Patented device detects blood disorders near-instantly

Makes blood samples part of laser beam generation process

By Neal Singer

A revolutionary handheld device that in a few moments can detect and then track disorders of the blood has been patented in prototype by scientists at Sandia and the National Institutes of Health.

The device immediately detects sickle-cell anemia as well as nanometer-scale changes in cell structure like those imposed by the AIDs virus.

The device, a biochip, also is better able to distinguish between cancerous and noncancerous cells than pap smear tests, which visually analyze only relatively small numbers of cervical cells. The device also should allow observers to monitor unrestricted cell growth — cancer — and cell death (apoptosis) as these processes take place. (Apoptosis — cell suicide —is thought to eliminate unwanted human tissue and to aid proper growth of organs, limbs, and neurons.)

Faster, better diagnoses

For victims of terrorist biological or chemical attacks, the device is expected to greatly reduce the time needed to analyze dangerous materials invading the blood stream. Diagnosis could be made on the spot, thus facilitating treatment when speed is crucial.

Widespread adoption of the device would end delays for patients in obtaining results from blood tests, when blood taken by a nurse is shipped to a lab for analysis.

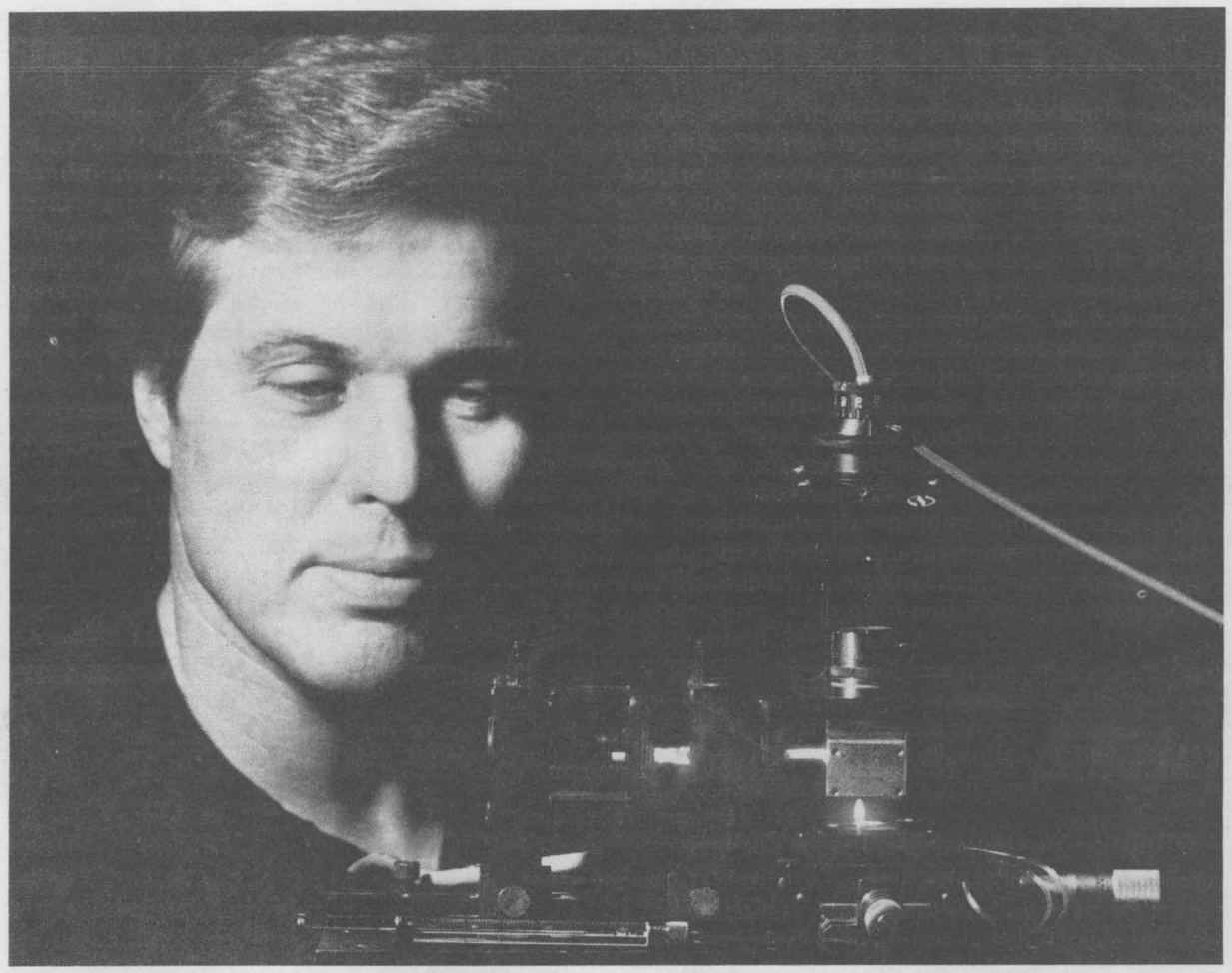
Princeton University physicist Robert Austin described the technique in *Science* as "really an innovative technology."

Using the Sandia device, says Paul Gourley (1112), project manager at Sandia, "It's possible to take a blood sample containing millions of cells and extract information about each cell in a few minutes. The results are quantifiable. If no cell is cancerous, we get a standard light signal. A cancerous cell gives a bright flash at different wavelengths."

The device is a kind of lab-on-a-chip, bringing fluids into a microlaboratory and reading results on the spot.

It works by employing a laser device called a

(Continued on page 4)



BLOOD LASER — Paul Gourley examines a semiconductor diode laser's horizontal and then bent vertical beam used to excite his VCSEL biocavity laser. The VCSEL releases an invisible infrared beam carrying information about blood cells to a detector, above. (Photo by Randy Montoya)

Sandia LabNews

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Sandia National Laboratories

You are invited to CNSAC dedication

Sandians are invited to attend dedication ceremonies for the new Center for National Security and Arms Control (CNSAC), Bldg. 810, beginning at 9 a.m. Thursday, Aug. 28.

In addition to a formal program with speakers, there will be a variety of displays throughout the day showcasing Sandia technologies. Of particular interest will be a history exhibit highlighting Sandia's role as a national security laboratory for 50 years.

"This event will be a celebration of the heritage of Sandia as well as its continued vital role for the future," says National Security Programs VP Roger Hagengruber.

Buses are being provided for remote-site employees, departing Area 3 at 8 a.m., Area 5 at 8:15 a.m., and Area 4 at 8:30 a.m. Return buses leave CNSAC every 30 minutes 10 a.m. - noon.

The ceremonies, displays, and refreshments will be under tents in front of the new CNSAC building.

Dealing with the terrorist threat: World's top bomb squads practice the occult art of bomb disablement

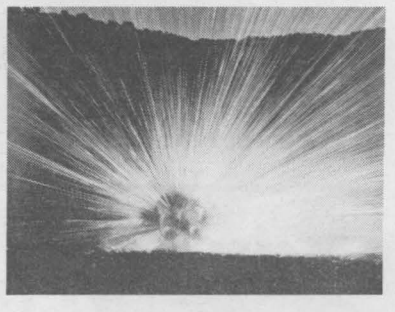
Labs' third Operation Albuquerque draws international participation

By John German

Clipping the red wire, or the blue (which is it?), seconds before detonation — that's for Hollywood. Real bomb disablers rely less on luck and more on sound tactics and proven technology.

That's because recent terrorist-style bombings in the US and abroad have featured explosive devices as extraordinary as the religious fervor or political zealotry that spurred their creation. And as the world's criminals and terrorists have become more technologically sophisticated, so have their bombs.

On Monday, 64 "bomb techs" representing the world's most elite bomb squads gathered in Albuquerque to begin an eight-day, hands-on bomb disablement training conference put together by Sandia and sponsored by the National Institute of Justice, DOE, and the Albuquerque Police Department. It is the third Sandia bomb training conference since 1994.



Operation Albuquerque '97, as the event is called, focuses on the science and methodology of bomb disablement, with emphasis on emerging technologies that keep bomb techs out of harm's way as they protect the public from explosive devices that grow more sophisticated and dangerous every day. Only members of the world's most advanced bomb squads are personally invited to participate.

"This is a chance for the best bomb techs in the world to learn advanced bomb-disabling

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Generation 'X'pert to discuss how boomers and Xers can get along 2

Two Sandians develop simple concept for heating silicon wafers 3

5 Two ways to afford the weekly-to-biweekly pay switchover

5 PBFA-II gets a new name and a new logo during Aug. 4 ceremony

This & That

Absent without apology – Our esteemed regular columnist Larry Perrine has been away on a secret mission (OK, vacation), so I'm taking over this spot for one issue. He will back by the time you read this – unless the golf lynx ate him.

* * *

The power of a new view – We got a nice note from a retiree the other day. He said he looks forward to every issue – we're grateful! But what struck me is the adjective he used in relation to some Sandia work we had just written about (*Lab News*, July 18). The work? The design and initial testing of the airbags that cushioned the bouncy landing on Mars of NASA's "smaller/faster/better/cheaper" Mars Pathfinder spacecraft. The risky, but successful landing enabled those dramatic new images from the surface of Mars, the first since the Viking landings of 1976.

The adjective he used? "Inspiring." It's not a word we often hear in relation to our jobs. But he's right. Daring, risk-taking explorations, made possible by innovative new ways of doing things, are inspirational.

Sandians can be proud we had a role in bringing those Mars photos to everyone on Earth and in contributing to that refreshing exuberance we've seen among the scientists and engineers at JPL's Mars Pathfinder mission control. By the way, have you noticed how young they all look?

Although Sandia did the feasibility design and initial testing of 3/8-scale airbag prototypes, a private company, ILC Dover, designed, built, and tested the full-scale airbags that actually went to Mars. As Carl Peterson (9116) says, "There's plenty of credit to go around."

* * *

An engineering-rich 50 years – The "inspiring" comment reminded me of a point Executive VP John Crawford made in our recent State of the Labs interview (*Lab News*, July 18). John suggested that whenever you get down in the dumps, look around and notice some of the wonderful work being accomplished here. It helps clear away cobwebs and reenergize the system.

And that reminded me of something else: The New Mexico Society of Professional Engineers' recent celebration of its 50th anniversary by selecting and recognizing the most outstanding engineering achievements in New Mexico over the past half century.

As we reported June 20, Sandia's laminar-flow clean room, which helped make possible the microelectronics industry, won one of the eight first-place achievements in NMSPE's judging. And our satellite monitoring of nuclear weapons won an honorable mention.

But the NMSPE – whose president is Roger Zimmerman of Dept. 2411 – published a booklet, *Ideas Turned Into Reality: Fifty Years of Outstanding Engineering Achievements*, with write-ups and photos of all the achievements nominated. I thought you might like to see all the Sandia entries, nominated by various Sandia groups. Here they are, in no particular order:

The National Solar Thermal Test Facility, the Applied Physics and Pulsed Power Centers, the Microelectronics Development Laboratory, the Enhanced Nuclear Detonation Safety project, the low-residue soldering task force test board, the semiconductor bridge project, microelectromechanical systems, infinitely variable transmission, the smart weapon technology project, and the alternative landfill cover demonstration.

That's quite a Hall of Achievement. – *Ken Frazier, Editor*

Industry Week contest opens for applicants

A two-page form to enter *Industry Week* magazine's Technologies of the Year contest is available at Sandia to researchers who believe they have "developed a new product with innovative technological content or whose success in basic research has opened a broad new horizon for the future."

The magazine's description states that "The focus can be either industrial or consumer and can include such things as software, materials, processes, and services — any technology-based innovation."

Entry forms can be obtained by calling the *Industry Week* customer service center at 800-326-4146. Or, if you e-mail Iris Aboytes (12620) at ioaboyt@sandia.gov with your fax number, she'll send you an application.

Industry Week has offered Technologies of the Year awards for five years. There is no charge to enter; a plaque and publicity are provided for those who succeed. The cut-off date is Sept. 15. Twenty-five applicants will be selected as winners.

Two years ago, the magazine selected Sandia micromachines as a winner. — *Neal Singer*

Sandia LabNews

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Ken Frazier, Editor **505/844-6210**
Barry Schrader, California site contact **510/294-2447**
***Lab News* fax** **505/844-0645**

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LOCKHEED MARTIN

Take Our Sons to Work Day

Thursday, Oct. 9, has been selected as "Take Our Sons to Work Day" at Sandia. Watch for information about registration, rules, and special events in upcoming issues of the *Lab News* and the *Weekly Bulletin*.

'X'pert to discuss how boomers, GenXers can find common ground in a volatile work setting

What's up with this breed of twenty-somethings whose professional motivations and loyalties seem mysterious and different? And what's Sandia going to be like 10, 20, and 30 years from now when these employees are running the place?

Generation "X"pert Bruce Tulgan will discuss these and other issues during the first in a series of diversity awareness colloquia at the Technology Transfer Center (Bldg. 825) on Thursday, Aug. 28, 1-2 p.m. (videolinked to Sandia/California, noon to 1 p.m.).

Tulgan's talk, "Managing Work in the Post-Jobs Era™," focuses on finding common ground between baby boomers and Xers whose generational differences can interfere with their ability to work together. He says Generation X is one of the most widely misunderstood phenomena facing US corporations today.

Money isn't everything

Tulgan is the nation's leading expert on Generation X issues in the workplace. After practicing law at a Wall Street firm, he founded what the *Wall Street Journal* called the "funky think tank" Rainmaker Inc. to study the working lives of Xers. Since then he has spoken to thousands of business leaders, managers, young workers, and students.

Xers (born roughly between 1963 and 1977) often are products of divorce and single parenting and can be fiercely independent, says Tulgan. They are entering a volatile labor market, and

Generation "X"pert Bruce Tulgan

Thursday, Aug. 28, 1-2 p.m. MDT
Technology Transfer Center
(videolinked to Sandia/CA)

they sometimes appear to be loyal only to themselves. Yet many Xers want more out of their jobs than just money. They want to be challenged, and they demand new professional experiences that increase their value in the job market.

Boomers, on the other hand, often see Xers as lacking company loyalty, selfish, nonpermanent, always complaining. On top of that, Xers' comfort level with technology makes them increasingly marketable in today's economy, and with job security a thing of the past, it's no wonder many boomer employees, some of whom have given decades of their lives to a single company, feel threatened, he says.

Striking a new bargain

But established corporations like Sandia need Xers' skills and entrepreneurial spirit, Tulgan adds. The answer lies in striking a new bargain with young employees, first by addressing the "Xer motivation problem:" job instability and the breakdown of traditional employer-employee relationships.

Prior to his talk, Tulgan is surveying confidentially by phone a cross-section of Generation X Sandia employees, whose names were submitted to him by Division Diversity Council leaders. He'll use the information and impressions from these interviews to color his talk.

Tulgan's appearance is the first in a series of awareness sessions to be offered by the Division Diversity Councils in the coming year. The purpose, says Sandra Begay-Campbell (4512), is to increase Sandians' awareness of intergenerational differences so that every employee has the opportunity to contribute as fully as possible to Sandia's mission.

While at Sandia Aug. 28 and 29, Tulgan will address managers during a breakfast lecture (contact Phyllis Owens, 3526, for information), focus groups in divisions 1000 and 4000, and the Corporate Diversity Team in a roundtable discussion.

Sandians also are invited to an informal reception with Bruce Tulgan on Thursday, Aug. 28, beginning at 4:30 p.m. in the Bldg. 800 lobby area. Participants will have a chance to discuss Generation X issues with Tulgan and ask questions. Refreshments will be served.

—*John German*

Simplify, simplify: Scientists license a 'simple, elegant' approach to processing silicon wafers

Novel device improves speed and uniformity of thermal processing

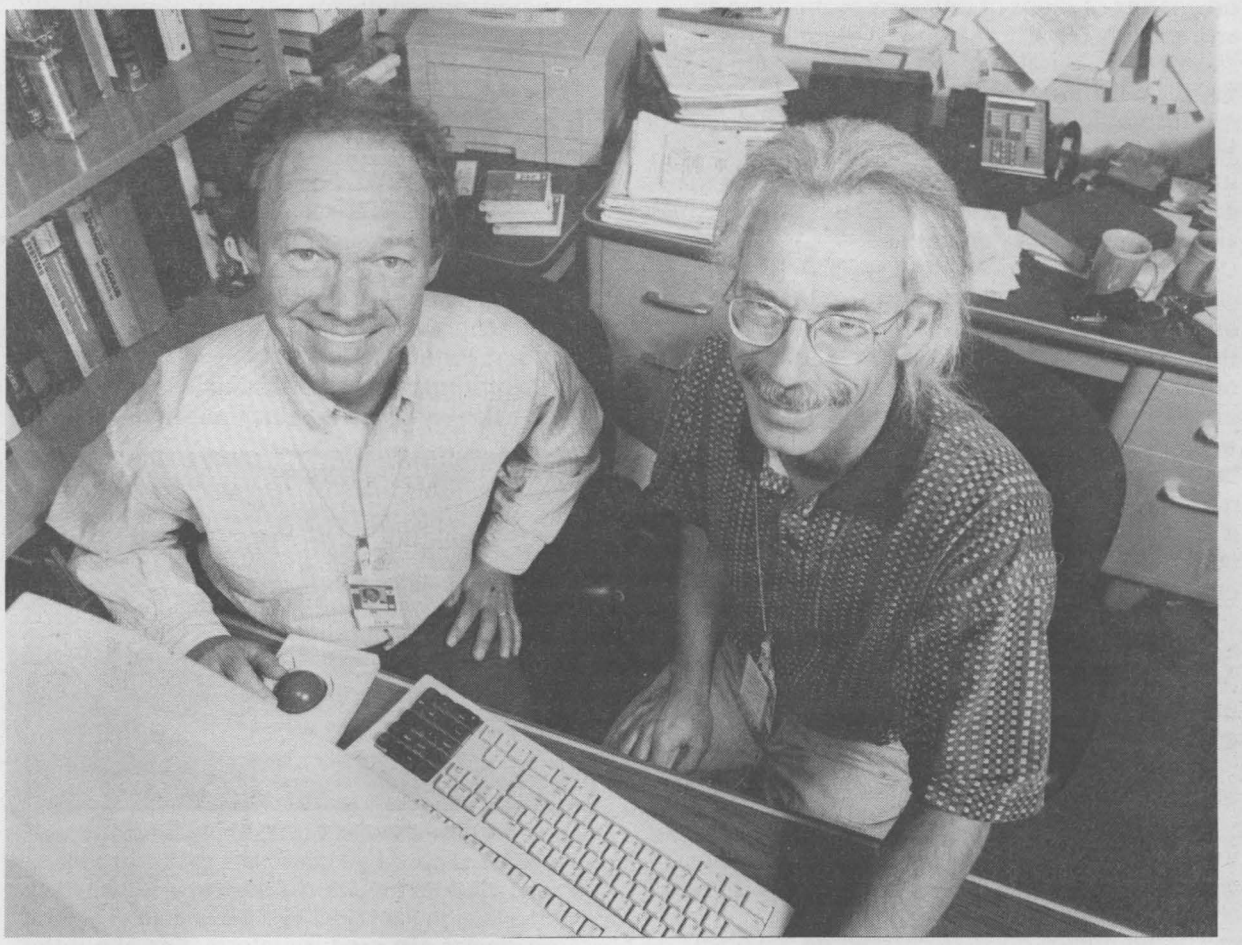
By Nancy Garcia

Silicon wafers are heated to between 500 and 1,200 degrees Celsius during manufacturing to anneal implants, drive in chemical treatments, oxidize surface layers, and deposit chemical films.

Processing many wafers at once has the advantage of high wafer throughput and good temperature uniformity, but it requires long processing times and very slow heating of the wafer stack to avoid excessive thermal stresses. Treating one wafer at a time reduces processing times but requires very rapid heating, usually by means of high-intensity lamps, in order to obtain throughputs competitive with those of batch processing. These lamps have yet to produce the desired temperature uniformity, despite ongoing development of increasingly complex optical pyrometry sensing and control systems.

Now two mechanical engineers developing mathematical models of high-temperature thermal processes have devised a novel means of rapidly heating the silicon wafers used to fabricate microelectronic components. The new device offers the best features of traditional batch and single-wafer processors.

Rather than following a path toward increasing complexity, Stewart Griffiths and Bob Nilson of Mechanics and Simulation of Manufacturing Processes Dept. 8345 devised another approach combining the temperature uniformity and simple resistance heating of the batch furnace with the speed of a single-wafer processor.



CALCULATING — Bob Nilson, left, and Stewart Griffiths modeled stresses experienced by silicon wafers during heat treatment and invented a better approach to thermal processing, which was recently licensed to industry.

Reducing defect-causing stresses

All previous single-wafer processors have at least some portion of the processor walls held at low temperatures. This permits inserting and withdrawing the wafer without producing large thermal stresses and associated defects in the silicon crystal structure.

Stewart and Bob have found another method of reducing these stresses, without employing nonuniform processor temperatures. This permits improved uniformity of wafer temperatures and is the heart of the new design.

Their concept was recently licensed to Mattson Technology, Inc. of Fremont, Calif. (Mattson manufactures advanced processing equipment for the semiconductor industry. Its products can be combined in a modular cluster to provide cost-effective, continuous processing systems for rapid thermal processing, chemical vapor deposition, and stripping.)

"I think they [Mattson] viewed it the same way we did," says Stewart. "They were looking for simple, elegant solutions to complex problems. We had a meeting of minds."

Mattson employees had already developed a processor that departed from the conventional lamp-heated technology and were expanding the capabilities of this tool.

Bob and Stewart had been modeling thermal and gravitational stresses in silicon wafers under the ongoing cooperative research and development agreement with the industrial consortium SEMATECH. The two devoted much of their efforts to understanding the physics to be modeled. A thorough understanding of the problem, they say, allowed them to find a simple solution.

"This wasn't an answer looking for a problem," says Stewart.

"It was the opposite," adds Bob. "We tried to make something simple that will succeed."

Wafers bigger, features smaller

The semiconductor industry is beginning to move from 200mm to 300mm wafers, which allows more devices to be patterned on each. At the same time, the microdevice features are decreasing in size from the current 0.25 micron standard, requiring even greater uniformity of temperature during fabrication. Just a fraction of a degree can be very important.

Also, cycle times (the length of time the wafer is held at the processing temperature) can influence whether this step will be a bottleneck in the flow of work in the factory.

Mattson became interested in the new concept, Stewart says, because it offered solutions to problems they were already working to address.

"It should allow their equipment to process larger wafers, at higher temperatures, and with better uniformity," adds Bob.

The highly competitive nature of the industry has constantly pushed microelectronics manufacturers to seek higher productivity through improved wafer processing. Technical advances have brought the semiconductor industry a 72-fold gain in manufacturing productivity in the last 10 years. Mattson believes the industry will meet or exceed those historic productivity gains by reversing the trend of reduced throughput, and has focused on processing equipment rather than software or robotics to meet that challenge.

Sandia CaliforniaNews

Feedback

Dependent Care Spending Account policy and procedures clarified

Q: Why do I have to accumulate money in the dependent care reimbursement account before my claim is reimbursed? My January expenses for child care were not reimbursed until March 17. Medical expenses are reimbursed when they occur, why not dependent care?

A: The Reimbursement Spending Accounts (RSA) Plan is regulated by the Internal Revenue Service (IRS). Sections 125, 129, 105, and 106 of the IRS Code provide specific guidance to employers with respect to how this plan is to be administered.

Section 1.125-1 of the IRS Code specifies that a health care spending account "must exhibit the risk-shifting and risk-distribution characteristics of insurance." For example, if a participant elects $1,000 for the plan year (calendar year) and submits reimbursable expenses of $1,000 in February, incurred in the first month of the plan year, the full $1,000 shall be reimbursed to the participant in accordance with the employer's claims processing guidelines. Note: Sandia issues checks once a month on the 10th. The employer incurs the financial risk that the employee might subsequently terminate employment later in the plan year and not pay the entire $1,000 into the plan.

A Dependent Care Spending Account is not subject to the risk requirements; therefore, Mutual of Omaha, the RSA administrator, reimburses the participant only the amount they have been notified that has been withdrawn to date. The employer is not subjected to the risk of nonpayment of contributions as with the Health Care Spending Account. In your situation, Sandia would have informed Mutual of Omaha of your contributions for the third and fourth weeks of January (contributions began the third week in January). Any expenses submitted prior to Feb. 5 would have been reimbursed up to the amount of your contributions for January and the rest would have been pended for payment in March.

If you have further questions about the RSA accounts, you may call Mutual of Omaha at 1-800-446-0113. — *Larry Clevenger, MD (3300)*

Blood sensor

(Continued from page 1)

VCSEL — a vertical-cavity surface-emitting laser originating millions of tiny laser beams from an area roughly the size of a postage stamp. This concept, too, was developed by Paul, together with Tim Drummond (1313), in the mid 1980s.

Instead of creating beams that pass through blood cells and then yield data, blood samples are inserted into the laser itself to become part of the generation process of the VCSEL laser beams, altering them as they are formed.

The process works using a specialized semiconductor and a coated glass mirror that forms one end of the laser generating area. In the glass, through etched microgrooves each 1/10 the width of a human hair, a blood sample is pumped. The unique design allows blood components — red or white blood cells, or invading particulates — to become part of the lasing process. The components of the blood in effect modify the lasing light as it is created in the tiny laser cavity, thus permitting output light to be analyzed in a spectrometer to detect changes in cell sizes and shapes.

Because the light reflects many times through a given sample — a consequence of the lasing process — the deviation in image created by the blood particle is magnified, greatly increasing the chances of positive, errorless identification.

A sickle-cell shaped red blood cell is clearly distinguishable from a normal, more spherical cell.

The components of a white blood cell, held inside the cavity, can be analyzed to see how it reacted to organisms or drugs in the blood, thus aiding in the design of new drugs.

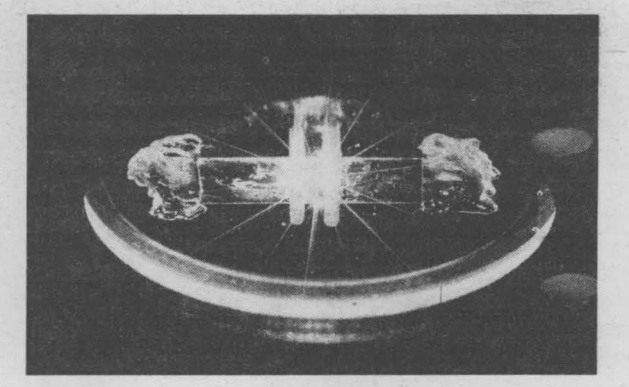
"After microsurgery to cut a white cell open and let out its proteins, we can see the extent of the material in a cell. Activated lymphocytes will show a larger volume and index of refraction change," says Paul.

Because the readout relies on light-emitting semiconductors, in most usages the cells do not have to be killed and stained — the most typical laboratory procedure. Instead, changes in cells can be watched as they occur — in "real time."

"It's basically a tool to study cell structure changes," says Paul, "and it could even be used for sequencing DNA."

In wafer form, the VCSEL device is activated in a laser microscope about the size of a telephone receiver that acts as an energy source and reads VCSEL output like a supermarket bar code scanner. For a commercial VCSEL biochip, quarter-sized electrical power sources already exist and optical components would be replaced by an optical fiber, says Paul.

Present methods of analyzing living cells involve flow cytometers, which merely shine a laser light through one cell at a time.



LAB ON A CHIP COMES CLOSER — A biocavity laser — a VCSEL capped by a glass plate enclosing a blood sample, all about the size of a quarter — is excited by a pump laser in Paul Gourley's lab in Bldg. 897. The VCSEL device can produce information about the state of millions of blood cells in a few minutes.

A small, no-frills system can distinguish between cells in a sample and offer a spectral analysis (without image) on a laptop computer for a cost between $5,000 to $15,000, Paul estimates.

A more complete setup for laboratory research to scan a laser over a surface or pump materials such as large quantities of blood through it would cost about $70,000.

A brief note here comparing VCSELs with ordinary lasers: Lasers require mirrors set opposite each other to reflect light back into the generating substance — a crystal or gas — placed between them, to create still more light. Lasers made from semiconductors use their sharply cleaved ends as mirrors — light reflects because of the difference in speed of light in silicon and air, just as a glass window reflects images though it lets other light pass through.

In the VCSEL, the semiconductor is not cleaved to provide a reflective surface. Rather, it is made by depositing alternating layers of tailored alloys. The layers are formed at exactly the distance from each other needed to reflect "in-phase" light, so the beam's efficiency is very high. (In-phase means that the maximums and minimums of the created light occur at the same time, creating a powerful effect.) The beams also are created in a far smaller generating volume than the typical semiconductor laser, and many more beams can thus be created to light an area.

In the medical device, the top layers of gallium aluminum arsenide and aluminum arsenide are replaced with the glass slide whose microgrooves carry blood. The lasing beams are varied by the quality and components of the blood through which they pass, and by the glass from which they are reflected.

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

DOE selects 5 universities to bolster large-scale computer simulation effort

Secretary of Energy Federico Peña has announced the selection of five major universities to participate in a $250 million collaboration among Sandia, Los Alamos, and Lawrence Livermore national laboratories to help advance high performance computer simulation capabilities needed to make an historic leap in large-scale modeling and simulation.

At a July 31 news conference in Washington, D.C., Peña said Stanford University in Palo Alto, Calif.; California Institute of Technology in Pasadena; the University of Chicago; the University of Utah in Salt Lake City; and the University of Illinois at Urbana have been selected as Academic Strategic Alliances Program (ASAP) centers.

The five universities each proposed very large-scale applications that collectively drive the development of complex modeling and computing capabilities. The endeavor will assist the three national labs in developing and validating the technologies needed to certify the reliability of the nation's nuclear weapons stockpile without actual testing, in support of the Clinton administration's nuclear test ban objectives.

Representing Sandia at the news conference were Labs President C. Paul Robinson and Bill Camp, Director of Computational Sciences, Computer Sciences, and Mathematics Center 9200.

Sandia received extra recognition early in the news conference when Peña played a video, "The Revolution in Engineering," produced by Video Services Dept. 12610 and explaining how Sandia is using high-performance computing as a tool to revolutionize the engineering process.

"President Clinton has challenged us to find a way to keep our nuclear stockpile safe, reliable, and secure without nuclear testing," Peña said. "We're going to meet his challenge through computer simulations that verify the safety, reliability, and performance of our nuclear weapons stockpile. I believe these alliances will produce a flood of new technologies and ideas that will improve the quality of our lives and boost our economy."

Paul Hommert, Director of Engineering Sciences Center 9100, said collaborations between researchers and engineers at the universities and the labs should prove invaluable in advancing the development of high-performance computing and its applications.

"Several of the universities have selected problems or large-scale applications that are engineering centric, and in fact, are very relevant to engineering issues of importance to the weapons program at Sandia," he said.

ASAP is a 10-year program, although the initial contracts will establish a five-year relationship with each university. Work will begin at the five centers as soon as the contracts are in place.

Each center will interact with each of the three national labs. The awards will be about $3 million per center this year, growing to an average of $5 million annually.

The centers will be given access to about 10 percent of the Accelerated Strategic Computing Initiative (ASCI) platforms at the DOE Defense Programs laboratories, making an unprecedented level of computing power available at these universities. ASCI is a program aimed at accelerating commercial computing development to achieve performance on the order of 400 times more powerful than today's most powerful machines by 2004/2005.

"ASCI is an enormous challenge and is such a demanding consumer of intellectual resources that the significant capabilities of our national laboratories need to be augmented with expertise in the academic community," said Vic Reis, Assistant Secretary of Energy for Defense Programs and key architect of the stockpile stewardship program. "Together with our university and private sector partners, we are confident we can achieve the kind of dramatic advances in computing and simulation capabilities that will make science-based stockpile stewardship a reality."

A major initial step in the ASCI program was realized in June with the full installation of the teraflops ultracomputer at Sandia. The computer is capable of performing up to 1.8 teraflops (trillion floating point operations per second) and ushers in a new era in which high-fidelity, three-dimensional simulation will enable scientists to reach the eventual goal of preserving a safe, secure, and reliable nuclear deterrent without underground testing.

—Chris Miller

Sandia/SensAble Technologies collaboration produces next-generation 3-D mouse

From simulating comet impacts in the Atlantic Ocean to modeling the air bags used in the recent Mars landing, Sandia engineers have long faced a seemingly insurmountable obstacle: navigating through advanced 3-D computer simulations with the confining 2-D input of the mouse.

Now that's changing.

Utilizing PHANToM hardware and GHOST software developed by SensAble Technologies of Cambridge, Mass., and enhanced by Sandia's FLIGHT multidimensional software environment, the new 3-D interface system is giving Sandia scientists the tools they need to analyze complex engineering problems.

"It's clear from our analyses that the 3-D user interface approach is improving the productivity of our engineers," says George Davidson, Manager of Computer Architectures Dept. 9215.

Key to the new system is its haptic (touch) interface that gives additional feedback when navigating through a 3-D environment.

"We focused our research on using the haptic device as a navigation and general interaction tool," says Arthurine Breckenridge (9215). "One obstacle to overcome in presenting such a revolutionary concept is to avoid too large a discontinuity from established methodologies and infrastructure. I feel that the ability to examine the standard data file formats using the full kinematics of the PHANToM interface for graphical navigation with the additional feature of haptic interaction offers a smooth transition from the mouse."

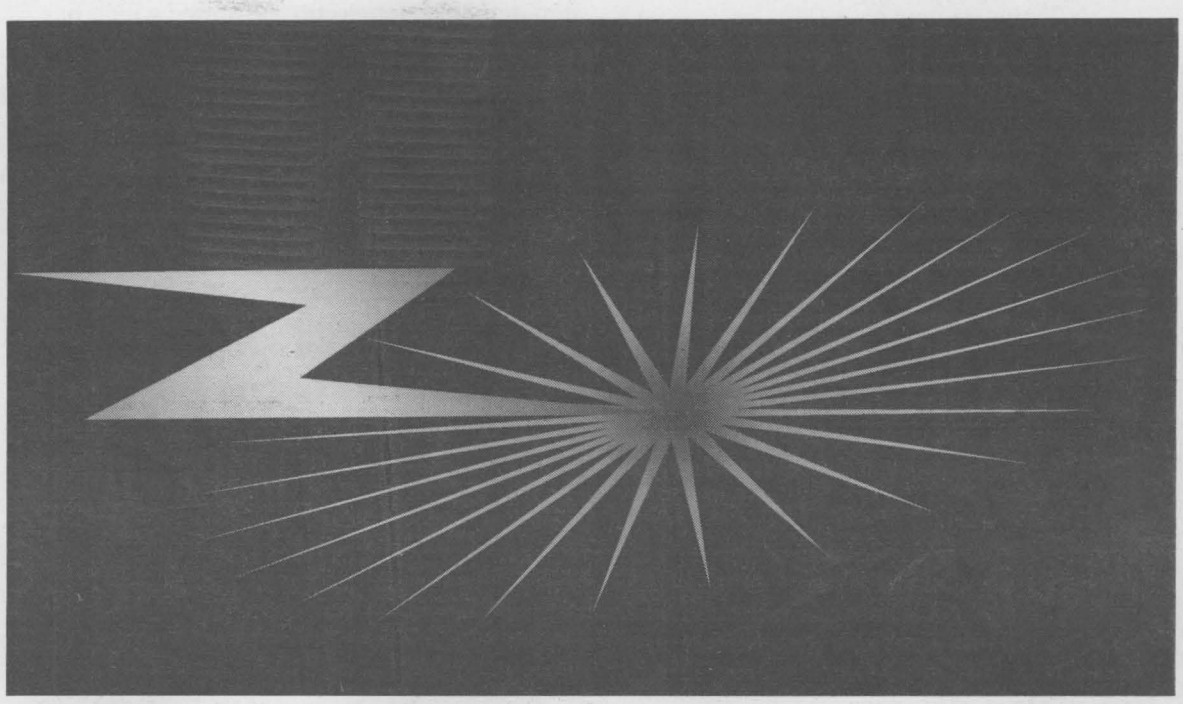
SensAble Technologies President Bill Aulet says the company is exploring ways to make the system available to the broader market. Founded in 1993, the company currently lists General Electric, Volkswagen, Mitsubishi, Disney, and the Mayo Clinic among its customers.

New logo accompanies accelerator's name change from PBFA-II to Z

A colorful new logo was on display at a ceremony held Aug. 4 to change the name of the huge X-ray generator in Bldg. 983, Area 4, from "PBFA-II" to "Z."

Present were members of the Z team and Sandia Quality Leadership Council.

The logo, designed gratis by former Sandian Ileana Mendez with help from her husband Tim Renk (9521), has a cartoon-like brightness and enough energy of line to be the jagged blue track of the starship Enterprise approaching a red-gold star. The track is really the letter Z, done in a lightning-like burst of blue color, and its sharp-pointed bottom extremity penetrates the glowing heart of a reddish atom that radiates stylized golden spikes of energy in every direction.



A 'fun' project

"There's a lot of satisfaction in seeing your design picked as the best," says Tim. "It was a fun project and will have a lot of visibility."

Ileana also designed the *Lab News* and Cooperative Monitoring Center logos, says Tim.

There were 36 logo entries sent in response to a request-for-submission by the Pulsed Power Sciences Center, says Cindy Olson (9500).

The upbeat logo reflects the mood of researchers at Z, where tremendous increases over the past year in generating power, energy, and heat have been the subject of articles in the journal *Science*, newspapers, and several issues of the *Lab News*. The work is part of DOE's stockpile stewardship program.

The accelerator's name was changed in part because of public relations but mostly because, as Paul Robinson pointed out in introductory remarks, the old initials no longer refer to anything.

PBFA stood for Particle Beam Fusion Accelerator. But the particle beam approach has been shelved and replaced with a z-pinch plasma accelerator.

In its current version, the machine passes huge, very brief bursts of electricity through a thimble-sized can called a hohlraum. Wires vaporized within the hohlraum ionize and are compressed rapidly — pinched — by a contracting magnetic field. Ions quickly run out of space as the magnetic field's diameter shrinks to that of a lead in a mechanical pencil. The subsequent very rapid decelerations of these ions have resulted in the highest outputs of energy and power in the X-ray range ever achieved in a laboratory, as well as output temperatures closer and closer to the realm of high-yield nuclear fusion.

Why "Z"? Electricity passes vertically through the hohlraum, a direction mathematicians refer to as the Z (as opposed to X and Y) axis.

"We're forgiving people, we know some of us have been saying PBFA for years, and we'll give everyone a month to get used to the name change," joked Jeff Quintenz, Acting Director of Pulsed Power Sciences Center 9500 while Director Don Cook is in Washington, D.C . "After that, it'll be a quarter in the box."

— Neal Singer

Apply for 'transition financing' by Sept. 12

Vacation sell-back and/or pay advance can cover FY98 transition to biweekly pay

When Sandia moves from a weekly to a biweekly payroll in October, the two-week stretch between the last weekly paycheck (on Oct. 2) and the first biweekly paycheck (on Oct. 16) may cause difficulty for Labs employees who have structured their personal finances based on the assumption of a weekly cash flow.

To minimize the impact of the change, the Labs is making available several transition financing options: A one-time sell-back of 40 hours of vacation at the employee's current rate of pay, or an interest-free loan equivalent to a 40-hour work week. If the loan option is used, payback will be made through a payroll deduction over the following eight weeks. Alternatively, employees can opt to take advantage of both options, the vacation sell-back and the loan.

Most employees eligible

All regular Sandia employees (except Metal Trades Council members) and nonregular employees hired under the postdoctoral, faculty-sabbatical, and limited-term programs are eligible to participate in the transition financing program.

Application forms are available for download via the Internal Web at: http://www-irn.sandia.gov/corpdata/corpforms/formhp.html. (Alternatively, click on the "Sandia Favorites" button at the top of the Netscape Navigator window and from the resulting screen click on the "Corporate Forms" entry.)

At the Corporate Forms Web site, you'll find a clickable link that takes you to a page of instructions about how to download and install the transition financing application form. (Note for Macintosh users: The download macro is still being tested; check back periodically to get the final version. If the download form is unavailable, call Dave Barton at 844-5152 for assistance.)

Once you've downloaded and installed the form on your computer, fill it out, print it, and return the hard copy to Payroll Dept. 10502 at MS 0152 by Sept. 12. Forty hours of advance pay or vacation earnings will be calculated, and you'll receive the proceeds on the regularly scheduled Oct. 2 pay date. You will not receive a payment of any kind on Oct. 9, so whatever option you choose, the money in your Oct. 2 paycheck will have to cover you for two weeks.

Ray Shaum, Manager of Payroll, Attendance, and Labor Accounting Dept. 10502, says he expects thousands of Sandians to participate in the transition financing option, primarily via the vacation sell-back. And Ray notes that eligible employees need not have excess vacation in order to participate: If the sale creates a negative leave balance for FY97, the employee will be borrowing vacation from anticipated FY98 accruals.

The buyback by the Labs of all that vacation does not represent an expense, Ray explains. In accounting terms, vacation earned by or owed to employees represents a liability; buying back a portion of employees' vacation, then, represents a reduction of accrued liability. Again, in accounting terms, the transaction is a wash.

Taxes handled as for IPAs

Here's how taxes will be handled. The one-time sale of 40 hours of vacation will be set up as a "supplemental payment," subject only to tax withholdings, as follows:

- 28 percent Federal income tax
- 8.5 percent New Mexico income tax or 6 percent California income tax (or appropriate rate for other states)
- 1.45 percent Medicare
- 6.2 percent Social Security tax ($65,400 annual cap)

Deductions will not be taken for savings bonds, the Employee Contribution Plan, or other regular payroll deductions.

The one-time pay advance is nontaxable and interest free. (Since the pay advance must be repaid by Nov. 26, federal and state tax laws define the advance as a nontaxable event. As structured, DOE does not require assessment of interest on the advance.)

If you have questions about the transition financing program, call the Payroll Helpline at 844-2848.

— Bill Murphy

History books available for pickup at museum

Copies of *Sandia National Laboratories: A History of Exceptional Service in the National Interest* were delivered to the National Atomic Museum Store on July 31.

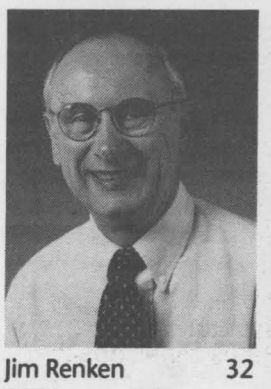
Sandia employees who ordered copies were to receive them through internal mail.

Sandia retirees who ordered copies had the choice of receiving copies through the mail (and were charged mailing costs) or picking them up at the museum store.

Retirees who opted to pick up their copies should do so if they haven't already.

If you have questions regarding your order, call the National Atomic Museum Store at 284-3242.

Recent Retirees



Jim Renken 32
9300

Claire Fraser 19
7832

Bomb squads

(Continued from page 1)

techniques, practice using the latest disablement technologies, and share their experiences with others in the bomb squad community," says conference organizer Chris Cherry of Engineering Projects and Explosives Applications Dept. 9333.

Tomorrow's technologies today

Sandia hosted the first Operation Albuquerque in 1994 after Chris and others at Sandia and the FBI recognized a need to put tomorrow's bomb disablement technologies into the arsenals of the nation's busiest bomb squads. The first event received wide acclaim from its participants. Since then, the list of invitees has grown and become more cosmopolitan.

Operation Albuquerque '97 includes 64 bomb techs representing the police departments of major US cities like New York, Chicago, Atlanta, Houston, and Los Angeles; state police departments; federal law enforcement agencies including the FBI and Secret Service; and antiterrorist and law enforcement agencies from such world hot spots as England, the Republic of Ireland, and Australia (host country for the 2000 Summer Olympic Games).

To stay ahead of the increasingly sophisticated antitamper and explosives bombing devices being encountered in the world today, the Sandia team researches and develops advanced "render-safe" technologies, along with reconnaissance technologies to help categorize complex, terrorist-type bombs and assess their potential threats remotely.

Since 1992, Sandia has developed and licensed a family of bomb disablers for a variety of situations. Foremost among these is the Percussion Actuated Nonelectric Disrupter, which has become the primary tool used by bomb squads nationwide to disable conventional, hand-made-type bombs remotely, says Chris. The PAN Disrupter was instrumental in safely disabling numerous "suspect devices" in Atlanta during the '96 Summer Olympic Games.

"The bomb techs who come here are concerned about more than just your run-of-the-mill pipe bombs."

How the disrupters work cannot be disclosed for security reasons, but each is designed to disrupt a bomb's internal gadgetry so instantaneously that it never has a chance to detonate.

The Black Box and Magic Cube

During this year's Operation Albuquerque, the bomb tech "players" are deploying the PAN Disrupter and a variety of other Sandia disablers — with cryptic names like the "Black Box" and "Magic Cube" — in realistic bomb disablement scenarios throughout Albuquerque to defeat mock bombs, many of which are booby-trapped or have small charges that go off if players accidentally trip the devices. The scenarios and bomb facsimiles were created by members of Dept. 9333. (See "The life and times of a bomb disabler" below.)

"The bomb techs who come here are concerned about more than just your run-of-the-mill pipe bombs," says Chris. "Our goal is to give them the training they'll need to deal with the kinds of devices we think they'll encounter in the next 10 to 20 years."

THE PAN DISRUPTER is the most widely used Sandia bomb-disablement technology among the nation's bomb squads.

In past Operation Albuquerque scenarios, teams were dispatched to locate and defeat sophisticated bombs hidden in public places, such as at shopping malls and on the front seats of cars, and disable "body bombs" wired to hostages, for example. This year, participants are responding to more than 60 simulated bomb threats at all hours of the day and night. Following each round of scenarios, players and observers from Sandia and the FBI discuss and evaluate the teams' tactical approaches.

The Sandia team also is adapting a variety of commercial robots to carry out some of the bomb tech's most risky jobs, such as delivering a disrupter to a bomb's location. The conference includes training in the use of robotics technologies, as well as classroom instruction and technical presentations on advanced disablement strategies, vehicle bombs, and other issues associated with current terrorist-type threats.

Kickoff demonstration at APD

The event began Monday at the Albuquerque Police Academy with briefings by several dignitaries associated with law enforcement and antiterrorism agencies.

"I've always been an advocate of using these great [national] laboratories to benefit national security," said Sen. Pete Domenici, R-N.M. "Terrorism is on the march in the world. Chemical and biological weapons now are far more dangerous to the world than nuclear weapons. My hat's off to you people who have stepped up to the plate to deal with this threat."

"Chemical and biological weapons now are far more dangerous to the world than nuclear weapons."

Rep. Bill Redmond, R-N.M., also saluted the "hand-picked leaders in this field" whose job it is to protect his family and theirs from "people who would use bombs to achieve their objectives."

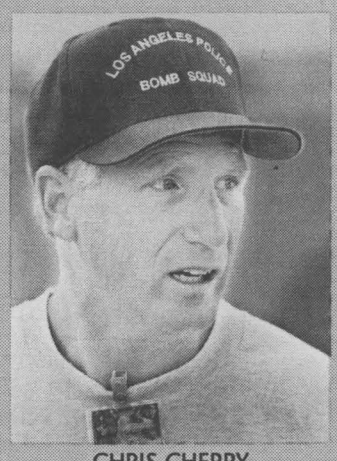
Don Thompson, Acting Assistant Director in Charge of the FBI's Laboratory Division, noted that emerging technologies such as the ones featured at Operation Albuquerque not only protect bomb techs, they also help preserve the evidence from bombing incidents so "we can find the

(Continued on next page)

The life and times of a bomb disabler

Reverse engineers. That's what you might call the small group of researchers in Dept. 9333 whose expertise is disablement of today's sophisticated terrorist-type bombs.

An engineer typically creates an innovative design and then builds it. A bomb disabler has to understand an innovatively designed device, then decide how to destroy it. If he destroys it before it destroys itself, it's a job well done.



CHRIS CHERRY

Chris Cherry is Sandia's lead bomb disablement expert. He's seen more bombs than a B-movie reviewer.

Much of what Chris and his team do he can't talk about. On several occasions in recent years, he's answered phone calls late in the night from organizations needing his help. Last year, after one such call, he and Rod Owenby (9333) left town before daybreak aboard a government plane on their way to take care of a particularly sensitive situation.

Thousands of bomb threats

Each year bomb squads in the United States respond to thousands of bomb threats. In more troubled parts of the world, such as Northern Ireland and Israel, citizens fear the possibility of being victimized in a bombing every day.

The majority of explosive devices are ordinary pipe bombs; they're easy to build, and they're destructive. It's the other devices Chris keeps his eye on. He watches for trends in bomb designs, learns the intricacies of particularly complex devices, respects and fears the most innovative designs and their designers.

"Bombers can be more than just kooks and scumbags," he says. "They're often intelligent but troubled people."

Chris knows many of the nation's bomb techs. When one is killed or injured, he grieves for the tech and the colleagues and families involved. His ambition is to get the most advanced bomb disablement technologies into the hands of bomb techs so no one gets hurt the next time.

To do that, he needs to not only understand today's bomb designs but anticipate tomorrow's as well. He fears tomorrow's bombs, for they are going to have unprecedented destructive potential and their ingredients are far too obtainable. And as terrorists become more technologically sophisticated, so do their designs — with antitamper devices, motion sensors, bombs the size of vehicles, and too many other surprises to list.

Technology as deterrent

Most of the technologies Sandia develops are designed to keep a safe distance between bomb and bomb tech: remote disrupters, diagnostic tools, and mobile robots that can deliver disrupters and reconaissance tools to a bomb's side.

Chris thinks technology is the answer to the growing terrorist threat — if terrorist devices can be defeated all or most of the time, then why try to bomb something? But that technology must be protected. It's like drug-resistant viruses.

"If we told the world how we defeat bombs, criminals and terrorists would create a new generation of bombs impervious to those methods," he says. "We can't do that. This is real life-or-death stuff."

The researchers in Dept. 9333 could create a bomb that would be difficult for even the top experts to disable. And they have.

Just before this year's Operation Albuquerque began, their lab was a shop of horrors. There the team built and stockpiled the more than 90 bomb facsimiles being used this week to train the elite of the bomb squad community.

"They have done a great job of challenging the participants, who are the best in the world," says Chris. "The bombs are what makes this event successful."

Labs' 3-D synthetic aperture radar pod completes 17-day mission over 'troubled' Kazakhstan

IFSAR pod maps environmental contamination, natural resources

By John German

Five members of Sandia's synthetic aperture radar (SAR) team returned from Kazakhstan recently following a 17-day ground-surveying mission over what world leaders have called one of the most environmentally troubled nations on earth.

During the Cold War, Kazakhstan hosted much of the Soviet Union's weapons development, space launches, and heavy industry. But decades of nuclear testing, industrial pollution, and use of fertilizers and pesticides now are taking their tolls on the Kazak environment, and the nation's leaders are worried that the widespread environmental contamination is causing increased death, disease, and deformity rates and marked drops in life expectancy and birth rates among its citizens. Economic independence has spurred the country to further exploit its natural resources, as well.

In June, Secretary of Energy Federico Peña and Kazakhstan Minister of Science Vladimir Shkolnik formalized an agreement to fly sensors supplied by DOE's Airborne Multisensor Pod System (AMPS) program to the Central Asian nation for a series of data-gathering flights.

High resolution, 3-D images

The sensors, originally developed for defense and nonproliferation purposes, were to help the Kazak government understand the extent of environmental contamination and map untapped coal and mineral deposits within the country's borders.

The Sandia team was accompanied by a relatively new SAR technology, called interferometric synthetic aperture radar (IFSAR), developed over the last several years by researchers in centers

(Continued from preceding page)

perpetrators and prosecute them."

John O'Connor, FBI Deputy Assistant Director for Counterterrorism, summarized recent incidents — bombings at the World Trade Center, the Oklahoma City federal building, and others — and noted the increasingly high consequences of failing to identify and disable the kinds of devices involved.

Lisa Hecker of Rep. Steve Schiff's (R-N.M.) office attended in lieu of Congressman Schiff, who is ill. But David Boyd, Director of the National Institute of Justice's (NIJ) Office of Science and Technology, pointed out Schiff's role in playing matchmaker between the NIJ and Sandia in support of Operation Albuquerque '97.

Accessibility of bomb info disturbing

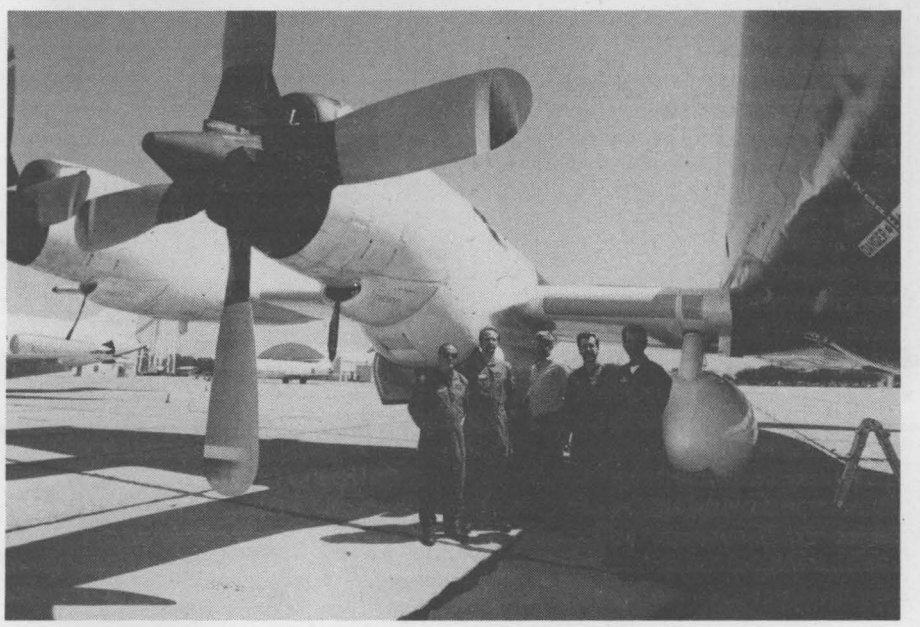
Labs President C. Paul Robinson related how he had over the weekend searched the Internet for information about how to build a bomb and was disturbed to get more than 2 million hits on that topic. "Clearly technology and courageous people are the tools needed to address the terrorist threat," he said.

Art Holguin, Albuquerque Deputy Chief of Police, also spoke briefly.

After the presentations, dignitaries and local and national media were treated to demonstrations of selected Sandia bomb-disablement technologies, including the PAN Disrupter opening a car trunk so bomb techs could look inside, a Sandia-modified mobile robot named FRED (For Remote Explosives Delivery) delivering Sandia's Black Box disrupter to the side of a footlocker bomb, the Black Box energetically disabling the bomb, and other mobile robots for diagnostic applications.

The media were treated to a fiery explosion that destroyed a dummy representing the fictional, not-careful-enough Acme Bomb Squad.

The event ends Monday, Aug. 18, when participants take a written "exam" that tests their analytical skills and bomb-disablement knowledge.



SANDIA'S INTERFEROMETRIC SAR takes advantage of several inches of separation between two antennae to produce data necessary to create very high-resolution, three-dimensional ground images. In the top photo, Bob Huelskamp inspects the SAR pod prior to its Kazakhstan mission. In the bottom photo, members of the Sandia AMPS team pose next to the IFSAR pod, mounted under the wing of the Navy P-3 Orion, at Kirtland Air Force Base prior to its overseas flight to Kazakhstan in June. From left: Grant Sander (2345), Steve Lebien (2527), Mike Taylor (2527), Sam Bensonhaver (2345), and Bob.

5900, 2300, and 2500. IFSAR is capable of providing high-resolution three-dimensional ground images from the air, even through cloud cover and darkness.

The modified aircraft cargo "pod" containing the Sandia-developed IFSAR — along with associated timing, navigation, data processing and storage, and power-supply equipment — is one of two wing-mounted sensor packages developed as part of the AMPS program to help the US and its allies verify that nations involved in arms control treaties are complying with those treaties. But the AMPS sensor pods have been used increasingly in recent years for nonmilitary purposes.

"SAR, and particularly three-dimensional SAR, can help gather data for a variety of applications outside the Pentagon, from mapping terrain in great detail to studying environmental damage," says Bob Huelskamp (2527), Sandia AMPS project manager.

Like most radar, SAR emits pulses of energy and then reads the electromagnetic "echo" reflected by ground features as an aircraft flies over a target area. Unlike other radar, SAR takes advantage of an aircraft's forward motion to simulate a large antenna array. By taking thousands of successive readings over a great distance, then correlating these millions of data points into a single image, SAR can produce very high-resolution ground images. Use of short-wavelength signals also allows SAR to penetrate clouds, precipitation, snow cover, and even soil in some cases.

IFSAR gets more information from conventional SAR data using the several inches of separation between its two antenna receivers (conventional SAR has only one antenna) to produce high-resolution *three-dimensional* images.

More than 100 overflights

In mid June, the Sandia SAR pod was carried to Kazakhstan and deployed under the wing of a Navy P-3 Orion supplied by the Naval Research Laboratory. In 17 days the Orion completed more than 100 overflights of areas selected by the Kazak government.

The mission included looking for precious metals near a former Soviet "secret city"; developing high-resolution 3-D maps of a mountainous area previously used for nuclear weapons tests; and providing detailed images of cities, railroads, and lakeshores.

The Kazakhstan customer was "very pleased," says Bob.

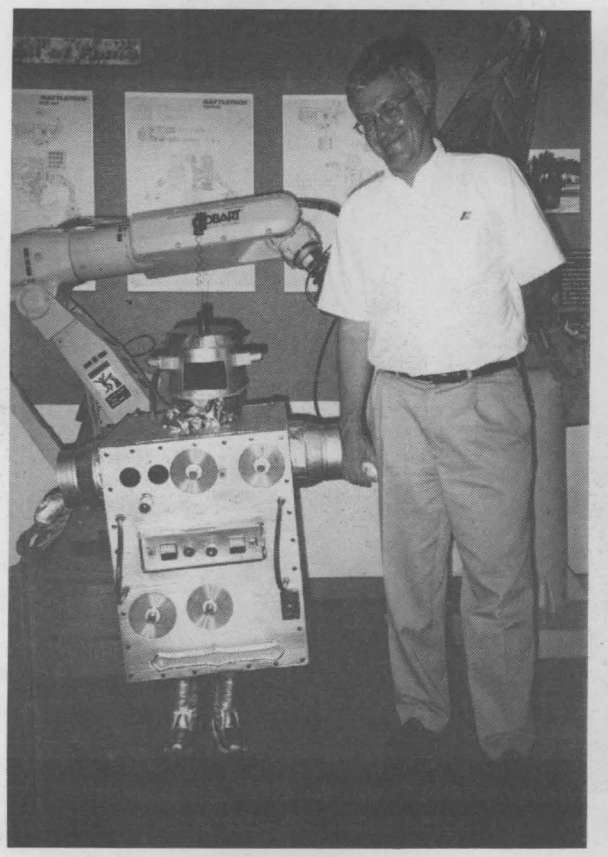
The Sandia team — including Sam Bensonhaver, Grant Sander (both 2345), Mike Taylor (contractor in 2527), Steve Lebien (2527), and Bob — provided the mission planning and precision navigation system for the P-3 aircraft, as well.

Topo maps for A-10 search

SAR capabilities are in high demand these days. Several government agencies have used data gathered by Sandia's SAR pod to determine the health of crops and marine sanctuaries, understand moisture and erosion patterns, map coastlines, monitor wetlands, and plan amphibious assault exercises. (*Lab News*, Sept. 30, 1995)

And in April, the Air Force called on Sandia's ability to map snowy, mountainous terrain during its search for the A-10 aircraft that crashed near Vail, Colo., after vanishing 800 miles off course April 2. Bob says high-resolution topographic maps created on the scene from IFSAR data were instrumental in mapping the debris field from the crash and in helping the Air Force locate key pieces of the wreckage and plan its recovery mission. The Air Force has invited the SAR team back to the crash site to map the area without the snow cover.

Sandia also has received requests recently from the National Oceanographic and Atmospheric Administration to map the Alaskan coastline, the Federal Emergency Management Agency to provide high-resolution mapping of the central California flood plains, and the National Imagery and Mapping Agency to develop topographic maps for battlefield applications.



ROBOTS IN ACTION — Pat Eicker, Director of Intelligent Systems and Robotics Center 9600, greets a small humanoid friend (left photo) during the July 19 opening reception of Roboquest, the National Atomic Museum's latest exhibit. Pat's keynote address focused on robotics and the future. Disguised as a Mobile Interactive Greeting Unit is 4-year-old Dana Jarigese. (Dana's father and their family friend Tom Salazar, 12660, designed the costume.) Attending the event were Mike Zamorski, Manager of DOE's Kirtland Area Office; Jackalie Blue, Vice President of the National Atomic Museum Foundation; Greg Starr, a University of New Mexico mechanical engineering professor; and several Sandia executives including Labs President C. Paul Robinson. In the right photo, Denise Padilla, one of Prof. Starr's engineering students, demonstrates during a July 23 media event at the museum a robot she created from Legos, infrared sensors, and a microprocessor as part of a class project. The robot navigates a maze and drops the pingpong ball into a basket. Roboquest, an interactive exhibit featuring 10 real robots provided by Center 9600 and Advanced Vehicle Development Dept. 5516, will be on display through December 1998.

Fun & Games

Tennis — SERP and C-Club members and military personnel are invited to participate in the Coronado Club Tennis Tournament Aug. 30-Sept. 1 at the C-Club tennis courts. Events include men's and women's singles and doubles and mixed doubles. Gifts will be presented to winners and runners-up, and drinks and balls will be provided to all participants. Consolation matches for first-round losers will be played. Participants' guests may play doubles. Entry deadline is Aug. 25. For entry forms, contact the SERP office at 844-8486.

Physicians at front line of bio war, *JAMA* article contends

Unusual disease outbreaks reported by doctors may be tip-off to weapons development, argue authors — including a Sandian

Physicians will probably be first to report signs of the manufacture and use of biological weapons, according to an article co-authored by Sandian Alan Zelicoff in the Aug. 6 edition of the *Journal of the American Medical Association* (*JAMA*). Alan is a scientist and physician in Nonproliferation Initiatives Dept. 5335.

The authors — Alan and colleagues Robert P. Kadlec, M.D., Office of the Secretary of Defense; and Ann M. Vrtis, M.D., Malcolm Grow Medical Center, Andrews Air Force Base, Md. — argue that unusual outbreaks of disease in given locales are likely to be the first indicators that rogue regimes are preparing for biological warfare, along with the investigation of allegations that these regimes are using biological weapons.

"These [indicators] are highly diagnostic of illicit activities while avoiding false-positive allegations," the article states.

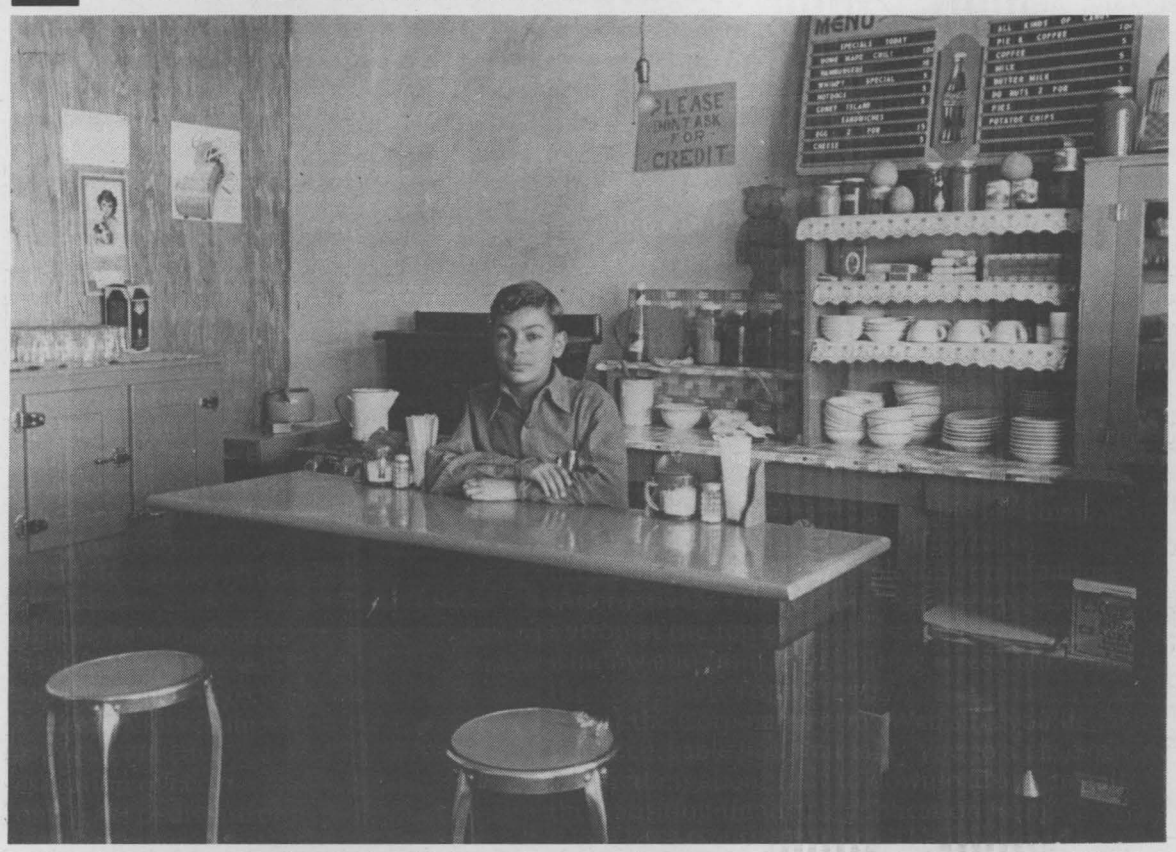
This information would indicate possible violation of the Biological and Toxin Weapons Convention (BWC), which is now under negotiation in Geneva. While commending the BWC's vision and intent, the authors claim that events of the past few years — including the use of chemical agents by the Aun Shinrikyo cult in Japan — "cast doubt about its current effectiveness to slow, stop, or reverse the current trends in biological warfare proliferation."

The number of nations known or suspected of having biological weapons capability has doubled since the convention originally went into force in 1975. Some 140 of 158 signatories have ratified the agreement.

"No measures or combinations of measures, to date, have been found with the requisite sensitivity or specificity that were useful for detecting violations of the BWC," the authors claim. "A future protocol that ensures an effective mechanism to permit investigation of occurrences such as suspicious outbreaks of disease or alleged use can simultaneously enhance global security and public health.

"The medical community plays an integral role in secondary biological weapons prevention because they participate in the network of disease surveillance and reporting that may provide the first indication of biological weapons use."

Favorite Old Photo



MA'S LUNCHROOM — Belen, N.M., old-timers remember that, except for the Harvey House, Ma's Lunchroom was the place for good home-cooked meals — at reasonable prices: note the 15-cent pie-and-coffee combination and the Wimpy Special hamburger for a nickel. Ma (a.k.a. my mother) had me working the counter in 1935 or 1936 when an itinerant photgrapher traded this photo of me at work for a complete 35-cent meal, and I learned that photographs could be traded for food. — Bill Laskar (ret.) (*Editor's note: Bill was the* Lab News *photographer from 1953 to 1980.*)

Launch of Supplier Relations Center aims to boost Labs' impact on local economy, enhance opportunities for small businesses

By Bill Murphy

With the launch of the new Supplier Relations Center during a reception for small business suppliers last week, Sandia has kicked its local business outreach efforts into high gear.

In brief ceremonies during the reception at the New Mexico Museum of Natural History and Science, Labs President and Director C. Paul Robinson said Sandia has created the new center to enhance the access to Sandia for both individual businesses and trade associations.

"Our goal," said Paul, "is to build long-term strategic partnerships, teaming with our suppliers across the board. I think together we can each be each others' strong advocates. We want to create a real symbiotic relationship [between Sandia and small businesses] to improve our individual business objectives and the results for all of us."

Frank Figueroa, VP for Finance Div. 10000, told the audience of about 100 business people that the reception, with its opportunity for one-on-one interaction between small-business people and Sandians, "is only the beginning."

"We [Sandia] do purchase a lot of goods" but would like to increase the percentage of procurement dollars spent in New Mexico, he said.

"We're at about 40 percent now; we'd like to make it bigger if we could. It's going to take both of us [Sandia and business people working together] to be able to make that happen. We're convinced that doing business with local business is good business, and that's what we're trying to strive for with the Supplier Relations Center."

Matchmakers

Officially, the new Center's mission is to match the needs of Sandia's line customers to a diverse set of suppliers capable of providing high-quality products and services in a timely and cost-effective manner.

In the more straightforward language used by Supplier Relations Center 10700 Director Leo Miranda, "We are matchmakers," bringing together small businesses — particularly disadvantaged and woman-owned businesses — and Sandia buyers. That matchmaker role, he said, has been made easier by the fact that Sandia's Procurement Center 10200 is committed to working with the Supplier Relations Center in achieving the Labs' socio-economic goals.

"The buyers are very good; they work with us very well," he said, adding that he has brought Steve Baca on board the center team to take advantage of Steve's knowledge of the line's needs and his long experience at Sandia. (Steve spent many years in Division 2000 before becoming involved in community-related issues management work.) In his capacity with the center, Steve will manage Supplier Relationships Dept. 10701.

Highly respected Albuquerque business and civic leader Edward Lujan spoke for the business community at the reception.

"I really want to commend Sandia for its effort and for really being committed to try to get small businesses involved with Sandia," he said.

Lujan said that in various meetings with Sandia leadership, he has emphasized the importance of personal interactions between business people and Sandia buyers.

"It is very difficult in a big, big company like Sandia to really have access," Lujan said. "It's not easy. I mean, who do you talk to? I don't know how many contracts Sandia gives, but you can't talk to Paul on every one of them. It just doesn't happen.

"All of us in business know that you have to have one-on-one relationships. You have to know each other; each one has to know the other. Unless you do that, it's very, very difficult to break in."

With the establishment of the Supplier Relations Center, Lujan said, Sandia has created a mechanism to foster those interactions.

"They [Sandia] are doing their part; they put together this team, but it goes beyond that. I think all of us have to do our part. . . Sandia by itself obviously cannot do it.

"There's a lot of business that can be done between our small businesses and Sandia. If we can get that synergy going and we can get that one-on-one relationship established, I don't have any doubt but that we'll succeed."

DOE HQ official Romulo Diaz was on hand at the reception to represent Secretary Federico Peña and extend DOE's endorsement to the Center.

"When you're doing good things, as Sandia is here today by launching the Supplier Relations Center, it's our responsibility at DOE headquarters to tell that story and make sure that we support you in those efforts," Diaz said.

"One of the reasons, the most important reason, I think, for my being here," he said, "is I want to communicate the message you heard this past April from Secretary Peña: We [DOE and its facilities] believe in being a good corporate citizen. We believe in being a good neighbor. We believe in making a difference in your everyday lives, because if we don't, then you're not going to care about us and we're not going to have the symbiotic relationship that we just heard about [from other speakers]."

Diaz lauded the establishment of the Supplier Relations Center as "exactly the right thing to do" but said the ultimate test of the Center is whether it delivers on its promise of steering more of Sandia's business toward small, local businesses.

"Ultimately," Diaz said, "we are going to be judged on our performance. It's not going to be about whether in fact we had this nice ceremony. We are going to be judged on whether we deliver the goods. And so, in the words of our good friend from the movie Jerry Maguire, one year from today I hope you [small-business people] can come back and say, "Sandia showed me the money."

VP Frank Figueroa promised that there will be an ongoing series of outreach efforts.

"We'll have more of these one-on-one sessions," Frank said, "once we can condense the requirements down to a low level of detail and then be able to communicate with each other so we can look at suppliers' specific capabilities and specific competencies and our specific needs. And that's what we're planning to do.

"And so, to paraphrase Winston Churchill, our commitment is that we will never, ever give up on achieving our mutual objectives; that you can count on."

GOOD RELATIONS — Labs President C. Paul Robinson, right, thanks community and business leader Edward Lujan following Lujan's positive comments about Sandia during a reception to launch the Labs' new Supplier Relations Center. Leo Miranda, Director of the Center, reaches for the wireless microphone as he prepares to discuss the Center's goals with an audience of about 100 small-business people and representatives from a variety of business advocacy groups.

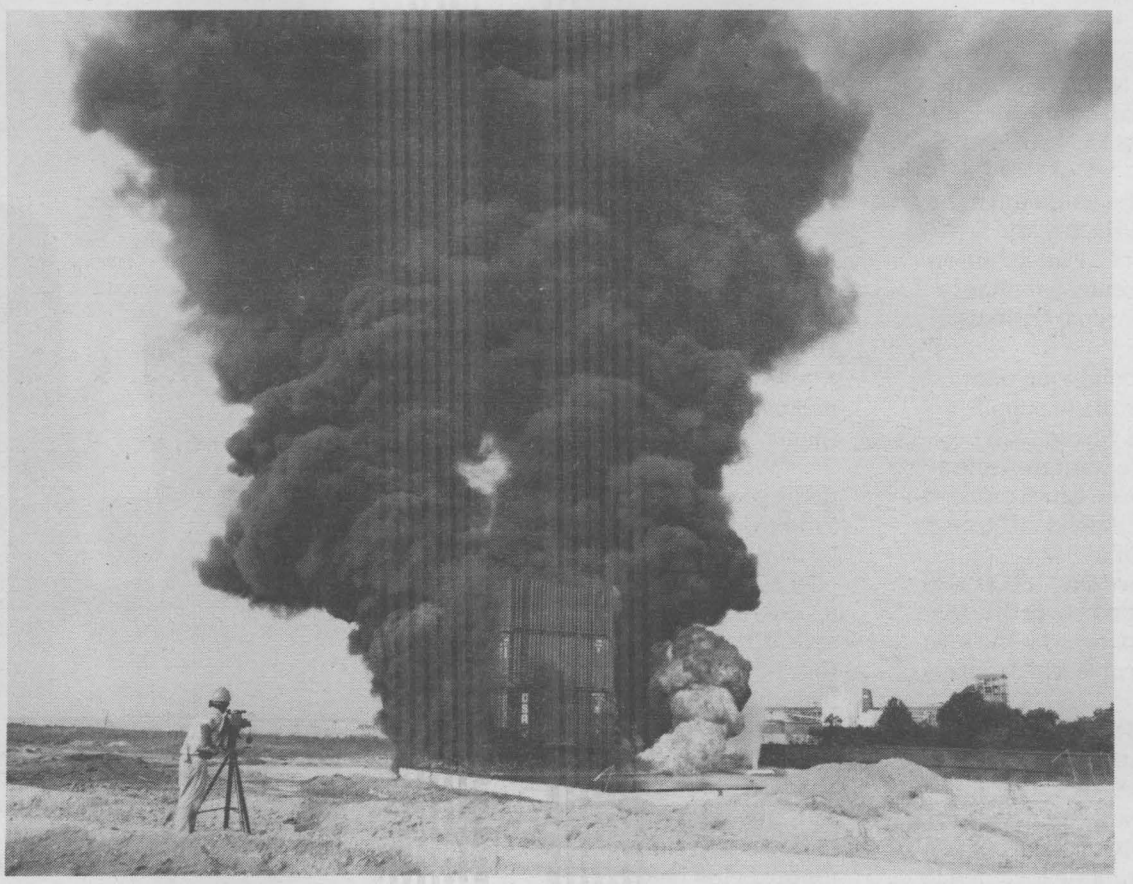
Science and technology in the service of solving drylands issues

SMOOTH OPERATOR — Roger Hill, left, of Renewable Energy Office Dept. 6201, explains the workings of a solar photovoltaic array to a group of visitors in Albuquerque to attend a conference, "Improving the Science and Technology of Environmental Security in Drylands." Drylands make up some 40 percent of the earth's land surface and are home to almost two billion people. By their very nature as arid, semi-arid, and dry sub-humid regions where water supply is problematic, drylands are the source of a variety of problems that can lead to human conflict. Sandia, the United Nations Environment Programme, and the City of Albuquerque cosponsored the conference. Following three days of meetings and discussions, the conference attendees toured several Sandia facilities. "What we want to do in this conference is begin to consider ways science and technology can be brought to bear on drylands-related issues," said conference co-organizer Dennis Engi, Manager of Sandia's Strategic Initiatives Dept. 4504. (Photo by Randy Montoya)

Fire tests help ensure safety of nuclear material shipping casks; subjected to 2,200-degree blaze

Nuclear material shipping casks transported inside standard steel shipping containers can survive large fires and still protect their contents and prevent radioactive material releases, according to preliminary results from recent Sandia fire-endurance tests.

Conducted near Mobile, Ala., for DOE's National Transportation Program, the tests exposed nuclear material casks inside International Standards Organization (ISO) shipping containers to a fire fueled by 4,000 gallons of JP-8 jet fuel. The containers tested measure 20 feet long, eight feet tall, and eight feet wide, and weigh about 5,000 pounds empty. (Other standard ISO containers are up to 50 feet long.) The multipurpose containers are used to ship cargo by sea, rail, and road.



HOT TIME IN ALABAMA — A Coast Guard employee videotapes a July 30 fire test near the Coast Guard's Mobile, Ala., Fire and Safety Test Detachment. Conducted by Sandia for DOE, the test subjected nuclear-material shipping casks — placed inside standard steel shipping containers — to a JP-8 jet fuel fire. Preliminary results indicate that the casks can survive these extremely hot fires (about 2,200 degrees F.) and still protect their contents and prevent radioactive material releases. (Photo by Diana Helgesen, 9761)

The primary purpose of the tests was to determine whether the nuclear material casks that are routinely shipped inside the ISO containers could withstand a major fire on a ship's open deck, says Sandia's technical project leader Joe Koski (6642). The tests were also designed to quantify typical container fire conditions and compare them to conditions that typically exist during land-based shipping accidents.

The tests involved nine shipping containers. They were conducted at the Coast Guard's Fire and Safety Detachment on Little Sand Island in the middle of the bay south of Mobile. The facility is used by the Coast Guard and other government-funded groups for marine fire and safety tests.

Several types and sizes of radioactive-material packages were inside one of the shipping containers during the tests, but no nuclear materials were involved. Other containers were packed only with steel pipe calorimeters simulating casks, and still others contained combustible materials such as wood pallets, cardboard, and paper.

The fire was set on July 30 with the jet fuel burning for about one hour, although combustible paper, cardboard, and wood in some containers continued to smolder more than a day. JP-8 fuel burns at temperatures up to 2,200 degrees F. Flames reached more than 30 feet high at times.

After the fire, the unloaded radioactive materials packages were examined and appeared to be in good condition. The packages are being returned to Albuquerque for further inspection and analysis.

"Although we need to study the test data in detail," says Joe, "we are encouraged by the preliminary results and believe the casks in combination with the containers will do exactly what they are designed to do — protect their contents and prevent the release of potentially hazardous radiation if they are ever involved in an accident of this type."

Spent nuclear fuel and other nuclear materials are typically moved internationally aboard cargo ships, in casks placed inside the standard shipping containers. Casks must meet standards set by the Code of Federal Regulations (10CFR71) in the US or International Atomic Energy Agency (IAEA) Safety Series 6 for international shipments.

"To the best of our knowledge, nuclear material shipping casks have never been involved anywhere in the world in a severe fire accident like we simulated," Joe says. But he adds that ISO standard shipping containers are used extensively, so knowledge of the protection they offer is valuable to analysts trying to understand the safety issues surrounding such shipments.

Sandia's tests were designed to answer questions about the actual temperatures and heat-transfer phenomena in and among the containers in a configuration typical of on-deck stowage where oxygen is available to contribute to the intensity of a fire, says Joe.

Sandia used a suite of scientific instruments including calorimeters, thermocouples, and data-recording devices that it built or configured specifically for these tests.

Joe and several others in Transportation Systems Development Dept. 6642, including Ray Dukart, Jeff Bobbe, Mike Arviso, and manager Glenn Hohnstreiter, had major roles in the tests. The tests contribute to a cooperative research program sponsored by the IAEA and funded by DOE. Final results will be published as soon as possible and provided to agencies and companies around the world that are concerned with nuclear materials shipping safety.

"These results will not be an end in themselves," says Joe. "Using what we learn, we plan to develop well-calibrated computer models that can predict the behavior of nuclear material shipping casks when exposed to various types of fire scenarios. Accurate computer models could save lots of money and time when approval is being sought for shipping potentially hazardous materials."

—Larry Perrine

EXIT SPENT FUEL — Cindy Kajder (10262), John Garcia (middle), and Paul Helmick (both 6423) place a "radioactive material" warning label on a cask loaded with irradiated fuel elements that departed from Area 5 June 30 on its way to the Savannah River Site in South Carolina. The spent fuel rods were shipped to Sandia from Savannah River's K Reactor in 1990 for a series of reactor safety experiments to support DOE's New Production Reactor (NPR) Program. When the program was cancelled in 1992, Sandia began preparing to return the fuel. The 60 reactor-grade fuel segments loaded in the cask represent the final shipment, fulfilling a commitment to DOE Headquarters that all the NPR spent reactor fuel would be returned to the Savannah River Site. To ship the fuel across the country, Sandia (in conjunction with DOE/AL) wrote a transportation plan that was reviewed by each of the corridor states the material traveled through. The State of New Mexico Transportation Division inspected the vehicle using the enhanced Commercial Vehicle Safety Alliance inspection procedures — the same standards to be followed for shipments en route to the Waste Isolation Pilot Plant (WIPP) near Carlsbad. Approximately 50 Sandians representing Divisions 6000, 7000, 9000, and 10000 participated in readying the shipments.

Recent Patents

James Crow (1523): Generating Highly Uniform Electromagnetic Field Characteristics.

Ravindra Deshpande (UNM), Douglas Smith (UNM), and Jeffrey Brinker (1831): Preparation of High Porosity Xeogels by Chemical Surface Modification.

Sandia Classified Ads

Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads

MISCELLANEOUS

DINING TABLE, 2 leaves, hutch, 6 chairs, $350; sofa & loveseat, $240; 4 bar stools, $65; coffee & end tables, $25. Shirley, 296-3972.

KING-SIZE WATERBED, bookcase/mirror headboard, padded rails, w/newer king-size waveless mattress, w/heater, $125. Shirley, 296-3972.

FIREWOOD, cut 1 year ago, best offer. Owen, 293-8149, after 5 p.m.

CELLO, 3/4-size Stradivarius reproduction, excellent condition, great for student, $495 OBO. Schaub, 821-7242.

MEMORY, 2-8MB SIMMS EDO, barely used, $30 ea. Potter, 292-5224.

WALLACE STERLING FLATWARE (Rose Point pattern) 12 place settings, plus serving pieces, best offer over $1,500. Vandewart, 298-4741 or Barsis, 293-5347.

RC AIRPLANE KIT, AT-6 Texan, 49 inches long, 69-inch wing span, new, $100; cast-iron gas grill, smoker box, $20. DiPrima, 275-3479.

BUNK BED, white metal, double size on bottom, twin on top, clean mattresses, $125. Gonzales, 298-2232.

CONCRETE INSULATION BLANKET, 20' x 20', $20. Vigil, 271-1328.

MAKITA BENCH TOP TABLE SAW, $125; 6-in. dual-bench grinder, w/stand & accessories, $50. Dwyer, 271-0741.

LAPTOP WINBOOK, 4MB RAM, 125MB HD, 386DX33, WIN 3.1, 3 serial ports, 1 parallel port, $400. Wendt, 345-6910.

REFRIGERATOR, 18 cu. ft., Whirlpool, white, icemaker, excellent condition, $300. Petersen, 275-7467.

STUDENT DESK, metal, 45W x 24D x 29.5H, $30. Edmunds, 856-6918.

SIMS SNOWBOARD, 132cm, w/bindings, good for beginner, very good condition, $50 firm. Krivitzky, 897-2648.

SOLID-OAK KING-SIZE WATERBED, complete w/pad, sheets, & pillow cases, $100. Zamora, 881-2835.

TWO FULL-BRED SHAR-PEIS, free to good home; sectional sofa, excellent condition, $150 OBO. Maxey, 352-9123.

GARAGE SALE, tools, furniture, housewares, clothes, jeans, costume jewelry, more, 10305 Eden Dr. NE, Aug. 23 & 24, 9 a.m.-3 p.m. Simon, 299-8468.

MAGNAVOX CVM320AV01 CAMCORDER SYSTEM, full-size, high-speed shutter, 8:1 zoom, 4 heads, flying erase, more, $575. Clabaugh, 292-4699.

SHOPSMITH ER-10, 5 shop tools in 1, table saw, lathe, drill press, disc sander, horizontal boring, $500. Whitley, 293-2807.

WOOD BEDROOM DRESSER SET, 5-piece, hunter green w/maple-color accents, $375; Tour Edge golf clubs, driver (10-degree loft), #3 wood, #5 wood, $125; OBO. Harms, 839-4852.

DUCKS, several breeds, different ages. Pantuso, 865-1597, ask for Andrew or leave message.

BABY FURNITURE: crib/dresser, $200; changing table, $30; car seat, $30; other items; NordicTrack, $150. Henderson, 858-1321.

WASHER & DRYER, Kenmore, gold, $125/both; entertainment center, $200; medium Dogloo, $60; moving boxes (w/7 wardrobe), $45. Oborny, 299-8509.

REFRIGERATOR/ICEMAKER, $165; freezer, $85; washer/dryer, free; indoor animal cage, $50; card table/chairs, $30. Vanderhoofven, 298-5661.

PIANO, upright, wonderful tone, good condition, $600. Koch, 856-1362.

PORTABLE TYPEWRITERS: manual, $25; electric, $40; adult life jacket, $12; bumper hitch, $10; manual thermostat, $5. Horton, 883-7504.

SCHWINN EXERCYCLE, w/adjustable seat, LED readout, excellent condition; Smith-Corona electric typewriter, w/ribbon & correction cartridges. Wade, 857-0349.

486/33 SX COMPUTER, DOS 3.1, WordPerfect 6.0, 3-1/2 & 5-1/4 disk drives, $400 OBO. Lord, 867-1252.

GIANT GUMBALL MACHINES, beautiful, $400 ea.; Evinrude 6-hp boat motor, $450. Shock, 877-3728.

BABY ITEMS: Simmons crib, $100; down crib comforter, $25; gate, $7; oak bassinet, $35. Crafts, 831-5234.

VIOLIN, Suzuki, 1/2-size, $150; flute, Gemeinhardt, $145; clarinet, Yamaha, $165; Peavey guitar amp, 35 watt, $100. Aragon, 888-3473.

GARAGE SALE, 3 families, many books, toys, clothes, children's videos, furniture, railroad ties, Sat., Aug. 23, 13904 Hope Court NE. Carroll, 298-2827.

VIOLIN, 3/4 w/case, great for student, $200; Yamaha RXV660, A/V receiver, $325; both excellent condition. Garcia, 294-7872.

SELF-CLEANING DOUBLE OVEN, Sears, 24-in., built-in, black, $75; Corning 3+1 cooktop, white, $50. Bear, 881-7128.

IMAGE 910 TREADMILL, scans for weight, time, distance, speed, calories, & pulse, owner's manual, $350. Prins, 867-9440.

ELECTRIC COOKTOP, $20; vent hood & fan, $20; light fixture, $3. Dean, 299-3281.

FOUR ALUMINUM WINDOW AWNINGS, removable, various sizes, $150/all; insulated glass window pane inserts, for casement-style windows, $100/all. Newman, 266-6928.

BEDROOM SET, twin bed, w/trundle, night table, double dresser, w/hutch, desk & chair, Stanley furniture, $600. Robertson, 299-7561.

THE PRINCETON REVIEW GUIDE TO SAT, book w/2 audio cassettes, top condition, $10/all. Wagner, 823-9323.

SWING SET, steel, 2 bars, swing, glider, slide, $50. Schamaun, 298-5192.

HONDA EM 2200 GENERATOR, $650; woman's all-terrain 10-spd., like new, $85; English saddle, $210; boy's bike, $20; Lifestyler treadmill, $125. Baker, 856-5069.

CF-800 POWER AMP; Carvin 12-channel mixer; Peavy SP-2 speakers; 2 Biamp cannisters; worth $1,600+, asking $900. Marquez, 873-5209.

STEPPER EXERCISER, w/timer-pacer, $70; Corel WordPerfect Suite 7, new OEM CD edition, $50; Keyboard, new Win95, $10. Molecke, 296-5850.

GASOLINE GENERATOR, 5,000-watt output, good condition. Chavez, 867-2213.

CERAMIC FLOOR TILE, grout & adhesive, 750 sq. ft., new, $2,500 value, asking $2,250. Garrison, 869-6979.

AIR CONDITIONER, for RV or trailer, duotherms, roof mounted, $150. Shunny, 265-1620.

WATERBED, super single, bookcase headboard, heater, 6-drawer pedestal frame, $50. Wieting, 823-0160.

ANTIQUE CHINA CABINET, $375; wicker king headboard, $125; Lowery organ, $300 OBO. Salazar, 899-0483.

KING BEDROOM SUITE, triple dresser, 2 tables, w/spread & sheets, $600; dining table, 6 chairs, $400; coffee table, $125. Kraft, 299-6827.

ELECTRIC GUITAR, Fender Squire Stratocaster, excellent condition, $150. Lenberg, 266-8988.

ITHACA M37RD SHOTGUN, 12-gauge, w/interchangeable barrels, 30-in. full & 28-in. imp. cyl., $395. Svensson, 898-3078.

ANTIQUE (OLD?) OAK ROLL-TOP DESK, $1,200; Naugahyde-covered recliner chair, $100; other items. Brice, 345-4827.

WOMAN'S HANDKERCHIEFS, small collection, use as starter or add-to, make offer. Blasyk, 881-0135, after 6 p.m., or leave message.

SLEEPER SOFA, off-white, great condition, $175; Raton kitchen table, w/glass top, 4 chairs, $75. Madrid, 296-7104.

HP LASERJET II PRINTER, 300dpi, 8ppm, serial/parallel, $225; font cartridges & 2MB/4MB RAM expansions available. Schkade, 292-5126.

CERAMIC KILN, commercial-grade, 22 inches deep, 18 inch diameter, w/furniture, extras, $1,800 new, asking $750. Rodacy, 293-1668

KITCHEN TABLE, four chairs, beautiful wood, $150; trumpet, good condition, perfect for band student. $90. Painton, 889-0314.

FIREWOOD, 60 pine logs, 18- to 24-in. diameter by 12- to 18-in. long, you haul, $50. Jones, 292-1581.

LAWN MOWER, push reel, w/owner's manual, $30 OBO. Blaisdell, 875-0719.

SUPER-SINGLE WATERBED, includes everything, used 1 month, Taos style, headboard, shelves & mirror, $160 OBO. Field, 268-4914.

PENTIUM 90, 1.6-gig. HD, CD, sound, WIN95, Office 97, 21-in. SVGA monitor. Burstein, 899-8971, after 6 p.m.

LARGE DOG IGLOO, insulated & vented for winter & summer, paid $150, asking $50. Wilson, 275-8384, after 6 p.m.

AQUARIUM, 110-gal., w/stand, $300; fluvial filter and all accessories extra. Cropp, 296-1877.

ELECTRIC RANGE, Maytag, self-clean, $150; dishwasher, Whirlpool, portable, $50; both almond. Anderson, 266-6342.

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

Ad Rules

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

BILLIARD TABLE, Brunswick, solid oak, 8 ft., scrolled legs with hand-carved ram's head feet, 1-in. slate, hardly used, $2,500. Butler, 821-7286.

MAYTAG REFRIGERATOR, 22.5 cu. ft; large-capacity, heavy-duty Whirlpool washer & dryer, 4 yrs. old; all excellent condition. Smallwood, 839-7298.

FUNDRAISER, for La Cueva High cheerleader camp fund, Aug. 31, buy or sell formal gowns, register to sell on Aug. 28. Strascina, 294-0305.

FANCY GUINEA PIG, red, very sweet, male, w/cage (sliding tray missing), free. Kahn, 243-5386, ask for Jennifer.

RECORDS, 33-1/3, 45's, 78's, good condition, big band, classical, vocal, albums, individual, 50¢ ea. Stuart, 345-6358.

AQUARIUM STUFF, gravel, light, more. Baldo-Pulaski, 345-0432.

TRANSPORTATION

'56 FORD TOWN SEDAN, 4-dr., runs well, needs work, $3,200. Anderson, 296-3352.

'76 DODGE DART, 318 V8, 4-spd., Holley 600cfm carb., Hooker headers, custom wheels, aluminum intake manifold, $2,500 OBO. Denton, 822-5067.

'95 FORD BRONCO XLT, 40K miles, 4x4, power everything, excellent condition, $19,500. Strader, 332-3359.

'77 FORD F-150, 351 cu. in., 4x4, long bed, 103K miles, runs perfect, 3 spd. + compound low, $3,700. Dwyer, 898-9061, ask for David.

'96 BMW 318TI, white, AT, very low mileage, almost new, $19,500 OBO. Domingo, 271-1105 or leave message.

'73 BMW BAVARIA, light blue, 4-dr., 6-cyl., 4-spd. standard, running but needs work. Roberts, 293-5447.

'81 MERCEDES 380SL, silver/navy, custom wheels, both tops, low miles, meticulously maintained, records, excellent, $17,250. Matz, 296-0209.

'92 TOYOTA LAND CRUISER, fully loaded, garnet red, excellent condition in/out, $18,900 OBO. Padilla, 266-1949, ask for George.

'84 TOYOTA PICKUP, long bed, w/bed liner, AC, very good condition, original owner, 86K miles, $3,300 OBO. Duus, 298-9453.

'94 CHRYSLER CONCORD, 4-dr., loaded, 3.5L, 48K miles, factory warranty, excellent condition, $13,200. Sena, 821-8898.

'93 MERCURY VILLAGER, blue, tinted glass, rear air/heat, PW, PL, PS, $12,200. (NADA $12,400). Bates, 291-6060.

'90 HONDA CIVIC, hatchback, 4-cyl., 4-spd. manual, AC, red, 99K miles, around 35 mpg, $3,400. Gelet, 898-7117.

'91 GMC SLE, 4.3L, V6, 5-spd., Sport Side, all options, $8,000. Zamora, 294-3737.

'78 FORD LTD, 2-dr., AC, runs well, $800 OBO; '94 Nissan Sentra, 4-dr., AC, Kenwood stereo, take over payments. Alexander, 865-4238.

'90 DODGE D-150, AC, AT, AM/FM, good mechanical condition, 73K miles, $4,800. Payne, 291-0124.

'94 FORD F150 XL TRUCK, 4x4, like new, 10K miles, 5-spd., AC, tinted windows, $13,100. Grazda, 867-0557.

'84 MERCURY GRAND MARQUIS, clean, new upholstery, good paint, needs minor repair, $1,600 OBO. Gamboa, 764-8212.

'82 JEEP WAGONEER, 4-dr., 4WD, good condition, 360 CID, AT, equipped for towing RV, $2,995 firm. Mares, 884-4843.

'91 MITSUBISHI ECLIPSE, GS turbo, red, loaded, AC, CD changer, low mileage, new timing belt. Ewen 836-3563.

'67 DODGE MONACO, very good shape, needs tranny work, must have $850. Aragon, 293-2866, after 5 p.m.

'93 DODGE GRAND CARAVAN SE, silver/red, damaged but working sliding door, 85K miles, runs great, new shocks/struts/brakes, $9,500. Barnette, 861-2451.

'91 FORD EXPLORER XLT, 4x4, AT, AC, PL, PW, new tires, below blue book, $9,250. Pullen, 858-1500.

'91 HONDA PRELUDE Si, great shape, 5-spd., midnight blue, $900 below book, $8,500. Doughty, 296-4142.

'94 VOLVO 850 GLT, loaded, like new, leather, sunroof, factory alarm, Alpine stereo, alloy wheels, $20,500. James, 294-6837.

'94 FORD TAURUS GL WAGON, fully powered, 3.8 V6, dual airbags, ABS brakes, runs super, 52K miles, $10,300. Hart, 291-8774.

'87 RED PONTIAC TRANS AM; '92 Suzuki Sidekick, 4WD, 4-dr.; bids through 8/20/97, right to refuse bids, sold as is. SLFCU, 237-7386, ask for Christine.

'91 TOYOTA PREVIA, white, 5-spd., dual air, cassette, tinted windows, new tires, excellent condition, $9,950 OBO. Criel, 856-6582.

'85 TOYOTA LAND CRUISER, 65K miles, I6, AM/FM cassette, AC, receiver hitch/brake control, clean, $8,250 OBO. Turner, 281-4264.

'88 DODGE GRAND CARAVAN, V6, AT, AC, PS, AM/FM cassette, cruise, tilt, tinted windows, 1 owner, $3,995. Behr, 856-6273.

'88 TOYOTA 4RUNNER, 4x4, 4-cyl., 5-spd., 2-dr., AC, AM/FM cassette, 68K miles, perfect condition, $9,900 OBO. Stuhlmann, 899-1205.

'86 CHEV. CAVALIER, 4-dr., all power, runs well, good tires, $1,200. Rexroth, 890-5492.

'82 VW RABBIT CONVERTIBLE, white, black interior, 5-spd., FWD, fuel-injection, AC, AM/FM cassette, 108K miles, $1,450. Halbgewachs, 268-1584.

'72 CHEV. MALIBU 2-dr. hardtop, 307 engine, 55K single-owner miles, good condition, $1,500. Drebing, 293-3335.

RECREATIONAL

SAILBOAT, 22-ft., MacGregor, 7.5-hp engine, dinette, sink, sleeps six, trailer and cover, $4,200 OBO. Deller, 298-5705.

'89 COLEMAN POP-UP, queen-size bed, 3-burner stove, sink, 1 family owner, negotiable. Mullaney, 292-7800, ask for Terry

THREE GIRL'S BICYCLES: two 20-in., one 16-in. (painted blue for boy or girl), $20 ea. Ruby, 821-0982.

MOUNTAIN BIKE, 18-in. Giant Iguana, blue frame, 12-spd., $200 OBO. Middleton, 260-4644, ask for Jennifer.

CASPIA KAYAK, used 4 times, $375; Mongoose Crossway 625, 20-in., 21-spd. man's bike, like new, $150 OBO. Furch, 345-1411.

WOMAN'S MOUNTAIN BIKE, less than 200 miles, 15-spd., $120; 2 pull golf carts, $5 ea. Norwood, 292-0072.

TWO SPECIALIZED MOUNTAIN BIKES: Rockhopper FS, 22-in., $300; Stumpjumper FS, 18-1/2-in., $175; 10-spd. road bike, 18-in., $50. Smith, 899-4922.

TRAVEL TRAILER, 18-ft., sleeps 6, shower, toilet, heater, refrigerator, stove, excellent condition, first $1,850 takes it. Wood, 271-9967.

'87 RV MOTORHOME, Falcon 17, Chev. 305 cu. in., new transmission, loaded, 88K miles, $15,600 OBO. Grandon, 272-7615.

BICYCLE, Cazenave, 10-spd., $25. Werkema, 883-4536.

BICYCLES, 26-in., 3-spd., 1 ea. boys/girls, need work, repairable, free. Sipola, 299-1119.

'97 GMC SAVANA HIGH-TOP CONVERSION VAN, 16K miles, TV, VCR, extras, $31,000. Kaufmann, 292-9249.

WOMAN'S BIKE, Schwinn, 10-spd., 26-in., w/car carrier, $75; cross-country skier, Weslo glide-motion, w/motivational calorie counter, $45. Bartel, 293-1879.

'71 HONDA TRAIL-90, 3.5K miles, excellent condition, w/loading ramps, tie downs & more, $575/all OBO. Hole, 255-1444.

'79 BROUGHAM HANDYMAN'S RV, 22-ft. 1/2-in., 454 engine, 43K original miles. Freeman, 268-6235, after 5 p.m.

'83 STINGRAY BOAT, 16-ft., walk-through bow, 120-hp '83 Mercury, trailer, $5,000 OBO. Avila, 275-9572.

'93 VACATION AIR TRAVEL TRAILER, Park Model, 39-ft., tilt-out living room & bedroom, special built, $19,900. Jarrett, 254-1035.

'79 TRAVEL TRAILER, Twilight Bungalow, 30-ft. fifth wheel, oldie but goodie, everything works, $3,000 OBO. Richards, 281-9471.

REAL ESTATE

PIONEER HOUSE, w/large shop/barn, good well water, on 1.06 acres, near Hillsboro, NM, $60,000. Carson, 281-5115 or 505-894-5076.

3-BDR. FOOTHILLS HOME, 2-1/2 baths, mtn. & city views, 15-minute commute to Sandia, landscaped. Domingo, 271-1105.

2-BDR. CONDO, 1,080 sq. ft., Wyoming/Comanche area, 1-1/2 baths, washer/dryer hookup, 1-car garage. Gutierrez, 293-2260.

4-BDR. HOME, 1-3/4 baths, well-maintained, nicely landscaped, mtn. view, AC, gas logs, NW of Juan Tabo/Constitution, $117,500. Garrison, 292-8973.

3-BDR. HOME, 2 baths, Elephant Butte, 1,700 sq. ft., w/1,600-sq.-ft. basement garage, large master suite, lake view. Kmatz, 299-5978.

'84 MELODY MOBILE HOME, 14' x 70', 2-bdr., 2 baths, see to appreciate, $13,500. Leyva, 877-4566, ask for Joanne.

FORTY ACRES, raw mountain land, north of Datil, excellent investment, easy terms, $375/acre. Warren, 294-5250.

3-BDR. NE HEIGHTS HOME, 2 full baths, 2-car garage, RV access, large backyard, landscaped, 1,400 sq. ft. Jones, 883-1284.

3-BDR. MOBILE HOME, 2 baths, 16' x 80', new carpet/paint, book $25,000, asking $19,900. England, 892-3533.

WANTED

HAND-CRANK ICE CREAM FREEZER, for use w/activities in senior living center. Novotny, 296-7167.

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

SCAFFOLDING, to borrow or rent for 1 or 2 weeks, must reach second story, for house painting. Brannon, 452-8707.

HOUSE TO RENT, 3 bdr., 2 baths, garage, approx. 1,600 sq. ft., in NE Heights, La Cueva school district, need 9/1/97. Sartor, 858-2554.

HOUSE-SITTING OPPORTUNITY or furnished rental for family of three, retired Sandian, 3-month duration or longer. Spalding, 299-3376.

BOX SPRING & MATTRESS, full-size, good quality, excellent condition. Piatt, 293-1204.

RAILROAD TIES, bricks, flagstones, other landscaping materials. Lauben, 275-7466.

LAPTOP COMPUTER, for daughter entering grad school. McBride, 856-6563.

DRUM SET, needed for beginning student. Oscar, 345-7046.

LOST & FOUND

FOUND: Silver ring, near Bldg. 890 turnstile. Ashcraft, 845-9720.

FOUND: Man's Armitron water-resistant sport watch, silver, near turnstile between Bldgs. 878 and 890. Lost & Found Office, 844-9272.

Sandia hosts statewide summit to improve telecommunications

Improving New Mexico's telecommunications infrastructure was the focus of a first-ever Telecommunications Summit at Sandia/New Mexico on Monday.

The purpose of the summit, hosted by Sandia and presented by the New Mexico Small Business Advocacy Council (SBAC), is to help small businesses understand how they are affected by telecommunications, and in particular, by the recent FCC (Federal Communications Commission) ruling regarding telecommunications.

"The FCC ruling opens up telecommunications to more competition, which should have some important consequences," says SBAC President Angela Atterbury.

Sen. Pete Domenici, R-N.M., who established SBAC three years ago to improve conditions for small businesses within the state, spoke during the summit, noting that the telecommunications infrastructure grows increasingly significant as we approach the 21st century.

"By utilizing new technologies and improving our telecommunications infrastructure, we can create a better life for rural citizens by providing distance learning, low-cost Internet access, and telemedicine," he said.

During the summit, Sandia demonstrated some of the latest technologies brought about through advances in telecommunication and computation, including Internet technologies that have helped automate its internal business practices and expand them to Labs suppliers and customers.

—Chris Miller

Coronado Club

Thursdays and Fridays through Labor Day —Summer swim nights. A la carte buffet. Pool open until 9 p.m.

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

Aug. 15 — Kids bingo. Buffet, 5-8 p.m., cartoons, 5-7 p.m., bingo at 7 p.m.

Aug. 17— Sunday brunch buffet, 10 a.m.-2 p.m. $6.95 all-you-can-eat buffet, kids 3-12, $1, under 3 free. Music by Bob Weiler, 1-4 p.m.

Tram tickets — Round-trip Sandia Peak tram tickets available at the Coronado Club office; $6 each.

Movie tickets — UA and General Cinema movie tickets available at a discount price of $5 each. At the C-Club office.

Swiming pool season passes — The bubble cover will soon be installed on the pool; get year-round passes at the C-Club.

Recent Retirees

Robert Blailock 14
12820

Francine Island 17
12336

Around the corporation

LOCKHEED MARTIN

Teets elected to Lockheed Martin board of directors

Peter B. Teets, 55, became Lockheed Martin's president and chief operating officer Aug. 1. He was elected to the corporate board of directors July 24, increasing the membership to 18. Teets had been serving as president and chief operating officer of Lockheed Martin's Information & Services Sector, a position he had held since the 1995 Lockheed Martin merger; he formerly had served as president of Martin Marietta Astronautics and the company's Space Group. He joined the company in 1963 as an engineer after earning baccalaureate and master's degrees in applied mathematics at the University of Colorado. He later earned a master's degree in management from MIT.

New Communications and Power Center opens in Pennsylvania

Lockheed Martin formally opened its new 420,000-square-foot Communications and Power Center (CPC) in the suburban Philadelphia town of Newtown recently, a facility Lockheed Martin Missiles & Space President K. Michael Henshaw said ushers in "a new era in space communications." When fully occupied at year's end, the CPC will employ 1,400 people in the design, assembly, integration, and testing of payloads and spacecraft power systems for some of the world's most sophisticated communications satellites. Its primary customer will be Henshaw's Sunnyvale, Calif.-based Missiles & Space, its parent company. "We have assembled a combination of payload and power-systems expertise that is unprecedented and that gives us an important technology advantage in this growing market," Henshaw said.

Sympathy

To Nigel Hey (12600) on the death of his father, Aaron Hey, in Albuquerque, July 25.

To Carter Kidd (10267) on the death of his mother, Maureen Kidd, in Albuquerque, Aug. 2.

Sandia News Briefs

Advanced Materials Lab hosts summer students

Staff at Sandia's Advanced Materials Laboratory on University Blvd. SE hosted an additional 23 students in their laboratories this summer, involving them in ongoing research programs. The summer influx essentially doubled the number of students at the AML, which usually has about 25 students on research programs throughout the academic year. The new students are at all levels, from high school to grad school. Two high school students (from Fresno, Calif., and El Paso, Texas) are part of a distinguished group of 300 from across the country selected by NASA for their promise in science and engineering. The universities represented include the University of Arizona; University of California at Berkeley; University of Texas/El Paso; University of Missouri, Rolla; the University of Washington; New Mexico Highlands; New Mexico Tech; the University of Oklahoma; the University of Illinois; Alfred University; the University of Colorado; and Boston University; as well as the University of New Mexico.

James Pacheco named to ASME's solar energy executive committee

James Pacheco of Solar Thermal Technology Dept. 6216 has been elected to the executive committee of the Solar Energy Division of the American Society of Mechanical Engineers (ASME), a professional engineering association with 125,000 members worldwide. The Solar Energy Division is one of several technical divisions of ASME; its purpose is to promote the art, science, and practice of mechanical engineering in the field of solar energy. The executive committee manages the affairs of the division, which include organizing an annual international solar energy conference, participating in other similar-interest conferences, and publishing the *Journal of Solar Energy Engineering*.

Labs photographers take home first- and second-place prizes in regional photo contest

Two Sandia photographers have won top awards in this year's Imaging Professionals of the Southwest photo contest. Diana Helgesen (9761) won first- and second-place awards in the scientific/technical category with her photos of a STARS rocket launch from the Kauai Test Facility (on display in the Bldg. 800 lobby) and of Comet Hale-Bopp, respectively. Leroy Perea (9761) won a first-place award in the portraiture category for his image of saxophonist and friend Ralph Waddles (7617) and a second-place award for his water color portrait of a local model. Imaging Professionals of the Southwest is a regional professional organization of more than 75 commercial, scientific, and portrait photographers. First-, second-, and third-place prizes were awarded in each of five categories.

THE RAINS CAME — Two Sandians hurry to their cars during a tremendous thundershower on the afternoon of July 28. On the same afternoon, the National Weather Service reported that a funnel cloud was sighted forming over a remote area of Kirtland Air Force Base in Albuquerque, activating the Labs' severe weather warning siren. Weather experts have speculated that Albuquerque's exceptionally wet summer is related to the El Niño phenomenon in the Pacific Ocean, bringing more-than-usual monsoonal moisture to the area. (Photo by Randy Montoya)