Sandia sensor has potential to help US military eliminate 'friendly fire' deaths during combat

Tagging device monitored from air to ground; Army to conduct tests this fall

By Michael Padilla

A device to help eliminate "friendly fire" during military combat has been created by Sandia engineers.

Building on more than 10 years of research and development, Sandia engineers have created a radar tag sensor that is mounted on military vehicles and which is recognizable to an attack aircraft as a "friendly." The device, tracked via aircraft radar, can be used to identify both US and coalition forces during combat to avoid fratricide. During war, fratricide is the act of killing one's own soldiers.

Lars Wells (2344) and a team of Sandia engineers have completed numerous tests and identified partners and potential customers for the sensor, which will be tested by the Army this fall.

One of the selling points is that the researchers have shown the sensor can work with multiple radars and multiple aircraft, says Lars.

"It is mature enough to consider as a fratricide and situational awareness solution now and for the long term," he says.

Radar echoes

The sensor, dubbed by the Army "Athena" — protector of the troops — is not a radio transmitter that broadcasts a signal for the aircraft to

(Continued on page 4)

FRIENDLY DEVICE — Lars Wells (2344) displays a prototype of the radar tag sensor. (Photo by Randy Montoya)

Sandia LabNews

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Sandia National Laboratories

Bringing power to remote Central American villages

A Sandia team is installing sustainable energy systems to bring electricity to places where it has never been available before. Iris Aboytes writes about Debora Ley's adventures on the project in a story beginning on **page 6.**

2003 ethics survey clarifies how supervisors should handle employees' ethics concerns

Some 3,100 Sandians took Lockheed Martin survey last fall — 29 percent say they observed ethics misconduct

By Chris Burroughs

Responses to 13 new questions in the 2003 Lockheed Martin ethics survey that some 3,100 Sandians took last fall are clarifying how Labs' supervisors handle ethics.

"We found that most Sandians are generally satisfied with the way their managers listened, handled, and provided feedback about ethics concerns — from the beginning when misconduct was first identified to the follow through," says Linda Vigil-Lopez, Manager of Ethics Office 12810. "The new questions also showed that supervisors talk about the importance of ethics and that employees trust supervisors to keep commitments."

Otherwise, 2003 survey results were generally consistent with the survey administered to employees in 2001, which indicated that Sandians view ethics in the workplace as necessary to doing good business and that employees have a high satisfaction with the Labs in general.

All Sandia employees were asked to take the anonymous survey between Nov. 3 and Dec. 3 of last year. Thirty-one percent responded using the various options available to them, including e-mail, paper, and telephone. Some 46,000 Lockheed Martin employees around the world took the same survey. Similar surveys were offered in 1995, 1997, 1999, and 2001.

A few areas of concern that emerged in the survey included:

• Pressure to compromise company's ethical standards. A small portion of Sandia respondents — 10 percent — said they felt pressured periodically or often by other employees or management to compromise the company's standards of ethical business conduct in order to achieve business objectives. Of that 10 percent, 46 percent said the reason was due to pressure attributed to aggressive objectives, and 41 percent attributed the reason to schedule pressures.

• Personal observance of misconduct. Twenty-nine percent of the Sandia survey takers indicated that they observed ethics misconduct in the past year, down two percentage points from

(Continued on page 4)

Sandia's CMC, Arab foundation to help revitalize Iraqi science infrastructure

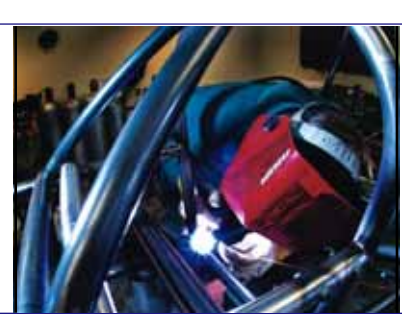
By Neal Singer

A cooperative effort is underway between a group of Arab scientists and Sandia researchers to help rebuild key elements of Iraq's scientific infrastructure.

The agreement was announced last week by the National Nuclear Security Administration (NNSA) between the Arab Science and Technology Foundation (ASTF) and Sandia's Cooperative Monitoring Center (http://www.cmc.sandia.gov).

In phase one of the project, ASTF will survey Iraq's science and technology situation to identify critical areas of Iraqi scientific strengths and technical needs. The survey will document Iraqi expertise in areas critical to reconstruction, as well as in potential areas of peaceful

(Continued on page 5)



What's what

Curious Charles' interest was piqued recently by a blurb in the Secretarial Services Wednesday Weekly urging people to save the tabs on beverage cans as a contribution to Ronald McDonald House. So he did a little 'snoping' (www.snopes.com) to see if what seemed suspiciously like an urban legend was.

It wasn't.

Said the Snopes page (www.snopes.com/business/redeem/pulltabs.asp): "Seeing as how folks were bound and determined to collect pull-tabs for charity, in 1987 McDonald's found it a good idea to get into the act. Their Pop Tab Collection program (scroll down the Snopes page and click on McDonald's) is a response to pull tab-mania, and although its web presence perpetuates the myth that the tabs are made of a purer form of aluminum than the rest of the can, it at least provides folks with a place to dump the tabs they've been hoarding over the years in the belief they could use them to purchase dialysis time for an ailing child. Tabs dropped off at various McDonald's are taken to a local recycling company, and the money made from selling them for their scrap value is given to the local Ronald McDonald House to help defray operating costs."

No urban legend, but quirky — at least.

* * *

Another cute spell-checker miscue:

An invitation from ¡Salud! beckoned: "So, come over and see our new Xanadu nested tidally between some of Sandia's historic technical facilities."

To which observant and nautically minded Bruce Hansche (9122) responded: "I wonder — does its size or location vary with the lunar cycle?"

Prompting Medical Director Dr. Larry Clevenger's (3300) *mea culpa:* "Yikes! The word should have been 'tidily.' The facility location will remain the same, but apparently my ability to spell is influenced by the moon."

* * *

And to that shy retiree who corrected my spelling: You're right, it's vaseline — with an "e" — not vasoline.

* * *

Although there was little fanfare, the Department of Homeland Security (DHS) observed its first anniversary last week. After its creation by Congress, DHS faced the huge task of striving immediately to make our nation more secure and simultaneously merging about 180,000 people and 22 agencies into an organization of workable groups.

DHS has come a long way in just a year, and some of that progress is due to the strong working relationships that Sandia and other national labs established with DHS long before it became a cabinet-level agency (it was formerly the Office of Homeland Security).

An upcoming *Lab News* piece will include the Labs' role in helping DHS get organized, some Sandia technology that is being applied or considered to enhance our homeland security, and how we continue to support and work with DHS. It will be interesting reading.

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

Sandia LabNews

Sandia National Laboratories

http://www.sandia.gov/LabNews

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To notify the Labs of changes in address, call or write Carol Wade, Benefits Dept. 3341, at 505-845-9705, Mail Stop 1021, SNL, Albuquerque, NM 87185-1021, or e-mail her at cawade@sandia.gov.

Others:

To receive the *Lab News* or to change the address (except retirees), contact Michelle Fleming, Media Relations and Communications Dept. 12640, at telephone 505-844-4902, e-mail mefleme@sandia.gov, or Mail Stop 0165, SNL, Albuquerque, NM 87185-0165.

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If your Mail Stop is not receiving enough copies of the *Lab News* for everyone, please call Honario Anaya, Mail Services Team 10268-4, at 844-3796. (At Sandia/California contact the Mail Room at 294-2427.)

Sandia Corporation Savings Plans removing Janus Worldwide Fund

Effective March 31, 2005, Janus will be removed from the Sandia Savings Plan fund options

Sandia's Investment Committee, which is responsible for the selection and removal of investment options within the Sandia Corporation Savings Plans, has voted to remove the Janus Worldwide Fund from the available investment options within the Plans.

The Investment Committee made the decision in January because a number of organizational and personnel changes at Janus decreased the Investment Committee's confidence that this fund's poor relative performance will improve in the foreseeable future.

Effective March 31, 2004, at 4 p.m. EST, the Janus Worldwide Fund will be closed to new contributions. If participants do not request a change to how their contributions are to be invested by this date, contributions that had been directed into the Janus Worldwide Fund will be redirected into the Interest Income Fund.

Effective March 31, 2005, the Janus Worldwide Fund will be removed from the Sandia Savings Plan fund options. If remaining balances are not exchanged by this date, the monies will automatically be exchanged for you into the Interest Income Fund.

The Janus Worldwide Fund charges a short-term redemption fee of 1 percent if shares are sold or exchanged before the completion of a 90-day holding period (effective Oct. 1, 2003). The short-term redemption fee can be avoided if a participant holds the shares for at least 90 days before exchanging or selling.

Participants interested in international stock exposure have the following options available in the Savings Plans: the Spartan International Index Fund, Templeton Foreign Fund-A, and three Life Strategy Options, which hold between 5 percent and 15 percent in international stocks.

For contribution changes (http://contributions.netbenefits.com), exchanges (http://exchanges.netbenefits.com), and information on all fund options (http://yourcompanyplan.netbenefits.com), select the appropriate link, or call Fidelity Retirement Benefits Line at (800) 240-4015. For other questions about this action, call Rebecca Spires (505) 844-9965 or Jane Farris (505) 248-1659.

Stevens to succeed retiring Coffman as CEO of Lockheed Martin

Vance Coffman announced Monday that he plans to retiree Aug. 6 as chief executive officer of Lockheed Martin, to be succeeded by current President and Chief Operating Officer Bob Stevens. Stevens, 52, will also retain his current position as president.

BOB STEVENS

Coffman, 59, who has been with the company 37 years, said to assist an orderly transition, he plans to serve on the board as a nonemployee chairman until April 2005.

"The board and I are extremely pleased by the selection of Bob Stevens as my successor," Coffman said. "He is an exceptional leader with great vision and a deep understanding of the industry, our customers, and our Corporation."

Stevens headed Lockheed Martin's Energy and Environment Sector before becoming chief financial officer and then, in October 2000, president. "I am deeply honored to be given the opportunity to lead this great company and its 130,000 extraordinary employees," Stevens said.

Site hears latest news on four key R&D projects

Symposium focuses on hydrogen storage, rad monitor, dental disease markers, fiber-optic lasers

By Nancy Garcia

Some late-breaking news came during the latest R&D Focus Symposium showcasing work by researchers at the California site. A nuclear reactor where Sandia is testing a radiation monitor just entered a maintenance shutdown, and Jim Lund (8232) learned during his talk from a team member in the back of the audience that the change was picked up, confirming the monitor works as planned.

Jim described the ongoing work on this anti-neutrino detector at the San Onofre Nuclear Reactor and also the development of a small neutron generator for use in probing the presence of nearby nuclear materials. He was among four researchers who described their projects during the symposium, the third since the series began about two years ago. Organized by a committee of Distinguished Members of Technical Staff, the series is open to the site as a whole.

Calling the collection of talks "very, very interesting and very exciting," California Laboratory VP Mim John thanked the entire committee for bringing the series to the site.

First up were Jay Keller (8367) and Weifang Luo (8773), describing hydrogen energy research, particularly work at the California site to investigate storage of the volatile gas in powdered metal hydrides, where it is absorbed like water in a sponge. The hydrogen is nonflammable on the hydride bed, and can be drawn off as needed to power a fuel cell to operate a vehicle without creating greenhouse-gas-generating tailpipe emissions.

DOE would like to find a way to store at least 6 weight-percent of hydrogen onboard a vehicle where weight and volume constraints are important. Weifang described a promising compound hydride that may achieve that goal, which is being studied to optimize its operating temperature and pressure.

Jay and Jim Wang (8773) have proposed for Sandia to be a DOE "Center of Excellence" in hydrogen storage, and is also working with Chris Moen (8752) on safety codes and standards, carrying out hydrogen-release studies with SRI.

Next Jim described how a detector the size of a small room installed near the core of the Southern California nuclear reactor is being investigated for its utility in determining whether any fissionable material is being diverted. The monitor detects about one-fourth of the antineutrino flux predicted from the radioactive material that powers the reactor.

Sandia has also developed a meter-tall neutron generator that could interrogate nuclear material by "pinging" it with neutrons that would incite the release of secondary particles that can be detected. The next iteration should be smaller, he says, and a prototype will be tested soon.

Another talk described a new foray for Sandia into a collaboration with the University of Michigan School of Dentistry and Cornell University on engineering the MicroChemLab to detect markers of periodontal disease in saliva. The hand-held device potentially allows better, faster, potentially cheaper analysis of components in liquid samples, and has demonstrated separation of six proteins in less than 30 seconds in a microchannel measuring just 1 millimeter.

Periodontal disease affects more than half of US adults, 20 million to 45 million of them severely, and may be an initiating cofactor in serious systemic illness that costs $5-6 billion annually. The goal is to be able to screen for a bacterial infection, gingivitis, which causes inflammation of the gum that leads to bone loss if unchecked.

Anup Singh (8130), who is leading the project with Victoria VanderNoot (8130), said patients conceivably will be screened during routine appointments by collecting saliva on a strip of paper inserted between the tooth and gum. The saliva would be subjected to an immunoassay on the microchip while the patient waits. Future improvements to the hand-held chemical analysis device might include changing the detection system (which currently employs a light source) to rely on chemiluminescence.

Wrapping up the symposium, Dahv Kliner (8356) talked about his breakthrough in a collaboration with the Naval Research Laboratory to amplify the power in fiber-optic lasers and change the wavelength to usable visible or ultraviolet light.

Dahv said their year-old record still stands of showing the highest levels ever extracted from a fiber light source of peak power, pulse power, and average power.

By selectively bending the fiber, they were able to direct the energy toward a stable beam that has 20 to 30 times the power of a typical fiber laser. The fiber is doped for optical gain, and the strategic coiling selectively eliminates unwanted modes without any loss of efficiency.

A series of three crystals converts the infrared light to visible or ultraviolet, which is particularly useful in the $500 million annual materials-processing market, among other applications. The invention fits in a box measuring 4.5 by 3.5 inches, which is two orders of magnitude less than the competing technology, and can deliver watts or tens of watts of power with no substantial additional breakthrough, Dahv said, commenting, "we've really just scraped the surface."

SHAPE OF THINGS TO COME — The current neutron generator package that Jim Lund (8232) described in his R&D Focus talk is expected to be made even more compact in its next version. Here, Kristin Hertz (8772) and John Steele (8232), the principal investigator and lead mechanical engineer, respectively, show the neutron generator in the device that has been developed over the past two years. (Photo by Bud Pelletier)

Sandia CaliforniaNews

Feedback

Q: *How exactly is the Extended Travel Allowance payment calculated? According to the "Request for Payment of Extended Travel Allowance" form, the rate is supposed to be 15 percent of my base pay. I have submitted a few of these forms; lately, however, no matter how I calculate it, what shows up on my paycheck (before tax) does not even come close to being 15 percent of my base pay for the affected period.*

A: The calculation for the Extended Travel Allowance is as follows: 15 percent of the base pay up to a maximum base of $50,000 with a total maximum allowance of $7,500 annually. After this amount is calculated, it is divided by the number of days in a year and then multiplied by the number of days of the extended travel.

Thus if an employee makes $75,000 annually and is on extended travel for 20 days, the calculation would be as follows: (.15 x $50,000)/365) x 20 = $410.96. If you have specific concerns regarding your calculations, please feel free to contact the Payroll Department.

— Jesus Ontiveros (10502)

* * *

Q: *I just read a Feedback Q&A about the traffic lights at NCO bypass and 12th Street that are scheduled to be replaced in 2004. Will this include pedestrian traffic light controls and additional crosswalk striping? This area is really fun to get across in heavy traffic.*

A: Thanks for the inquiry; there are no current plans for pedestrian controls or additional crosswalks at the intersection of NCO Bypass and 12th Street. Pedestrian controls would require a significant investment by the USAF for new poles, additional signals, and supporting infrastructure. The criteria for the placement of crosswalks are presented in the Manual of Uniform Traffic Control Devices. The current crosswalks meet these criteria; any additional crosswalks would not meet these criteria for providing safe crossings.

— Ed Williams (10864)

Tag sensor

(Continued from page 1)

receive. Instead, the sensor creates synthetic radar echoes, so that the radar picks up the sensor signal in the same way it picks up radar echoes from tanks, trucks, or other objects.

In general, the radar transmits a pulse of energy then looks for the reflections of that energy from objects on the ground. The tag sees the radar's transmitted pulse and sends it back to the radar, except it adds a little bit of data to the reflection (or echo).

"Blue-on-blue" incidents have long been a problem during war. "Developing the capability to identify 'friendly' vehicles in battle will bring about a great reduction of fratricide."

As the radar picks up (or receives) all of the reflections from the ground, it looks for that unique data signal. Once the radar sees that data on an echo it knows it is looking at a tag, and places an alert icon on the pilot's screen. The project has good system integration between tag and radar, Lars says, which is key to making it usable.

"Generally the radar will be nearly as accurate in locating a moving tag as it would be in locating any other moving object," he says.

MILITARY SUPPORT — Rick Ormesher (2344) explains where the radar tag sensor will be placed on a military vehicle. Rick has been the project's technical lead for the last four years. (Photo by Randy Montoya)

Eliminating fratricide

According to the Department of Defense, 24 percent of the 146 American battle deaths during Operation Desert Storm were by friendly fire. A further 15 percent of the 480 wounded were also by friendly fire. Historically, fratricide accounts for 10-15 percent of wartime casualties.

"Blue-on-blue" incidents have long been a problem during war, says Lars. "Developing the capability to identify 'friendly' vehicles in battle will bring about a great reduction of fratricide."

The sensor has shown the potential to truly save lives on the battlefield, "but it can also assist battlefield situational awareness," he says. "Many times during combat the military has to pull back from an attack plan because they don't know who is on the ground."

The Radar Tag Sensor team

Marjorie Kirkel (2305), Stephanie Otts, Don Small, John Mathews (2341), Lars Wells, Rick Ormesher (2344), Mike Murphy, Ana Martinez, Ken Plummer, Ken Smith (2346), Jeff Hollowell, Mike Gardner (2348),General Atomics Corp., and Sierra Monolithics Inc.

Lars says a future path of the project is to include tags on every soldier.

Keeping costs down

Mike Murphy (2346), Sandia's longtime tag expert, says one way of keeping costs down is by making the tag work easily with existing systems.

"The aim of affordability is a big factor of the project," says Mike. "By adding tagging to existing radars, we don't need to build new equipment for the aircraft."

Costs can also be kept to a minimum by partnering with industry and with various military agencies.

"Our industrial partners will be able to take this technology and drive the cost down quickly so that it is affordable for every Army vehicle and Air Force fighter jet," says Mike.

Technological support

Recent underlying development has been supported by DOE's Nonproliferation Office, which has an eye toward using the technology to track proliferants. In fact, this application was how Sandia started to create what became Athena, says Lars.

"The aim of affordability is a big factor of the project. By adding tagging to existing radars, we don't need to build new equipment for the aircraft."

The current project is sponsored by the Army's Communication Electronics Research, Development, and Engineering Center (CERDEC), which is staging a large exercise this fall that will demonstrate the tag system for high-ranking officers and regular soldiers alike.

"Sandia was the only developer that could ready a tag to support their short deadline," says project leader Rick Ormesher (2344). "We were able to do an initial demonstration for the Army in January 2003 with only a few months worth of effort."

The success of that initial demonstration helped lead to the current effort, says Rick.

"We are really excited about the prospect of deploying this technology and seeing it make an impact," says Lars.

Ethics survey

(Continued from page 1)

2001.

• Failure to report misconduct. And of the 29 percent, 39 percent reported the misconduct to a manager or another appropriate person. A concern is that the majority of people (61 percent) do not report this observed misconduct to management or another appropriate person.

• Report unethical activities without fear of retaliation. Overall there is an upward trend that more employees (57 percent) feel they can report unethical practices without fear of retaliation, an increase of 2 percentage points from 2001. However, there is still room for improvement.

• Supervisor fails to discipline those who violate ethical standards. One concern is that only 42 percent of the respondents believe their manager disciplines employees who violate the corporation's ethical standards. (Note: Because of privacy issues, the respondents may not be aware of disciplinary actions.)

In general, the results of the survey showed that Sandians take ethics seriously and want to do the right thing.

"This is shown, not only in the survey, but in the increased number of people coming to the Ethics Office with concerns," says Jennifer Crooks, Director of Audit and Ethics Center 12800. "More and more, when people note ethics misconduct, they are reporting it so the misconduct can be addressed by management."

Last year 263 inquiries and 34 investigations of possible ethics misconduct were handled by Sandia's Ethics and Business Conduct Office. Following investigations, about 40 percent of the cases were substantiated — shown to be valid with corrective action taken. These allegations of misconduct were reported by employees, retirees, contractors, and vendors.

Linda says now that the Ethics Office has the results of the survey, it will closely analyze data and write an action plan, as was done with previous years' surveys. Following the 2001 survey, the office increased its communication efforts to alert people to the importance of ethics in the workplace. Office staff committed to increased visibility by initiating a quarterly case study sent to managers for discussion with staff that described an ethics misconduct case. The Ethics Office staff began including ethics quotes in the *Porcelain Press* and visited with vice presidents and directors to informally discuss the ethics programs and relay issues and trends. In addition, Jennifer reports statistics, trends, and issues to the Sandia Audit and Ethics Committee, a subcommittee of the Gover-

Look for your copy of the annual ***Lab News*** Labs Accomplishments issue soon

The 2004 Labs Accomplishments issue, dated March 2004 — 16 pages, printed in full color on quality paper — is at the printer now (on a special press in Colorado Springs). It will be delivered soon to each employee and on-site contractor and mailed to retirees and our outside recipients in government, industry, and universities.

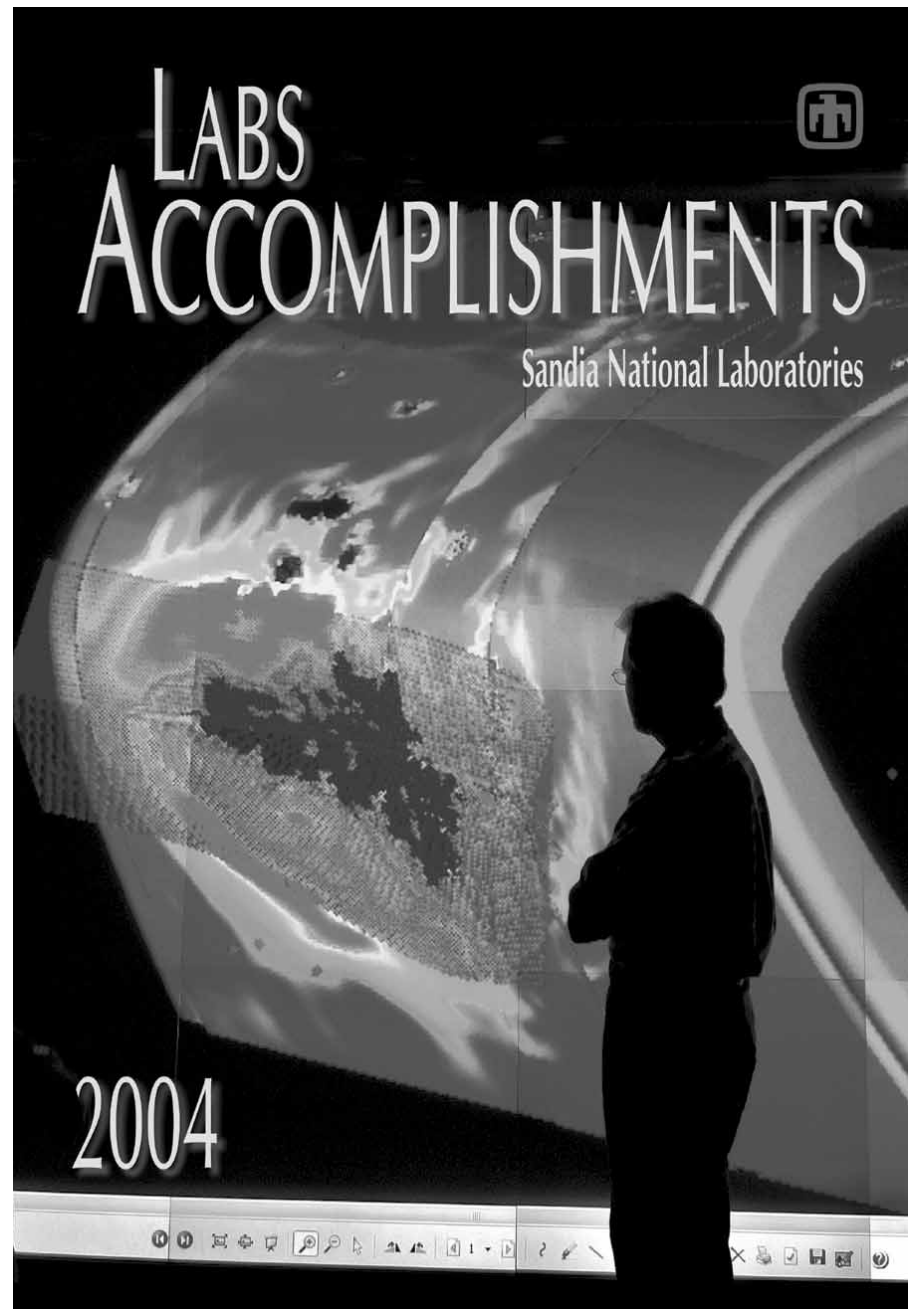
Extra copies have been printed for recruiting purposes and for special mailings to Sandia friends and customers.

This year's issue includes succinct summaries of approximately 150 Labs accomplishments over the past year, illustrated with 50 color images.

The categories are nuclear weapons, homeland security, nonproliferation and assessments, security, materials/physics/chemistry, bio/nano/cogno, computing, energy and infrastructure assurance, pulsed power and radiation effects, military technology and applications, technology partnerships, manufacturing and production, community outreach, environmental management and remediation, electronics, engineering science, and Integrated Enabling Services (health and wellness, human resources, financial, and facilities/administration/logistics).

This annual *Lab News* project is carried out in close cooperation with Sandia's VPs (who make the selections), technical staff, and Labs Director C. Paul Robinson, who provides an introductory note.

For many years, the annual Labs Accomplishments issue was distributed as an insert inside a regular issue of the *Lab News*. Beginning in 2002 it has been printed on glossy paper and distributed as a separate special issue. — *Editor*



The cover photo for this year's Labs Accomplishments issue is by *Lab News* photographer Randy Montoya. In it, Sandia researcher Kenneth Gwinn studies a large-screen projection of a Sandia computer analysis of the damage done to the leading edge of a space shuttle wing by insulation material striking it at near-supersonic speeds. The Sandia analysis, done at the request of NASA, played a key role in helping NASA determine the cause of the space shuttle *Columbia* accident.

Iraqi science

(Continued from page 1)

scientific development.

"We both [at ASTF and CMC] had the idea of engaging the Iraqi S&T community," says Arian Pregenzer (6920), Sandia senior scientist. "We decided to combine our ideas into one proposal that could take advantage of Sandia's experience working with scientists in Russia and the Newly Independent States on peaceful research and development, as well as ASTF's extensive contacts in Iraq."

"We're trying to help revitalize the Iraqi scientific community."

Sandia worked with ASTF to help establish the survey's goals, says Arian. An ASTF team entered Iraq in late January and established a temporary office in Baghdad for completing their survey. They also recruited a team of Iraqis to assist in their work. Plans are to brief Washington officials of their results in March, and then plan an international workshop to obtain international support and funding for high-priority projects.

"We're trying to help revitalize the Iraqi scientific community," says Arian.

The Arab Science and Technology Foundation, headquartered in Sharjah in the United Arab Emirates, is a nongovernmental organization established to stimulate scientific research in the Arab world. Its president, Abdalla Alnajjar, holds a physics PhD with a focus on solar energy. He is professor of physics and Director of Research at Sharjah University.

National Geographic has nothing on Sandian

Debora Ley, Sandia team bring renewable energy help to people in rural communities in Central America and Mexico

Story by Iris Aboytes

Running down a mountain screaming to escape from a snake or staying in a remote (but picturesque) hotel where *cucarachas* (cockroaches) hold their own rodeos is probably not how the average Sandia newcomer would imagine spending their first year and a half on the job. Neither did Debora Ley (6233). During her short time at Sandia, she has traveled to the rural areas of Honduras, Guatemala, and Nicaragua. She also has traveled to Mexico, Canada, and Costa Rica.

Debora is assigned to the International Sustainable Engineering Group (ISEG). She is part of a team that works mainly in Mexico and Central and South America. The program has provided energy in a sustainable manner for applications such as televised education, agriculture, protected-areas management, and electrification. The goal is to increase the quality of life for the various communities.

DOE and the US Agency for International Development are sponsors of the work. "They make it possible to provide sustainable energy resources to people who really need and appreciate it," says Margie Tatro (6200).

DEBORA LEY inspects a water pump.

Guatemala

In Guatemala's protected areas, ISEG is trying to combine conservation and development. Reaching Waxabaja, in the Biosphere Reserve of Sierra de las Minas, was quite an adventure. From Guatemala City, it is about a three-hour drive to the nearest hotel. From there, it is another two-hour drive, followed by a four-hour hike up and down and around mountains. Parts of the road/trail are very steep and treacherous, even ledge-like. "It is from about two feet wide to parts where you have to put one foot in front of another and don't look down. As treacherous as some parts are, there are parts that are beautiful — waterfalls, wild flowers, and lush green vegetation," says Debora.

CHILDREN watch as villagers carry turbine up a trail.

Forty-five minutes into the ISEG members' hike, the steeple of Waxabaja's church came into view. Each village in these mountains has its own school, church — in some cases, it's the same building — and a little *tiendita* (store). The *comunidad* (community) is spread out so much that neighbors are a hike apart. Addresses are their cell phone numbers painted on the entrance of the cinder block or wood homes.

"We were panting as we were reaching the top," says Debora. "Little children ran up and down the mountain to see us. They laughed jokingly, as they are used to running up and down the mountain with ease.

The residents in this community are of Mayan decent (Pocomchí). At first glance you notice their shiny teeth, which are a source of pride. Their teeth are inlaid with stars, moons, etc. Their speech is deliberate so as to show their teeth. Waxabaja's main sources of income are cardamom and coffee, grown on the mountain sides.

There is a central area 15 kilometers from Waxabaja where the *mercado* (market) and *Purulhá* — the *cabecera municipal* (county municipality) are located. Waxabaja is the community furthest away.

"Todo lo que sube tiene que bajar" (everything that goes up has to come down), says Debora, "and so did we. The fact that it rained while we were there made me wonder how we were going to do it. I had visions of sliding down the muddy mountain. Getting back was uneventful until I spotted a snake. Hysteria kicking in, I reached the truck 20 to 30 minutes ahead of everyone. Adrenalin works."

Debora has gotten less squeamish since that trip. When she spotted a *masacuata* (boa) on her most recent trip to Guatemala, she calmly swallowed hard, moved to the other side of the boat, and looked at it with binoculars, while thinking to herself, "*Víbora maleducada - su mamá nunca le enseñó a no sacar la lengua*" (Ill-mannered snake, your mother obviously never taught you not to stick your tongue out).

Back at the picturesque hotel, her fellow travelers searched her room for unwelcome visitors. Crawling little creatures, spiders, scorpions, and beetles sometimes enter rooms through the opening below the doors.

A VILLAGER with a solar oven; (inset) a traditional wood-burning oven.

TIKAL, an archaeological site near Waxabaja; the mound is an unexcavated Mayan temple.

Honduras

"In Honduras we [ISEG] are working to integrate energy, productive uses, irrigation, and watershed protection. The advantage of going to Los Suncuyos, Honduras, was that there was a road most of the way to the community. We still had to hike — but not for four hours!" Debora explains.

All electrical connections had been installed in the village buildings, as the residents were waiting for the turbine that would enable the 2 kW pico-hydro system to bring electrical power. "We took the turbine with us, and residents of the village carried it down the mountain," says Debora. "About a month after we were there, the villagers completed the final connections and the village had power. We found out via e-mail a big announcement: *'Por primera vez se vio luz en Los Suncuyos!'* " (For the first time, there is light in Los Suncuyos!)

The people from the different *comunidades* are eagerly awaiting the benefits of having electricity. Some, however, are concerned about how their lives will change. Will they still meet in the center of the village after dark to share cool water or will their evening be taken over by *telenovelas* (soap operas)?

ROOF-MOUNTED solar photovoltaic panels bring change to village.

THE MEN of the village of Los Suncuyos in Honduras carry a turbine up a mountain trail.

Nicaragua

"In Nicaragua we [ISEG] are trying to have the people use solar cookers. We also visited a photovoltaic battery charging station," says Debora.

One of ISEG's goals is to provide residents there with more efficient stoves. The cook stoves they are using currently have a small exhaust or chimney, causing the whole house to be covered with soot. "Their lungs might look the same," says Debora. "While cooking they inhale a lot of carbon monoxide. One of their staples, *frijoles* [beans], for example, requires a long time to cook, so imagine all the carbon monoxide they are inhaling."

Nicaragua has not yet recuperated from an earthquake that hit about 30 years ago and from Hurricane Mitch in 1998. "During our visit there, we had to cross several rivers," says Debora. "The bridges have not been rebuilt since Hurricane Mitch. The deeper parts of river crossings are marked by rocks. When driving, it is better to go with someone familiar with the crossings, because when you ask residents about the deepest parts and where to cross, they just answer *por allá — donde está aquella roca"* (that way, where that rock is).

Mexico

In Mexico ISEG is beginning to integrate Central American activities to Southern/Southeastern Mexico. The region shares Mayan cultures and the *Selva Maya* (the jungle) with Mexico, Guatemala, and Belize. That area also is very rich in Mayan archaeology.

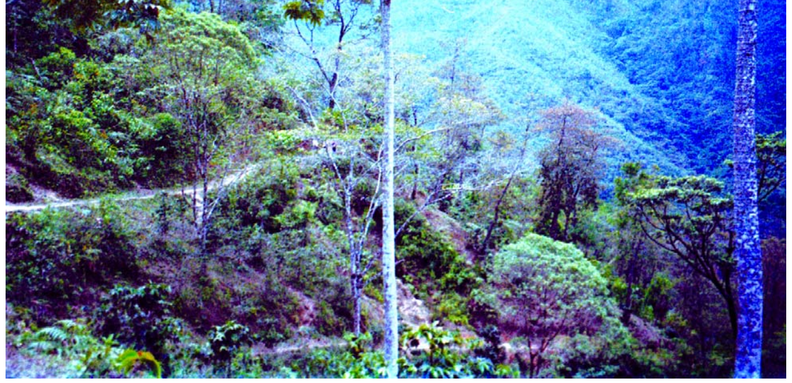
During the last 10 years, more than 400 cost-shared pilot or demonstration solar/wind energy systems have been installed throughout Mexico, promoting awareness and catalyzing market growth of renewable energy technologies. Local training and capacity building have been an integral component of pilot system implementations (workshops, training, monitoring).

Sandia

Back at Sandia, Debora helped write Sandia's presentation for the recent New Mexico visit of Mexican President Vicente Fox.

Retiree Max Harcourt, project leader when Debora first came to Sandia, says, "I really enjoyed working with Debora because of her energy, enthusiasm, and persistence. She is a good mix of technical competence with human empathy. I took a city girl and turned her into a *campo* [country] girl."

"Debora has a unique ability to connect with the people and their cultures in Latin America because of her knowledge of the language and her family background," says Warren Cox (6233).



THE TRAIL to Waxabaja, in Guatemala.

Debora's desire for adventure could have come from her dad, who also worked on renewable energy development in rural Mexico, for example, in the Chiapas jungle. She is working in this same jungle, but on the Guatemalan side of the border. Now they get together and share their experiences. "I wondered why my dad liked a job like that," says Debora. "Now here I am doing the same."

"There is a great amount of personal satisfaction in doing this work," says Debora. "It is not only in providing the energy to the communities, but in teaching and working with the people as they learn to adjust, manage, and adopt this new means to accomplish their daily activities. It's the technical effort teamed with the human element that makes this whole endeavor sustainable."

Debora was not always an adventurer. As a student intern she supported Sandia's Mexico Renewable Energy Program and worked with the solar energy group. She got accepted into the one-year-on-campus program and earned her graduate degree at the University of Colorado at Boulder. For her master's final report she did an energy and water assessment of the Galápagos Islands, off Ecuador's coast. "The animals — iguanas, birds, giant turtles or galápagos — are true residents," says Debora. "They don't hide behind bushes. Instead they act like friendly pets, looking at you with *curiosidad* [curiosity] and introducing themselves by casually nudging you."

Debora cannot sit still, even for a minute. She offers some advice for Sandia travelers: "If you go hiking in a place where there are snakes, make sure you are not the third person in line. I have been told that if there is a snake lying there, the first person will wake it up, the second startles it, and by the time the third person arrives, the snake is ready to attack. I was the third person in line."

For more technical information on Sandia's Mexico Renewable Energy Program go to www.re.sandia.gov.

Manos program introduces intern Melissa Martinez and mid-school students to science, engineering

By Iris Aboytes

Sandia intern Melissa Martinez (14411) was first introduced to science through Sandia's Manos Program. From the sixth through the eighth grade, she participated in the program that met at West Mesa High School. Says Melissa, "I did not know what engineering was or what engineers did. Manos opened up a new world for me."

Manos, Hands-On Science and Engineering program, is an educational program targeting Hispanic middle-school students. The program is sponsored by Sandia's Hispanic Leadership Outreach Committee and Diversity, EEO & AA Services Dept. 3553. It has been in existence since 1991.

The program is designed to introduce science and engineering concepts to middle school students and spark their interest in pursuing careers in science and engineering. It is offered each spring for students in grades 6 through 8.

The four-week program meets twice a week for two hours at either Rio Grande or West Mesa schools during the spring. Classes are taught by Sandia volunteers in physics, chemistry, electronics, math, and computer design. There are currently 294 students enrolled in this year's program — 204 at West Mesa and 90 at Rio Grande.

Melissa's mother, a teacher, encouraged Melissa to attend. She had talked about becoming a doctor. She decided against that, but became interested in science.

"I love science and engineering and wanted to get kids excited about it," says Manos volunteer Liz Sorroche (1851). "I think many kids don't get the opportunity or encouragement to seek careers in science and engineering because they come from families that have never had a college student, and feel that a goal like that is out of reach."

STUDENT INTERN Melissa Martinez got interested in science through Sandia's Manos program at Albuquerque's West Mesa High School. (Photo by Randy Montoya)

Says Liz, "I was the first in my family to get a college degree. Besides thanking my parents for their support and encouragement, I give a lot of credit to my teacher at the Career Enrichment Center for his enthusiasm for electronics and for showing us that it could be fun."

Volunteer Joe Maes (5744) says, "I have a new admiration and respect for teachers. My goal is to inspire and encourage the students to get a degree in science or engineering."

Today Melissa aspires to be a mechanical engineer. She would like to get her bachelor's degree, get accepted into the OYOC (one-year-on-campus) program, and work at Sandia. Until then she is very happy working on the Oracle database program.

"I am constantly learning," says Melissa. "If I have a problem, I am surrounded by people who can help me solve it. I really enjoy working at Sandia."

Feedback

Reader asks: Any chance of annual physicals at Sandia Medical? Also, readers ask about Martin Luther King Jr. holiday, numbered gates

Q: *I recently went to my primary care doctor for a full physical. I was very disappointed with the lack of thoroughness. I never saw the doctor. I was examined by the nurse practitioner who asked me how I was. Since I replied, she knew I was alive and breathing and could hear and speak. Then she thumped a few places on my lungs and abdomen and that was it. I even had to ask her to do a urinalysis. I am a 58-year-old male and there was no EEG or EKG or any type of stress test. I have always received much more thorough exams at Sandia Medical. I also have much more confidence in our own Sandia doctors than those available in Albuquerque. Many of the good ones are either overworked or have left the state or have left the practice.*

What is the possibility of getting criteria written for Albuquerque doctors to follow to ensure us that we are getting a proper physical? I think Sandia Corporation is getting short-changed. We are probably less healthy because of poor physicals. What is the possibility of getting physicals at Sandia Medical again, even if we have to pay for them?

A: Some years ago, Sandia's medical organization provided voluntary periodic health examinations based upon an age-related schedule. These were intended to offer a "point-in-time" comprehensive assessment of one's health and to provide recommendations regarding identified problems. The examination program was discontinued for a variety of reasons, including an increasing number of medical surveillance exams, migration from "comprehensive" examinations to Health Risk Appraisals, and, more recently, structured preventive health and disease management programs. As this occurred general health examinations were made a covered expense under our health plans so that employees, their dependants, and retirees could benefit from this service provided by their PCPs.

Overall, these changes were intended to enhance services to our Sandia community, but, as you identify, routine care sometimes receives less attention in a busy private practice than it deserves. We will provide feedback to Sandia's network administrator, but responsible medical directors in the community provide specific guidelines for care delivered by physicians, nurse practitioners, and physician assistants.

You do have a couple of options. You may select another primary care physician who more closely meets your expectation, and you may place a complaint directly with Mutual of Omaha Provider Relations. The person to contact is Dwayne Asche at (402) 351-5506.

— Larry Clevenger (3300)

* * *

Q: *In times past, we were told (via Feedback, as I recall) that Sandia does not allow Martin Luther King, Jr., Day as a holiday because Sandians already get 24 days of vacation. That seemed reasonable to me at the time; however, new Sandians get only three weeks vacation. What are the plans to give this national holiday to Sandians on the new vacation schedule? If there are no such plans, what is the real reason Sandia doesn't allow this holiday?*

A: As you probably know, the Laboratory observes the following holidays:

- Memorial Day
- Independence Day
- Labor Day
- Thanksgiving Day
- The six working days comprising the New Year shutdown
- In addition, at the discretion of the Laboratory president, a day off with pay, called an Energy Conservation Day, may be designated.

Because we observe the six working days comprising the New Year shutdown, we do not observe a number of national holidays including Martin Luther King, Jr., Day, Presidents Day, Columbus Day, and Veterans Day. At this time we do not plan on changing the vacation policy or the holidays observed.

— Larry Clevenger (3300)

* * *

Q: *Why doesn't Sandia have signs at each of the external gates identifying the gate number? After working at Sandia for 13 years, I can honestly say the only gate I know by number is Gate 10. Having signs posted seems beneficial to employees when trying to direct other employees, visitors, etc., to nearby gates. It would be much easier than trying to remember the inconsistent numbering scheme of buildings when providing directions.*

A: This is a good idea and we will proceed with the installation of new signs as soon as money is available. As you are probably aware, most gates were identified in the past but due to security changes over the past few years, updates to the signs have lapsed. Thank you for the reminder and suggestion.

— Lynnwood Dukes (10860)

The Beginning

In the fall of 1945, at the very beginning of the effort to put atomic weapons work on a peacetime footing, Los Alamos Laboratory started transferring its field-testing and engineering organization known as Z Division to Sandia Base near Albuquerque. This organization formed the nucleus of Sandia Laboratory, created in 1948 as a separate branch of Los Alamos.

The Atomic Energy Act: In 1946, President Truman signed the Executive Order that ended the Manhattan Project and formally transferred control of the nation's atomic energy program from military to civilian authority.

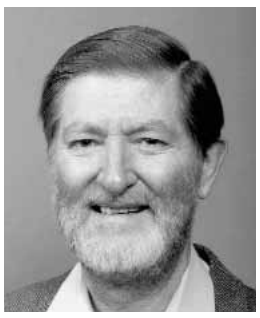
In 1949, President Harry Truman asked American Telephone and Telegraph (AT&T) to render "exceptional service in the national interest" and manage Sandia Laboratory via Sandia Corporation. In the late 1940s, the nuclear stockpile was small, but as tension between the U.S. and the Soviet Union grew and hardened, a vision of a larger national stockpile emerged and was realized. As a result, Sandia's staff grew to nearly two thousand employees by 1950. The core mission of Sandia Laboratory was nuclear weapon ordnance engineering and production coordination, with an increasing emphasis on research and development as time passed.

Building 800: Sandia's main administration building opened in 1949, one of the first permanent buildings at the site. The building continues to serve as the lab's front door and is an abiding symbol of Sandia.

This page is a reproduction of the first of a series of new posters highlighting Sandia's decade-by-decade history since its origins in the mid-1940s. The posters, mounted on heavy glass for permanent display in the hallway outside the Labs' executive suite in Bldg. 802, were produced by Mike Clough (project lead), Jerry Gorman (graphic designer), Myra O'Canna (archival images), and Rebecca Ullrich (writer).

Mileposts

New Mexico photos by Michelle Fleming



John Anthes
30 5944

Frank Gallegos
30 02

Gerry Hays
30 11

Vernon Wallace
25 14181

Guadalupe Massoth
20 9524

Danelle Tanner
20 1762

Recent Retiree

Patricia Neiswander
41 6101

Management promotions

New Mexico

Marcey Abate, from PMTS, Weapons Program Integraton Dept. 2102, to Manager, Stockpile Evaluation I Dept. 2951.

Since joining the Labs in 1995 as an applied statistician in the Statistics & Human Factors Department, Marcey has supported the quality and reliability of the nuclear weapons stockpile through statistical and quality analyses of various components. She also worked with external organizations to evaluate aviation safety data, analyze safety inspection work processes, and develop system safety concepts.

MARCEY ABATE

Marcey participated in Sandia's Weapon Intern Program and was a graduate of the inaugral class. In her most recent assignment in the NM Weapon Systems Engineering Department, she provided technical program management support to weapon programs and participated in efforts to implement formal cost, schedule, and risk management practices.

She has a PhD in mathematical statistics from Purdue University.

* * *

Charles Barbour, from Manager, Nanostructure and Semiconductor Physics Dept. 1112, to Level II Manager, Nanophysics and Optical Sciences Dept. 1110.

Charles joined Sandia in March 1987. His work at the Labs has been in the areas of materials physics, ion-solid interactions, high-density plasma processing and characterization, corrosion science, mechanical properties of nanostructured materials, and optical ceramics.

CHARLES BARBOUR

He serves on two international committees: Ion Beam Modification of Materials and Radiation Effects in Insulators. He is Nanomechanics Thrust Leader for the Center for Integrated Nanotechnologies

Charles has a BS in physics from the Colorado School of Mines and an MS and PhD in materials science, both from Cornell University.

* * *

David White, from PMTS, Computational Modeling Science Dept. 9226, to Manager, Data Analysis and Visualization Dept. 9227.

David joined the Labs in July 1996. Until recently he researched algorithms and developed software for the finite element mesh generation code called CUBIT for Computational Modeling Science Dept. 9226, serving as project leader for the team from 1998 to 2000.

DAVID WHITE

From 2000 to 2003 David participated in Sandia's Doctorial Studies program, where he continued research in mesh generation, including development of methods for predicting the difficulty of meshing CAD models. Upon returning to Sandia last summer, he began serving on the Design Through Analysis Roadmap Team (DART) to help Sandia map out directions for reducing the time spent preparing and analyzing computer simulations.

David's degrees are in civil engineering: a BS and an MS from Brigham Young University, and a PhD from Carnegie Mellon University.

FY05 LDRD Call for Ideas

The FY05 Laboratory Directed Research and Development (LDRD) Call for Ideas opened on Feb. 23. The call is available on the LDRD homepage.

This year submissions for general and Grand Challenge ideas will be via the web. Proposals are due no later than March 10. The LDRD Office will contact principal Investigators submitting continuation proposals, no later than April 5, for proposal submission.

For additional information, contact the LDRD Office at 844-8403 or 844-9229.

Sandia News Briefs

Sandia, EPA supercomputers to be linked

Under a new memorandum of agreement, the Environmental Protection Agency (EPA) and DOE will link supercomputers in EPA's North Carolina facility and at Sandia. The agreement builds on prior research and computing collaboration between EPA and DOE. High-performance computing allows better and faster runs of environmental models such as the Community Multi-Scale Air Quality model, an important tool for states to meet upcoming deadlines for their air quality attainment plans. "Linking and leveraging these two great research resources will strengthen the scientific foundation for environmental, energy, and public health issues," EPA Administrator Mike Leavitt said. DOE Secretary Spencer Abraham praised the agreement's ability to "leverage the expertise of both agencies" and referred to sharing "the tremendous store of scientific knowledge and experience" at the national laboratories. They announced the agreement Feb. 18.

NNSA Pollution Prevention awards presented

NNSA Administrator Linton Brooks presented 2004 NNSA Pollution Prevention Environmental Stewardship Awards in three categories to several Sandians Feb. 26 in a ceremony in the Bldg. 810 auditorium. Cited for "Sustainable Design Integrated Educational Series" were Maylinda Aragon, Anthony Baca, Matthew Brito, Chris Evans, Roy Hertweck, Kristin Klossner, Mark Leafstedt, Jack Mizner, Jimmy Romero, Lucille Roybal, Otto Van Geet, Doug Vetter, Michael Weiss, and Ralph Wrons. An award for "Continuous Improvement for Construction Purchasing" went to Gilbert Aldaz, Christine Cooper, Lynn Fitzpatrick, Judy Follis, Kristin Klossner, Charles Pechewlys, Jimmy Romero, Rick Ramirez, and Clare Stanopiewicz. And Jack Mizner, Doug Vetter, Larry Wright, Phil Rivera, and Dave Castillo were cited for "Construction Waste Recycling at SNL/NM." In addition to the recipients, NNSA Sandia Site Office Manager Patty Wagner, Labs Director Paul Robinson, and Deputy Director Joan Woodard also were on hand.

Recent Patents

Linda Domeier, Alfredo Morales, and Patrick Keifer (all 8762): Castable Plastic Mold with Electroplatable Base.

Douglas Chinn (1763): Actuator Device Utilizing a Conductive Polymer Gel.

Jonathan Weiss (1739): Fluorescent Fluid Interface Position Sensor.

Video Services wins awards in competitions

Video Services Dept. 12610 has won awards in two different competitions. Two productions were recognized with Aurora Awards. The Aurora Awards is an international competition designed to recognize excellence in the film and video industries. Programs are judged on creativity, message effectiveness, and technical excellence.

The production titled "Validation and Qualification Sciences Experimental Complex Facility Tour" won the Platinum Best of Show award. This video was produced for Mechanical Environments Dept. 9134, and demonstrates many of Sandia's test capabilities. The "Price Anderson Amendment Act" video won the Gold award. It was produced for the NW Requirements Integration Dept. 9724.

Three other productions received recognition in the Videographer Awards competition. "State of the Labs 2003" produced for Paul Robinson as the show opener for the 2003 State of the Labs presentation, was recognized with an Award of Distinction. "Life at the Labs: Z Beamlet" also received received an Award of Distinction. This video was produced for Public Relations and Communications Center 12600 as part of the employee communication series. It was shown on the video network and is available for viewing via streaming from the Video Services Department home page. Another video produced as part of the employee communication series, "Technology Trends: Gun Residue Kit," received Honorable Mention.

Sandia student interns take part in UNM formula-style racecar project

WHEEL ADJUSTMENTS — UNM students Carl King and James Lawrence fine-tune the frame of the 2004 formula-style racecar. (Photos by Randy Montoya)

By Michael Padilla

Sandia student interns are playing a major role in the creation of a small formula-style racecar at the University of New Mexico.

The engineering students design, fabricate, and test the car before competing in the international Formula Society of Automotive Engineers (FSAE) competition in Pontiac, Mich., each May. The race, consisting of 140 universities, is known as the single biggest collegiate engineering competition and racing event in the world.

UNM has participated since 1997 with a total of five cars. The sixth car will compete in the 2004 competition. UNM finished second in skidpad in 1998 and 14th in acceleration and in the top 44 percent overall last year.

This year's team consists of 13 Sandia student interns out of a core of 25 students.

Joshua Arvizu (14111), Sandia student intern and 2004 team leader, says it's a difficult task to have a running car before the competition.

"More than 75 percent of the teams are still finishing their cars at competition," Joshua says. "The most competitive teams not only complete their cars before competition, but also finish them with time to test, redesign, and re-test their cars."

The team's goal was to have the car finished last month, which leaves plenty of time to test, tune, and drive, says Joshua.

"This allows the team to have presentable information and data of their car to the design judges and a competitive setup for the dynamic racing events," he says.

Program support

The most beneficial types of support that FSAE receive are funding, materials, tools, machining, welding services, testing aids, and marketing and business support, he says.

One of program's goals is for students to gain real-world experience.

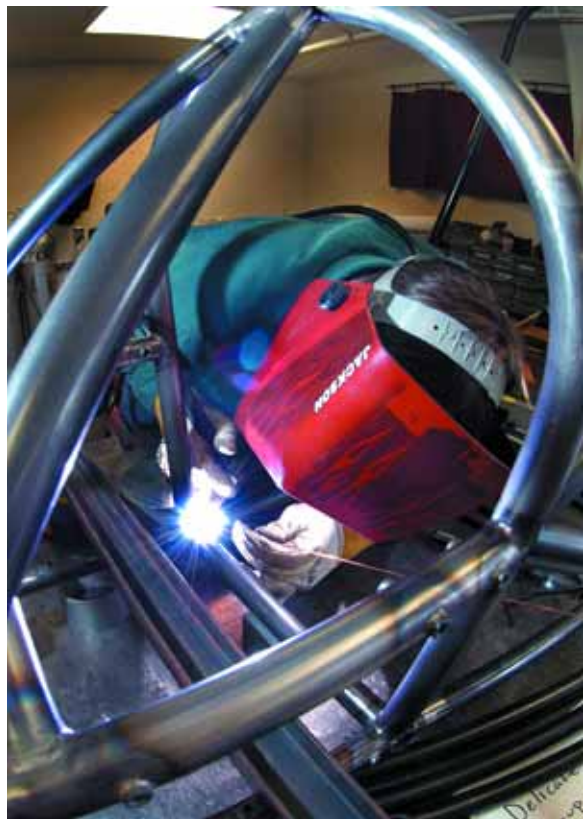
"No other program gives such real-life interface in the many aspects of industry," Joshua says. "This includes the business and marketing, manufacturing, design, testing, and the relationships of the project managers, team leaders, and workers."

Various Sandians are assisting the team, including Ernest Correa (14172), Herman Molina (14181), and Scott Campin (14172).

Those interested in supporting the team can contact Joshua at 844-7290.

The Sandia members of the 2004 team include: Andy Brewer (2332), Christopher Boyden (6218), Cletus Kuhn (5532), David Yao (15252), Heather Gorenz (15322), James Sanchez (1747), Joshua Arvizu (14111), Kirk Rhoades (2554), Mario Chavez (2665), Rebecca Coones (5735), Stephen Yao (2612), Tiffany Roberts (6233), Wesley Johnson (6214).

GEAR PERFECTION — Joshua Arvizu (14111) checks out equipment that will be used in the 2004 racecar.



WELDING TECHNIQUE — UNM student James Lawrence welds a section of the 2005 formula-style racecar.

TEAMWORK — Members of the 2004 team look over the 2003 racecar.