

Secretary Bodman visits Sandia



ON HIS FIRST OFFICIAL TRIP as Secretary of Energy, Samuel Bodman chose to visit Sandia and Los Alamos national laboratories. In remarks at a Sandia all-hands meeting, Bodman praised Sandians for their work, reminded them of the heritage they carry, and asserted that safety and security are inextricably linked. A chemical engineer, Bodman said he was "in awe" at being chosen as leader of the nation's top science and engineering laboratories. Story on page 4. (Photo by Randy Montoya)

Sampling 'small atmospheres' in the tiny new worlds of MEMS

Sandia gas sampling device rapidly determines whether MEMS seals are effective

By Neal Singer

Just as astronomers want to understand the atmospheres of planets and moons, so engineers want atmospheric knowledge of worlds they create that are the size of pinheads, their "skies" capped by tiny glass bubbles.

Should their silicon inhabitants — microcircuits, microgears, and micro-power drivers — exist in a vacuum? An atmosphere of nitrogen? Air as we know it? More important, whatever atmosphere was intended, how long will it stay that way? Is the protective barrier hermetic or will its atmosphere change over time, potentially leading to the early death of the device? Will water vapor seep in, with its sticky molecules causing unpredictable behavior? What, in short, can engineers say about how long this little world and its inhabitants will survive and function?

The most advanced place in the world for such evaluative work is at Sandia. "I know of no one, anywhere else, who can do this kind of testing," says Steve Thornberg (1861) of the sampling procedure he developed to look at small atmospheres with University of New Mexico undergraduate chemistry student Therese Padilla and graduate chemistry student James Hochrein.

John Maciel agrees. Chief Operating Officer of Radant MEMS, a three-year-old start-up company in Stow, Mass., he is under contract with DARPA to develop high-reliability MEMS (microelectromechanical) switches for microwave devices and phased array antennas. He also sees markets for his MEMS switches in cell phones. For long-term reliability, small-atmosphere stability is a must. "We can't go to a commercial house to get this work done," he says. "We can't find the capability anywhere else but Sandia."

His parts are checked here under a subcontract with DARPA.

The Sandia method — funded by LDRD, revealed in late January at the

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We can't go to a commercial house to get this work done. We can't find the capability anywhere else but Sandia.

John Maciel

Chief Operating Officer, Radant MEMS

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Symposium for National Cancer Institute features best of labs' research

By Neal Singer

Presentations demonstrating the formidable biological research capabilities of New Mexico's two national labs greeted National Cancer Institute Director Dr. Andrew C. von Eshenbach at an afternoon symposium held last Thursday afternoon at Sandia's International Programs Building (IPB). (Eshenbach is on the right in photo at right along with Sandia President C. Paul Robinson and UNM Cancer Research and Treatment Center director Dr. Cheryl Willman.)



The purpose of the symposium, as US Sen. Jeff Bingaman baldly put it to Dr. von Eshenbach, "is to persuade you to put a regional cancer center [in New Mexico], I presume."

Retorted a smiling von Eshenbach, "I thought it was to persuade the two labs to study cancer."

Sandia President C. Paul Robinson made up the difference, describing Sandia as "already having ventured into biomedical engineering," which he said could be described as "wet nanotechnology." The increasing convergence of dis-

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Sandia steps up efforts to ensure security of critical infrastructures

By Chris Burroughs

With increased support from DOE and the Department of Homeland Security (DHS), Sandia is stepping up its efforts to ensure that critical infrastructures in the US are secure.

For DOE Sandia is

testing Supervisory Control And Data Acquisition (SCADA) systems and supporting technologies — both hardware and software — to make sure they work properly. SCADA systems control computerized operations of the nation's critical infrastructures, including the electric power grid, oil and gas pipelines, and water treatment and distribution. Also with DOE support, Sandia is offering classes to energy infrastructure owners so they can learn to assess and secure their own systems.

And for DHS Sandia is working to improve security of control systems for all infrastructure sectors.

"We are working with SCADA system vendors to check out new systems they will be marketing to critical infrastructure owners as well as helping them improve the security of communication pro-

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State of Labs address highlights technologies, community efforts

By Chris Burroughs

Assembling platinum at the nano scale, super-computers that compute at 40 trillion operations per second, and explosive detection portals that are being placed in major airports were just some of the Sandia technologies Labs President C. Paul Robinson and Executive VP Joan Woodard highlighted before several hundred Sandians in the Steve Schiff Auditorium Feb. 23 during the annual State of the Labs presentation.

Titled "From Nanotechnology to the Stars," the event gave the duo an opportunity to share with pride some of the new and varying technologies being developed at the Labs, along with major contributions Sandia has made to the local, national, and international communities.

Joan and Paul presented the same basic information to employees at Sandia/California on Feb. 21 and to Albuquerque and New Mexico community leaders at the Hyatt Regency Hotel the evening of Feb. 24.

Joan challenged the audiences to think about

(Continued on page 5)



Munitions-destroying system shown to employees. Story on page 3.



Jerry McDowell named VP of Div. 15000, DoD programs. Story on page 7.



Four Sandians with unique stories to tell compete in Mt. Taylor Quad. Story on page 9.

What's what

This year's State of the Labs talks got good receptions all around – at the California and New Mexico campuses for employees and at Albuquerque's Hyatt Regency for community leaders. They were, as always, great "show-and-tell" sessions by Labs Director Paul Robinson and Deputy Director Joan Woodard about the fascinating and vital work always under way at Sandia.

At the California employees session, Paul got a big laugh when – as Joan talked about the Hound's use in drug detection – he mischievously pointed it toward the seats and mimicked scanning the audience. Although a twinkle of mischief crossed his face when he picked the gadget up in front of the Albuquerque employees, he passed on scanning them.

All in all, the three sessions were filled with information and well received, and you can read about them in Chris Burroughs' (12651) story starting on page 1.

* * * * *

A "This Month in the Past" photo in the Feb. 4 *Lab News* of four Sandians playing handball in February 1955 caught Charles Hickox's (6211) attention. He called to say that John McKiernan (on the left in the photo, now retired and 80-ish) still plays handball at the base gym two or three times a week.

Charles knows, he says, because he's a noontime base gym handball player himself, and sometimes plays with John. He didn't say anything about who wins those matches.

* * * * *

Retiree Bruce Hawkinson stopped by the office for a visit not long ago and chuckled about a driving violation term he ran across in his Kansas hometown newspaper, *The Lindsborg News-Record*. While on a recent four-time-zone jaunt across the country, he said, he stopped in Lindsborg and noticed in the newspaper's police blotter column that so-and-so had been arrested for "driving while suspended," which he visualized as someone driving while trussed-up in a harness attached to the roof of his car. (It actually means driving without a driver's license.)

Bruce was probably a little light-headed from all that driving.

* * * * *

Bill ("retired and never regretting it for a second") Fienning e-mailed recently: "On page 8 of the *Lab News* [Jan. 21, in a] Feedback, I learned that in a couple of years, Sandia will replace the common use of the Social Security Number with a wonderful new invention called the Employee Number.

"When I came to work at Sandia in 1964, I was given an Employee Number which, several years later, was replaced with a wonderful new invention called the Social Security Number."

Well, Bill, I guess that would be categorized as "what goes around comes around" (or is it the other way?).

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

NNSA honors Ron Bentley with five awards for exceptional service

Sandian Ron Bentley, who has served in a series of assignments in Washington for DoD, NNSA, and DOE, has been recognized for his exceptional service to NNSA and the nation.

Ron has served in his current assignment at DOE and NNSA Washington since December 2001. He has just finished a stint in NNSA's Office of Strategic Planning and will spend the next three months in the Office of the Administrator before returning to Albuquerque in May and probable retirement in October, when he will have worked 40 years at the Labs in national security programs.



RON BENTLEY

On Feb. 1, Ron received awards from each level of the NNSA management in a well-attended ceremony at NNSA Headquarters:

- From the Office of the NNSA Administrator, Ambassador Linton Brooks, the NNSA Silver Medal for distinguished service in the national security of the United States.
- From the Office of Defense Programs, Everett Beckner, the Defense Programs Award of Excellence for contributions to the nuclear weapons stockpile stewardship program.
- From the military element at NNSA under the command of Brig. Gen. Ron Haeckel, the Military Excellence Award, recognizing significant contributions to the NNSA mission.
- From the Office of the Assistant Deputy Administrator for Military Application and Stockpile, an award recognizing his dedication to the NNSA mission.
- From the Office of Strategic Planning in NNSA's Program Integration Office, a commemorative award recognizing his exceptional service to the country.

Ron also received a special letter recognizing his years of service to the nuclear weapons program from Sen. Pete Domenici, R-N.M., and a US flag that had been flown over the Capitol especially for Ron at Domenici's request.

Ron is a senior engineer in Nuclear Weapons Planning, Operations, and Integration Center 9700. "I was overwhelmed and humbled by the recognition that you bestowed on me," Ron said in a thank you note to Defense Programs headquarters personnel. "The event is a highlight of my career and created a memory I will cherish forever."

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Lab News Accomplishments issue coming



Photo by Brian Webb

THE 2005 *LAB NEWS ACCOMPLISHMENTS* issue, dated March 2005, is in final production and will be distributed to all Sandians and on-site contractors within a couple weeks. Retirees and all other *Lab News* recipients will be mailed a copy. This special 24-page issue, printed in full color on glossy stock and saddle-stitched, is a major annual project of the *Lab News*, conducted in cooperation with the VPs, line management, and staff.

Recent Patents

Dhaval Doshi, Hongyou Fan (1843), Nicola Huesing, Alan Hurd, and C. Jeffrey Brinker (1002): Photo-Definable Self-Assembled Materials.

Timothy Shepodd, Leroy Whinnery (both 8762), and William Even (8760): Castable Three-Dimensional Stationary Phase for Electric Field-Driven Applications.

Joseph Schoeniger (8321), Eric Cummings (8324), and James Brennan (8321): Conduc-

tive Valve and Pressure-to-Conductance Transducer Method and Apparatus.

John Parmeter, Charles Brusseau, Kevin Linker, David Hannum (all 4118), and Jeri Davis: Explosives Screening on a Vehicle Surface.

John Barnum (4152), Larry Warne, Roy Jorgenson (both 1642), and Larry Schneider (1643): Method and Apparatus for Electrical Cable Testing by Pulse-Arrested Spark Discharge.

Jonathan Weiss (1739): Downhole Geothermal Well Sensors Comprising a Hydrogen-Resistant Optical Fiber.

Success story for Sandia': Munitions-destroying Explosive Destruction System shown to employees

By Nancy Garcia

"A success story for Sandia" is how John Didlake (8228) characterized the Explosive Destruction System (EDS), of which he is the project manager, during an overview for employees last month when the fifth and final EDS left Sandia/California.

The EDS is a customized flatbed trailer with a vessel that resembles a large, front-loading washing machine in which explosively configured chemical munitions can be destroyed in a contained manner. The Army approached Sandia 10 years ago seeking an alternative to open burn/open detonation of aging, unstable munitions recovered on former Department of Defense property that has been turned over to public use or borders public developments.

238 operations, tests already

"Processing three to six munitions in a year was the original envisioned usage of the system," John said. In the last six years, however, there have been 238 Army operations and tests in which 106 actual recovered munitions were destroyed — including one on the very morning of his talk (in a previously delivered system at Aberdeen Proving Ground in Maryland). The other operations included 56 destructions of cylinders bearing chemical agent and 76 of simulated agent. (Simulated agent tests are used for procedures verification and crew training.)

Just the week before his talk, Sandia issued a report documenting the system's

efficacy against surrogates of anthrax, *Bacillus thuringiensis* and *Bacillus stearothermophilus*. The Sandia team undertook a \$60,000 Laboratory-Directed Research and Development project to demonstrate its effectiveness against bacterial spores, which could provide a means to neutralize an improvised terrorist device.

"There's high value in extending the EDS' successful track record into other areas," said Technology Application Dept. 8228 Manager Mary Clare Stoddard. "Should the need arise, a solution stands ready" for destroying weapons bearing biological agents, of which anthrax is among the most resistant to disinfection.

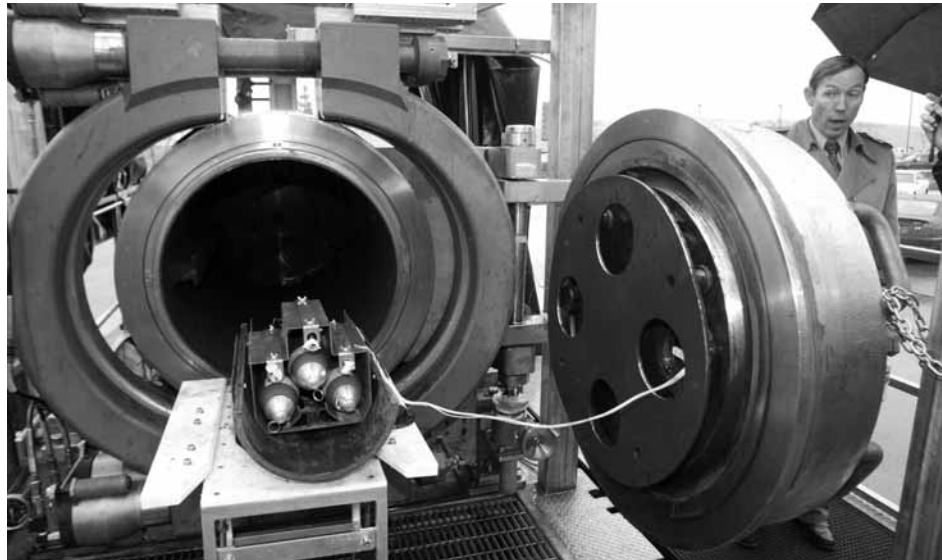
Sandia's novel concept

Operated by Army ordnance disposal experts, the system, she said, marries previously existing technologies in a novel way. Sandia's concept was to first detonate a device's explosives, then neutralize the agent it contains, all within a sealed stainless steel vessel.

Explosive charges are applied on the outside of the device to explode the munition's burster and cleave open the shell, exposing the agent inside. The charges are set off inside a fragment-suppressing pipe loaded into the vessel.

Then chemical reagents are pumped into the sealed vessel, which is agitated and heated to accelerate neutralization. The effluent is collected for environmentally sound disposal.

The latest EDS unit was just transported from Livermore to Albuquerque for more explosives testing. It is one of two larger units, with a vessel volume of 160 gallons, able to handle 4.8 lbs. of TNT equivalent. The entire trailer weighs 55,000 lbs. and was custom-made for the US Army Non-Stockpile Chemical Materiel program.



JOHN DIDLAKE describes the EDS system operation. A mock-up of three 4.2-inch mortar rounds is shown ready for loading into the open vessel. The team demonstrated the capability of dispatching more than one munition at a time in this larger system.

(Photo courtesy of Jay Solmonson, *Tri-Valley Herald*)

It is deployed along with a diesel power generator and a utility trailer containing spare parts, consumables, and tools. John said EDS is unique in being the first and so far, only, system certified to destroy these type weapons in the US. It has been approved by both the military and regulators in the five states where it has been used (Alabama, Colorado, Delaware, Maryland and Utah). An Army study identified more than 100 sites around the country where aging munitions might be uncovered.

If necessary, the \$3.5 to \$5 million systems can be air-shipped to respond to unearthing of a vintage munition of uncertain pedigree. When a munition is recovered from a former testing site or other civilian location, it is nondestructively imaged to determine its fuzing and contents. The system processing is then operated in keeping with those observations, and the results are checked by testing vessel contents before they are drained and the vessel door opened.

The EDS was designed to be transported because, by Department of Transportation regulations, an explosively configured recovered munition cannot be moved. Three smaller systems, an initial prototype that was put into operation and two "production" models, have a vessel rating of just over 1 lb. TNT equivalent and are compact enough to ship in an Army C-141 aircraft (the larger systems would require an Air Force C-5A). These smaller systems are capable of handling 90 percent of the munitions the Army expects to find.

'Things started working quickly'

Early on, EDS was dispatched to Porton Down in England for testing on WWI-era recovered shells and projectiles. From December 1999 to November 2000 the first system destroyed 12 munitions there containing phosgene and 14 containing mustard.

One additional test was conducted at Porton Down just before the system came back to the US and demonstrated EDS could destroy a container with 1.3 lbs. of sarin.

Meanwhile, six sarin-filled bomblets, the size of a grapefruit, were found at Rocky Mountain Arsenal outside Denver, currently a Superfund cleanup site.

Although EDS was ranked fifth of the alternatives considered for ridding the arsenal of the bomblets, it was picked on Dec. 1, 2000, at the urging of the Colorado governor and the six were destroyed starting on Superbowl Sunday in 2001. "Things moved very quickly because a four-star general wanted it to happen," John said.

Four more bomblets were destroyed there just after the Fourth of July in 2001, and in 2002, EDS was put into action over Labor Day, disposing of an armed and fuzed phosgene-containing mortar found in a farmer's field (formerly Camp Sibert land) near Gadsden, Ala. "We don't get holidays on this program," John quipped.

In fact, the morning of the talk he'd been roused at 5 a.m. with a technical question from Aberdeen, where the second Lewisite munition to be destroyed in this country was being neutralized, a three-day-long operation due to the complex chemistry of the Lewisite agent inside.

"We keep expanding the capabilities and we keep expanding the agents," he said later that day, touring both employees and reporters through the EDS, parked outside the Combustion Research Facility.

For instance, the National Research Council conducted a study that concluded that using three EDS units would have the highest probability of meeting schedule and be the most cost-effective way to dispose of 1,200 munitions at Pine Bluff Arsenal in Arkansas destined for demilitarization under the Chemical Weapons Convention.

The Chemical Weapons Convention Treaty initially called for completion of demilitarization of chemical weapon stockpiles in 2007 (now extended to 2012). The Pine Bluff EDS operation is expected to begin later this year.

The initial need was sparked when construction of luxury homes in the Spring Valley

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development in Washington, D.C., near American University in 1992 unearthed four explosively configured mortars containing chemical agent, prompting evacuation of the neighborhood. The standard method of destroying these munitions is called "open burn, open detonation (OB/OD). It involves packing five times the amount of the explosive as the amount of agent around the munition and setting the explosive off to breach the shell and consume the agent in the ensuing fireball. Interestingly, Sandia/New Mexico did the calculations that derived the five times explosive factor for the Army. The noise and complications of blowing out windows and damaging houses from setting off 10 to 15 pounds of explosive made OB/OD unsuitable for Washington, D.C., John said. This caused the Army to seek some other technology. Ultimately many more munitions were unearthed and transported with special waivers out of the area. However, nearly a decade later, in 2003, EDS set up operations 100 yards behind Sibley Hospital in Spring Valley and neutralized 15 munitions containing mustard — six of them explosively configured.

Next explosives tests in Albuquerque

From July to September of 2004, 22 items were destroyed at Dugway Proving Ground in Utah that had been in storage since 1980. In October 2004 EDS destroyed a 75 mm mortar containing mustard found at a chicken ranch in Bridgeville, Del. Although EDS has never had a deployment in California there have been two close calls. A 4.2-inch mortar containing phosgene was found in 2003 near a housing development in Vista, north of Escondido, and later that year a 10-pound sarin bomblet was found at Edwards Air Force Base. The phosgene round was not explosively configured and could be transported to a destruction site and the bomblet was a trainer.

Explosives tests in Albuquerque will focus on preparations for the Pine Bluff arsenal operations. There are more than 700 recovered 4.2-inch mortars and over 400 German traktor rockets stored at Pine Bluff. The tests will demonstrate the capability to do six mortars or six traktor rockets at one time in the larger EDS.

You are 'great explorers of our society,' DOE Secretary Samuel Bodman tells Sandia researchers

Chemical engineer-trained chief tells all-hands session that security and safety are 'inexorably linked'

By Bill Murphy

A chemical engineer by training and temperament, just-confirmed DOE Secretary Samuel Bodman told a near-capacity audience of Sandians at the Steve Schiff Auditorium that he is "in a bit of awe at being here, a bit in awe of the technical excellence and historical significance that Sandia and its sister laboratories represent. I consider it to be a personal and professional honor to be here."

Bodman, making his first official trip as DOE secretary, received a day-long series of briefings at Sandia last week before speaking to the all-hands meeting that afternoon.

Although Bodman spent many years in the financial industry — he was CEO of Fidelity Investments after serving as head of Fidelity Ventures — and served as deputy secretary in both the Commerce and Treasury departments during President Bush's first administration, he still "I like to think I have retained the perspective of an engineer." (He has a PhD from MIT and taught chemical engineering there for several years.)

In measured and deliberate words, Bodman spelled out his thoughts about his new job, his expectations of the laboratories, and his hopes for the continued relevance and success of DOE.

Speaking about how he will approach his job, Bodman cited lessons he learned in his reading of Richard Rhodes' Pulitzer Prize-winning classic, *The Making of the Atomic Bomb*.

The book, he noted, offered deep insights into the personalities and the thinking of that generation of scientists who embodied — even invented — 20th century science.

The voices of those pioneering giants, coming to us across the span of years, Bodman said, can teach us that "science and technology have consequences."

"Now, that may sound like a simple idea — even trite — but I think it's something worth reminding ourselves about.

"Research has implications beyond the quest for the accumulation of knowledge. Some outcomes are miraculously positive . . . but some have the potential to cause great harm. Does the fact that scientific advances may be used for catastrophic ends mean that we should not pursue



DOE SECRETARY SAMUEL BODMAN gets a close-up look at the heart of a Z machine target. Holding the flashlight is Keith Matzen, Director of Pulsed Power Sciences Center 1600. (Photo by Randy Montoya)

them? Of course the answer to that question is no. But we must be aware of potential consequences and carefully consider them.

"In other words, as world-renowned engineers, chemists, biologists, materials scientists, computer scientists, developers of microsystems, and nanotechnology, you embody both vast opportunity and great responsibility."

That responsibility, Bodman said, extends "beyond your commitments to intellectual rigor and ethics. You have real responsibilities to society. It is a public trust that we as a nation placed in our scientists and engineers and it is one that is well-earned.

"Our nation counts on you for great science, but it also counts on you to safeguard our most precious scientific information, information that must be protected from disclosure to ensure our

collective national defense. In addition, you have a fundamental responsibility to protect yourselves and your fellow workers from harm so that you can continue to do the valuable science and engineering for which this great laboratory is known.

"Let me be crystal clear about this: It is unimaginable to me that one can separate scientific and technical excellence from security and safety at this laboratory, or anywhere else throughout our nuclear weapons complex.

"I expect that safety and security are integral to what you do and how you do it. No matter the temptations, scientific or otherwise, we must never lapse into complacency, [which is] the enemy of safety.

"Simply put, safety and security are critical, essential, and inexorably linked components of our mission at this lab. We cannot guarantee security if there are lapses in our safety, and we cannot guarantee safety if we compromise our security.

"I would hope that you will view me as a colleague, and I would like to think that you will be pleased at the work we will do together.

"This department started 60 years ago — not formally but started in fact 60 years ago on a nice spot in the desert of New Mexico. It is not random that I have come here on my first trip as your leader.

"To me, you are the great explorers of our society, people who are energetically pushing us forward into the unknown, to better, more prosperous, safe, and more secure days ahead. But also, be ever-cautious of the path you are forging. That is how I see you, and that is how I see this laboratory and this department. And that is how I hope the American people will come to view us and the work you do here.

"I commit to you that I will do everything in my power to ensure that the people of this laboratory receive the proper credit for what they have done in the past, for what they are doing in the present, and for what they will do in the future. In return, I would ask for your commitment to work with me to help find solutions to the common challenges that we face together and to move us forward to a future of many more breakthroughs and many more successes of the sort that you have experienced in the past."

NCI symposium

(Continued from page 1)

ciplines, he said, led to linkages that otherwise might have seemed improbable.

Specifically, the symposium highlighted the technical capabilities at Sandia and Los Alamos National Laboratory that support the UNM Cancer Research and Treatment Center in its five-year quest to become one of the Designated Regional Comprehensive Cancer Centers of the National Cancer Institute. The goals of such centers are to cure cancer through scientific discovery, translate research into improved diagnostics and therapeutics, and



SEN. JEFF BINGAMAN speaks to the NCI symposium showcasing research capabilities at UNM, Los Alamos National Laboratory, and Sandia.

(Photos by Bill Doty)

deliver state-of-the-art patient care.

Said Sen. Pete Domenici, "There's nothing in the charter of this [national defense] institution that has anything to do with cancer. But the time has come when what the laboratories can do is seen by [the National Cancer Institute,] a major deliverer of healthcare, as [having the capability to help in the cancer struggle]."

"It's simple but profound," Domenici continued, "for the National Institutes of Health to ask DOE to help. It doesn't happen often."

The symposium provided an overview of collaborations in cancer research carried out by UNM with the two giant national labs.

A poster session highlighting nano- and microsystems, flow cytometry, computational biology, and high-end computing showed why the alliance between institutions looked promising.

Von Eshenbach spoke of the movement in science over the last 50 years from "matter and energy to life, from the atom to the cell," and "to the most significant aberrancy of the life processes — cancer." He foresaw only an additional 10 years needed "to eliminate . . . not cancer . . . but the outcome of cancer — suffering and death."

Other speakers included Sandia UNM Cancer

Research and Treatment Center Director Dr. Cheryl Willman; Sandia VP for Science-Technology and Partnerships Pace VanDevender (1000); Sandia and LANL bioscience leaders Terry Michalske (8300) and Bob Atcher; and Sandia/LANL Center for Integrated Nanotechnologies Director Julia Phillips (1100).

The program, with its considerable breadth, was put together by Grant Heffelfinger (8330).

Domenici, a science buff and a leading champion in the public arena for science investment, speculated that the next 20 years would see more advancements in science than in humanity's entire history. Reluctant to miss any of it, he said wistfully, "Wouldn't it have been great if I could have been elected [for the first time] yesterday. . . ."



SEN. PETE DOMENICI, left, talks with Labs President C. Paul Robinson, center, and National Cancer Institute Director Dr. Andrew C. von Eshenbach.

State of the Labs

(Continued from page 1)

what is possible in this age where “building things atom by atom or molecule by molecule can revolutionize the production of virtually every human-made object and alter our basic assumptions of the possible.”

“Consider self-assembling devices that scour plaque from arteries, attack cancer cells, or repair intracellular damage,” Joan said. “Or consider nanobots that clean up environmental accidents or instrumented space probes no bigger than a BB. At Sandia we’re involved in nanotechnology research because it may prove to be useful in various technologies we’re pursuing to make the nation safer.”

Paul then told about more of Sandia’s research in the nanoworld — in particular work assembling platinum. This “new and improved” platinum could be used in many new applications, including medical devices, homeland security sensors, and environmental monitors.

“Under this process, the platinum grows into some interesting shapes, some that look like nano-Koosh balls.”

As he said that, Joan threw out toy Koosh balls to the audience, much to their delight.

The audience received another visual when Paul showed the most recent MicroChemLab, a hand-held biodetector in the “designer color” yellow. Joan explained how the device has detected biotoxins and chemical agents and now in a new incarnation is being used in the analysis of bodily fluids, such as saliva and blood, for detecting disease.

Rooftop scale

Going from the small to the large, an image on screen did a “flyover” of the new Microsystems and Engineering Sciences Applications (MESA) project. Sandia’s largest construction project ever — at \$462 million — the facility will be all about microsystems, which are small, highly integrated and low-power mechanisms that combine diverse functions on a single computer chip.

“MESA,” Joan said, “will give us the ability to develop microsystem technologies for weapons and other critical applications in defense, homeland security and intelligence gathering.”

Some of the other technologies Joan and Paul highlighted:

- Silicon Re-ENTRY Sensor (SiRES), Sandia’s first microsystems-enabled component now being developed for use in the Trident nuclear weapon. It is intended for precisely monitoring the deceleration of a reentry vehicle.



Photos by Randy Montoya

- Red Storm, Sandia’s latest supercomputer coming on line this year. It will be able to compute 40 trillion operations per second and play a huge role in the weapons program and Sandia’s other science programs as well, such as biology, proteometrics, and climate and weather change.

- Trilinos, an R&D 100 Award winning software, used in solving complex engineering and scientific problems.

- Sandia-developed Explosive Detection Portal that is now being used to screen for faint traces of explosives at New York’s John F. Kennedy International Airport.

- Microhound, a hand-held device that detects explosives and illegal drugs.

- Kevlar gauntlets that protect the arms of combat troops exposed as they ride in Humvees and fighting vehicles.

- Z machine advances that have included heating deuterium fuel in capsules to the temperatures found at the center of the sun.

Classified work

Joan paid tribute to the hundreds of people at Sandia who do classified work.

She said she and Paul are very aware that much of the work Sandians do is related to nuclear weapons and other national security programs and can’t be talked about publicly.

“We want to thank the hundreds of Sandians who work in deeply classified environments, doing remarkable work that is keeping our nation safe,” Joan said. “They work in anonymity, which is a terrific career sacrifice where reputations are made and careers built on publishing results.”

Community efforts

There’s an insurance ad that says “we live where you live.” Said Joan, “That’s Sandia as well.”

Some of Sandia’s efforts to make the community a better place include:

- After more than a decade, the Environmental Restoration Project is nearing completion. During the past few months a Sandia environmental team finished the last of its scheduled non-landfill cleanups.

- Through the New Mexico Small Business Assistance Program, Sandia uses a portion of its gross receipt taxes paid each year to provide technical advice and assistance to small businesses in the state. So far Sandia has helped nearly 300 businesses. An analysis by the University of New Mexico shows that Sandia has used about \$1.8 million in tax credits to fund these assistance efforts.

- More Sandians serve on community boards, chambers of commerce, service clubs, and museum foundations than ever.

- Sandians donated \$2.5 million through the United Way and Community Fund campaigns in New Mexico and California.

- Volunteer support and financial assistance has increased to numerous organizations, including Habitat for Humanity, the National Hispanic Cultural Center, Shoes for Kids, and the Roadrunner Food Bank

National endeavors

As a national laboratory, Sandia routinely makes contributions to the national community, Paul said. Some of the national contributions are:

- Sandia has worked with a number of government agencies to assess the dangers posed by huge liquefied natural gas (LNG) fires that might result from terrorist attacks on LNG ships.

- Sandia has taken on a number of initiatives to improve the country’s water supply. The Labs, together with the American Water Works Association and the EPA, developed a risk assessment approach to evaluate security and mitigate risks in the water supplies of more than 90 percent of the largest US cities, serving an estimated 130 million customers. Also, Sandia is working with the US Bureau of Reclamation to advance water desalination technology. A new 16,000-square-foot facility will be a national center for research on desalination of groundwater and the use of renewable energy, such as solar and wind, for water treatment.

- In the area of clean energy for the nation, researchers at Sandia’s Combustion Research Facility in California are working with industry to reduce emissions of vehicles. Sandia is also moving forward with solar technology. The Labs have joined forces with Stirling Energy Systems, Inc. of Phoenix to test a solar dish-engine system.

Global and extraterrestrial efforts

Paul emphasized, “Energy problems aren’t just a national concern, but an issue that ties all the nations of the world together.” Sandia is working with laboratory directors from both Russia and the US to chart out a path to gain political and public support for a “Global Nuclear Future.”

In the realm of space, Sandia helped NASA analyze the *Columbia* shuttle accident and show convincingly that the damage to the shuttle using during the launch led to an ultimate failure on reentry. Also Sandia researchers are working with NASA and Boeing to deploy new detection sensors that will be embedded in the wing surfaces of the next shuttle.

Paul and Joan on budget, staffing, education

- **Budget:** The budget is at \$2.3 billion. While staffing is being restrained in the nuclear weapons program, Joan said she expects continued growth in the areas of Homeland Security and intelligence in the '06 budget. “Reduction in nuclear weapons in coming years will allow us to have a mission mix,” Joan says. Paul noted that the “diversity of customers has never been as great.”

- **Staffing:** Over the past several years, Sandia has been involved in an aggressive hiring program. Last year the Labs hired 500 new employees; in 2005 Joan and Paul anticipate hiring another 500, keeping staff at a sustainable level of about 8,500 full-time employees.

- **Education:** Because the nature of work at Sandia changes, even as the fundamental mission remains the same, the Labs has placed a renewed emphasis on continuous learning. Hundreds of Sandians have gone back to school to keep their skills up to date with course offerings at Sandia and



educational institutions. Right now, 560 employees are using various Labs’ educational assistance benefits to pursue their education. In 2004 more than 200 earned degrees, ranging from associate degrees to doctorates.

Two Labs researchers to present on SCADA at power conference

Two Sandia researchers will present papers and give a three-hour tutorial on SCADA-related topics at a Power Systems Conference at Clemson University in Clemson, S.C., March 9-11.

The papers and tutorial focus on cyber security for automation systems, including Supervisory Control And Data Acquisition Systems (SCADA).

Attending the conference and presenting papers from Sandia will be Jason Stamp (5616) and Steve Hurd (8941). One paper, "Framework for SCADA Security Policy," was written jointly by Jason and Dominique Kilman (5616). The other, "A Reference Model for Control and Automation Systems in Electric Power," was written by Jason and Michael Berg (5616).

Jason says the reference model describes how SCADA systems operate, and it provides context and a starting point for developing security solutions. The next steps will be to develop best practices for cyber security and then processes to assess the security of existing SCADA systems.

The framework paper describes important points for designing security policies of SCADA systems. Effective security policies are a fundamental requirement for adequate SCADA security.

SCADA

(Continued from page 1)

protocols and security products," says Juan Torres of Critical Infrastructure Systems Dept. 5615. "We are also showing infrastructure owners how to identify vulnerabilities in legacy SCADA systems and correct them using best practices."

Complex, interdependent network

The critical infrastructures are a complex and interdependent network vital to the national security and economic well-being of the country. They rely on the highly computerized SCADA systems for control and optimized operation.

Most computer systems that run the electric power grid, oil and gas pipelines, transportation systems, water treatment plants, and other critical

infrastructures are hybrids of new and old SCADA systems and information technology. Historically they were isolated from other networks, but that is changing as they connect with corporate networks for improved business efficiency.

"As the critical infrastructures become more automated and use more standard computer hardware operating systems and communications, they may also introduce new vulnerabilities," Juan says. "In addition, the threat from cyber terrorism continues to increase as people become more knowledgeable about these systems."

Sandia's Center for SCADA Security was established in 1998. For nearly six years it did research, advised industry on ways to improve SCADA standards, conducted SCADA vulnerability assessments, and held training courses. Sandia's significant involvement with infrastructure dates back to support of the President's Commission on Critical Infrastructure Protection in 1996 and assisting DOE with implementation of the 1998 Presidential Decision Directive-63 that provided a framework for critical infrastructure protection.

All these, along with preparations for the change of the millennium, helped Sandia to become more focused on cyber security for critical infrastructure protection, causing SCADA research to take a leap.

Juan says the new DOE-sponsored National SCADA Test Bed program, co-led by Sandia and the Idaho National Laboratory (INL), is allowing the labs to intensify their efforts to ensure the security of SCADA systems.

Homeland security

"Part of this DOE program is outreach," Juan says. "We will be spending a lot of time developing relationships with industrial organizations [such as the American Petroleum Institute, American Gas Association, and North American Electric Reliability Council] and give presentations at their industry conferences. Interest is growing in what we have to offer."

Sandia's Center for SCADA Security is also



RED TEAM MEMBER Charles (Chuck) Villamarin assesses a script to test a modem attack on a SCADA application. (Photo by Randy Montoya)

receiving new support from the Department of Homeland Security.

Sandia is leading a task to assess regulations and standards that influence industry's implementation of control system security.

"Sandia's strengths are in the areas of SCADA assessment, research and development, and standards development, and both DOE and DHS are beginning to really leverage them," Juan says. "DOE has expanded Sandia's SCADA tasks in the Fiscal Year '05 budget, and DHS has also committed to leverage more of the Labs' expertise in control system security for a national effort."

Center for SCADA Security

Sandia's Center for SCADA Security is composed of several test bed facilities that allow real-world critical infrastructure problems to be modeled, designed, simulated, verified, and validated. (See <http://www.sandia.gov/scada/>.)

All of these labs are networked with modeling and computational capabilities to find problems in SCADA systems and solve them. The facilities include:

- Control Center Lab that provides a centralized command center to communicate with remote SCADA elements using commercial SCADA software and hardware.
- Remote Substation Lab that provides a facility to evaluate security of remote devices.
- Distributed Energy Technology Laboratory that provides a platform to test the control of operational generation and load systems.
- Network Laboratory that provides network visualization and wired and wireless network modeling.
- Cryptographic Research Facility that supports research and development of encryption for applications in SCADA networks.
- SCADA Attack Resource Center that provides tools to attack and analyze SCADA vulnerabilities.
- Advanced Information Systems Lab that is used to research intelligent technologies for development of the infrastructures of the future.



Virtual environment

The Center for SCADA Security is developing advanced tools that allow analysts a way to understand the impacts of an attack on a SCADA system.

A 3-D computer simulation shows a SCADA system controlling a power grid, a "bad" guy launching a cyber attack on the SCADA system, and the physical effect on the power grid. It's all shown on a projection screen.

"This new method allows more flexibility to look at different attack scenarios at less cost than testing on a real power grid," says Juan Torres of Critical Infrastructure Systems Dept. 5615. "We can simulate an entire utility and interface a simulation with real SCADA hardware and security mechanisms."

SCADA Red Teaming

Last year the US Air Force requested Sandia's Information Operations Red Team & Assessment (IORTA) program to "red team" or attack a commercial telephone modem security product connected to a Supervisory Control And Data Acquisition (SCADA) system.

Air Force officials were interested in purchasing the TeleWall/AAA appliance combination, a device designed to keep unauthorized users from breaking into SCADA systems through modems.

To test the appliance's security claims Sandia's Red Team conducted mock attacks against the device.

"The Air Force came to us because Sandia is the only place in the country with SCADA security experience, organic infrastructure, and IORTA's Information Design Assurance Red Team [IDART] system in place," says Charles (Chuck) Villamarin (5612), who works in

the Red Team Laboratory.

Three teams were assembled. They included a Blue Team, the group that runs computer operations on the system in an authorized fashion; a Red Team, the opposing group intent to wreak havoc on the system; and a White Team, the arbitrators controlling demonstration managers.

The Red Team played the bad guys trying to compromise the security system and make the SCADA fail.

IDART applies structured, measurable, and reproducible adversarial approaches to assess information systems and provides actionable information for decision makers.

The Red Team Laboratory does this routinely for outside customers like the Air Force.

A Red Team group, which may consist of three to eight cyber-warriors, meets with clients in advance to determine the nightmare consequences from a possi-

ble attack. The Red Team studies the system, formulates possible attack strategies, and in many cases launches the most relevant attacks. System defenders conduct normal operations using security features for their software, platforms, firewalls, and network system components. The White Team determines the Red Team's level of success.

In the case of the equipment being tested for the Air Force, Chuck says, "Our Sandia team initially succeeded in gaining unauthorized access to the protected modems, but doing so proved extremely difficult. This showed that the TeleWall/AAA combination was in fact effective. In addition, we were able to provide immediate feedback to the vendor for product improvements. Simultaneously, the use of IDART resulted in a win-win situation for the Air Force [customer], SecureLogix [equipment manufacturer], and Sandia." (See <http://www.sandia.gov/iorta/>.)

Small atmospheres

(Continued from page 1)

SPIE Photonics Meeting in San Jose, Calif., and presented for consideration to Sandia's patent office — involves a small commercial valve that comes down like a trash compactor and crushes a tiny device until it releases its gases — currently, about 30 nanoliters — into a custom-built intake manifold.

Picobursts of gas

Because Steve's test mechanism requires only picoliters, his sensitive device can recheck measurements — using bursts of gas delivered in a series of puffs — dozens of times from the same crushed device in a 20-minute time span.

The method thus provides statistically significant atmospheric measurements at any given moment in a component's life cycle. (Current industry tests can achieve at best only a single reading from the release of nanoliters of gas. A single, statistically unverifiable result may contain significant error.)

By waiting a longer period of time — weeks, or even months — other microdevices from the same batch can be crushed and then analyzed to see what changes have occurred in their atmosphere over time.

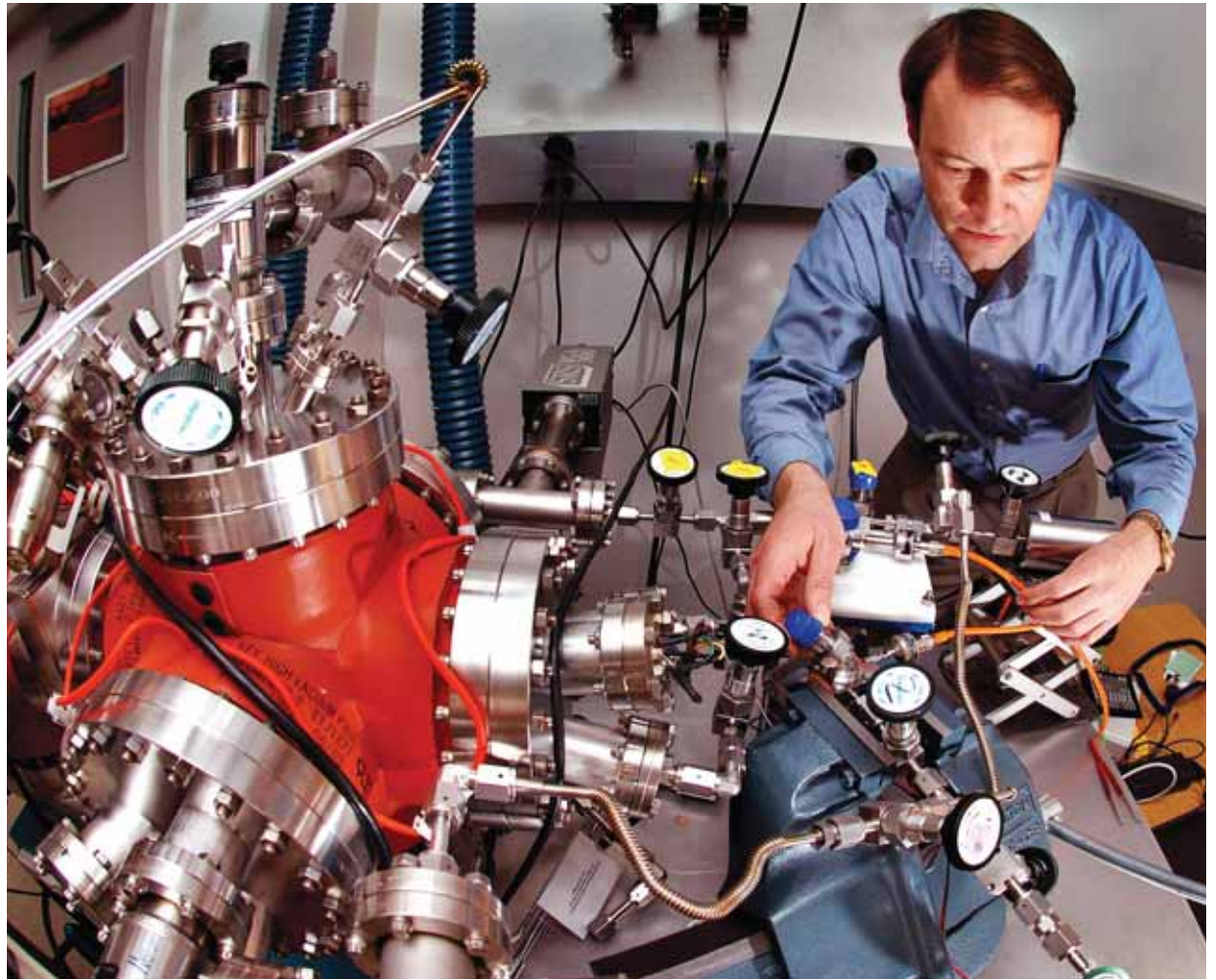
Currently, the system is able to measure gases emerging in pressures ranging from one atmosphere to 10 to the minus 4 torr. (One atmosphere is 760 torr.) The group hopes soon to decrease its lower sensitivity limit to 10 to the minus 6 torr — in effect, to be able to measure the quality of vacuums.

Danelle Tanner (1762), who describes herself as "a reliability-and-aging mechanism physicist" working on the silicon re-entry switch of the SiRES package for MESA, says, "We want 100 percent nitrogen [atmosphere] in our device. Steve's group gave us a really good idea of what species other than nitrogen were present in the package."

"Maintaining the integrity of the internal atmosphere of a hermetic device is essential for long-term component reliability," says Steve. "It is within this environment that all internal materials age."

Success of his group's new investigatory technique lies in the details of the test mechanism.

A precisely machined sample holder holds



MASTER OF SMALL ATMOSPHERES — Steve Thornberg arranges picobursts of gases from crushed MEMS devices to be sampled by his group's unique analytic device. (Photo by Randy Montoya)

the MEMS package to be crushed within the sampler valve. If the sample holder is too low, the part would not crush the MEMS device; too high, and the device would crush prematurely, letting gases escape unmeasured.

Because tested devices come in many sizes, height adjustments to the crushing mechanisms are needed for each sample.

The problem of debris from the smashed MEMS part interfering with gases that must pass through tiny tubes was solved by sintering a filter into a central gasket.

Perhaps most important, manifold volumes were minimized to maximize pressures when MEMS-released gases expand, reducing the amount of gas needed for an analyzable puff.

Still ahead is success in measuring very small amounts of moisture, which stick to manifold walls without making it to the detector.

To overcome this problem, the Sandia group is working with Savannah River National Laboratory to incorporate that lab's optical moisture measurement techniques based on surface plasmon resonance (SPR). In that technique, an optical fiber is used to transmit light from a specially coated lens. Moisture levels are measured from wavelength shifts.

Says Fred Sexton (1762), "Steve's group is making great inroads on measuring atmospheric composition in very small packages. This work was performed under an LDRD championed by the Reliable Predictable Microsystem Program."

Jerry McDowell named vice president for DoD Programs

New VP brings more than 25 years of Labs experience to position

Jerry McDowell officially began work as the new VP of Department of Defense Programs Division 15000 and Military Technologies & Applications Strategic Management Unit (MTASMU) on Feb. 18 after Sandia's Board of Directors unanimously approved the selection.

Jerry succeeds Jim Tegnella, recently appointed director of the Defense Threat Reduction Agency (*Lab News*, Feb. 18).



JERRY McDOWELL

Jerry most recently has served as director of DoD Systems Analysis & Concepts Center 15100 and chief operating officer of the MTASMU. Promoted to director in 1999, Jerry also managed the Aerospace System Development Center, a role that included oversight of Sandia's Missile Defense and Precision Strike Programs, as well as management of the Tonopah Test Range and Kauai Test Facility.

"We're fortunate to have Jerry," says Labs Director C. Paul Robinson. "His breadth of experience allows him to move quickly into this very important position, which is Sandia's direct link with the Department of Defense. I welcome him on behalf of the entire lab."

Labs Deputy Director Joan Woodard also praised the appointment, noting the variety of

jobs and projects Jerry has handled.

"Jerry has done terrific work for Sandia — and in turn, for the security of the country — during his more than 25 years here, and we look forward to many more years of association in his new role," Joan says. "I know I speak for the whole lab when I say that the board's unanimous vote is a testament to the esteem in which he is held."

Jerry says his first concern as VP is to preserve continuity of operations through the period of transition.

First priority: listen to concerns

"We have many exciting programs under way, and sometimes, changes can be disruptive," he says. To help with the transition, he sent a message asking all Div. 15000 Sandians to stay focused on the division's commitments with its customers. He says he will soon be visiting with each center within 15000 face-to-face.

"My first priority is to reach out to my management team and our staff and listen to their concerns," he says. "I want to get them talking about the really tough problems facing the DoD and how we can leverage the considerable resources in the Lab to help. I'm excited about the opportunities."

"I want to build a strong sense of identity within Div. 15000 and pride in the work that we do," he says.

Jerry says Division 15000 has many unique capabilities to offer the Labs and to all the other SMUs.

"A key strength in 15000 is a culture that reaches out to its customers in four ways," he says. They include: anticipate customers' tough problems; innovate solutions from a solid, systematic engineering, science, and technology foundation; create value by promptly delivering products and services that meet customers' needs; and help inform policymakers by providing key information on future national security challenges.

Jerry came to Sandia in October 1979 and began his career as a member of the technical staff in the Aerodynamics Department. He has broad experience in Work for Others programs for the DoD and served as chief of staff to the Nuclear Weapons Program. Outside of Sandia he worked for private industry with Vought Corporation and for the government, including working at the NASA Johnson Space Center from 1972 to 1975. During that period Jerry was assigned to the Aerodynamics Branch with responsibilities for the aerodynamic assessment of the space shuttle orbiter. He also supported the flight operations of the lunar missions Apollo 16 and 17.

He earned bachelor's, master's, and doctoral degrees at the University of Texas at Austin, all in aerospace engineering.

Manager promotions

New Mexico

Jim Dahl from SMTS to Manager, Facility Engineering & Support Dept. 6783.

Jim joined Sandia in September 2003. His Sandia experience includes support of hazard and accident analyses for the Annular Core Research Reactor Facility and the Sandia Pulsed Research Reactor Facility. In Jim's recent work as the Tech Area 5 nuclear safety basis program manager, he was responsible for development and maintenance of Documented Safety Analyses for the two reactor facilities and two nonreactor nuclear facilities.



JIM DAHL

Before joining the Labs as a full-time employee, Jim was a contractor at Sandia from July 2002 until September 2003. He has more than 10 years of experience supporting DOE and weapons laboratories in the areas of nuclear safety basis development, implementation, and training.

Jim has a BS in microbiology from the University of New Mexico and an MS in mechanical engineering with an emphasis in nuclear engineering from the University of Texas at Austin.

Todd Jones from Manager, Weapon Surety Engineering Dept. 12346, to Level II Manager, Surety Assessment Group Dept. 12330.

Until his promotion, Todd had been in essentially the same department since he joined Sandia in May 1993, as a member of Special Projects Dept. 6411, where he did risk analysis methods development for nuclear weapons. Dept. 6411 became Assessments Technologies Dept. 12333 in 1994, and Todd continued working on nuclear weapon risk assessment methodologies. He was promoted to manager of Dept. 12333 in 1998 and

was responsible for safety assurance work on nuclear weapons both at Pantex and LEP programs.

He was instrumental in developing an electrical modeling analysis capability for nuclear weapon systems and components. Dept. 12333 eventually became Weapon Surety Dept. 12346.

Todd spent 20 years in the military where he served in artillery, aviation, and nuclear weapon assignments. Before joining the Labs, Todd was one of 12 military research associates in the Army, with a duty assignment at Sandia/California from 1987 through 1990. He was the Sandia lead engineer for follow-on to Lance nuclear weapons development program. He was then assigned to the Defense Threat Reduction Agency, where he was responsible for developing a risk assessment capability for the Department of Defense from 1990 to 1993. He retired from the military in 1993.

Todd has a BS in general engineering from the US Military Academy at West Point and an MS in nuclear engineering from the Air Force Institute of Technology.

Dave Skousen from Team Leader, IS/IT Section Team 4227-1, to Manager, Safeguards & Security Information Systems Dept. 4227.

Dave joined the Labs in June 1993 as a systems analyst in the Benefits Department, where he worked on various benefits-related information systems. After two years in Benefits he moved to Technology



TODD JONES



DAVE SKOUSEN

Transfer and worked as a systems analyst developing information systems to track and manage information on cooperative research and development agreements, patents, licenses, etc.

After three years in Tech Transfer, Dave moved to Safeguards and Security, where he worked as an application manager and project lead for the Special Nuclear Materials tracking and management system. In September 2003, he was promoted from PMTS to Team Leader and given the responsibility of managing the information security needs for the newly reformed Safeguards and Security Center 4200.

Dave has a BS in finance with minors in accounting and economics from Brigham Young University and an MBA in management information systems from the University of New Mexico.

California

Jeff Gebel from PMLS to Manager, Site Business Office Dept. 8521.

Since joining the Labs in July 1999, Jeff has worked in Procurement and the California Site Business Office. While in Procurement, Jeff's work included negotiation and placement of the design and construction contracts for the Distributed Information Systems Laboratory and a period as acting manager for the group. In the California Site Business Office, he served as the Nuclear Weapons Business Lead for Division 8000 and led the California Site Finance Team.

Jeff has a BS in business administration from California State University, Hayward, and an MBA from the University of California, Riverside.

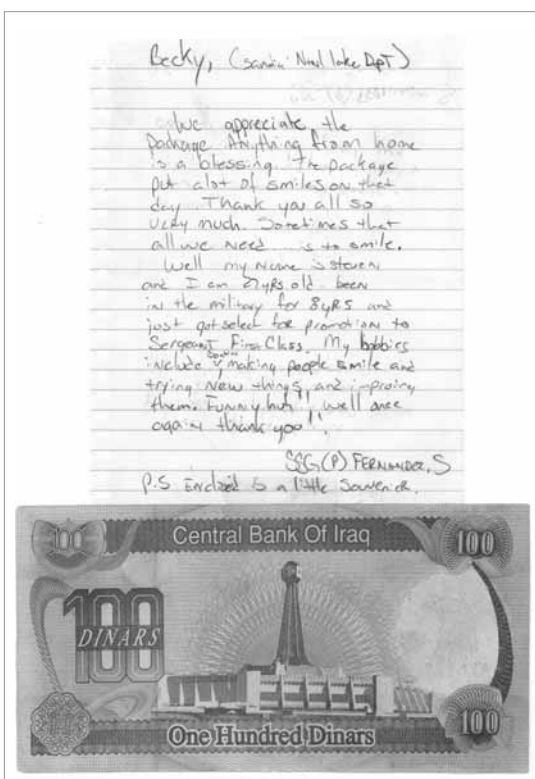


JEFF GEBEL

'My Soldier' becomes a reality as sergeant responds with gratitude

"We appreciate the package. Anything from home is a blessing," says Sgt. 1st Class Steven Fernandez. Sandia Dept. 9103 has sponsored a soldier through the My Soldier program at Manhattanville College and recently received a letter from him.

My Soldier is a program that lets US soldiers know that someone back home cares. It was established by Sgt. Juan Salas with the help of his school, Manhattanville College, when he returned home after serving in Iraq for 14 months.



ONE SOLDIER sent a thank-you note with a 100 dinar note from the Bank of Iraq as a souvenir.

The goal of the program is to show support for troops by establishing pen-pal relationships with them. The website www.mville.edu/mysoldier/index.html has more information on the program.

"During our holiday potluck, I shared the information about this program with my staff and it just grew from there," says Becky Hunter (9103). "We got involved as a way that we, as group, could give back to the troops who are fighting for our freedom."

The group has sent three care packages, the most recent last Friday. "Returning soldiers comment on how much they love getting mail and packages — even from strangers like us," says Becky. — Iris Aboytes

Safe and considerate driving habits while entering base help everyone

By Col. Hank Andrews, 377th Air Base Wing commander

Col. Andrews asked that we publish this item in the Lab News. — Editor

Some commuters to Kirtland have found "shortcuts" to the base, forging new routes to and from work every day. But we need to be mindful of the effect this has on our neighbors. For example, the "shortcut" through the residential areas east of Eubank and south of Central on roads such as Elizabeth Street and Tony Sanchez Drive are interrupting the lives of residents in these areas.

I want to appeal to the "good neighbor" in all of us by asking that we respect those living in residential areas near the base. Although these locations seem to present tempting shortcuts to Kirtland, they are by no means thoroughfares. It seems only right that we avoid them.

Also, many morning commuters have told our security force professionals and me about the occasionally inconsiderate and sometimes unsafe driving behaviors displayed by some drivers entering the base. The behaviors include speeding, talking on cellular phones while approaching the gates, and cutting into traffic. I know the latter point is a special irritant for many, as this habit causes bottlenecks of its own where side street traffic reenters the flow of vehicles entering the gates. Overall, we are safer and traffic flows more smoothly if we stay in line, to say nothing of the fact that the gains achieved by cutting into traffic are usually minimal at best.

The "cooperate and graduate" method of driving can work well for everyone involved. When traffic does back up while approaching our gates, if it looks like you can help smooth the flow, please let another vehicle merge into your lane of traffic. It's a good bet you'll get a smile or a wave of thanks for your courtesy and — combined with our ever increasing efficiency in getting you through our gates — everyone will arrive at work a little more relaxed.

Although commuters passing through Kirtland's eight gates face many challenges posed by enhanced security, we've been making significant progress in reducing traffic lines during peak traffic periods and we will continue to look for new measures to keep improving peak traffic flow.

I thank you for your cooperation.



COL. HANK ANDREWS



3 gimps and a geek

Victory at Mount Taylor

Why did three gimps climb the mountain? For the same reason a geek did. They did it because they could. The four men named their team "Three Gimps and a Geek" and competed in the 22nd Annual Mt. Taylor Quadrathlon near Grants on Feb. 19. More than 560 participants registered for the race, and winners were awarded medals. Three Gimps and a Geek received no medals. They did, however, share a victory.

The gimps were two Sandians, Dick Fate, 56 (6147), and Mark Miller, 51 (6331), as well as a former contractor to Sandia, Phil Henderson, 45. Each has faced a life-threatening illness. For them, the competition wasn't the

other athletes. Rather, it was a personal drive to overcome obstacles. It was another victory against odds that often overwhelm others.

The geek is a contractor at Sandia who simply embraces the opportunity to endure such events. He hasn't faced his own life-threatening challenge. He sees the "Quad" as a chance to stay fit and enjoy the outdoors. Tim Goering (6147) is a 44-year-old hydrologist who has worked at Sandia with the gimps since 1992. This was Tim's 13th year in the Quad. Having soloed seven times, he wanted to get a team together, and he encouraged Dick to enter.

Story by Jan Kohler
Photos by Tim Goering

"All I know is, I don't have a tumor today, and I get the mountain tomorrow."

Dick Fate

Soft-tissue sarcoma is a term that Dick, manager of Sandia's Environmental Restoration (ER) Project, is all too familiar with. Challenged three times in 11 years by the same cancer near the same hip, Dick underwent surgery each time, most recently in May 2004. Chemotherapy and radiation followed his first two surgeries, but chemo was dismissed the third time to prevent damage to his heart. Radiation destroyed much of the sciatic nerve, so most of the feeling in his left leg is diminished below the knee. His right leg does most of the work, causing him to limp.

This was Dick's seventh year in the Mt. Taylor Quad. He has competed in all four legs (biking, running, cross-country skiing, and snow-shoeing), soloing in 2000. "Each leg is a good physical test; each has its own character." This year Dick walked the "running" leg. With the Quad committee's permission, the team was allowed to start an hour ahead of the other teams, in the hope of finishing alongside them. With the aid of a leg brace, and ski poles for stability, the former runner walked 10 miles in the race, five of them uphill (an elevation gain of 1,200 feet) and five downhill, averaging 17 minutes a mile.

What did the race mean to Dick? "It means that I'm back in the game — running or not." Conditioning is ongoing. Dick swims twice each week with Tim, walks during lunch with some folks in his department, and hikes on the weekends with his wife. "I work out all year and then try to peak for various competitions." He liked the idea of other gimps joining the team. "I didn't want to be a burden on any healthy team."

"We're in it for the challenge and the good time together."

Tim Goering

The National Weather Service estimated that wind-chills were below zero, and wind gusts reached 70 mph at the top of the mountain. Being the snowshoe leg of the team meant Tim would encounter those brutal conditions, and they greeted him like a stinging, cold slap in the face. He snow-shoed with the skiers up "Heartbreak Hill" to the beginning of his leg. While waiting for teammate Phil to finish the skiing leg, Tim captured photos of the raw pain of other "Heartbreak Hill" skiers.

Staying active is always on Tim's agenda. He'll take on the "Stealbender Triathlon," near Moab, Utah, in May and several 14,000+ foot climbs near Telluride, Colo., in September; and in June 2006 Tim will bike across Kansas with his dad and brother.



"This is a second life."

Phil Henderson

In June 2001, Phil was running the Tramway bike path. The then-41-year-old was training for the La Luz run, and he was alone. The woman jogger who found Phil lying on the ground summoned help. Phil had suffered a stroke. Because the medics on the scene couldn't measure how long he'd been down, Phil wasn't given a drug which could have minimized stroke damage. It must be given within the first three hours of a stroke, or it can prove fatal.

As a geologist, Phil worked in the ER department, alongside Dick, Tim, and Mark. Part of his job included taking measurements, notes, and samples in the field. Numbers and letters were part of his work. These days, Phil spends two days each week, two hours at a time, working with the folks in the UNMH Hearing and Speech program. He's learning how to write numbers and letters again.

His therapy has him back to about 80 percent of his strength. "I lost sense of my body," he says. "You know what's put me in touch with my body? Yoga and Pilates. I'm making progress." He continues to run, hike, and ski. This year Phil was happy to be the team's cross-country skier in the Quad. "It makes you want to challenge yourself. And not working, I don't see these people."



"Pain is a good reminder that you're alive."

Mark Miller

Then a contractor in Sandia's ER department, Mark was about 43 when he began losing his balance. When he sang at family events, he couldn't hit high notes anymore. One day the right side of his face went numb, giving him that "Novocain feeling." An MRI revealed a tumor — a "cavernous malformation" of capillaries and veins, at the base of his brain stem. The tumor had small holes, and blood leaked out, putting pressure on Mark's brain. This affected his vocal chord and other parts of his body. Mark says it was similar to a slow-motion stroke.

In 1999, at age 45, Mark underwent surgery to remove the tumor. He missed work for three months, and spent the next three months working half-time. "It was a long road" to recovery. He admits that he's not training for anything right now, but began Tai Chi as a way to help regain his balance. He exercises regularly, but not strenuously. The year after his surgery Mark teamed with co-workers to form a Mt. Taylor Quad, as a goal to regain his physical conditioning after surgery.

Mark's brain still plays tricks on him. "My left leg drives me nuts with pain," he says. Not really, though. "My brain just thinks my left leg hurts." This year, for his fourth Quad, Mark was the bicyclist. He admits he's not "a real ardent jock like Dick is." So in planning the Quad he thought, "If I bicycle, now that would be smart," acknowledging that his RV would be parked near the bike/run transition, a comfortable place to wait for his team.



"We each have our own motivations" — Dick Fate

Three Gimps and a Geek did the Quad because they could. It wasn't about getting medals. It wasn't about getting the best times. It was about getting another chance to enjoy the important things in life.



Mileposts

New Mexico photos by Michelle Fleming
California photos by Bud Pelletier



Paul Gourley
25 8331



Kurt Wessendorf
25 1732



Tad Ashlock
15 5724



Timothy Petersen
15 12334



David Straub
35 5932



W.R. (Chip) Olson
20 14152



Carol Skaggs
15 6147



Berweida Learson
30 4121



Frank Peter
20 2614



Sam Subia
15 9141

Recent Retirees



Marian Van Delinder
35 15400



Jim Hubbs
32 2541



Lorraine Solanos
25 4233



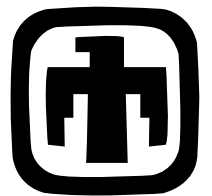
Paul Sealey
25 9616



Peter Watterberg
25 15231



Gregory Soo
30 8772



Feedback

How big does a pocketknife have to be before it becomes a deadly weapon?

Q: When I went to the badge office to get a new badge, I noticed that a poster showing prohibited items included pocketknives. At the tech area gates, it says no dangerous weapons but it doesn't specifically say anything about knives. How big does a pocketknife have to be before it becomes a deadly weapon? Also, how do we slice the ham and turkey at potluck dinners before the holidays without knives? Please clarify.

A: The Sandia National Laboratories Access Control CPR prohibits the following from Sandia controlled premises: "Personally owned instruments or materials that are likely to produce substantial injury or damage to persons or property."

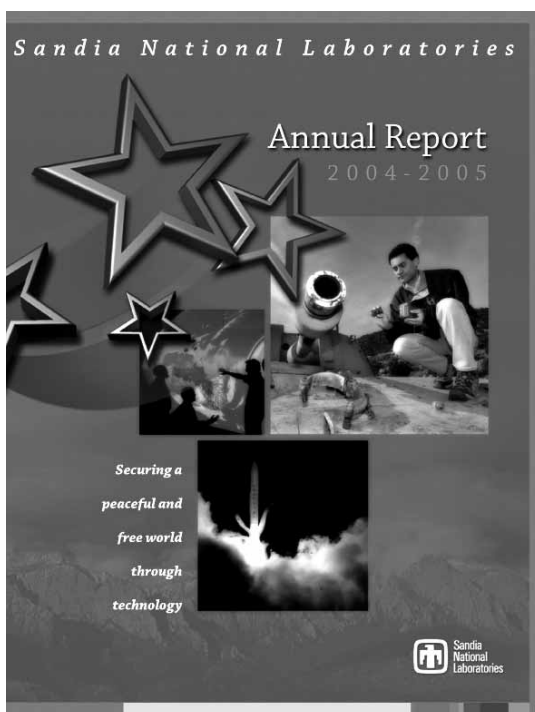
This is derived from the United States Code of Federal Regulations, 10 CFR 860.4, which states: "Unauthorized carrying, transporting, or otherwise introducing or causing to be introduced any dangerous weapon, explosive, or other dangerous instrument or material likely to produce substantial injury or damage to persons or property, into or upon any facility, installation or real property subject to this part, is prohibited" from DOE property.

Since neither of these specifically defines what these items are, we can use the New Mexico Criminal Code as a general guide. It defines a deadly weapon as: "... any firearm, whether loaded or unloaded; or any weapon which is capable of producing death or great bodily harm, including but not restricted to any types of daggers, brass knuckles, switchblade knives, bowie knives, poniards, butcher knives, dirk knives, and all such weapons with which dangerous cuts can be given..."

Items that clearly fall in this category are switchblade knives or hunting knives. While these types of knives are legal to own, they would fall into the category of items prohibited from Sandia controlled premises if personally

owned. Other, smaller types of pocket or utility knives, such as Swiss Army or Leatherman tools, are generally allowed. The Protective Force orders dictate that during random searches they do not allow pocketknives with blades longer than three inches into an area. Knives used for eating, whose blades are significantly weaker than other types of knives, are generally allowed. — Joe Sandoval (4213)

New Sandia annual report available



Sandia's new 2004-2005 annual report is now available through Public Relations and Communications Center 12600. The new report uses as its theme Sandia's core vision: "Securing a peaceful and free world through technology."

The 74-page color publication emphasizes the many ways that Sandia contributes to national security. This year's report includes

information organized by the Labs' strategic management units and a special report on Sandia's homeland security activities. One section reviews community involvement programs at both major sites.

The publication features recent technical accomplishments and capabilities that should be of particular interest to Sandia customers and employees. (Administrative accomplishments are covered in the *Lab News'* annual Labs Accomplishments issue, which will be published in the next few weeks.)

More than 2,000 copies of the annual report have been mailed to customers and other individuals and groups interested in Sandia's work. Single copies will be sent to all Sandia managers, bundled with the Labs' Institutional Plan. The annual report is also used by Sandia's recruiting office.

Peter Nolan, of Technology Marketing, and Holly Larsen, of The Plus Group, helped with the writing. Will Keener (12651) was editor, with technical editing assistance from Sherri Mostaghni (12652). Michael Vittitow (12654) designed the publication. Randy Montoya (12651), Bud Pelletier (8528), and Bill Doty Photoimaging contributed photos.

Employees and departments wanting printed copies of the new annual report can call the Media Relations and Communications Dept. 12651 at 844-4902. It can also be downloaded from www.sandia.gov/news-center/publications/annual-report/index.html.

Sandia joins other New Mexico research institutions in patent-bundling agreement for quick licensing

Goal is to speed commercialization of technologies, create economic benefit

Sandia is among seven New Mexico research institutions signing an inter-institutional agreement that allows bundling of patents for economic development.

On Feb. 25 Sandia joined Los Alamos National Laboratory (LANL), Science and Technology Corporation (STC) at the University of New Mexico, New Mexico State University, New Mexico Institute of Mining and Technology, The MIND Institute, and the National Center for Genome Resources. These organizations are all members of the Technology Research Collaborative (TRC), whose mission is "to collaborate in the acceleration of new technology business formations, and extensions that will benefit research programs of TRC Members, entrepreneurs, industry, investors, and the state of New Mexico."

The agreement also allows for other research organizations



GOV. BILL RICHARDSON addresses the crowd in the Roundhouse during the Inter-Institutional Agreement signing among seven of New Mexico's major research institutions. Labs Director C. Paul Robinson was first to explain the importance of the intellectual property bundling. Sherman McCorkle, president and chief executive officer of Technology Ventures Corporation, introduced the speakers. (Photo by Randy Montoya)

to become signatories.

The agreement is an experiment to provide rapid response and flexibility so that when commercialization opportunities arise, these institutions can quickly capitalize on them rather than spending time negotiating contracts. Each institution will identify specific patents that are appropriate for this agreement and are available for licensing.

Selected patents can then be included in a bundle of patents, along with those from other institutions, and licensed to interested companies. The licensing will be handled by one institution identified by all those having patents in the specific patent bundle.

"The flexibility and capability of this agreement give it great power and the potential to create both economic benefits for the region and technological advances that will strengthen the US," says Paul Smith (1304). "Sandia strongly supports economic development, and the public signing of this agreement shows that Sandia

also supports the TRC."

Allen Morris, the licensing executive who negotiated the agreement for LANL, says this inter-institutional agreement is a symbol of the cooperation between TRC members.

"This agreement will be used as a tool by TRC members to foster the growth of high-tech industries within New Mexico," says Morris. "LANL is committed to being a good neighbor in northern New Mexico and is helping to support economic growth in our region."

"The agreement will allow a company to easily access patents from a number of New Mexico research organizations and have one party represent these institutions in the transaction," says STC President and CEO Lisa Kuuttila, who negotiated the agreement on behalf of STC. "This reduces the barriers considerably." — Michael Padilla



Sandia/California celebrates first Family Day; Labs studies use of radioactive waste to treat sewage sludge

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 . . . A short story about Sandia's lost-and-found service in the March 25, 1955, issue mentioned some unusual items that had been found and turned in. The most unusual was a ticket from an Albuquerque pawn shop for a set of false teeth, which had gone unclaimed for some time. (We trust the poor owner wasn't pawning the teeth to buy fresh corn on the cob.)

40 years ago . . . The March 12, 1965, issue was the first in which news about Sandia's Livermore Laboratory began running regularly on page three. The Livermore page in that issue was devoted entirely to a short story and lots of photos of the first Sandia Family Day held in California. The event was a huge success; about 1,500 people were expected, but about 2,500 attended. The Sandia/California page on page



SANDIA/CALIFORNIA'S first Family Day in 1965 was a huge success. Here a young visitor is shown what her pulse beat looks like on an oscilloscope by Family Day host Howard Reed.

three continues to be an important feature in the *Lab News* today, although the *Lab News* frequently starts major California-related news and features on page one or elsewhere.

30 years ago . . . Sandia was beginning a new study cosponsored by the Energy Research and Development Administration and the Environmental Protection Agency to determine whether radioactive waste from nuclear power reactors might be used to disinfect and treat sewage sludge. The March 7, 1975, *Lab News* explained that Sandia researchers thought the simultaneous application of heat and ionizing radiation to sewage sludge might be an effective way to make it useful as a fertilizer and soil conditioner. Sandia actually built a prototype plant in 1978 and then Sen. Harrison Schmitt declared at the dedication ceremony that sludge and nuclear waste should in the future be considered "resources in disguise." An enthusiastic City of Albuquerque later sought funding to construct a similar operational plant, but the technology was never fully developed.

10 years ago . . . The March 3, 1995, issue reported that the new compressed workweek pilot program was running smoothly after its first month and that 75 percent of exempt employees in the three pilot divisions had chosen to participate in the "9/80" schedule. (The option was extended to all employees on June 30). Hiring restrictions and budget concerns were also making news 10 years ago. The March 3 issue announced that all hiring actions and promotion job postings had to be approved by then Executive VP Jim Tegnalia. The March 17 issue reported that Sandia had two groups looking at cost-reducing measures in response to a DOE initiative to cut costs by about \$10 billion over the next five years. And the March 31 issue reported that some 2,000 Sandians had access to the Internet and that then-Chief Information Officer Mike Eaton said the goal was for everyone with a computer to get access to the web. — Larry Perrine

Feedback

Reader asks who to call when animals are hit on base

Q: Last night someone hit a dog on the bridge to Areas 3 & 4 and drove on. Besides being severely injured and clearly in pain, the dog was probably over 100 pounds so it might have caused a more serious accident if someone else had hit it again in the dark. I spent a lot of time going through 411 and being passed around to find the correct contacts.

I have seen coyotes in that area and have been concerned about them crossing the road and getting hit by a vehicle in the dark. I would like to be better prepared in case this happens in the future. Is there a central number we can call from a cell phone to report unsafe road conditions on base? Is it a different number to report an injured animal on the road?

A: Thank you for your concern and taking the time to attend to an injured animal. In the future you should contact the Sandia Non-Emergency Hot Line (311 from any Sandia telephone or 844-0311 from a cellular or non-Sandia phone). Operators are available 24/7 and they then will get the pertinent information and contact the necessary authorities to respond to an injured animal or other unsafe condition immediately. — Ed Williams (10864)