833-2165.
3-BDR. MOBILE, DW, 5 miles south Los Lunas, 1 acre, 2-car garage, fenced, sprinklers, granny-lived, extras, \$155,000 OBO. Beasley, 865-5850.

3-BDR. HOME, 2-story, Sandia Park, 2,300 sq. ft., 2-1/2 baths, 2-car garage, 4 large porches, 2 yrs. old, fireplace, 2.25 acres, views, \$214,950. Salazar, 899-1174.

WANTED

'90 or '91 SUBURBAN 350, 4WD, AT, overdrive, AC, cruise, tailgate, bench seats, electric windows, locks. Hawkinson, 281-1281.
MICROPROCESSOR, (5-volt), Intel 486DX2-66, working. Nicholls, 294-6713.
HOUSESITTER/HOUSEMATE, out of town/country next 6 months, pool, hot tub, 3 blocks north of NE malls. Semonisck, 883-4212.
DOG CRATE, Vari-Kennel, intermediate size 400. Skroch, 899-4471.
YOUR FREE SOUTHWEST TICKET, will pay you \$200. Cooper, 281-0950.
PLATES, weight-lifting, prefer metal. Armistead, 299-8773.
RETIRED SANDIAN to manage 4-plex, with or without maintenance. Roseth, 856-6964.
PIANO: good condition, Baldwin Studio upright (Hamilton) or Baldwin console (Acrosonic) or equivalents. Blain, 293-3971.
HOUSE TO RENT to university professor on sabbatical, July-February, contact Dr. Peter Stacey, (702) 825-8229, email: stacey@unr.edu. Jansma, 294-3524.
BABY JOGGER, for out-of-shape mom. Hatch, 265-4642.
ROOMMATE, to share 3-bdr., 2-bath NE home, 10 minutes to SNL, \$250/month, share utilities. Chavez, 298-7465.
SWING SET. Harrison, 899-0193.
NEWSLETTER COPIES, *Hulbert Financial*, for Dec. '96 & Feb. '97. Schubeck, (954) 680-7722.
MANUAL SETUP DISC for NEC APC-H 801 386 computer, borrow or buy. Leisher, 281-5258.
FURNITURE, French Provincial. Hill, 821-4795.
WINCHESTER RIFLE, Model 9422, 22 long-rifle caliber configuration, good condition. Miller, 292-5634.
RENTAL HOME, 2,300 sq. ft. minimum, NE Heights or near Sandia. Marder, 291-8140.
HOUSEMATE, M/F, to share nice 3-bdr./2-bath home, near KAFB/SNL, \$295/month + utilities. Rose, 293-2442, leave message.
HARDWOOD HEADBOARD, for king-size bed; 2 children's desks, copy machine, long frame for twin bed. Barnette, 861-2451.
INEXPENSIVE REFRIGERATOR, washer & dryer, good working order. Evans, 897-4303.

WORK WANTED

COLLEGE STUDENT, data entry or similar type work, done at home. Torres, 865-2800.

LOST & FOUND

LOST: Gold ID bracelet, "Molly," and lost bronze earring. Glen, 845-9325, ask for Molly.
FOUND: Socket set, at Sandia, appears complete, call to identify and it's yours. Underhill, 844-6665.
FOUND: Small green cloth coin purse, Bldg 823 parking lot, claim by identifying. Mitchell, 844-4317.

Sandia News Briefs

Tool company licenses Sandia sensor technology

A fiber-optic "dipstick" invented by Jonathan Weiss (1231) and patented in 1991 has been licensed by Salt Lake City-based Seago Tool, Inc., a division of Groen Brothers Aviation. The "dipstick" provides the capability for continuous measurement of liquid levels in environments where conventional measuring systems are impractical or potentially unsafe. Instead of manipulating electricity, as conventional measurement devices do, Jonathan says, the fiber optic system manipulates light with the help of tiny glass rods that guide it to where it is needed. The liquid level sensor works by responding to the hydrostatic pressure produced by a column of liquid, Jonathan explains. Since this pressure is directly proportional to the column's height, a measure of pressure is effectively a measure of liquid level. What does the pressure actually do? It causes a corrugated diaphragm to displace proportionately. This displacement affects the optical power returning to a fiber-optic reflective displacement sensor situated on the dry side of the diaphragm. Thus no optical component or light in any way contacts what may be an opaque or caustic liquid. What also makes this sensor commercially appealing, Jonathan says, is its use of standard, readily available components. He says that in addition to Seago, another private company has expressed serious interest in the technology.

Earl Boebert serves on NRC committee recommending better electronic records privacy

Earl Boebert of Vulnerability Assessment Projects Dept. 5903 is a member of a National Research Council committee that is recommending improved privacy safeguards for computerized patient records in the health care industry. Issued last week, the report urges hospitals, doctors' offices, and health insurance firms to adopt a set of technical and organizational practices to improve the security of computer systems used to access and transmit patient information, including individualized computer passwords, encryption, firewalls, access audits, and penalties for abuse. The report says current computerized records systems are vulnerable to unauthorized use by employers, insurance companies, marketing firms, and others who could misuse the information. The study was conducted for the National Academy of Sciences.

Video Services production takes medal in New York Festivals

Quality of Life, a video produced for Jerry Langheim and the Lockheed Martin Energy and Environment Sector by Video Services Dept. 12614, won a Bronze World Medal in the New York Festivals in the Public Relations: Government category. *The Hundred Year Impact*, produced by Video Services for Mark Boslough and Computational Physics & Mechanics Dept. 9232, achieved finalist status in the Sciences category. The New York Festivals has honored excellence in communications media for 39 years. This international awards competition is designed primarily to recognize and reward outstanding achievements in nonbroadcast media.

Send potential Sandia News Briefs to Lab News, Dept. 12640, MS 0165, fax 844-0645.

Sandia Web Watch



Many people find virtual reality (VR) games a real kick, but the science of VR and its application to real-life problems is what keeps a group of Sandia researchers busy. And many of those problems are the life-and-death kind.

Anyone interested in finding out what Sandia is doing in this area can visit the Virtual Reality/Intelligent Simulation (VR/IS) Lab home page at http://www.sandia.gov/vris/vris_homepage.html.

As the introduction explains, "We believe there is a problem domain where VR can provide unique benefits. That domain is training for operations where classroom instruction is insufficient, but where 'hands-on' practice is dangerous, expensive, logistically complex, or provides only limited experi-

ence." Law-enforcement, emergency response, and rapid deployment military operations are general examples.

Sandia's research focuses specifically on the use of VR to train small-team, close-quarters operations. The VR/IS Lab integrates "graphical humans" into its simulations. The Web site gives details and depicts how graphical humans are used and what for.

Sandia's "VRaptor" prototype system, which allows noncomputer specialists to define and create VR scenarios for planning, rehearsing, and training for assault operations, is explained on one of the site's pages. Hostage rescue is VRaptor's current application. (See related story, page 8.)

The VR/IS Lab site is maintained by Sharon Stansfield of Analysis Department III (5913). The site can also be found from Sandia's External Web home page <<http://www.sandia.gov>> by clicking on the Technology Showcase link, then on VR.

("Sandia Web Watch" is a *Lab News* series featuring news and developments about Sandia's Web sites.)
— Larry Perrine

United Way agencies receive 600 Sandia-donated books

Approximately 600 books were delivered recently to several United Way of Central New Mexico agencies. Four agencies — Career Services for Persons with Disabilities, Cornucopia Adult Day Care, YWCA, and Christina Kent Day Nursery — received 50 books each, based on specific requests and needs identified by these agencies. Fourteen other agencies received 25 volumes each.

Last October more than 1,500 Sandia employees purchased approximately \$60,000 worth of books offered at discounts of up to 70 percent by Reading's Fun Ltd. at the 1996 Employee Contribution Plan Kickoff Book Fair. The books were sold at various Sandia/New Mexico locations.

"A percentage of the profits from the sale were donated in the form of books to United Way

agencies to help in their literacy programs — one book donated for every 10 sold," says Juanita Sanchez (12650), ECP program administrator.

All books are hardbound, high quality, and new or recent editions. Each was stamped with the words "This book donated by the employees of Sandia National Laboratories."

The book fair resulted in something extra for Sandia employees and United Way agencies, she says. Employees received significant discounts on the books they purchased and the agencies received donated books.

The ECP campaign itself raised pledges of \$1,477,215, with a 75 percent participation rate and an average gift per participant of \$285.
— Janet Carpenter

Coronado Club

March 13, 20, 27 — Thursday bingo night. Card sales and buffet start at 5 p.m., early birds' bingo at 6:45 p.m.

March 14 — St. Patrick's Day dinner/dance. \$7.95 all-you-can-eat buffet, 6-9 p.m. The High Desert Pipes and Drums, 8-8:30 p.m.; music by the Bob Weiler, 7-11 p.m.

March 16 — Sunday brunch buffet, 10 a.m.-1 p.m. \$7.95 all-you-can-eat buffet. Kids 3-12, \$1, under 3 free. Music by Swingshift, 1-4 p.m.

March 21 — Kids bingo night; free hot dog and soda with \$2.50 bingo card purchase. Buffet open 5-8 p.m.; bingo games start at 7 p.m.

March 29 — Carnival and Easter egg hunt with the Easter Bunny, 9 a.m. to noon. \$1.50 per person. A low-cost buffet lunch served 9 a.m.-noon.

March 30 — Family Easter brunch; call 265-6791 to select a seating time: 9 a.m., noon, 2:30 p.m. \$10.95 for members.

Triple Option Plan Summary Plan Descriptions

Recently the Triple Option Plan Summary Plan Descriptions (SPDs) were mailed to plan participants from the Health/Work & Family Benefits Department. The SPDs were sent to on-roll employees via internal mail and to retirees via external mail. If you, as a plan participant, have not received your SPD by March 24, please call the Benefits binder line at 844-7575 and provide the appropriate information to receive a copy. Please note that this document replaces all previous plan correspondence (except directories — for more current directory information, call Prudential Member Services at 1-800-845-6986).

★ Congratulations

To Norma Orand (4823) and David Lauben, married in Albuquerque, Feb. 22.

Sympathy

To Gene Hauser (5831) on the death of his mother, Mary Jean Hauser, in Ladysmith, Wis., Feb. 14.

To Darlene (1412) and Leroy (2314) Tafoya on the death of her mother and his mother-in-law in Grand Junction, Colo., March 5.



READING IS FUN — Bruce Fetzer (12680) gets down on the floor to read aloud one of the 50 books Sandia employees donated to children at Christina Kent Day Care. The books were provided to 18 United Way agencies from the proceeds of the 1996 Employee Contribution Campaign Kickoff Book Fair last October. "This facility [Christina Kent] has been taking care of low-income working families' children [ages 2-1/2 to 5] since 1919," says Carol Cabiedes, Day Care Director. "When it first opened, workers went door to door soliciting money for milk." (Photo by Randy Montoya)