

# Bombs, budgets, and biology: Sandia's Robinson, Woodard share their thoughts on the state of the Labs as 2005 begins

*It had been more than 18 months since the Lab News last sat down for our "annual" State of the Labs interview with Sandia President and Laboratory Director C. Paul Robinson and Executive VP and Deputy Director Joan Woodard. So there was a lot of ground to cover. In this interview they talk about a host of external and internal issues that affect Sandia and Sandians: budget matters, future possible funding squeezes, bunker-busting bombs, controlling proliferation of nuclear weapons, Iraq, the Labs' outstanding technical work, its new thrusts in biology, thoughts on our mission and identity, fighting bureaucratic processes, the security management turn-around, safety problems, recruiting, the contractor workforce, the gate delays, and Sandia's outstanding people. Ken Frazier and Bill Murphy of the Lab News staff conducted the interview.*

**Lab News:** On the budget, what are your thoughts on the recently passed appropriations bill for fiscal year 2005, the Energy and Water Development Appropriations Bill, for our DOE funding? It seems to have been kind to Sandia and the national labs.

**Joan:** One very positive thing going on is the MESA [Microsystems and Engineering Sciences Applications complex] funding. I'm very pleased to see that come through. That project has been conducted so well by our team that we've been able to manage under the budget, not eating into the contingency. So with the new appropriations that came through for this year, we are very, very close to being able to complete MESA successfully.

**Paul:** The nuclear weapons program had to really grow, and that's exactly what happened with all the other funding. Now, there is a suspicion that we're at a high water mark in the nuclear weapons program. Few believe that it could increase again, certainly not significantly. Particularly since most of the strategies being talked about nationally are to have less emphasis on nuclear weapons. I'm pleased to say nobody's talking about them going away and not having major continuing roles, but some are trying to take them back from the center stage of our

*(Continued on page 6)*



LABS DIRECTOR AND PRESIDENT C. Paul Robinson and Executive VP and Deputy Director Joan Woodard in Paul's office during the annual *Lab News* "State of the Labs" interview. (Photos by Randy Montoya)

## Sandia LabNews

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## Optical innovator Jon Weiss uses soda-straw-like tubes to solve three widespread problems

**Car battery failing? Hazardous material migration? Oil level dropping? There's a simple sensor solution**



A LIGHT TOUCH — Jonathan Weiss's sensors light the way, providing simple solutions to complicated problems. (Photo by Randy Montoya)

By Neal Singer

You come out to your car in the freezing morning. Your battery struggles to start your motor and fails. There you are, tapping your fingers on the cold steering wheel as your windows cloud over from your breath. How could you have known your battery was that low?

Or perhaps you're in the oil business and you've pumped oil and water (just the way it increasingly comes out of the ground) into a holding tank. You want to retrieve only the oil floating atop the water so you can transport the least possible weight from the oil field to a refinery. How do you know — accurately, safely, and simply — when to stop pumping? (This widespread problem is often solved currently by the most primitive means: an employee opens a hatch and drops a stick into the liquid, possibly inhaling its fumes as pumping is in progress.)

Or perhaps you want to monitor a landfill to know whether liquids are causing downward migration of hazardous materials toward groundwater.

Simple solutions to these three problems and others have been created by Sandia researcher Jonathan Weiss using inexpensive plastic or glass tubes that resemble soda straws and transmit light. The light is generated by hardy, inexpensive diodes (LEDs), already mass-produced for traffic signals, house night lights, bike tail lights, and instrument control panels.

With trivial additional hook-ups and a bit of engineering logic, Jonathan shows — at least in laboratory demonstrations — that answers to the above

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## What's what

The *Lab News* launches the new year with a bang – an interview, really, but an important one – the annual sit-down with Labs Director Paul Robinson and Deputy Director Joan Woodard. *Lab News* Editor Ken Frazier and Bill Murphy (both 12651) sat down with Paul and Joan late last year with a long list of questions about Sandia and its missions.

You'll be interested in the responses they got. The wide-ranging session covered budget matters, the debate over bunker-buster bombs, nuclear weapons proliferation issues, security, safety, gate delays during the morning commute, and our new work in biology.

While on the face of it, it's Paul and Joan talking with Ken and Bill, it's really about all of us and why we're here – serving the nation. Don't miss it, starting on page 1.

\* \* \*

Just before we closed for the holidays, a study Sandia conducted for DOE about the consequences of terrorists detonating a shipment of liquefied natural gas (LNG) was released, triggering a number of calls by reporters to the Media Relations office.

One arrived while the designated answerer of LNG study questions was not immediately available, so our student intern jotted down the info from the caller, who had said, of course, that he was calling about LNG. When the designated answerer returned, he read the note, then asked, "Who's Ellen G?"

\* \* \*

Retiree Jim Borders e-mailed recently that the Albuquerque Quality Network had notified his wife about a new quality examiner from Sandia, identifying her as a Distinguished Member of Lavatory Staff.

"Things must have changed since I retired," he wrote. "I never thought Sandia would have Members of the Lavatory Staff. Evidently the bathrooms need a lot of work."

There's quality for you.

\* \* \*

Here's another testament to the fine work photographer Randy Montoya (12651) turns out about the fine work Sandia turns out. Go to Google ([www.google.com](http://www.google.com)), click on "images" above the subject line, then type "jpg" with no punctuation in the subject line. The first two images you see are Randy's illustrations of Sandia work.

\* \* \*

A very nice e-mail arrived in the Media Relations office not long ago. "I was trying to explain the Z machine to my son who is a high school freshman," it said. "He had asked me about fusion (and) of course I can only talk in very simple terms about it. I was very pleased to see a recent article showing a picture of the firing of the Z machine and talking about its refurbishment. . . ."

"We are very fortunate in our country to have our national laboratories reaching for the future and helping to keep us safe. I am sure that we take our national labs for granted, but I would like to say thank you for all of the efforts of our national labs."

– Howard Kercheval (844-7842, MS 0165, [hckerch@sandia.gov](mailto:hckerch@sandia.gov))

## Sandia receives 'A' grade, Lockheed Martin gets one-year contract extension

Sandia got an 'Outstanding' grade. Lockheed Martin got a one-year contract extension. And everyone involved was happy.

That in a nutshell is what happened in December when the National Nuclear Security Administration's (NNSA) Sandia Site Office announced completion of the DOE/NNSA FY2004 Performance Evaluation Report, scoring Lockheed Martin's performance in managing and operating Sandia.

### Performance objective

The total performance objective score was a 90 (Outstanding). That was good enough to give Lockheed Martin a sizeable incentive fee award and a one-year extension of its current five-year contract to manage Sandia. The contract, which had been set to end in 2008, will now go to 2009. The contract allows one-year extensions up to a maximum contract length of 10 years.

"Allowing a contractor to earn annual extensions for exceptional performance offers a unique and powerful incentive for leaders of management and operating contractors," said NNSA Administrator Linton Brooks.

Sandia President and Laboratories Director C. Paul Robinson said, in a

statement, "We are pleased to have received the outstanding rating from NNSA and are very proud of the Lockheed Martin/Sandia National Labs relationship." He said it provides "an understandable 'report card' that we'll use for continued improvement. . . ."

"I'm smiling from ear to ear" was Paul's slightly more exuberant comment to an *Albuquerque Tribune* reporter. "This is report card day, and it feels great. . . . I'm thrilled."

### New Mexico senators pleased

New Mexico's two US senators were likewise pleased.

"Sandia National Laboratories has been run extremely well since Lockheed Martin first took over in 1993, and the company has been a friend to the Albuquerque area and to New Mexico," said Pete Domenici, R-N.M.

"This move demonstrates the level of confidence DOE has in Lockheed Martin and the entire Sandia work force, while giving Lab employees a sense of stability and continuity," added Sen. Jeff Bingaman, D-N.M.

The report consists of NNSA's evaluation of Sandia's performance for meeting a variety of objectives, measures, and targets. It's a detailed assessment, and the full report totals more than 100 pages.

"Let me add my accolades to those that already have been conveyed," says Gary Zura, who as Level II Manager of Corporate Contracts & Policy Management Dept. 10730 oversees the annual evaluation process from Sandia's end. "Superb job!"

## Retiree deaths

Loy A. Robinson (age 94)	Oct. 19
Harold L. Brint (79)	Oct. 27
Betty J. Van Gundy (85)	Nov. 3
Robert G. Taffe (83)	Nov. 5
Ann E. Culley (96)	Nov. 6
Verne E. Blake (79)	Nov. 12
Edward L. Strance (87)	Nov. 12
Evelyn L. Garman (81)	Nov. 14
Dorothy A. Schroepfer (81)	Nov. 19
Richard J. Rudolph (76)	Nov. 20
Malcolm J. Snyder (81)	Nov. 23
Dean E. Irvin (86)	Nov. 25
Oscar L. Oren (74)	Nov. 29
William C. Wilson (76)	Nov. 30

# Sandia LabNews

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# Sandia signs partnership to develop automated sensor system for ensuring a safe water supply

By Nancy Garcia

Saying "the threats of the future cannot be met with the science and technology of the past," Microfluidics Dept. 8324 Manager Art Pontau presided at a cooperative research and development agreement signing ceremony Dec. 6 to develop unattended water safety sensors.

The multiyear, multimillion-dollar agreement will apply MicroChemLab technology to an integrated safety monitoring system. Sandia's partners are CH2M Hill and Tenix Investments Pty. Ltd.

The system will detect currently unmonitored biological agents such as bacteria, viruses, and protozoa in water or wastewater.

The United States has more than 300,000 public supply wells, 55,000 utilities, 120,000 transient systems at rest stops or campgrounds, and tens of millions of hydrants. "To try to protect this kind of infrastructure is extremely daunting," said Bruce Macler of the Environmental Protection Agency's Region 9.

## 'Nothing short of revolutionary'

Current real-time, remote water quality monitoring is limited to detecting such water-quality parameters as turbidity or the presence of dissolved solids, pH, nitrates, and ammonia.

Dept. 8324 Manager Yolanda Fintschenko called the partnership "nothing short of revolutionary" for advancing water security, safety, and sustainability. Peter Davies, Director of Geoscience and Environment Center 6100, described

how those three objectives are being pursued under Sandia's overarching water initiative.

The development schedule will be intense, with initial commercial units anticipated in late 2005, followed by wider deployment in mid-2007. The sensors are being developed for use in



SMILES ALL AROUND — Mim John (8000, left) shakes hands with Bob Leece, center, chief operating officer of Tenix. Looking on is Glen Daigger, right, chief technical officer of CH2M Hill. In front are two examples of MicroChemLab. (Photo by Daniel Strong)

potable water, reclaimed water, and wastewater systems.

"The goal is to increase protection of the nation's water supply," said California Laboratory VP Mim John (8000). Seeing the early investment lead to this, she said, "is really quite a dream come true."

The units will incorporate sensing technology created for  $\mu$ ChemLab through DOE's first Laboratory Directed Research and Development

## Sandia California News

grand challenge, which was approved nearly eight years ago.

"It has been great," said Larry Adcock, assistant manager of science and technology programs for the DOE/National Nuclear Security Administration's Sandia Site Office. He agreed in early 1996 to approve grand challenge funding to create a device that proponents envisioned would replace up to five laboratory-scale apparatus in a small, mobile device akin to the fictional Star Trek tricorder.

Jay West (8324) described how  $\mu$ ChemLab identifies proteins by separating samples into distinct bands in seconds to minutes. Separations occur in channels as narrow as a human hair coiled onto a glass chip about the size of a nickel. The device has identified viral and bacterial proteins and eventually should be able to also identify parasites, Yolanda said.

"It is beyond my imagination that people can come up with this type of technology," said Bob Leece of Tenix, the ranking executive to attend the event. He called being able to do business in the US, something the company has accelerated in the last 18 months, a "great honor."

Tenix, Australia's largest defense and technology contractor, will work with CH2M Hill as systems integrators. CH2M Hill is a global engineering and construction management firm with particular expertise in sewer and wastewater treatment design and hazardous-waste cleanup. Tenix has more than 30 years' experience in water supply, sewerage, and drainage infrastructure.

*"It is beyond my imagination that people can come up with this type of technology."*

## Former Sandian Dan Arvizu named director of NREL

Former Sandian Dan Arvizu Tuesday was named Director of the National Renewable Energy Laboratory (NREL) in Golden, Colo., effective Jan. 15. DOE Secretary Spencer Abraham made the announcement. Dan succeeds Vice Admiral Richard Truly, whose retirement was announced last June.

The Midwest Research Institute also appointed Dan Senior Vice President. Kansas City-based MRI has operated and managed NREL for DOE since the lab's inception in 1977.

Dan has been with CH2M Hill in Englewood, Colo., since 1998, first as vice president, then as senior vice president.

From 1977 to 1998 he had a distinguished career at Sandia, conducting and managing research in solar photovoltaics and other areas. He became director of Sandia's Technology Commercialization Center in 1990, director of the Advanced Energy Technology and Policy Center in 1992, and director of the Materials and Process Science Center in 1996.

"I am absolutely delighted," said Sandia Executive VP Joan Woodard. "I have had the privilege of working with Dan since he first joined Sandia in 1977 and have seen his passion and creativity to work some of the most challenging problems. Dan has extensive technical background and experience to lead NREL, as well as provide national leadership. . . . We look forward to continuing strong collaborations with NREL and wish Dan all the best in his new position."



DAN ARVIZU

## Samuel Bodman nominee for Energy Secretary

The nominee for Secretary of Energy during President George W. Bush's second term should have no trouble identifying with the advanced engineering research Sandia does. Samuel Bodman, nominated by the president Dec. 10 for the top job in the Department of Energy, has a doctorate in chemical engineering from the Massachusetts Institute of Technology and early in his career taught at MIT and later became director of its School of Engineering Practice.



SAMUEL BODMAN

Bodman also has impressive financial experience. He worked three decades in the private sector as a financier and executive. From 1983 to 1987, for example, he was president and chief executive officer of Fidelity Investments and a director of the Fidelity Group of Mutual Funds.

His Washington experience is not too shabby either. He's been the number two man in both the departments of Treasury and Commerce, currently serving as Deputy Secretary of Treasury. At Commerce he oversaw R&D organizations such

as the National Oceanic and Atmospheric Administration and the National Institute of Standards and Technology.

Bush called Bodman a problem-solver. "He will bring to the Department of Energy a great talent for management and the precise thinking of an engineer."

The appointment also drew kind words from other well-placed Washington figures.

"He is articulate and brings a broad and impressive set of skills to the Department of Energy," said Senate Energy & Natural Resources Chairman Pete Domenici, R-N.M., who met with Bodman on the morning of his appointment. "His management experience will be a boon to the department. His financial expertise will be a tremendous asset. . . . I am particularly pleased with his technical training and outstanding track record at MIT. He understands the critical role science, research, and advanced technologies will play in meeting our energy challenges."

Outgoing Energy Secretary Spencer Abraham offered his congratulations and told the DOE employee community, "Sam is a good friend and will be a great Secretary of Energy. . . . I look forward to working with him and all of you to ensure a smooth transition."

# Royalty Awards honor 225 Sandia inventors, authors

## Squires keynote speaker at Royalty Awards ceremony

By Michael Padilla

More than 225 royalty-producing Sandia inventors and authors were honored at the 12th annual Sandia Royalty Awards ceremony Dec. 9 at the Albuquerque Uptown Sheraton.

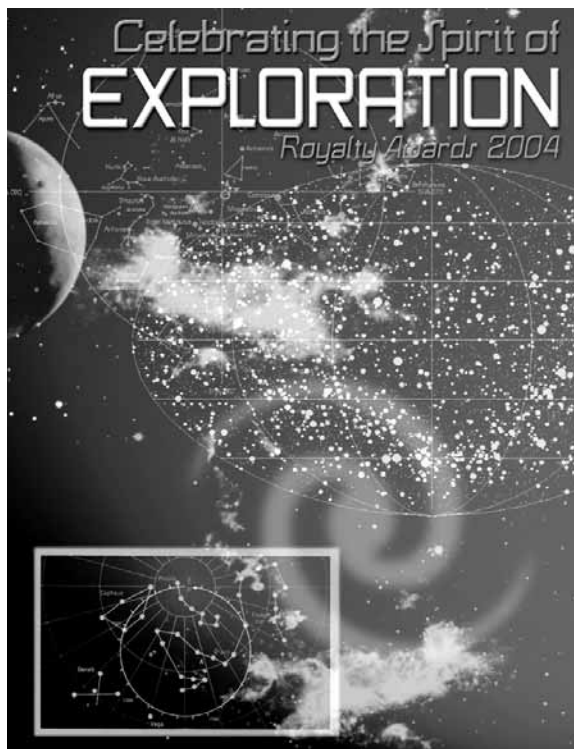
The event, "Celebrating the Spirit of Exploration," was sponsored by Sandia's Corporate Business Development & Partnerships Center.

The Royalty Awards celebration also recognized the significant contribution made by divisions that sponsor the Labs' research and development efforts, which are the foundation for technological innovations throughout Sandia. The event also acknowledged the licensing and legal staffs at Sandia.

Royalty income earned and received by Sandia for intellectual property (IP) licensed by Sandia to external entities is distributed through the Royalty Sharing Program. Royalty income is defined as income from license agreements in the form of up-front fees, minimum annual royalties, and running royalties. Twenty percent of all royalty income received at Sandia is shared with the inventors and authors of the IP in the form of monetary royalty awards.

David Goldheim, Director of Corporate Business Development and Partnerships Center 1300, said he was pleased with the outcome of this year's program.

"These numbers indicate that, for the future, we are continuing to fill the pipeline at a very healthy rate, and the licensing program is robust and growing," he said. "The more inventions we can put into the beginning of the pipeline, the more revenues and rewards we will find at the end."



PROGRAM COVER for the Royalty Awards ceremony highlights the theme of the evening: celebrating the spirit of exploration.

### Year-end highlights

This year's royalty distributions to inventors and authors are just under \$590,000.

The largest distribution in royalties to a single individual this year is \$68,000.

Sandia's total income from active licenses was \$3.2 million.

354 patent disclosures were submitted to the intellectual property legal staff.

151 patent applications were filed with the US Patent Office, and 102 patents were granted. This brings Sandia's total to 1951.

138 commercial licenses were negotiated last year. Sandia now has 866 active licenses.

The Divisions responsible for the future application of the technologies for the benefit of DOE missions will receive \$1.93 million.

An additional 10 percent of royalty revenues, or about \$296,000, is set aside to acknowledge significant contributors in generating and transferring the Labs' intellectual property, and to recognize individuals responsible for classified inventions.

Since the program's inception in 1992, Sandia has distributed more than \$3.75 million to inventors and authors.

David says it is particularly gratifying that these royalty-generating products are being sold in highly competitive markets, relevant to Sandia's national security missions and incorporating the Labs' technologies.

"Opportunities to reward the substantial efforts inherent in protecting and licensing intellectual property and to acknowledge the creativity and inventiveness of the Sandia staff and by executive management and among peers and families deserve the recognition accorded by the Royalty Award Ceremony," David says. "As the organization responsible for creating relationships with commercial businesses to exploit our technologies, it is our center's pleasure to host this annual event."

**Related article:**  
"Database highlights opportunities to license Sandia intellectual property," page 12.

## Mars researcher astonished with endurance of Spirit, Opportunity rovers

Mars is a cold dry place, yet there are possible clues that life could have been supported on the once watery red planet.

That is what Steven Squires said during his keynote presentation at the 12th annual Sandia Royalty Awards Ceremony held Dec. 9.

Squires, the principal investigator for the Athena science payload on the Mars Exploration Rover Project (MER) and a professor of astronomy at Cornell University, spent the last four years designing and building two rovers for the mission.

He and a team of engineers at NASA's Jet Propulsion Laboratory conducted numerous tests to ensure the rovers would survive the landing on the planet. He described how airbags were used to protect the rovers. (Sandia worked on the airbags that cushioned the Mars Pathfinder landing on July 4, 1997.)

In January 2004 Spirit and Opportunity touched down on opposite sides of Mars, and what was supposed to have been a 90-day mission could now possibly go for hundreds of days, he said.

### Adventure of a lifetime

Since the landing, the two rovers have found proof of past water on the planet, including minerals that can form only in the presence of water from sea-like currents.



AN ANIMATED Steven Squires talks about Mars rovers, science, and the spirit of exploration.

Squires showed the latest images from the Spirit and commented on the excitement every time the images are bounced back to Earth.

Each rover is equipped with "seeing eye cameras" that help navigate the rovers. It takes 10 minutes or more for a signal from Earth to reach the rovers, directing them where to go. The rovers are equipped with sensors that help guide around rough terrain.

Squires said he remembers where he was standing when he realized he was dealing with something extremely extraordinary.

"It truly has been the adventure of a lifetime," he said.

Spirit has traveled more than two miles across the Gusev Crater region where it landed. The rover has climbed the Columbia Hills and is now nearly 80 feet above the surrounding plain. From the data obtained from Spirit, the layered rocks of the hills are much different from the plain below. Squires said an explanation as to why they are different is that the rocks could have formed from volcanic ash that fell out of the sky or moved along the ground in ash flows, and minerals inside them could have been subsequently altered by ground water.

Opportunity has just completed its exploration of stadium-size Endurance Crater in the Meridiani Planum region.

Squires has participated in a number of

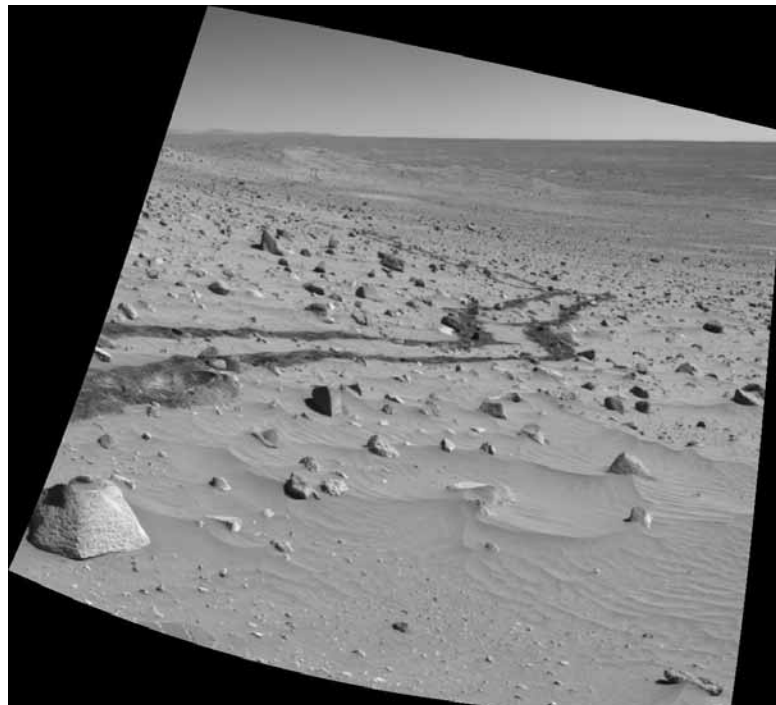


IMAGE from Mars Rover Spirit shows its own track winding across martian surface. (NASA image)

planetary spaceflight missions. He was an associate of the Voyager imaging science team, analyzing imaging data from the encounters with Jupiter and Saturn. He was a radar investigator on the Magellan mission to Venus, a member of the Mars Observer gamma-ray spectrometer flight investigation team, and a co-investigator on the Russian Mars 1996 mission. He is a member of the Gamma-Ray Spectrometer Flight Investigation Team for the Mars Odyssey mission, and a member of the imaging team for the Cassini mission to Saturn.

He recently served as chair of the NASA Space Science Advisory Committee and as a member of the NASA Advisory Council.

— Michael Padilla

## Optical innovator

(Continued from page 1)

problems can be quickly determined.

The oil/water interface sensor is the subject of a pending Sandia patent application and a research agreement with Customs Electronics, a well-established electronics company in upstate New York. The company is partnering with Sandia to develop a prototype device from the current benchtop demonstration. The car battery solution awaits a visionary entrepreneur to put this cheap, safe, patented solution in the hands of the public. In an invited talk at a recent American Soil Society meeting on Nov. 3 in Seattle, Jonathan presented his patented device for detecting hazardous waste movement.

### Avoiding the unexpectedly dead battery problem

A turkey-baster-like device inserted into a popped-open port has been the traditional way for a driver to test the amount of acid in a battery (and possibly splash sulfuric acid on his or her fingertips). Jonathan's simple invention requires no direct human intervention under the hood.

His procedure: factory-inject sulfuric acid or even, possibly, sugared water into a clear glass tube smaller than a soda straw and immerse same in the battery. Glass is inert in acid and should have ample longevity, he says.

In simplest terms, Jonathan shoots light through the tube, bounces it off a metal reflector placed at the end of the tube, and measures what returns.

The amount of light that stays in the tube depends upon the refractive index of the surrounding solution. If the refractive indices are identical, light would just as soon escape from the sides of the tube as stay within it. That is the case when the tube is filled with sulfuric acid at maximum charge. The refractive index is at first the same as that of the battery acid surrounding it (1.38). But over time, the battery acid weakens and becomes more like water (1.33). Its lessening refractive index is less enticing to the light in the tube. The exchange rate, in a manner of speaking, is worsening for light that travels abroad.

A simple solid-state light detector — a photodiode — at the tube's near end therefore registers more light as the battery deteriorates. The detector could easily be wired to activate a dashboard alarm light similar to ones that notify a driver that a seat belt is unclashed.

Sugar water also works well, Jonathan says, since the refractive index of water can be adjusted upward by dissolving sugar in it. "Quite a substantial change can be produced, far exceeding that needed for this application," he says.

While the glass of the tubing does have an effect on light leakage, says Jon, "the liquid core and liquid cladding are dominant." The tube is a millimeter in diameter, two to three inches long, and inexpensive: 200 set Jonathan back \$10 for his experiments. Mass production would drive costs

down far lower.

The ability to measure battery deterioration will become more important as more hybrid electric/gas vehicles, with their high reliance on batteries, take to the highways, he says. Another possible use is for cheap, continual monitoring of battery banks maintained by local phone companies. The batteries are used for back-up power to keep home phones working when wall-current electricity fails due to an outage.

### Using light to find the level of oil and water in a tank

Jonathan's recipe for detecting the interface between oil and water is somewhat different from the battery solution, but still involves light rather than electricity: take two five-foot-long optical fibers made of plastic. Mount them vertically in a tank that holds water with oil on top. Send light down one fiber, and then detect light carried back up by the second fiber. The strength of the detector's signal depends on the height of the oil/water interface. If it is all water, the signal is very strong, and the pumping machine is instructed to stop pumping fluid; there is no oil left.

"The device is immune to electromagnetic interference and will not create sparks in a potentially explosive environment," says Jonathan.

The possibility of sludge building up on the device, muting the light as the large tanks are filled and depleted, is a potential reliability problem that might be overcome by "potting" the fibers in a clear plastic that repels hydrocarbons, says Jonathan.

The transfer of this technology to a private company is the maiden effort of Sandia's new "Mission Centric Venturing" program, intended to expedite interactions with industry. The program offers Sandia researchers the alternative of marketing their ideas commercially while remaining at Sandia, rather than forcing them to start their own companies — a prospect that does not gladden the hearts of researchers who may feel unprepared to do that.

### Detection device for landfill

When people are interested in the behavior of a landfill that holds chemicals that may undesirably leach into groundwater, the problem naturally comes up: How can an observer tell what the chemicals in a landfill are doing?

For leaching to occur, water must be present.

Jonathan's solution: arrange two fiber optic cables like snakes, one above the other, in the landfill. Shine a light through the fibers. Because the temperatures of the fibers change the amount of light scattered by them, the emissions can be used to indicate the temperature at any point along the fiber. That temperature is determined in part by how much water is in the surrounding soil. Thus, fluid flowing down through the landfill would produce a clear signal from the wetted fiber.

Jonathan's innovative fiber optic sensors have received 12 patents in the last 10 years, five of them with Sandia and the others with DOE.

## Custodians became Angels for the holidays

For the third year in a row members of the Custodial Staff (10848) participated in the Angel Tree (giving tree) for one of the nonprofit children centers, La Mariposa Youth Development Inc. The Angel Tree is decorated with paper angels that have ages of the little children, boy or girl, their needs, and their desires.

YDI, founded in 1971, is a nationally recognized youth service organization that provides educational, developmental, and humanitarian assistance to children, youth, and families in central and northern New Mexico. YDI serves more than 20,000 clients each year.

The population La Mariposa center services, with its daycare and other varied services, constitutes very low income to impoverished parents and families. "Many of these toddlers and infants would not receive a present under their tree each year if it were not for the great people we have here in our Sandia Custodial Services Department," says Charles Hollis Sr. (10848-4).

"There are about 90 custodians at Sandia," says Charles. "About 87 of them participate. Many of them take more than one angel. Some buy extras just in case there is a child or two who got left out."

Gifts were delivered to YDI on Dec. 16. Santa gave gifts to 80 to 100 toddlers and infants on their last day of school. "We have a great bunch of 'angels' in Custodial Services," says Charles.

## Feedback

**Q:** The flag in the patio of the CNSAC building is in tatters. Does Sandia Security maintain and replace all flags flown at Sandia? Shouldn't this flag be replaced?

**A:** I appreciate your concern and patriotism. The flags have since been replaced. Security maintains the flags at the CNSAC building and Bldg. 802. Please call the Protective Force Captain at 284-9597 if you notice any of the flags showing stress at either of these locations. — Mark Jamsay (4211)

## Annual gift drive a success



DIVISION 10000 DIVERSITY COUNCIL held its annual gift drive from Nov. 8 through Dec. 16. With the generosity of many people, \$1,400 in cash donations plus many gifts were gathered for three organizations. Between Share your Care and Peanut Butter and Jelly, 171 people were supplied, and All Faiths Receiving Home received gift donations of twin bed sets, car seats and toys. Diversity Council member Cheryl Martin, seen here, prepares to load donated gifts for delivery.

## State of the Labs

(Continued from page 1)

defense posture.

**LN:** What about the elimination of the bunker-busting bomb program that you advocated, Paul? That's apparently a clear decision.

**Paul:** I feel it's sort of unfortunate, because when we really did get to have some discussions with Chairman [David] Hobson [R-Ohio], who chairs the House Appropriations side, he got a totally different understanding than when they had written that bill. We had been hoping maybe he would change. I want to make one point about the campaign. Nuclear weapons got mentioned once in the campaign, in the debate, by John Kerry. I hope people paid attention to what he keyed on. It was a view I don't agree with, but I find it to be certainly the charge from the left. It is that proliferation is the biggest problem and that the worst thing we could do to encourage proliferation would be if we built new nuclear weapons and therefore one thing we absolutely must not do if I'm elected president, John Kerry said, is build a new nuclear weapon like this bunker buster.

**LN:** How, briefly, do you counter that argument?

**Paul:** Very easily. I don't think it's the weapons that threaten, it's the deterrence balance. And we have had the ability to hold at risk key targets that others value more than they value an act of aggression that they would otherwise carry out. That's what we want to prevent. The knowledge that we could hold at risk what they value, whether it's on the surface, underground, anywhere, is sobering. And that is what deters. Lately they've been realizing there are other ways to go about that. Instead of making agreements or deciding not to be hostile aggressors, they could just hide this stuff away where we can't reach it. And there are several ways to do that. They could hide it under large structures with large roofs so you can't precision target it or they can place it deeply underground. And we've been saying we can't let them move out from under what was a stable deterrent for many decades. So we have to have the ability to hold at risk wherever things move to, and we think we have the technology to do that. That's what the system is all about. And it's not a fundamental change, it's not an aggressive weapon on our part, it's a deterrent weapon just the same as it always was. It's to plug up other actions they've taken to escape from our deterrents.

**LN:** We've had fairly generous funding for three or four years in a row, maybe more. We know there's no guarantee that will continue. What kind of contingency planning are you doing? What do we expect farther down the line in funding, and what can we do about it?

**Paul:** Well, we could talk about the strategic planning and the theme of our fall leadership conference, which was "Keeping the Glass Full." We weren't referring to money, we were talking about important programs — but they come one with the other.

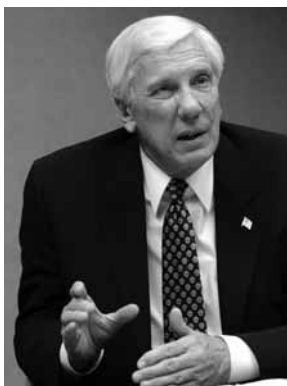
**Joan:** Our best budget for new revenue in this fiscal year is to be comparable to last year. We did have an increase in the carryover last year so we're expecting our costing will allow us to maintain a stable lab. So basically from '04 to '05, we expect things to be flat across the board. However, the years beyond '05 are where we're really spending time trying to figure out the driving fac-



LABS EXECUTIVE VP AND DEPUTY DIRECTOR Joan Woodard makes a point during the annual *Lab News* State of the Labs interview as Labs Director and President C. Paul Robinson looks on. (Photos by Randy Montoya)

tors. Clearly there's going to be pressure as a result of the federal budget deficit. We're hearing that already from NNSA, which is expecting some significant cuts in the budget request. The budget deficit challenge may disproportionately hit some agencies over others because both DoD and probably Homeland Security are to some extent going to be off the table for reductions. Other areas may be taking a bigger hit, and this means some of our programs in DOE and other agencies may see even greater pressure.

In addition to our discussions at the Fall Leadership Forum, we're gearing up over the next months to spend some time in formal and informal strategic planning. We just spent a day and a half in Mission Council going through each of the mission areas and our expectations over the next five years. We've created some bounding assumptions of where the mission area mix may change over time and also what the overall impact may be on the magnitude of the work. We expect to continue to see great needs in homeland security, which is a continuing opportunity for us to bring some real contributions to bear. At DoD, with a war going on it takes large budgets, so there will be pressure on other than the war-making part of the department. However, there are some who believe that as a result of the "beating" our military equipment is taking in the war, acquisition will have to increase, and R&D funding often increases in periods of increasing acquisition. This may again provide opportunities for us to serve. In the nuclear weapons program there's going to be some pressure, and I think we've yet to really see how that's going to bear



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out. There's an important study requested by the House that [NNSA Administrator] Linton Brooks is trying to organize. It's to take a look at the whole complex and examine appropriate transformation within the nuclear weapons complex over the next years.

**Paul:** And I cannot believe that the major themes will not be "smaller" and "less expensive." So reducing

the footprint as well as the cost have to be the stresses here.

### '06 budget to be huge turning point

**LN:** Is there anything in that line of thinking that would lead you to think that we might be moving toward an Atomic Weapons Establishment-type complex?

**Paul:** Some have suggested that that was behind this study but others have said, no, they don't really understand what the Brits are doing. I believe they are just natural pressures. Certainly

when Representative Hobson was here he remarked how what he found here was very different from what he had expected and for that reason he was very happy that he came and spent the time. And in comments he made to others and to us he said he had expected to find the same kind of things he saw at Savannah River and at Oak Ridge Y12 Plant and at Pantex — which in his belief looked like factories of 40 or 50 years ago and not modern operating companies. And in that sense he felt very good, since he's the one who asked for the study and he wants to take down old-looking and old-style factories and come up with some more modern ones.

I have one addition that I think is very important that suggests that the FY06 budget is going to be the huge turning point. It arises because of the way changes are going on in the Administration. There are changes throughout the government and cabinet positions and senior officials everywhere. It's becoming less and less the case that people who serve the president stay as long as the president; most serve one term or half a term, as was familiar for awhile. But the people who are staying are the OMB [Office of Management and Budget] folks. Now, one of the things that does not catch a lot of the spotlight are the constant budget battles between the agencies and OMB that lead up to the president's budget finally getting developed. We've had to depend upon the Secretary, the Deputy Secretary,

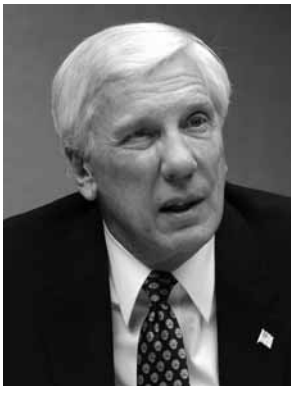


*"Our best budget for new revenue in this fiscal year is to be comparable to last year. We did have an increase in the carryover last year so we're expecting our costing will allow us to maintain a stable lab. So basically from '04 to '05, we expect things to be flat across the board."*

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# State of the Labs

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*“And what they found is a revolution. . . . [T]hey found that most of the early work that’s been done in the field is not as useful because they kept finding this funny signal that was coming from all of the gene arrays, micro arrays. It was coming from the solvent these things were in.”*

and Linton Brooks to argue and carry the torch back in fights against OMB positions, which are never to increase things but always to ask what could be cut back. Except now there will be green and new people; in fact, they probably won’t be well attuned to knowing what game is being played yet, but the same OMB people who were there the first four years will still be there. And so I think the balance has shifted considerably toward the side of OMB and their tendencies to reduce rather than add, and that it’s the ’06 president’s budget we all had better watch out for.

**LN:** *When are we going to see that?*

**Paul:** January. And then it gets argued with the Congress for the next number of months while there’s a continuing resolution. But I don’t think they could continue on. You do recall during the campaign there was a fight within the Republican party with members of the House saying we’ve let foreign trade go too far out of balance, the national debt has risen again. We’ve got to come to grips with that and so we won’t approve just an open checkbook. And so I believe all of those pressures are converging so that in the ’06 budget you really better sharpen your pencils and put on the green eyeshades.

## Labs’ technical innovations superb

**LN:** *What’s going well for Sandia right now, and what, if anything, is not going well? What’s the overall status of things here?*

**Joan:** I think one thing that’s going well are the enormous contributions, the technical contributions, for our customers. Our customer satisfaction survey completed during the summer showed a statistically significant increase in customer satisfaction and sense of value we provide to them. To me that was a great, great vindication. Testimonials continue to come in; letters to Paul’s office highlight the great contributions we are making.

**Paul:** I’m convinced we’ve never been better in the technical innovations we’ve done and the development of applications nearly immediately of any of these breakthroughs we’ve seen.

We had a talk at fall leadership about a detector to measure directly gene changes. It is sort of revolutionary to that field. As the environment that living cells are in changes or disease becomes present or other species a cell must interact with come into being, the cell begins to change its genes and turn on or turn off certain ones. That’s been documented very well in a few things. That’s the real life force that goes on. Well, our people said we could observe this a lot better than those doing it with filters and dyes looking at fluorescence, and so they split the spectrum up into 512 bins and have found a precision that’s extraordinary. And what they found is a revolution. For one thing, they found that most of the early work that’s been done in the field is not as useful because they kept finding this funny signal that was coming from all of the gene arrays, micro arrays. It was coming from the solvent these things were in. The company making the solvent was unaware of that as were all the researchers because they didn’t have the precision to know

that this was going on. So suddenly we came on to the scene as people about whom some said, “What do you know in genetics and biology?” to “Is that what you’ve been working on? We all need that technology.” So a lot of people have been excited. That’s one of our big contributions to biology.

## We have a cohesive mission and identity

**Paul:** Let me say one of the things that I think is going well for us. It’s the message we communicated to David Hobson, and that is we based our current organization and the way we do business on a

fairly simple model that nuclear weapons must remain the priority mission of the laboratory — and that the other work we will do will be work that draws on the nuclear weapon capabilities, enriches them so that they’re more useful in the nuclear weapons program at later times. That makes a cohesive package to know who we are and what work and programs we want to do. It sets our other mission areas — the nonproliferation and assessments work, the military support technologies, the energy and critical infrastructures work, and the homeland security work. The one area that for awhile appeared would be excluded by that model was work in biology. But with taking on the major threat role in homeland security, biological and chemical threats, biology now fits fairly well. Of course we’ve applied our microelectronics capabilities, and the lab on a chip is a big turning point in all of that. And so we think that fits together to say who we are, where we’re going, and why we’re important to the country. It’s a message we



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believe. But certainly Congressman Hobson saw that, advocates it. He says he was very pleased to see the picture we put together. So I would say the basic picture of how we’ve structured ourselves to do business is working.

Now, at fall leadership, Bruce Harreld [of IBM] came and talked about cultural transformation and change. He showed us a list of great companies over history and said, what do you know about this list? You stare at their eminent names. A lot of them went out of business and certainly they all sort of reached the end of their rope or nearly did and had a major turnaround, including his own company. And so he said he couldn’t articulate what needs changed at Sandia but said, “Every one of you here working together knows that it wouldn’t take you long to decide because of the very success you’ve had.” And he said, “I did my homework on Sandia. You guys have really been successful, but the very success you’ve had has sowed the seeds for your problems of the future.” He meant when we think we don’t need

to change, we won’t question any more, saying, “Oh that’s fixed, we won’t change that.” So I don’t want to be so over-confident in our picture to you about how nuclear weapons and the other things stack up so neatly that I imply that that’s the way it’s always going to be, because we certainly can’t predict that future. We have to be constantly questioning both how we do business and what things need to change, because the outside world we interact with has changed.

**LN:** *That maybe answers the other part of the question. What might not be going so well or what do we need to appeal to employees or others to help with?*

**Joan:** I believe over the next years we’re going to feel pressures on the budget, and pressure across government to be much more cost effective. We need everybody to step up to the plate and really work on efficiencies. And that comes not only in everybody’s individual job and how they can be more efficient and careful about their expenditures and expenses but also it really reinforces the importance of the work we’re doing in putting in place more effective, cohesive management systems. We’re building on the work going on in the Integrated Enabling Services SMU [Strategic Management Unit] and the Nuclear Weapons SMU. We’re developing an Integrated Laboratory Management System. The whole idea is that by integration we actually can leverage to reduce costs and be more efficient across the board.

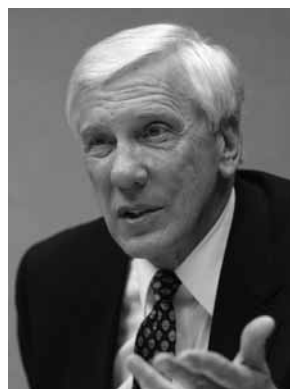
## Open season on bureaucratic processes

**Paul:** I think that’s where we have contributed not only to our own fiscal status but to the whole complex — some of the ideas we’ve been developing of late should be used much more widely, not just in our manufacturing programs but in everything we do here: Lean Thinking. There’re so many steps and processes you don’t need to do. Once you have methodologies to recognize those, not only are you cheaper but you are so much better than you were with these not-value-added steps in there. This is a time to start harvesting some of the things we’ve already proven can work.

**Joan:** An example of that is the recent work on Lock Out/Tag Out [electrical safety]. A number of audits have highlighted problems in our LO/TO program. We just don’t effectively perform or really integrate that habit into our day-to-day operations in so many areas where we have high-powered equipment. A team applied the Lean/Six Sigma approach to mapping out processes that are defined in our ES&H manual for LO/TO. The purpose was to clarify and simplify. Previously, the program was so complicated that some users, I am told, went to the law for direction rather than to our manual. Significant clarification and simplification was achieved. Great compliments to that team, and I hope that that will lead to similar work in other areas.

**Paul:** And it’s always open season on bureaucratic processes. I think anytime you find that we’re doing things bureaucratically and quit thinking how to do it better, there’re probably tremendous gains that can be made. And the other thing about Lean/Six Sigma, which was invented by American professors but then realized by the Japanese, is that when they finally applied it to their business processes, the first time they figured about 4 percent of the things

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*“And it’s always open season on bureaucratic processes. I think anytime you find that we’re doing things bureaucratically and quit thinking how to do it better, there’re probably tremendous gains that can be made.”*

# State of the Labs

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they were doing added real value and 96 percent was wasted effort and motion. Why they were doing these no one could answer. Well, those

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that have improved the most, the very best in the world — the model company is Toyota/Lexus — they think they’re up to about 25 percent of value-added work. So this is going to go on for awhile, eliminating the waste.

## Big turn-around in security management

**LN:** Are the security management problems that afflicted us in the last 18 months mostly resolved to your satisfaction?

**Joan:** I think we can report that we have made some significant strides in improvement and, of course, we have some areas of continued work. The place where we made noticeable improvement is the overall Protective Force. The performance of the people is really setting the bar for many others. I think there’s been a wonderful, dramatic turnaround that we should all feel very, very proud of, and congratulate the team. The areas where we have our challenge are where security hits the line. That is where we have individual responsibilities for protection of classified matter, classified materials, documents, etc. in the line. Other areas are in our self-assessment. That’s not just each manager looking at his or her own operations but data that Paul and I could look at corporately to say, yes, we’re on track, we know that we are in fact implementing our policies and they are effective.

**Paul:** I would worry the most if anyone should draw the conclusion that good security is a destination as opposed to journey. It is a journey, and things will change, and in particular we know lots of foreign intelligence services target us. They aren’t going to stop because of the things we’ve done. They will now be looking for other routes. And one of those that we’ve targeted and we’re all likely to lose to sleep over is that we have gotten better at putting our classified information on classified information networks. Making sure we don’t have vulnerabilities in those networks is going to be a huge undertaking and one that’s going to require a lot of vigilance and day-to-day attention. Once again you will never say, “Boy, we’re good enough.”

## Need more work on safety

**Joan:** Personally, my worry level has come down a bit with regard to security. This has allowed us to see some of the problems we have in other areas. One area that I think is extremely important to emphasize is safety, our safety culture, and the overall ES&H operations in the Laboratory. And again where policy is implemented by the line is where we have significant problems and need improvement. Examples are the accident rate. We look at our accident rate and say that’s not so bad. But unfortunately if you compare ourselves with some of the best out there within the DOE system, we find that there are others better than we are. And if you go out in the industry to companies that have really taken on safety as a significant value, we have a long way to go.

It gets back to simple things like mindfulness, paying attention, planning work, following your

procedures. I recently had an opportunity to talk with a group of folks involved with one of the near misses in electrical safety that occurred in November. It was an example where an experiment was modified but in planning the modification not enough thought went into the safety aspects. That was further compounded by the employee involved in doing the actual experi-

ment not strictly following procedures. The combination of the two led to a shock situation for an individual — fortunately not serious, but truly a near-miss. So plan the work, be mindful. There is no place where we can short-cut safety. That’s true whether it is paying attention in the winter when you’re walking to the parking lot where there may be ice or

whether you’re dealing with a high-voltage electrical experiment.

## Recruiting extremely important

**LN:** We had a big push for recruiting for several years and now it seems to have calmed some. What is our situation in recruiting?

**Joan:** Two or three years ago we put a lot of attention and focus on very high quality recruiting — improving our recruiting, candidate review, and selection and increasing the magnitude of our recruiting. For the past few years we actually exceeded our recruiting goals for each year of about 500 people. Because we saw good candidates and our budget was going up, mostly in nuclear weapons, we actually recruited above our plan, hiring about 600 a year. This last year, anticipating some budget uncertainties, we hired to our plan of 500. This year we believe we will need to keep the Lab size steady at 8,500, based on analysis of this year’s budget and a multiyear perspective. This means a 350-400 person hiring program, which is a very good hiring program, and we will be bringing in outstanding candidates.

Let me add a special thanks to the people who this past summer hosted students and worked with students. Because we see the nation facing a terrible problem with math and science education — getting the best and brightest to go into the physical sciences and engineering in college and graduate school — we have a very strong summer-hire program. We had 1,400 students here last summer, and the impact we had with those students, encouraging them in their careers, is something that people should be very, very proud of.

**Paul:** And hopefully it’s preparing a number of students to wish they could work at Sandia later in their careers. We had already mentioned the [budget] carryover. Carryover in DOE is fairly small by the way the rules work, but in Work for Others agencies, defense, intelligence, and homeland security, we can carry those over. I think it’s been a part of our diversifying as “a true national lab” that has given us carryover, which allows us to do a number of things not as one-year slices anymore. We can look at multiyear planning, and that’s going to continue to be a big help to stabilize things in the future.

## Workforce larger than just employees

**LN:** What about Limited Term Employees? We have a number of them, they develop good skills here and become experienced members of the staff, but we can’t guarantee they can stay. Can we do a better job

of bringing them on as permanent employees?

**Joan:** First, let me emphasize that limited term positions, just as the name implies, are positions for which we are uncertain about the long-term Lab need. Just as we do with the 1,400 students we had last summer, we’re always looking for the best that we might consider for evaluation as regular employee candidates. There are many places in the Labs where some combination of staff augmentation, contract employees, limited term employees, postdocs, and regular staff is very appropriate. This is especially true where we have programs with uncertain future funding or we may need a unique skill for a short period of time. Those approaches to managing our workforce are very appropriate. We always must be clear that these temporary positions do not guarantee future employment.

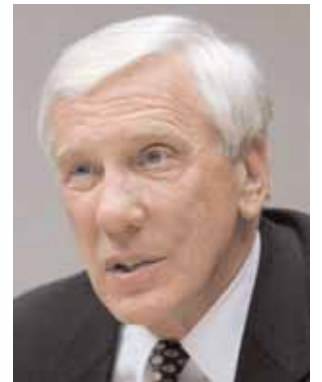
**Paul:** In the same way you recall this was a thing thrust onto my plate the first month or two I got this job — the question of hiring staff augmentation people away from our own contractors. That seemed to be the predominant model. Well, we did fix that — I think in a way that now allows contracts to fluctuate up and down according to our real needs and not having the same obligation as if everyone were employed.

**LN:** Contractors are, in a way, a hidden workforce. How many on-site contractors do we have?

**Joan:** As I mentioned, contractors are an important part of the base to accomplish our mission. We have staff augmentation contractors and many individuals from performance-based contracts — where we contract for a product or service rather than for an individual person.

**Paul:** If you count us, I think we’re around 8,500 people in round numbers on roll. But you can think of us as 10,000 as an overall Lab workforce, with the combination of limited term and augmented labor of various types. But it’s interesting — those who have clearances active in our system total 13,000. That’s because we have changed our rules about consultants. With the Sandia pension plan it used to be that when you retired you had to banish yourself away from here. We were the only lab that did that. So among the changes we made and got approved in the previous big change in pension benefits was that change. We have to be careful about how many hours people can work, but it does allow people to still have an association with the Laboratory. And I can tell you when 9/11 happened

*“You can think of us as 10,000 as an overall Lab workforce, with the combination of limited term and augmented labor of various types. But it’s interesting — those who have clearances active in our system total 13,000. That’s because we have changed our rules about consultants.”*



the first phone calls were from retirees all over whose brains had not stopped working, and they were thinking: Have you guys looked at doing this? I can help with that. With the change, we were able to allow more people to keep a continuing relationship after they retiree.

## The gate delays

**LN:** The extraordinary delays at the gates: They are affecting every single employee, so I know that’s on everybody’s minds. Do you know why it’s taking longer for each car to go through the gates and is there anything you can tell Sandians about that? Will it change? [Also, see Lab News front-page article, Dec. 10.]

**Joan:** First of all, the base security is an important part of Sandia National Laboratories security. So I would first ask everybody to be understanding, to be patient, and to be respectful as they go through the gate. The base is working

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LAB NEWS EDITOR Ken Frazier, right foreground, and staff member Bill Murphy meet with Joan Woodard and Paul Robinson to discuss the state of the Labs.

## State of the Labs

(Continued from preceding page)

very hard to figure out ways to improve flow. Through their own self-assessment — looking at the procedures at the gates for allowing access — they found some needs for improvements. There have been some aspects of examining credentials that have been strengthened. Recently the *Sandia Daily News* listed what people can do to have necessary information available when they approach the gate. Not being prepared slows down everyone. If everyone had their appropriate credentials out and with the new process of putting two and three protective force personnel in a row so that you can get two and three cars through at a time, traffic can move very well.

**Paul:** And they have been having problems as we've both grown and so there're more people coming through the gates. They have had more people coming on base because they've taken on some additional missions that were not here before. So the numbers are up, but as you've seen, across the military reenlistments are down, and that's true in security. As the needs have arisen in the theatres of warfare they've moved people, and so the very gate guards that we were having from

*"I'm an optimist, as you know, and I still believe that it's best for us to have the encounter with terrorists on their soil and not have them infiltrating into the US. And if they would like, to take their shots at us there, thanks to the brave men and women who go over and defend us there."*

— C. Paul Robinson

the military are now in Afghanistan and Iraq. All kinds of brand new folks are there, being trained by the others. The Air Force is looking at a system that would allow them to have more contract security guards in some functions, and among the functions they're looking at are gate guards. We may be on the way, but we haven't solved the

problem yet.

**LN:** *Is an act of Congress required?*

**Joan:** No, this was reported in the press as an initiative the Air Force has taken, Air Force-wide. How it will affect Kirtland we don't know yet. Meanwhile we need to continue publicizing that if people are prepared when they get to a gate then the flow can occur a lot better than it is now.

### The wars in Iraq

**LN:** *When we last talked to you in this setting it was just before the Iraq war began and that was much on your minds. Paul, you said then that you wondered if we would find nuclear, chemical or biological weapons in Iraq and you also said "God forbid" if they might use them against us in one way or another. What are your brief thoughts about what's happened in Iraq since then, both good and bad? And how the war's gone? And where we are with that?*

**Paul:** Let me give you a simplified capsule first. We're now engaged in the second war since we went into Iraq. The first war was a military campaign: We sent an invasion force to take power to overthrow the previous government; it was extremely successful. In fact, successful beyond anyone's guess as to how quickly all that could happen and the low number of casualties, just unbelievable, again in a place as big as Texas. The second war is a war of insurgencies, including reinforcement by a lot of places. Neighboring countries all over the Middle East have sent people in, and these are the insurgents we're battling. It's a totally different war, needing totally different tactics and with a different enemy than we faced the first time.

I'm an optimist, as you know, and I still believe that it's best for us to have the encounter with terrorists on their soil and not have them infiltrating into the US. And if they would like, to take their shots at us there, thanks to the brave men and women who go over and defend us there. The numbers of the recent Fallujah attack are just incredible in terms of the casualties of the insurgents, versus our casualties, including those captured as well as those killed or injured. In Fallujah we found some chemical shops, so now I replaced my fear about using chemicals in a mass effect on a battlefield to using chemicals in a terrorist attack. I still worry that our folks will see that. And there are still grounds to worry, as you know, that that's the thing we need to fear the most at home. Indeed, both the new Homeland Security Department and the Homeland Defense Northern Command are most worried about a bioterrorism attack here in the US as their number one priority. I worry just the same about that, biochemicals as well as industrial chemicals that could be used. So I'm still worried, but the worries have certainly morphed during the period.

*"I want to tell everyone how incredibly proud I am of the people of this Lab. Preparing for the Mission Council retreat I had each of the mission areas compile just a few pages on programmatic, technical highlights of this last year. Just reading through that list has been rewarding. . . . There're examples across all the areas that are very exciting."*

— Joan Woodard

### Bottling the nuclear genie

**LN:** *Paul, you published a really interesting commentary in the Nov. 25 Nature giving your thinking about containing nuclear proliferation in the future and world peace. You proposed a global network of NATO-style inter-country alliances (Lab News, Dec. 10). What stimulated your thinking along those lines?*

**Paul:** I did an interview with the editorial board of *Nature* and talked about some of my thoughts about the future of nuclear weapons and found myself drawn into a debate with them. Is the world going to change? Will it ever change or will it just keep going this way? And I said, now you've asked the really hard question. I have believed for a long time we should be spending a lot more time addressing that very question. I still believe it is a miracle beyond any expectation a human could have that we took weapons up in power by a factor of a million and used two of them in Hiroshima and Nagasaki, with the huge effect that had, and we have never used one of those weapons since. But more amazing we then took the designs of Hiroshima and Nagasaki and took them up another one million in effective yield-to-weight in thermonuclear weapons. And we've never seen one of those used. What will change that? Are we doing anything fundamentally that could prevent one someday being used? I said we're not and we should be giving our top attention to that. They asked what I would do. I said, "That's easy."

The US put forward the Baruch plan [after World War II], when we were the only power in control of the first generation of nuclear weapons. We said, "Let's draw a line now and have international control of these weapons." Not enough

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# State of the Labs

(Continued from preceding page)

people were shocked by the deaths of World War II, Hiroshima and Nagasaki, to do that. They were all in an arms race already, so that proposal died. Well, what has happened since then? Not only did that proposal die but any enthusiasm you might have had that an effective form of world government is just around the corner has sure gotten dashed to pieces by the poor performance of UN agencies. The United Nations as a structure is in the doldrums, to say the least. And so the question put to me at that point was, "Does that mean you can't do anything?" I said, "No, actually I've been toying with an idea." So I told them the idea I've suggested in a bunch of talks in recent times: I believe the North Atlantic Treaty has done more to prevent proliferation than has the Nonproliferation Treaty. And that collective security that arose there has done an awful lot to make people realize, with some hope, that nations can cooperate and agree to forego certain choices in order to have real security. And that in fact not only did all the original NATO nations do that, but almost all of the former Warsaw Pact now have changed sides and joined NATO under part of that collective security including collective nuclear weapons. They now don't need to have their own nuclear weapons, and they won't proliferate.

So I said, "Why are we not working this problem in parts?" Let's divide up the world into plates if you will, not geo-technical or tectonic plates but zones, and start building alliances. Now, one of the keys of my thinking is the US would help put those together. People of good will everywhere we'd invite to join. I wrote in the article how I would start in Southeast Asia

because almost all the folks could have weapons in this huge area. Also, A.Q. Khan's [then head of Pakistan's nuclear weapons program] proliferation network and his use of Malaysia to build and sell centrifuges are real worries. That should be a wake-up call for us. So, it is there I would form the next collective security pact and then move into northern Asia and then the Middle East. South America I think will be easy. And finally Africa, which is the hardest. None of this is going to be really easy. But it sure looks to me like a feasible way of gaining control over these super weapons, and gaining control over proliferation so that nobody needs to die from nuclear weapons again. And the bigger reward than people not dying is real collective security so the world can get on to more important things.

**LN:** *Have the problems with nuclear weapons in North Korea and Iran and Russian President Putin's recent statement about nuclear missiles intensified your concerns in these areas?*

**Paul:** I have known about all of those for a long time. We all knew these things for a number of years before they hit the open literature. There are real worries about whether someone is going to get one or more of these weapons and use them. What can stop it and what are we doing to stop it? Not very much. After my *Nature* article appeared someone said Robinson's trying to walk out of the obligations of the Nonproliferation Treaty. Did I ever say that? Do I believe that? Not at all. But the Nonproliferation Treaty is being quite ineffective. Let's go out and do something that has a chance at making a difference.

## Multiple masters, one mission: security

**LN:** *Back to Sandia. We used to have one fundamental mission and one main master. Now we have many different funding sources, agencies, and entities*

*to report to or get money from. The former situation created a lot of unity. Is there danger now of fragmentation and being a job-shop? You addressed this earlier with your comment about nuclear weapons being still the fundamental mission and everything else drawing around that mission, providing a sense of unity.*

**Paul:** Joan and I really have had great discussions on this. One of the key questions on the table was, what happens if this is the high-water mark for the nuclear weapon budget? If these other national security missions that we've taken on continue to grow, will this change the basic character of the Laboratory? Can you still have nuclear weapons as the prime program if its proportion of the funding goes below 50 percent? It's at 56 percent to 58 percent now. What if it goes below 50 percent? There used to be an idea that if nuclear weapons ever became 50 percent you'd have to stop doing some other Work for Others so that would never be true. I don't believe that. But what happens if nuclear weapons continued to erode in priority, down to 40 percent, 30 percent, . . . 20 percent? If nuclear weapons were only 20 percent that could still provide most of the infrastructure support. Is that a healthy lab and could we really guarantee weapons were the highest priority? We discussed it with our Board of Directors, the Mission Committee, and the Board, and were we taken up short! Larry Welch, who chairs the Mission Committee, said, "I was Commander-in-Chief of SAC [Strategic Air Command] and I was Air

*"The Lab has got to be a living organism and be prepared to change. . . . The state of the Lab I think is very healthy in that sense. I see that when I look at the list of innovations that have been done and that really make a difference. . . . We are mastering as never before the benefits of pursuing science and applications at the same time. We're doing that and doing far better than I think we ever have before, and it's amazing how it continues to build."*



Force Chief of Staff and I remember those years well. Nuclear weapons were 9 percent of the total budget, but if you thought for a minute it didn't dominate all our thinking and get the highest priorities, you were really wrong." There is a different viewpoint. It is security that we're about, and maybe that's what gives me so much passion around things like the *Nature* article and that debate. It's security that we're trying to develop, and that's our mission. I believe we can become "a true national lab" in this same model regardless of how the relative funding sources change. By the way, I don't find it at all hand-capping to have more than one customer. It makes life busier, but it gives us a lot more flexibility.

## The integrating force: Our capabilities

**Joan:** You're right to point out that for so long in our history nuclear weapons have provided that integrating force within the Laboratory. And so what about the kind of scenarios that Paul described? We've been debating that. What provides that integrating source? I contend it is the capabilities of the Laboratory. The nuclear weapons program has provided to the nation a wonderful range of capabilities. In fact, we now have very good processes by which we look at the health of those capabilities, 20-some capabilities across the nuclear weapons program. We're taking that same approach of active capability management and we're bringing that now to the Labs overall, some 35 capabilities. We're now looking at Lab-wide capabilities, and we have a tool by which we can actively do capabilities management. It's the capabilities that really provide the integrative force of the Laboratory. We serve national security but not in all areas. There are some areas where we are not that good and some

areas where we have no capability. But where we serve is where we have strong capabilities, and nurturing those must be one of the most important things that the leadership of the Lab does over the next years.

**LN:** *Let us follow up on this. Are we recruiting new employees to come to work in a nuclear weapons lab or in a capabilities base that gives them lots of opportunities?*

**Joan:** I talk to the new-hire orientation class every time. What I tell them is that we're a national security lab and you have an opportunity here to make contributions over a career in many different areas if you like. You could have multiple careers or multiple mini-careers at a place like Sandia, all serving national security. The bottom line is we're a national security laboratory and you'll feel the satisfaction of serving this nation and protecting this nation.

## Sandia's great self-organizing people

**LN:** *Is there anything we haven't talked about that you would like to make a point about?*

**Joan:** I want to tell everyone how incredibly proud I am of the people of this Lab. Preparing for the Mission Council retreat I had each of the mission areas compile just a few pages on programmatic, technical highlights of this last year. Just reading through that list has been rewarding. Not to cut any of them short, but the nuclear weapons program and the very demanding schedule of tests and hardware and analysis to

understand the design and really make sure we have a certified, qualified design, is going very, very well. There're examples across all the areas that are very exciting.

**Paul:** I've been using the analogy of a living organism now that we're into bio. The Lab has got to be a living organism and be prepared to change. We've got to look at our processes, and bringing in new recruits is a key part of that. The state of

the Lab I think is very healthy in that sense. I see that when I look at the list of innovations that have been done and that really make a difference. We get a lot of complimentary letters from folks, a lot of prizes, awards, we get National Academy memberships and people appointed Fellows of all the scientific societies.

We are becoming a better Laboratory in recent times. The budget support is just one aspect of it. Pointing to the things that really make a difference to the country is the biggest reason to have this organism exist.

We are mastering as never before the benefits of pursuing science and applications at the same time. We're doing that and doing far better than I think we ever have before, and it's amazing how it continues to build. We can put together teams more quickly to solve an important problem that comes up than we ever could before. As you study biology you find that self-organizing networks are the biological way. More than us managing from "top-down command-control managing" this place has reached the point of being self-organizing. We had some major highly classified projects that have come up, and I find people here have gotten the right resources, put together a team. When finally I get a report, I look and say, my God, they are using some of the best people at Sandia. How did they know to find them? Well, it's magic. That magic is something I believe all of Sandia knows well how to do. We have great people, and they're finding how to find each other and use each other in performing our programs. That makes me very optimistic about the future.



# Paul Robinson, serving on panel at Washington summit, calls for intensifying innovation

**Summit sponsored by Council on Competitiveness was 'call of warning' to the nation**

By Chris Burroughs

America must wake up to how crucial innovation is to the future of this country, says Sandia President and Labs Director C. Paul Robinson.

In mid-December he represented DOE and all its 19 laboratories on a panel at the National Innovation Initiative Summit held in Washington, D.C. Sponsored by the Council on Competitiveness and carrying a theme of "Innovate America," the conference focused on the need for the US to become more innovative if it is to remain competitive in the global economy.

"It was a call of warning," Paul said. "The world is moving forward. The global economy is moving forward. Innovation has been a key of 50 percent of the growth of our economy, and we need to stay innovative if we are to be competitive."

The summit was a rollout of a report by the Council on Competitiveness that studied what needs to be done to ensure the country's competitiveness. As part of the rollout, three panels gave presentations that discussed what is in the report.

Paul's panel was titled "Mobilizing for Success in the 21st Century" and consisted of Paul; Norm Augustine, retired chairman and chief executive officer of Lockheed Martin; Mitt Romney, the governor of Massachusetts; and John Engler, president of the National Association of Manufacturers.

"I began by saying we always try to be careful about the terms innovation and invention," Paul told the *Lab News* after his return from Washington. "Invention is easy to define as something new that is useful. Innovation is taking something known well in one field and applying it to another field with revolutionary benefit."

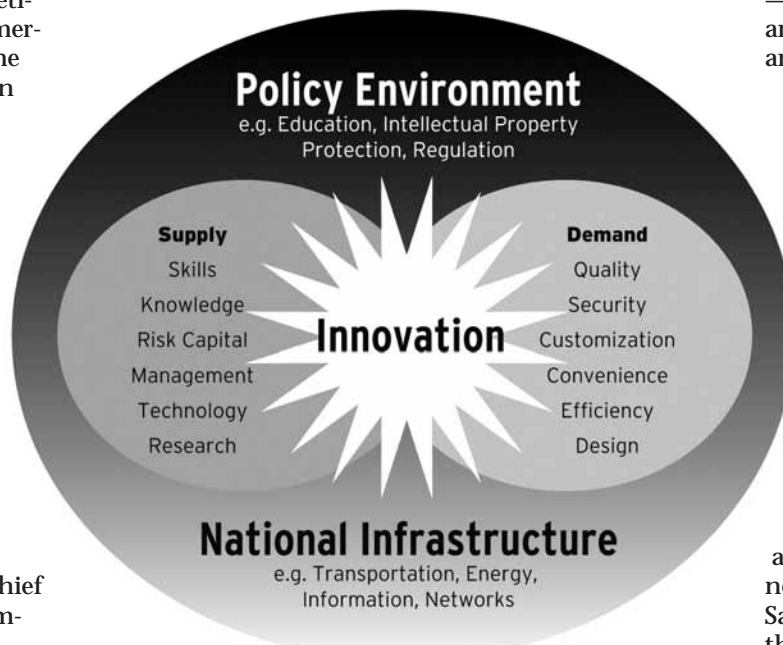
He also talked about one of his favorite terms — "T's" — people who are very deep in some technical field but always have their arms open wide across their disciplines to look for other places they can relate their field to and create advantage.

"You create T's by organizing people to work in multidisciplinary teams and work at the state of the art," he said.

He then touched on the fact that it's always been true that much of the front-end research comes from government laboratories and agencies, particularly as the world becomes compli-

cated and more disciplinary. To make advances, major research facilities beyond private industries are needed.

Today, Paul said, 28 percent of national investment in research and development is from government spending. In 2005 the federal investment in research and development is \$130 billion.



GRAPHIC from Council on Competitiveness report "Innovate America" depicts how multiple factors converge to encourage innovation.

That number, he said, is the highest in history.

"This administration made a big commitment to R&D," he said. "It's the highest in several decades when you measure either share of discretionary spending or fraction of GDP [Gross Domestic Product]."

That's the good news. The bad news is that so much depends on riding over the top of that \$130 billion.

The Council on Competitiveness report stresses that the world is changing and that the US could well be falling behind.

"Clearly the rest of the world has woken up to doing R&D," Paul said. "They are doing R&D, building laboratories, and training scientists. They are not only going to compete with us for manu-

facturing, but for innovation and new products."

Paul said he was asked to discuss the role of the national laboratories in innovation in the country today. Sandia is one of 19 DOE national labs and four technical centers.

He noted that these are "not your father's labs." These labs alone employ 30,000 scientists and engineers and perform cutting-edge research — usually in multidisciplinary teams, both large and small, doing R&D, advanced technologies and applications.

In particular, Sandia has been reinventing itself as it pursues its missions in national security, energy supply, and the stopping of the global war on terror.

"We're already doing what's recommended in this report," he said.

He said that one of the drivers for change was the National Competitiveness Technology transfer Act of 1989 authored by "two of my favorite senators" — Jeff Bingaman, D-N.M., and Pete Domenici, R-N.M. This legislation allowed Sandia and other laboratories to develop more partnerships.

"Our partnerships extend not only to universities but to industry with products and applications," he said. "Sandia has strategic partnerships with 32 universities. In the industry area Sandia alone has 580 CRADAs since we started the first one in 1992."

The other area he believes is important to both universities and industry is the opening of Sandia's facilities as "user facilities." Sandia now has 20 user facilities that people can come to and use. One, in particular that is really exciting to Paul is the Center for Integrated Nanotechnologies currently being built along Eubank Blvd. He calls it a "center of innovation."

A question directed to him at the summit dealt with future goals.

"One of the things we notice is that there is a spectrum of research from development to applications and finally to products," he said. "Universities dominate the front end and industry dominates the tail end as the ones who deliver the product. The difficulty in getting them to interact involves getting through that spectrum. We at the labs do some of everything in that spectrum. We can serve as a natural bridge between the university research communities and industry."

The two other panels at the summit discussed "Thriving in a world of challenge and change"

## Paul Robinson's 'heads-up' letter to all Sandians outlines proposed rule change on polygraph policy

*Editor's note: The following letter was sent via e-mail from Labs Director and President C. Paul Robinson to all Sandians on Monday, Jan. 3.*

Fellow Sandians,

You might recall that last spring we had worked with Linton Brooks and Deputy Secretary Kyle McSlarrow to try and put more reason in who would be subject to polygraph exams on either a regular or random basis. During the holidays, work was completed on a proposed rule change which should be submitted for publication in the *Federal Register* this week. This message is a "heads-up" to let you know that this change is being proposed, but of course it will be open for public comment before it goes into effect.

Although I've not seen the proposed rule as yet, my understanding is that it follows along the lines of what we had all agreed to.

The rule will include the following requirements:

**Mandatory:** Categories of Federal and contractor employees subject to mandatory CI evaluations, to include polygraph, no less frequently than every five years would include: (1) Office of Counterintelligence-related employees; (2) most Office of Intelligence-related employees; (3) Non-Intelligence Special



PAUL ROBINSON

Access Programs designated by the Secretary; (4) Individuals with regular and routine access to Top Secret Restricted Data; (5) Individuals with regular and routine access to Top Secret National Security Information; and (6) Individuals designated by Program Managers in certain DOE Offices and Programs with approval of the Secretary.

**Random:** Beyond core coverage, CI evaluations, to include polygraph, of Federal and contractor employees may be randomly scheduled for: (1) Office of Security-related employees; (2) Office of Emergency Operations-related employees; (3) Office of Independent Oversight and Performance Assurance-related employees; (4) Sigma 14 and 15 employees and those who have regular and routine access to weapons concepts and designs that could produce improvised nuclear devices; and (5) System administrators for systems containing classified information.

I believe the effect of these changes on Sandia will be minimal; I supported the proposed rule change because I believed these changes made sense. Those people who are subject to mandatory polygraphs are those with routine access to materials at the Top Secret level, or its equivalent. Those coming under random polygraph examination have routine access to the most secure information of our weapons program. I hope that you will take the opportunity to read the rule change when it appears, but wanted to advise you we knew it was coming and that I have supported it.

Regards,  
Paul R.

## Sandia to conduct annual property accountability activity Jan. 17-Feb. 21

By Chris Burroughs

Sandia will conduct its annual Property Accountability Statement activity Jan. 17 through Feb. 21. Labs employees and contract associates will receive an e-mail alert requiring them to complete their annual property accountability statement.

The statement is a tool designed to promote individual awareness of property responsibilities and to enable effective communication among Sandians, contract associates, and their property coordinators.

"From a DOE/NNSA perspective, accountability statements are a key element of our approved property system and are part of Sandia's performance objective for FY05," says Jodi Maheras, Manager of Property Manager and Reapplication Dept. 10267. "As such, we have a performance goal which is incorporated into Sandia's prime contract evaluation."

The annual accountability statement goes to individuals and shows what property items are assigned to them for which they are accountable. Their response is acknowledgement that they reviewed the information and agree or disagree

with its accuracy. The activity does not constitute a physical inventory; such an inventory is verification of Sandia's control of government assets and a requirement for Sandia to buy and hold government property.

"Responsiveness to the accountability statements and outstanding inventory results are critical to our annual property system approval granted by NNSA," Jodi says.

In addition, a physical statistical sample inventory is planned for the spring of 2005. By identifying discrepancies in the database now through the accountability statement exercise, Sandia can mitigate the risk of inventory shortages later.

"Therefore, if discrepancies are noted in your accountability statement, please notify your property coordinator and Property Management as early as possible so that research can be conducted to reconcile these discrepancies," Jodi says. "This will ultimately minimize line effort once the inventory is begun."

Anyone with questions regarding accountability statements should contact JoAnna Vigil at 284-0145 or Jodi Maheras at 845-0610 in New Mexico or Vicki Schoeneman at 294-2588 in California.

## Internal website provides beryllium information

Everything you wanted to know about beryllium can now be found in just a few clicks.

A new website has been created on the Sandia Restricted Network to provide beryllium information.

The website includes a description of beryllium, an updated list of affected buildings, a list of related resources, and frequently asked questions.

Lisa Hooper (6328) says the purpose of the website is to update the Sandia Beryllium Inventory that was started this year.

The website provides a single site containing information and details regarding Sandia's beryllium inventory initiative that could be updated, eliminating redundant and outdated information.

"The website is intended for managers, workers, contractors, and roving personnel who have concerns regarding potential exposures to beryl-

lium and/or have responsibilities to implement controls for work/workers performing work in contaminated spaces," Hooper says.

The resources page contains information on who to contact concerning beryllium, including the list of division ES&H coordinators and the number to contact at Medical.

A manager's guide for beryllium-contaminated sites contains useful information for what to do in case there is a beryllium incident.

Information on Sandia's Medical Clinic voluntary beryllium screenings is also given.

Links to related sites include the DOE Chronic Beryllium Disease Prevention Program, DOE site on Chronic Beryllium Disease, National Jewish Medical and Research Center, and ORISE — Former Beryllium Worker Medical Surveillance Program.



*This monthly column highlights Sandia Lab News items from 50, 40, 30, 20, and 10 years ago, but each column does not necessarily include items from each decade.*

**50 years ago . . .** The Jan. 14, 1955, *Lab News* noted that the maximum Social Security tax employees would pay in 1955 was going up to a whopping total of \$84 (two percent of a maximum salary of \$4,200). The maximum previously was \$72 (two percent of a maximum \$3,600 salary). According to the Social Security website, the maximum for individuals in 2005 will be \$5,580 (6.2 percent of a maximum \$90,000 salary); employers will pay an additional \$6,885 (7.65 percent of \$90,000).

**40 years ago . . .** Early pulsed power: "The world's largest flash x-ray device" is now in operation at Sandia, announced the Jan. 15, 1965, issue. The machine produced more than 20 rads (equivalent to total cost of 1,000 chest x-rays) and was projected to produce up to 50 rads later. It was to be used to study radiation effects on electrical components and for testing large electrical systems, but some problems remained. For one, firing it generated lots of electrical noise, causing the phone to ring. And how times — and prices — change! A Jan. 29, 1965, story stated that Sandia's medical insurance plan at the time provided a maximum of \$15,000 in benefits over an individ-

ual's lifetime. (A single, uncomplicated surgical procedure and short hospital stay could total that much today.) Sandia's medical plan administrators say there is no lifetime limit today for the several optional plans available to employees, but a lifetime maximum of \$150,000 applies to Medicare-primary retirees in the Mutual of Omaha plans.

**20 years ago . . .** Sandia researchers Tom Zipperian, Ralph Dawson, and Chuck Barnes had succeeded in making a tiny semiconductor diode laser from a new kind of material, the strained-layer superlattice (SLS), reported in a Jan. 18, 1985, page-one story. (Tom is today Level II Manager in MESA Microfabrication Dept. 1740.) This marked the first time SLS material had been used to make a successful continuous-wave solid state injection laser. The story explained that SLS semiconductors, under development at Sandia since 1980, made it possible to tailor make semiconductor materials with a new range of electronic and optical characteristics.

**10 years ago . . .** Sandia and Intel had just recaptured the world's supercomputing record from the Japanese, according to the Jan. 6, 1995, issue and by a "befittingly super-sized margin" of more than 50 percent. Linking two Paragon supercomputers into a distributed system, Sandia and Intel had achieved a speed of 281 gigaflops, or 281 billion floating point operations per second. For comparison, Sandia's Red Storm supercomputer, when fully operational this year, will have a peak speed of at least 40 teraflops, or 40 trillion operations per second. The same issue reported that the proposed Martin Marietta and Lockheed merger was on schedule and expected to close in the first quarter of 1995. — *Larry Perrine*

## Database highlights opportunities to license Sandia intellectual property

By Michael Padilla

A new database created to highlight opportunities to license Sandia intellectual property is now available for the general public.

The purpose of Intellectual Property Available for Licensing (iPAL™) is to show Sandia technologies that may not be fully utilized, and to effectively commercialize the technologies.

"iPAL highlights some of the interesting technologies Sandia has which many people outside Sandia have often never heard of," says Licensing and Intellectual Property (IP) Manager Kevin McMahan (1304).

"The database gives the public an opportunity to see if these technologies would be valuable in the commercial world," adds Kelly Cowan, a graduate student intern studying Management of Technology, who is the developer of iPAL.

The web-based system allows customers to search through the intellectual property that is available for licensing and get in touch with the appropriate people to negotiate a license.

After that, Sandia works with the companies to execute a mutually beneficial commercial licensing agreement.

"We would expect corporate technology officers at private firms and technology transfer agents at universities and other organizations to look at some of the technologies we are offering and decide if they want to license this IP from us," says Kevin.

iPAL provides a mechanism to see if anyone is interested in a particular technology, and if Sandia does not get any interest after a certain period of time, the decision may be made to drop that technology from Sandia's portfolio.

Large businesses regularly save millions of dollars by actively reviewing their IP portfolios and deciding which technologies they want to either keep or drop.

"This is important because with the rapid pace of change in technology, IP developed at the Labs only a few years ago can rapidly become obsolete, or at least no longer be the optimum way of accomplishing its original purpose," says Kevin. "Therefore, a great deal of perfectly usable technology can fall by the wayside and not be fully utilized."

iPAL will be advertised, promoted, and cross-listed by organizations allied with Sandia. iPAL can be found at <http://ipal.sandia.gov>.

## Recent Patents

Jeffrey Sniegowski, Thomas Krygowski, Seethambal Mani (1749), Scott Habermehl (1746), Dale Hetherington (1746), James E. Stevens (1747), Paul Resnick (1749), and Steven Volk (1746): Process for Fabricating a Microelectromechanical Structure.

Kenneth Peterson (14152) and Robert D. Watson (11500): Microelectronic Device Package with an Integral Window Mounted in a Recessed Lip.

Ernest Garcia and Gerard Sleepe (both 2614): Electrical Latching of Microelectromechanical Devices.

## Congratulations

To Fran Chavez and Mark Diener, married in Santa Fe, Oct. 23.

## Manager promotions

### New Mexico

**Peter Geib** from SMTS, Software and Information Engineering Dept. 5536, to Manager, Testers and Information Systems Dept. 5743.



PETER GEIB

Pete joined Sandia in April 1999 as a member of Dept. 5532, where he worked on the NAP Ground Station and developed the front-end application for viewing real-time EnRad data. He worked on the data pipeline for the Multi-spectral Thermal Imager (MTI) satellite and the analyst remote sensing toolkit for MTI data.

Most recently, he matrixed into Dept. 5743 as the payload tester project lead for a large work-for-others program.

Before coming to Sandia, Pete worked 11 years as a software engineer on several projects, including the Boeing 777 flight deck displays, an experimental radar for MIT Lincoln Lab, and secure distributed computing applications at Tektronix.

Pete has a BS in electrical engineering from the University of Washington and an MS in computer science and engineering from the Oregon Graduate Institute of Science and Technology.

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**Greg Hebner** from PMTS to Manager of Laser, Optics, and Remote Sensing Dept. 1128.



GREG HEBNER

Greg now heads the only department he has worked in at Sandia since first joining the Labs in 1989. Before hiring in as a staff member, Greg was at Sandia as an Associated Western Universities postdoc from 1987 to 1989.

He has specialized in low-temperature plasma physics and has worked on a range of projects at

Sandia, including nuclear pumped lasers, understanding plasma processing of microelectronic materials, neutron tube arc physics, and the development of microwave and optical plasma diagnostics. He was recently named a Fellow of the American Vacuum Society.

Greg has a BS, an MS, and a PhD in electrical engineering, all from the University of Illinois, Urbana-Champaign.

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**John Larson** from Manager, ISDI Special Projects Dept. 9511, to Level II Manager, Cyber Infrastructure Development & Deployment Dept. 9330.



JOHN LARSON

John started his Sandia career in New Mexico in February 1989, moved to Sandia/California in 1993, and then moved back to New Mexico in 1996. As a staff member, he worked in software development and network/server administration duties.

John was promoted to manager in 1998 in

the Computer Sciences and Information Technologies Center 8900 at Sandia/California. He managed the Sandia/California Computer Support Units, which also included operations of the Cplant cluster.

In 2000, John transferred to Information Systems and Data Modeling Dept. 9519, where he led a group of software engineers in supporting the application needs of the Nuclear Weapons SMU. During the last year of his Dept. 9511 assignment, he was matrixed to Center 2900 to lead the Improved Surveillance Data Infrastructure program; he also led a program element in the Design through Analysis Realization Team

(DART) program.

John has a bachelor's and a master's degree in Management Information Systems from the University of New Mexico.

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**Linda Lovato-Montoya** from PMLS, Information Management Team (IMT) Department 6302-1, to Manager, Creative Arts Dept. 12654.



LINDA LOVATO-MONTOYA

Linda joined Sandia in September 1993.

Since coming to the Labs, Linda has worked as a diversity consultant in the Diversity organization; center business administrator and supplier relations consultant in the Procurement Center; an administrative program/project lead in the Protective Force Department; and

was team leader of the IMT in the ES&H Center.

She earned a BBA in human resources from the University of Albuquerque and an MBA from the College of Santa Fe.

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**Lisa Trainor** from PMTS to Manager of Business Systems Support Dept. 9521.



LISA TRAINOR

Lisa joined Sandia in February 1995 after

working for eight years at General Dynamics (now Lockheed Martin), where she developed logistics applications for the F-16 program. Between projects at General Dynamics, she went to American Airlines to redevelop its frequent flyer application.

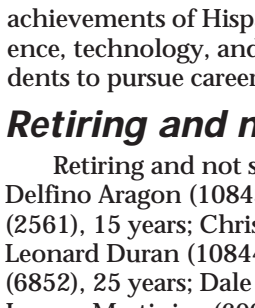
Sandia Lisa has worked on maintaining and developing applications relating to the payroll system. She worked as the system administrator for the PeopleSoft system, and recently focused her efforts on the Information Systems Development Center 9500 Software Information Life Cycle (SILC). "SILC is the guiding principle behind the Center 9500 goal to achieve Carnegie Mellon's Capability Maturity Model (CMM) Level 3," she says.

Lisa has a BBA in business computer systems from New Mexico State University.

## Sandia News Briefs

### Veronica Chavez-Soto named a HENAAC role model

Veronica Chavez-Soto, an electrical/electronics/electromechanical engineer in Sensor Subsystems Dept. 5735, was named HENAAC Role Model of the Week Dec. 13. "Veronica takes role modeling, especially to young women, very serious," says VP Lenny Martinez (14000). "I'm very pleased with the selection and proud of Veronica." HENAAC (www.henaac.org) is a Los Angeles-based organization that promotes



VERONICA CHAVEZ-SOTO

achievements of Hispanics in engineering, science, technology, and math and motivates students to pursue careers in those fields.

### Retiring and not seen

Retiring and not seen in *Lab News* pictures: Delfino Aragon (10843), 16 years; Russell Bonn (2561), 15 years; Chris Crafts (2521), 30 years; Leonard Duran (10844), 24 years; Mary Heardt (6852), 25 years; Dale Leonard (2332), 42 years; Joanne Martinico (6001), 14 years; Robert Pacheco (2953), 23 years; Mary Russo (1843), 26 years; Stephen Stronach (1643), 33 years; and Darlene Tafoya (14151), 26 years.

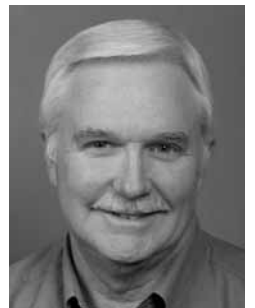
## Recent Retirees



Charles Salazar  
44 14131



Lawrence (Mike) Ford  
40 4221



Eric Reece  
39 15400



Ron Jones  
37 5523



Robert Varga  
37 5714



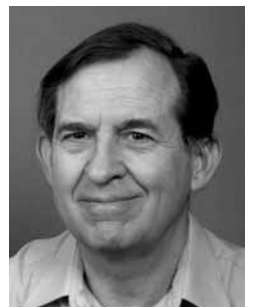
Bruce Hansche  
35 9122



Marti Mohr  
30 5701



Larry Pope  
28 14425



John Covan  
27 6202



Joyce van Berkel  
26 5925



Vernon Wallace  
26 14131



John Olson  
20 5742



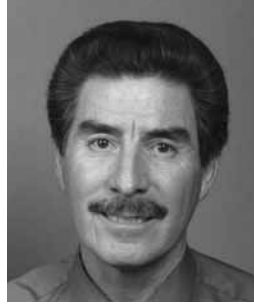
Darlene Leonard  
19 12650

# Mileposts

New Mexico photos by Michelle Fleming



Robert Martinez  
35 5918



Phillip Gallegos  
30 14151



Ronald Hartenberger  
30 14151



Carlos Griego  
25 3000



Phil Hoover  
25 2111



Paul Sealey  
25 9616



Patrick Sena  
25 2124



Jim Allen  
20 1769



Carol Christensen  
20 2122



Fran Current  
20 9329



Jeff Danneels  
20 4141



Larry Desonier  
20 6957



James Dotson  
20 10848



Pablo Garcia  
20 15510



Anthony Gomez  
20 9125



Tom Mancini  
20 6218



Ami Peterson  
20 10730



Randall Romero  
20 6743



Brian Schwaner  
20 5923



Samuel Sevier  
20 2111



Paul Vrabel  
20 1733



Chuck Yagow  
20 2992



Janise Baldo-Pulaski  
15 15402



Brenda Barajas-Romero  
15 14000



Jackie Blackburn  
15 10730



Terri Calton  
15 15242



Deanna Ceballos  
15 9208



Max Decker  
15 5725



Mike Dugger  
15 1851



Eliot Fang  
15 1834



Michelle Fromm-Lewis  
15 12336



Reeta Garber  
15 9904



Jeff Gruda  
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Bill Jenkins  
15 1920



Allison Kane  
15 9724



Elaine Lieberman  
15 9527



Dorothy McCoy  
15 12105



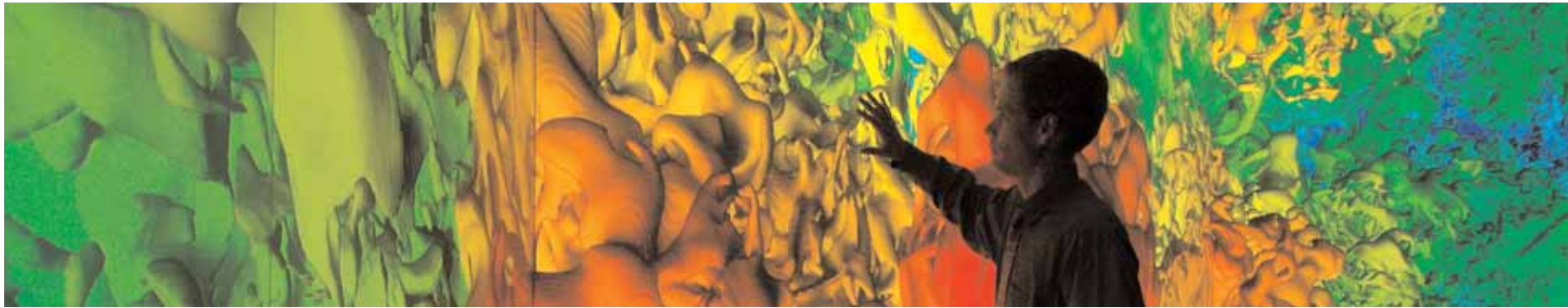
Chuck Meyers  
15 9720



Pat Milligan  
15 12650



Gary Nordyke  
15 2950



(Photo by Randy Montoya)

# Labs computational scientists team with artists to capture and display gigapixel-sized images

## Sandia, NYU co-host first-ever Big Picture Summit

By John German

An eclectic group of artists and scientists that organizers have dubbed the “dream team” of imaging and visualization gathered at New York University last month to begin to create a photographic system capable of capturing and displaying a gigapixel — one billion pixels — of visual information.

The first Big Picture Summit, Dec. 8 and 9, was organized by artist-photographer Clifford Ross and co-hosted by the Computer Science Research Institute at Sandia and the Interactive Telecommunications Program at NYU’s Tisch School of the Arts.

Ross says his goal in bringing together top imaging experts from leading scientific institutions is to bring closer to reality his desire to create a “you are there” photographic experience for those who have not personally witnessed the sublime beauty of natural scenes such as Mt. Sopris in Colorado.

“In the early 15th century, the impulse to render flesh more realistically drove the artist Jan van Eyck to invent oil paint,” says Ross. “The same sort of impulse is driving me, except that I’m trying to capture a mountain. Pixels are simply 21st century oil paint.”

### Gaining insight

The computational scientists at Sandia who are collaborating on the project believe a display system of the magnitude proposed by Ross will enhance the ability of scientists to visualize and

gain insight from massively complex data sets that can be understood only through human intuition, ranging from supercomputer-generated simulations of a weapon’s physics to high-resolution satellite imagery.

The display would provide an overall view of images at a very large scale while allowing viewers to perceive extremely fine detail.

“We have a lot in common with an artist like Clifford Ross and his quest to make extremely detailed images that evoke a powerful emotional response,” says Carl Diegert of Data Analysis and Visualization Dept. 9227. “We want to understand from an intuitive standpoint what it is that enables viewers to gain insight — for example, a visual metaphor that makes a human viewer comfortable and thus better able to interact with an image. Computer science alone is not likely to invent a means for scientists to intuitively comprehend highly complex problems.”

“My own goal is to fill the eye with so much information that it overflows and reaches the human heart,” adds Ross. “Art is emotional, but the path is technical, and virtually all the scientists involved in this effort know more about the technical aspects of imaging than I do.”

### Major implications

Ross’ newly patented R1 camera system, which broke through the gigapixel barrier, has achieved some of the highest resolution single-shot images ever created, he says. (Efforts by other photographers have digitally melded many smaller images taken over a period of time into single sweeping, gigapixel-sized landscape images.)

The quality of the first landscape images created with the R1 — the “Mountain” series — convinced many of the scientists involved in the summit to join in the effort, says Carl.

The 15 professionals invited by Ross to participate in the summit include renowned artists, scientists and engineers from government agencies,



CLIFFORD ROSS assembles R1 camera. (Photo courtesy of Clifford Ross)

and digital imagery experts from the entertainment and film industries.

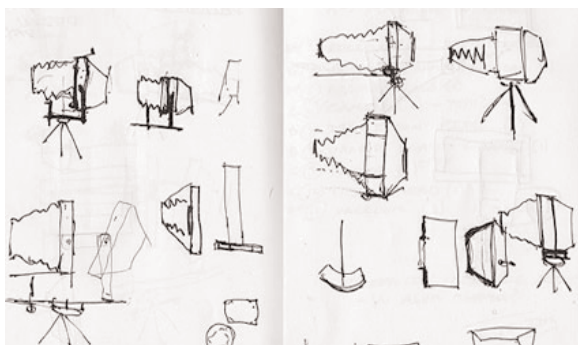
The project could have major implications for all industries that rely on precise imaging, including environmental science, space exploration, telecommunications, and homeland security, says Carl.

### An electronic Sistine ceiling

The project has two parts. The first is to design and build a new camera, building on concepts embodied in the R1, that can capture a gigapixel of digital information at a speed of 1/15th of a second or faster.

The second part is to build the display system, which Ross likens to building an “electronic Sistine ceiling.” It will have 16 times greater data display capabilities than the VIEWS Corridor display system currently in use at Sandia (photo atop page).

The summit is expected to result in a concrete agenda and working group, which would then be funded by interested individuals, foundations, corporations, and government agencies with an interest in the practical implications of Ross’ quest.



FIRST SKETCH by Clifford Ross of his R1 high-resolution camera system. (Image courtesy of Clifford Ross)



ZOOMED-IN detail of photo made by Clifford Ross illustrates resolution of the R1 camera system. It was this kind of detail that caught Sandia scientists’ imagination and spurred them to work with Ross. (Photo courtesy of Clifford Ross)



PHOTOGRAPHER/INVENTOR Clifford Ross, right, and associate prepare to shoot high-resolution photo.