

# New Sandia ultraviolet light-emitting diodes emit short-wavelength, high-power output

Only a handful of research groups have come anywhere close to the Labs' breakthrough



NEW UV LEDs — Sandia researcher Mary Crawford tests the output of an ultraviolet light-emitting diode developed by a Labs team that set new records. (Photo by Randy Montoya)

By Chris Burroughs

Sandia researchers developing ultraviolet (UV) light-emitting diodes (LEDs) recently demonstrated two deep UV semiconductor optical devices that set new records. One emits at a wavelength of 290 nanometers (nm) and produces 1.3 milliwatts of output power, and the other emits at a wavelength

of 275 nm and produces 0.4 milliwatts of power.

"Emission wavelengths of 275 to 290 nm with such high power outputs is a major breakthrough in UV LEDs development," says Bob Biefeld, Manager of Chemical Processing Science Dept. 1126. "Only a handful of research groups around the world have come anywhere close."

Operating at the shorter UV wavelengths

makes it possible to build miniaturized devices that can detect biological agents, perform non-line-of-sight (NLOS) covert communications, purify water, cure polymers and other chemicals, and decontaminate equipment.

The Sandia team is part of the Defense Advanced Research Projects Agency (DARPA) project SUVOS (for semiconductor ultraviolet optical source), which funds various research groups around the country to develop deep UV compact semiconductor optical sources. (Visible light can be seen in the 400 to 700 nm wavelength range. UV is shorter than about 400 nm. Deep UV is less than around 300 nm.)

The team reached the 275-290 nm breakthrough a couple of months ago after working on similar research for more than three years — one-and-a-half of those years with DARPA funding.

"When we started the project, one group had been clearly leading the field for several years without any other group making much progress," says Andy Allerman (1126), the Sandia scientist who leads the growth of the LED semiconductor material. "Our LED performance increased rapidly the past year and recently we reached record power at 290 nm and 275 nm, leapfrogging the other group."

The device has a sapphire substrate with conductive layers of aluminum gallium nitride. It is well known that the more aluminum added to the semiconductor material, the shorter the output wavelength. But with increasing aluminum content the material becomes much harder to grow, and harder to flow electrical current through it. The mix that reached the 275 nm is around 50 percent aluminum. A key step in achieving the high powers was getting high-quality material growth at these high aluminum percentages, con-

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## Sandia LabNews

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Managed by Lockheed Martin for the National Nuclear Security Administration

## No further investment to be made in 50-year-old Coronado Club facility

By Michael Padilla

The Coronado Club's future is in doubt. The Coronado Club has served Sandia for more than 50 years. It was originally created to provide a place for employees and their families to participate in social and recreational activities when Albuquerque had little entertainment to offer. Many employees, retirees, and their families have fond memories of times at "the Club." The Coronado Club also has a long history of providing a lunch line and services in support of meetings, classes, and conferences. In the past 12

months, 247 large events took place in the Fiesta Room, plus 885 events downstairs.

Unfortunately, the facility is now 50 years old, its condition is deteriorating, and it would require \$4.7 million in renovations for continued safe, efficient, and competitive operations. Renovation needs include resurfacing the pool and tennis courts, improving the food facility, replacing all plumbing, air conditioning and heating, and others.

In addition, operating costs have continued to increase due to decreasing membership and the rising costs of services. The funding required to continue to operate the Coronado Club in its current form is significant. Currently the total annual operating costs are \$938,000. Current membership is at 1,700, down from 3,000 in 1997. Seventeen thousand people are eligible for membership.

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OPEN ENROLLMENT for Benefits Choices 2004 extended to Nov. 17. See page 4 for details.

### R&D 100 ceremony gives California EUVL winners a surprise honor

The Extreme Ultraviolet Lithography (EUVL) program was honored at the R&D 100 awards ceremony in Chicago with a surprise announcement of a second award for the "Greatest Improvement Upon an Existing Technology," one of three Editor's Choice awards. See Nancy Garcia's story on page 3.



### Cooperative Monitoring Center-Amman opens with official dedication

By Chris Miller

It's an idea that officially came to fruition last month.

Its vision is cooperation in a region of the world that has seen an abundance of war and violence over many years.

The Cooperative Monitoring Center-Amman (Jordan) is modeled after Sandia's Cooperative Monitoring Center in Albuquerque, and, in fact, Sandia germinated the idea, worked hard to bring the new center to reality, and continues to assist center staff to help it succeed.

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New high-performance computer clusters now available to Labs 6

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8 Two Sandia organizations receive Straight-to-the-Top Awards

9 TVC, NNSA team to launch new tech transfer magazine

# What's what

We all know Friday the 13th is supposed to be a bad-luck day. That's partly because Friday is considered a bad-luck day and there are lots of reasons for that, but the real kicker is 13. Most of us are at least a little leery of 13, even if we're not superstitious. Where does that come from? Well, nobody really knows, but as is often the case – maybe even more often when “nobody really knows” – a lot of people have written a lot about triskaidekaphobia. That's the \$5 word for “aversion to the number 13.”

The ancient Scandinavians believed that as a result of the intrusion of Loki, the spirit of evil and mischief, into a Valhalla banquet for their mythological 12 demigods – making 13 at the table – Balder, the favorite of the gods and spirit of light and peace, was killed.

On Friday, Oct. 13, 1307, Pope Clement V, with the collusion of King Philip IV of France, issued a secret death warrant to eliminate the very powerful Knights Templar. There's a collusion of Friday and the number 13.

Better known to us here and now, of course, is the saga of Apollo 13, which was launched April 13 from Cape Canaveral's Pad 39 (three times 13) at 1313 local time, sustained an on-board explosion on its way to the moon, and just barely made it back to Earth.

So what does this have to do with a lab whose research is based on reason and scientific fact?

Well, nothing, except that one of our curious writers pointed out recently that we have divisions numbered 1000 through 15000, but we're missing a 13000 (although we do have a Center 1300 and some department numbers that end in 13). A search through the Sandia Directory shows that we have folks in T13 and MO213, but there's no Bldg. 813 or any other structure numbered 13. There are no mailstops that end in 13, no phone numbers that end in 13, no Gate 13.

Interesting.

\* \* \*

Know why those pecan shortbread cookies you handled carefully all the way home from the grocery store looked like you drop-kicked them in the parking lot? Fault lines. No kidding.

At least, that's what a group of physicists at the University of Loughborough in Leicestershire (central England) reported after a careful study. Apparently suffering a lapse in relativity to the more mundane world of teaching, they baked some cookies – lots of cookies, likely – and determined that as they cool after coming out of the oven, they pick up moisture around the rim, which causes them to expand at the same time moisture in the center makes them contract. The result is strain forces that create fractures.

And that's what makes the cookie crumble.

\* \* \*

Thanksgiving arrives before the next issue of *Lab News*. We wanted to invite all of you over for dinner, but instead of putting you on the spot on such a family-oriented holiday, send you to <http://www.happydaycards.com/stories/turkey.html> for an appropriate greeting.

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

# 'Your Thoughts' requested about 'The Sandia Culture'

## Identify its strengths, weaknesses

*“The totality of socially transmitted behavior patterns, arts, beliefs, institutions, and all other products of human work and thought.”*

It doesn't take long these days to hear someone talking at Sandia about its culture or to read someone's comments about the Labs' culture, its strengths, its weaknesses, or how it has changed over time.

Some of Executive VP Joan Woodard's thoughts, for example, appeared in the Sept. 5 *Lab News* article about “Sandia's recent security struggles” (<http://www.sandia.gov/LabNews/LN09-05-03/labnews09-05-03.pdf>).

The content of some Feedback Program questions delve into a “Sandia Culture.” For example, “Does Sandia plan a formal effort to examine how its safety and reliability culture can be improved?” (Find a Feedback on page 8 of this issue or on the internal web's Newscenter.)

A daily newspaper article published in the Sandia/California area last spring reported on what it believed to be cultural differences among various DOE labs.

*“The predominating attitudes and behavior that characterize the functioning of a group or organization.”*

More of you now have a chance to weigh in about Sandia culture by answering the current question offered by “Your Thoughts, Please,” the web-based employee comment.

That question asks participants, as precisely as possible, to define “The Sandia Culture” along with offering thoughts about its “most impressive and positive aspects” or what aspects might “create challenges or may be in need of a makeover.”

Find “Your Thoughts, Please” at the NewsCenter (<http://www-irn.sandia.gov/newscenter/news-frames.html>).

From there simply click on its link located near the top left of the page. Submit responses to this “What's our Culture” question no later than Dec. 10.

*“Patterns, traits, and products considered as the expression of a particular period, class, community, or population.”*

# Sandia LabNews

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Albuquerque, New Mexico 87185-0165  
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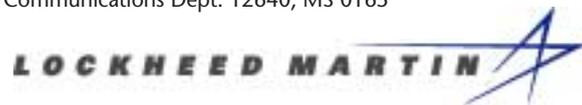
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**Ken Frazier**, Editor . . . . . **505/844-6210**  
**Bill Murphy**, Writer . . . . . **505/845-0845**  
**Chris Burroughs**, Writer . . . . . **505/844-0948**  
**Randy Montoya**, Photographer . . . . . **505/844-5605**  
**Nancy Garcia**, California site contact . . . . **925/294-2932**

**Contributors:** Janet Carpenter (844-7841), John German (844-5199), Neal Singer (845-7078), Larry Perrine (845-8511), Howard Kercheval (columnist, 844-7842), Will Keener (844-1690), Iris Aboytes (844-2282), Michael Padilla (284-5325), Rod Geer (844-6601), Michelle Fleming (Ads, Milepost photos, 844-4902).

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**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 [meflemi@sandia.gov](mailto:meflemi@sandia.gov), or Mail Stop 0165, Sandia National Laboratories, Albuquerque, NM 87185-0165.

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## Retiree deaths

Joe A. Trujillo (age 78) . . . . . May 16  
E. Earl Buss (85) . . . . . July 20  
Berta L. Guest (95) . . . . . Aug. 3  
A. G. Schuknecht (73) . . . . . Aug. 5  
Pauline H. Spradling (88) . . . . . Aug. 5  
Harold A. Neuhaus (86) . . . . . Aug. 10  
Charles H. Stockley (76) . . . . . Aug. 17  
Coy L. Moss (80) . . . . . Aug. 20

## Employee death

Domonic Otero of 10848, died Nov. 2 from injuries suffered in a motor-cycle accident.

He was 22 years old.

Domonic was a custodian and had been at Sandia since June 2002.

He is survived by his daughter, Makayla Otero; fiancé, Patricia Rivas; parents, Paul and Cecilia Otero, and sister, Melissa Otero.



DOMONIC OTERO

## Sympathy

To Martha Martinez (2950) on the death of her mother, Jessie Martinez, in Albuquerque, Oct. 3.

Robert S. Gillespie (88) . . . . . Aug. 23  
Seymour W. Mayer (76) . . . . . Aug. 25  
Calvin S. Cox (77) . . . . . Aug. 27  
Malcolm Ward (88) . . . . . Aug. 30  
David V. Doleshal (83) . . . . . Sept. 5  
Mathias J. Madlener (83) . . . . . Sept. 7  
Edgar T. Schreiner (80) . . . . . Sept. 17  
Frank N. Baros (90) . . . . . Sept. 21  
Eugenio C. Montano (85) . . . . . Sept. 22  
Karl H. Zimmerman (92) . . . . . Sept. 26  
Martin W. Hansen (88) . . . . . Sept. 26

# R&D 100 awards ceremony gives Extreme Ultraviolet Lithography winners a surprise honor

***EUVL designated 'Greatest Improvement Upon an Existing Technology'***

The Extreme Ultraviolet Lithography (EUVL) program was honored at the R&D 100 awards ceremony last month in Chicago with a surprise announcement of a second award for representing the "Greatest Improvement Upon an Existing Technology," one of three Editor's Choice awards.

"It was just an obvious choice," said *R&D Magazine* editor Tim Studt. "It's such a large technological achievement."

The R&D 100 awards to the EUVL program — and to six other Sandia technologies — had been previously announced (*Lab News*, July 25), but this extra-special honor was a big surprise.

Researchers from Sandia, Lawrence Livermore, and Lawrence Berkeley national laboratories, as well as Northrop Grumman Space Technology/Cutting Edge Optics were honored for their entry, "Extreme Ultraviolet Lithography Full-Field Step Scan Systems for Patterning Future Generations of Microelectronics." The EUVL test stand assembled at Sandia was the first system to use the small wavelength of extreme ultraviolet light to pattern chip-size areas with features as small as 50 nanometers. This advance will allow the speed and memory capacity of computer systems to continue to improve over the next decade.

The other two Editor's Choice awards were the

*"It was just an obvious choice. It's such a large technological achievement."*



**TROPHY** — This spring Charles McQueary, foreground, undersecretary for the Department of Homeland Security's Science and Technology Directorate, learned about work done at the Micro and Nano Technologies Laboratory at the California site. Here, Advanced Lithography Dept. 8751 Manager John Goldsmith (far right) briefs him on the Extreme Ultraviolet Lithography Program as 8100 Director Rick Stulen (center) looks on. In the display case is a mock-up of the EUVL Engineering Test Stand condenser assembly, part of the chip-patterning tool's optical system.

"Most Socially Responsible New Technology," GE's Revolution Real Time Radiography Detector System, and "Most Promising New Technology,"

Hitachi's AG 8100, the first available technology for the next generation of Internet protocols.

Studt said the Editor's Choice awards were instituted four years ago when the screening panel noticed that some submissions were in a class by themselves. "Some generally have a tendency to stand out from the others," he said. "EUVL was on the leading edge of the bell curve."

Since 1963, the magazine has highlighted the top 100 technological inventions of the year. Past honorees include the flashcube, fax machine, and computer printer.

— Nancy Garcia

## Sandia California News

### Defense-asset unattended monitor wins patent

***T-1 Electronic Sensor Platforms already protecting material at about a dozen US and foreign sites***

By Nancy Garcia

A system designed for unattended monitoring of weapons material or other high-value assets, already in use at about a dozen US and international sites, is now subject to a broad patent awarded to Robert Kinzel (8226).

"Robert has made a significant contribution in high-surety remote monitoring. The T-1 system forms a foundational first step needed in the monitoring of high-value assets while in storage or transport. The system developed by Robert and his team meets the standard expected from a national laboratory to address a tough situation where high security is required," says Mike Murphy, Manager of Special Radars and Communications Systems Dept. 2346.

Robert says he found the uniqueness of the task particularly enjoyable. "There aren't too many projects that are done for the first time so you get to write the ground rules. This is fundamentally a new technology that hasn't been out there before — it's an active seal."

The seal uses radio communication to relay information remotely, which minimizes the need for physical inspection of stored radioactive material or other assets. "We look at it as a real improvement in seals for Department of Energy inventory purposes, with a potential for improving security, as well," Robert says. "You don't have to open the door [as often for inspections] — if you don't open the door, no one can take the asset." The remote monitoring also protects workers by reducing their radiation exposure.

Its range of potential applications could

include secure storage facilities, shipping containers, inactive reactors, armories, locked portals or enclosures, and inventory of controlled materials such as radioactive standards or pharmaceuticals.

The system consists of a box about the size of a couple of VCR tapes from which a short, fiber-optic loop extends. Using an authenticated transmission, the seal can be actively queried by a remote inspector seated at a computer display. The platform's integral sensors collect, authenticate, and transmit data about the asset, its environment, and the platform state-of-health. Information is gathered from its active fiber-optic seal, case tamper indicator, item motion detector, and temperature sensors.

Designed for relatively low-cost manufacture, the T-1 Electronic Sensor Platform is housed in relatively thick stainless steel to provide some radiation protection. To date, about 700 T-1s have been manufactured at the Kansas City plant, and some 400 are fielded. The production even won Honeywell/Federal Manufacturing & Technologies a "Technology



**SECURE** — Robert Kinzel (8226) displays the fiber-optic, active seal that has received a new patent award.

(Photo by Bud Pelletier)

of the Year Award" from the Silicon Prairie Technology Association, Robert says.

"We went from concept to prototype in less than a year," says Robert. "Our goal was to get something out there as fast as possible and at low cost."

The device is being fielded to support near real-time monitoring applications at about a dozen US and international sites, including the Waste Isolation Pilot Project in Carlsbad, N.M., and the Savannah River Site K-Area Material Storage in South Carolina. There, due to use of the sensor platform, the interval between physical inspections of the high-level radioactive waste has been extended. The material surveillance system has been approved for domestic operation, and the system is completing approval by the International Atomic Energy Agency for treaty monitoring.

Follow-on work to optimize the hardware electronics has continued under Mike's organization in New Mexico, which was involved in the original project since its early days in 1997. Dubbed the T-2, the newest version under development incorporates features to allow remote reprogramming and reconfiguration.

The design uses a lighter weight plastic housing, with shielding localized to particular circuitry. Mike says its security features are more robust and the design should be even easier to manufacture. The objective is to bring the unit cost to less than half that of the T-1.

"The customer is very pleased with what they have," Mike says, predicting, "As the Department of Energy does more high-surety monitoring, the basic technology will be commercialized."

## UV LEDs

(Continued from page 1)

sidered to be very difficult.

Also contributing to the advance is a smart packaging technology that has a flip-chip geometry. Instead of the standard top-emitting LED, the LED die is flipped upside down and bonded onto a thermally conducting submount. The finished LED is a bottom-emitting device that uses a transparent buffer layer and substrate.

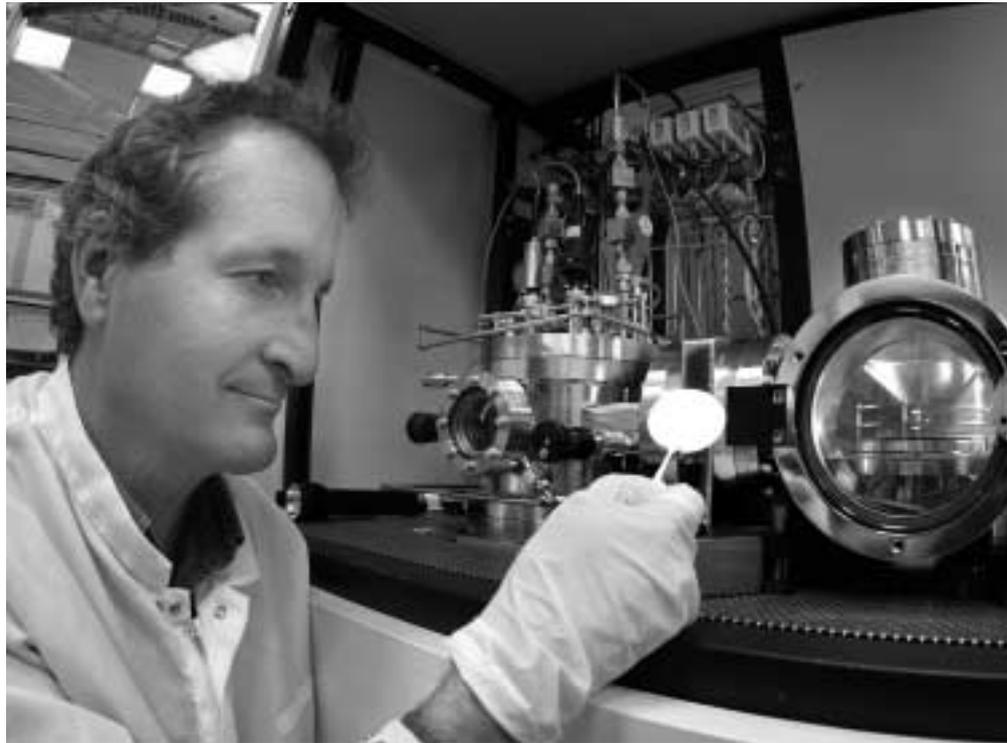
Having the device emit light from the bottom serves two purposes, says Kate Bogart (1126) who together with Art Fischer (1123) developed the advanced packaging at Sandia.

"First, the light is two times brighter when the LEDs are in the flip-chip geometry, primarily because the light is not physically blocked by the opaque metal contacts on the top of the LED," Kate says. "In addition, the flip-chip submount pulls heat away from the device because we make it out of materials with high thermal conductivity. This improves efficiency levels with less energy getting converted to heat and more to light."

The result is a device that is low-weight, small,

and resistant to vibrations and shock.

Conventional UV sources are mercury vapor and other types of discharge lamps which are bulky, heavy, and power-hungry — completely different from the new LEDs developed at Sandia



IT ALL STARTS HERE — Andy Allerman is the Sandia scientist who grew the new UV LED materials. (Photo by Randy Montoya)

that are no bigger than one square millimeter.

Bob says another aspect of the device that makes it unique is that the high power output of 1.3 milliwatts at 290 nm is obtained in a continuous wave (CW) mode.

"That was a continuous wave power measurement under direct current (DC) operation, not a pulsed current measurement like other UV LED groups have reported," Bob says. "We were able to control the heat issue to reach these powers in CW mode."

In October Mary Crawford (1123) and Andy attended an LED conference in Virginia where Mary gave a presentation on the advances of their devices.

"People were very interested," Mary says. "One of our long-term DARPA program goals was to reach 1 milliwatt powers. And now our team has gone beyond that. Everyone was very excited about the power levels."

While Mary and Art continue to characterize the new UV

LEDs and determine exactly how they can be used, LED devices are already being supplied to DARPA program participants making both non-line-of-sight communications and bio-sensor test beds.

**TEAM MEMBERS:** Working on the UV LEDs team are Mary Crawford, Art Fischer, Steve Lee, Kris Fullmer, Firouzeh Jalali, Steve Kurtz, Bob Kaplar, Jerry Simmons (all 1123), Kate Bogart, Andy Allerman, Karen Cross, Jeff Figiel, Allen West, and Bob Biefeld (all 1126).

*"When we started the project, one group had been clearly leading the field for several years without any other group making much progress. Our LED performance increased rapidly the past year and recently we reached record power at 290 nm and 275 nm, leapfrogging the other group."*

### Reminder: Open Enrollment extended through Nov. 17

The Open Enrollment period for Benefits Choices 2004 will end after 11:59 p.m. MST on Monday, Nov. 17. All deadlines that were previously Nov. 9 are now Nov. 17.

**Confirmations:** After the Open Enrollment period has ended, the Benefits Department will mail Benefit Confirmation Statements to the home addresses of employees and retirees. The statements will go out by the second week in December to all employees and retirees, regardless of whether any elections or changes were made during Open Enrollment. Each employee statement will list the Sandian's coverage for medical and dental plans and the Voluntary Group Accident plan as of Jan. 1, 2004, and any elections made under the Reimbursement Spending Accounts and Vacation Buy plan for the 2004 calendar year. Please review your Benefits Confirmation Statement immediately and notify the Benefits Customer Service Center at 845-2363 if your statement is incorrect.

#### Paycheck Deductions

**Employees:** Your new premium share amounts for medical coverage will begin with your Jan. 15, 2004, paycheck. If you elected Dental Deluxe coverage, your premium share amounts will begin with your Jan. 15, 2004, paycheck, as well.

Payroll deductions for those employees who enrolled in the Reimbursement Spending Accounts (RSA) for 2004 will begin with the Jan. 15, 2004, paycheck.

If you are a new enrollee or have changed plan coverage under the Voluntary Group Accident Plan, your payroll deduction will begin with your Dec. 4, 2003, paycheck.

**Retirees:** If you are paying a premium share for medical coverage, your new premium amount will be deducted from your pension check beginning in January 2004.

**Appeals:** If you want to request an exception relating to the 2004 enrollment process, you must send a written appeal to the Open Enrollment Appeals Committee in the Benefits Department at MS 1022, or P.O. Box 5800, Albuquerque, NM 87185-1022. Appeals must be received no later than Dec. 16, 2003. (The deadline for submitting an appeal has been extended due to the extension of the Open Enrollment period.)

## UV LEDs have multiple uses

From decontamination to white light generation, semiconductor-based ultraviolet (UV) light sources will have many applications, says Jerry Simmons, Manager of Semiconductor Material and Device Science Dept. 1123. And many of the applications will play an important role in the security of the nation.

One of particular interest to the Defense Advanced Research Projects Agency (DARPA) and to the Sandia research team is using UV light-emitting diodes (LEDs) in the detection of biological agents, such as anthrax. A proven technique for discriminating between weaponized bioagents and naturally occurring organisms is laser-induced fluorescence. In this technique, a UV source is focused on a sample. The pump energy excites electronic transitions and it is the fluorescence from these excited molecules that indicates the presence or absence of a biological organism. The goal is to make these detectors small enough to be hand-carried by a soldier or placed like a smoke detector in buildings.

Other potential uses of the UV LEDs include:

- **Non-line-of-sight (NLOS) covert tactical communications.** The ability to perform covert communications where line-of-sight is generally not available with very low power consumption is severely limited with conventional technologies. (Radio frequency communications technology, while highly developed, is broadly available and hence easily intercepted.) UV-based transceivers will enable networked unattended sensors, small unit communications, and communications in military operations in urban terrain environments. The NLOS systems use aerosol and molecular scattering of a short-wavelength optical transmitter to provide short-range communications with low probability of

interception or detection.

- **Light production.** Through appropriate materials growth and processing, semiconductor structures can be engineered to emit at desired wavelengths. Semiconductors offer the advantages of extreme compactness, low cost, high-volume production, and lower power consumption. While they are unlikely to be used for lighting, these deep UV LEDs are enabled by basic advances in wide bandgap semiconductor materials science. Those advances can also be applied to create near-UV and visible LEDs with higher luminous efficiencies for solid state lighting.

- **Water and air purification and surface decontamination.** Deep ultraviolet radiation is effective at killing live bacteria and many viruses. LEDs are promising as small, compact, robust, energy-efficient sources of deep UV for use in water purification, either for military use or in Third World countries. UV LEDs have already been used in experimental air purifiers to break down airborne organic compounds. UV irradiation can also be used to rapidly decontaminate surfaces without the use of damaging wet chemicals, useful not only for chem-bio decontamination but also for a host of civilian and industrial applications.

- **Polymer curing and chemical processing.** UV illumination is used to cross-link polymers and stimulate various chemical reactions, such as epoxy curing, in industry. Examples include dental coatings to prevent tooth decay, protective polymer coatings over automobile bodies to prevent corrosion, and over optical fibers to relieve stress. Typically, these coatings are applied in liquid form, and subjected to UV to cure. But the mercury vapor lamps currently used emit large amounts of heat, fluctuate in intensity, and are expensive, fragile, and bulky.

## CMC-Amman

(Continued from page 1)

A two-hour inauguration ceremony for the CMC-Amman was held Oct. 16 with about 70 dignitaries in attendance including Jordanian Prince Rashid bin Hassan, US Ambassador in Amman Edward W. Gnehm, President of the Royal Scientific Society Saad Hijazi, and several Jordanian government ministers and officials. Arian Pregoner (5320), Amir Mohagheghi (5324), and Laura McNamara (5324) of Sandia's Cooperative Monitoring Center joined CMC-Amman director Maj. Gen. Mohammad Shiyab at the ceremony.

"We were extremely pleased with the level of turnout and the enthusiasm shown for the new center," Arian says.

Arian adds she was particularly impressed by an impromptu meeting between Ambassador Gnehm and Prince Rashid that occurred at the center following the official ceremony. "They stayed for about an hour talking about substantial issues," she says.

Both Arian and Amir say they now are excited about the potential value the center can bring to the region.

"It's an experiment. But there is a lot of hope and we are very optimistic this will have a positive impact," Arian says.

Amir says he is hopeful the new center will grow and develop its own solutions for expanding cooperation and collaboration among nations in the Middle East.

"There are, of course, border issues that need to be addressed, as well as water management issues,

particularly associated with the Jordan River," Amir says. "It's important that they take ownership of these issues. If you keep providing solutions to them they won't take responsibility for the problems."

Both Arian and Amir have traveled several times to Amman and have worked closely with the new center's Jordanian staff members and to coordinate activities with government and agency officials in the surrounding community.

The new CMC-Amman will serve the region in much the same way Sandia's CMC has promoted international cooperation. The new center's objectives are:

- Promote the role of science and technology to help resolve nonproliferation, arms control, and other security issues.
- Develop a cooperative-monitoring culture within the Middle East through education and training.
- Deploy monitoring technology projects that allow multiple countries in the Middle East to experiment with the technology and to share their experiences.



MAJ. GEN. MOHAMMAD SHIYAB, director of the Cooperative Monitoring Center-Amman (dark suit with mustache), leads a tour of the facility during its recent inauguration. With him are, from left, Saad Hijazi, president of the Royal Scientific Society; Scott Davis, deputy director, Office of Nonproliferation Policy, National Nuclear Security Administration; Edward W. Gnehm, US Ambassador in Amman; and (far right) Rashid bin Hassan, Prince of Jordan. Other dignitaries attending the ceremony stand in the background.

- Help regional security officials bridge the gap between technical and political issues.

Major activities at the center will include research and analysis to identify areas of mutual interest and to establish dialogue among experts; workshops to train Jordanian and regional participants on applications of technology for border security, resource management, arms control, explosives detection, and public health; and collaborations to develop new concepts for applying technology to these issues. Examples of current technology demonstrations at the CMC-Amman exhibit hall include border-control technologies, explosives detection, environmental monitoring and assessment, commercial satellite imagery, sustainable land-use, and disease monitoring. Additional capabilities will be added as new projects develop.

Arian says Greg Kolb (6218) negotiated the contract to establish the center in August 2002 and that the center has been slowly gearing up since then through a series of staff-training activities. Arian says she was convinced the center was ready to fully operate following the success of a workshop this past July to introduce Jordanian participants to cooperative monitoring concepts and the advantages of cooperative approaches to security issues. The workshop also familiarized them with a wide range of techniques and technologies for designing and implementing effective monitoring systems. Sixteen Jordanians representing civil defense, public security, and military organizations attended the workshop.

"The workshop was an effective training tool that demonstrated to the center's staff, in essence, how to put on a workshop," she said.

### Located at Jordan's Royal Scientific Society

The CMC-Amman is located at the Royal Scientific Society, situated on an 85-acre picturesque site in northern Amman. The center occupies about 2,000 square feet on the third floor of one of the RSS buildings. Retired Jordanian Maj. Gen. Mohammad K. Shiyab, a past attendee of Sandia's annual Arms Control Conference in Albuquerque, is the center's director.

RSS engineers and scientists currently staff the center. Staff members are responsible for organizing future training workshops and developing cooperative technology projects. Depending on the needs of a particular workshop or project, the staff will draw upon the technical strengths of the 700-person RSS.

Two CMC-Amman engineers (instructors in computer science) spent six weeks at Sandia last year to learn about the operations of Sandia's Cooperative Monitoring Center.

The RSS was established in 1970 as a not-for-profit national research and development institution. The society works with local, regional, and international research and academic institutions and organizations to promote technological and scientific improvements in the region.

Arian Pregoner (5320) says while a number of factors pointed to selecting Jordan as the site of the new cooperative monitoring center, a major reason was that it is an Arab country that has recognized Israel. "We are trying to get them to develop their own ideas for solving regional problems," she says. "In regard to border security, perhaps there can be an Israeli/Palestinian partnership."

Says Amir Mohagheghi (5424): "CMC-Amman can be a place for sharing information; it is a neutral party." And Amman, Amir adds, "is a beautiful city."

## Coronado Club

(Continued from page 1)

As part of an overall review of services funded by Integrated Enabling Services (IES), the IES Strategic Management Unit (SMU) chartered a study to assist in a decision on the future use and funding of the Coronado Club. The results helped to develop a full understanding of the benefits and the complete set of costs.

Due to the high cost of renovation and operations and in keeping with the IES objectives of delivering productivity gains and services that are worth the cost, a decision has been made that no further funds will be invested in renovation or upgrade of the current Coronado Club facility. However, basic operations of the Coronado Club will be funded for FY04, and a second study has been commissioned to look at the four major types of services provided by the Coronado Club: on-site food services, catering, meeting/conference space, and recreation and fitness.

### Current evaluation

"We have been charged to look at services offered by the Coronado Club and determine if there is a continuing need for these services and

*Due to the high cost of renovation and operations and in keeping with the IES objectives of delivering productivity gains and services that are worth the cost, a decision has been made that no further funds will be invested in renovation or upgrade of the current Coronado Club facility.*

identify alternative ways of providing services," says Becky Statler (3341), study lead. "People assume if the building goes, then the services go. This may not be the case."

The study team will assess the continued need for the services. This assessment will include determining who are the primary total customers using each service. In addition, the assessment will look at frequency of the service used and whether the service is being adequately provided from another source.

An evaluation of options for providing that service will be conducted. This will include who are other possible providers. The evaluation will determine if it is more cost effective to buy the service from commercial providers or to provide the service from within Sandia.

Becky says that the options could range from building a new facility, to continuing to provide the services from within Sandia, to arranging with community providers for delivery of the services. "We are looking for alternatives," she says.

### Input opportunities

Sandians and other users will be given an opportunity to express their concerns through open meetings or through Sandia's Feedback Program. Dates for meetings will be announced via *Sandia Daily News*. Questions and concerns may be e-mailed to [benefits@sandia.gov](mailto:benefits@sandia.gov).

Updates to the study will be published in the *Sandia Daily News* and posted on the Human Resources home page. The *Lab News* will of course report on major developments.

# New high-performance computer clusters now available to entire Sandia technical user community

## Institutional Computing Clusters ran 2,200 jobs in first month; 'democratizing' supercomputing access

By Chris Burroughs

A new high-performance computer resource is now available to the entire Sandia technical user community.

It's the Institutional Computing Cluster (ICC) systems, which started running jobs in October and was officially dedicated Nov. 3 at a dual ribbon-cutting ceremony in New Mexico's Bldg. 880 and California's Bldg. 912. The ICC is composed of three Linux-based high-performance computing clusters from Hewlett-Packard, totaling more than seven teraflops in raw computational power and 25 terabytes total disk storage.

Two of the clusters — one classified, the other unclassified — are at Sandia/New Mexico, and one unclassified cluster is at Sandia/California.

"This new computing capability is for all the SMUs [Strategic Management Units]," said Pace VanDevender, VP for Science-Technology and Partnerships 1000, at the ribbon cutting. "It's the beginning of a really great capability for the Labs and came just in time."

Researchers from across Sandia — from energy to nonproliferation — will put their requests to use the machines in a queue, and their jobs will be processed based on the need and time allotments of the four Sandia "business" SMUs (Nuclear Weapons, Non-Proliferation and Assessments, Military Technologies & Applications, and Energy & Infrastructure Assurance) and the single "initiative" SMU (Homeland Security). Use will not be billed to direct projects but will be tracked by project and task for reporting against subscriptions made by the SMUs.

The ICC has already proven popular. In the month the ICC has been operational more than 2,200 jobs have been successfully processed

### Out-of-the-box thinking

VP 7000 Lynn Jones recalled at the ribbon-cutting ceremony Nov. 3 that when the request for the Institutional Computing Clusters (ICC) project first came to Sandia's Mission Council, everyone agreed it was something needed but questioned where the money was going to come from.

"No one SMU could pay for this," she says. "We did a lot of out-of-the-box thinking."

The good news is that the actual costs came in at \$4.2 million — some \$400,000 less than original estimates.

"This is an investment the whole Labs can use," Lynn says.

through it, and 140 user accounts were added in New Mexico and California.

During the ribbon-cutting ceremony, Art Hale, Director of Computing and Network Services Center 9300, talked about the heritage of the ICC, which can be traced to Sandia's Cplant™ project that started in 1997. The Cplant system, the first scalable Linux cluster, now provides highly used production computer cycles to a subset of the technical user community. The ICC is modeled after Cplant, but is available to the entire technical community.

Bill Camp, Director of Computation, Computers, Information, and Mathematics Center 9200, agrees, saying, "It's very satisfying to see our research and development efforts in this area lead to high-impact, commercially available tools so rapidly."

Organizations across the laboratory crafted the 160 specifications and requirements for the ICC systems that included lessons learned in taking Cplant from a research project to a full production environment. Rob Leland, Level II Manager of Computer and Software Systems 9220, says, "We were on a mission to democratize access to supercomputing."

Sandia and Hewlett-Packard worked closely together to specify, build, deliver, and integrate the ICC systems under a very tight schedule. "It's been a long road to get to this point," Art says. "Along the way Sandia built a great partnership with Hewlett-Packard. They've learned a lot, and we've learned a lot."

The fast turn-around of the project was noted by several of the attendees at the ribbon-cutting ceremony. The systems were ordered July 3, delivered in August, and operational on Oct. 1.

"When I first saw the schedule, I didn't think it would work," said Larry Ellis, Level II Manager of Strategic Development 6502. "But it hit every milestone."

John Zepper, Manager of Infrastructure Computing Systems Dept. 9324 — the organization that operates the New Mexico machines — says the ICC is going to fill a huge void for researchers from all of the SMUs needing high-performance computer resources.

"Previously, most computer resources were purchased through the Advanced Simulation and Computing Initiative [ASCI] program for people in the nuclear weapons SMU. These new ICC machines provide the power of the ASCI computing program to the rest of the Labs. The emphasis for the ICC is to provide production computing at its best for the whole Lab," he says.

Mike Vahle, Director of Advanced Product Realization Program Center 9900, agreed at the ribbon-cutting, saying that the SMUs needed the ASCI-like capabilities.

"Tools built for ASCI had to be made available for everyone," Mike said. "Now all the SMUs have access."

Jim Handrock (8960), Deputy Director for Computer Sciences in California, says the new ICC will "allow



ART HALE (9300), standing, addresses a group who made the Institutional Computing Clusters systems happen and who will be working closely with the new systems. He spoke prior to the ribbon-cutting event Nov. 8 in Bldg. 880. At Art's left are John Zepper (9324), VP 7000 Lynn Jones, and VP 1000 Pace VanDevender. Seated is Mike Vahle (9900). (Photo by Bill Doty)

us to maintain our computing capability in California."

"This has been a great opportunity for us to partner with New Mexico," he says. "The machines are already nearly fully utilized."

Also sharing comments at the ribbon-cutting ceremony about the importance of the ICC to their SMUs were Jerry McDowell (15400), Jill Hruby (8700), and Grant Heffelfinger (1802).

### ICC team members

Sandia/New Mexico ICC team members: Rob Leland, Jim Ang (both 9220), Doug Doerfler, Jim Laros, Ron Brightwell (all 9224), Frank Mason, John Noe (both 9320), John Zepper, Geoff McGirt, Jerry Smith, and Eric Engquist (all 9324)

Sandia/California team members: Mike Koszykowski, David Evensky, Josh England, Jim Brandt (all 8961), Tuesday Armijo (8963), and Cathy Houf (89452).

### About the ICC systems

For the first time in seven years Sandia has a Labs-wide computing resource, the Institutional Computing Clusters (ICC) systems.

There are two systems at Sandia/New Mexico that consist of 256 nodes. A smaller 128-node cluster will serve Sandia/California. The systems are composed of the latest in commodity hardware for cluster computing, including 640 dual-processor 3.02 GHz Pentium 4 nodes, the newest generation of the Myrinet high-speed interconnect from Myricom, and HP EVA5000 Fibre Channel storage arrays.

ICC uses open-source software including RedHat Linux, MPI libraries, and GM high-performance messaging libraries from Myricom, OpenPBS, and the Maui scheduler. The Intel Pentium 4 dual-processor nodes provide about 12 Gflops of peak computational power while the Myrinet XP interconnect provides internode latencies of under seven microseconds and bi-directional bandwidth of more than 485 MB/s.

More than 30 applications are currently available to researchers on the ICC, including CTH, Ccaffeine, Lammops, HDF5, Mpsalsa, SAF, Salinas, SEACAS, Alegria, Adagio, JAS, Aria, Presto, Pronto, Calore, Calagio, Chemkin, Curl, Faust, Sierra Framework, Socorro, Emphasis, Cabana, Ceptre, Fuego, Krino, Premo, Synchronix, Tempo, and Vihar.

More information about the ICC systems can be found on Sandia's internal network at <http://icc.sandia.gov>.



JOHN ZEPPEER, Manager of Infrastructure Computing Systems Dept. 9324 — the organization that operates the New Mexico machines — stands next to the unclassified system. He says the ICC is going to fill a huge void for researchers from all of the SMUs needing high-performance computer resources. (Photo by Bill Doty)



**EXPLOSIVE CONTROL** — Jeff Bobbe, left, and Harold Ortiz (both 5932) display contents of a bomb prior to a live demonstration highlighting bomb disassembly techniques created at Sandia.



**BOMB DEMO** — The first detonation shows the effects of a bomb explosion prior to using Sandia's bomb disassembly techniques. After the first detonation, Sandia officials showed the minimum effects of an explosion using a technique created at Sandia.

## Homeland Security/Antiterrorism conference attracts 600 attendees

The messages of awareness, preparedness, and responsiveness were echoed at the 2nd Annual Homeland Security/Combating Terrorism Conference held the last week of October at the Isleta Conference Center.

"Making sure that our state is well prepared was one of the goals of the conference," says Sandia Homeland Security Director T.J. Allard (80). "Making sure our first responders are well prepared puts us in better shape and makes us more secure."

The conference focused on the role of public service personnel in protecting the public from events such as 9/11. It helped gain an understanding of New Mexico's activities to build the public health infrastructure and emergency response capacity as well as to enhance hospital and health systems capacity.

Gil Baca (80), from Sandia's Homeland Security Office, said the intention of the conference was to improve the response to terrorism and to outbreaks of infectious disease, and improve the interrelationships of the state's various emergency response agencies.

Michael Brown, Under Secretary of Emergency Preparedness and Response for the US Department of Homeland Security, told conference attendees that everyone needs to be involved with the fight against terror. He stressed the importance of training law enforcement, first responders, and volunteers, and strengthening communities and preparing citizens.

A series of talks in various tracks focused on health/medical, law enforcement/fire, and emergency management.

Chris Cherry (5932) led a mid-week bomb demonstration for attendees and showed Sandia's current research techniques in defusing suspicious packages. In addition, the Albuquerque Police Department staged a mock civil demonstration and showed how police would react to the disturbance.

Maj. Mark Weaver, Office of Professional Standards and Internal Affairs Bureau Commander with the New Mexico State Police, served on a panel discussing what the public needs to know

*Photos by Randy Montoya*

*Text by Michael Padilla*



**SIMULATED EFFECTS** — Members of the Albuquerque Police Department (APD) enter a plume of simulated smoke used for crowd control.

during a terrorist event.

On the fourth day of the conference a tabletop exercise simulated an attack similar to that at Columbine High School in Colorado. The purpose was to test interagency memorandums of understanding and to evaluate how the agencies respond to that type of situation.

"These situations create chaos, and in a real attack there will still be chaos, but hopefully through training like this it will be more manageable," Gil says. "Getting New Mexico's first responders better prepared is one of the primary missions for

our Sandia National Labs Homeland Security Office and for the conference."

Sandia President C. Paul Robinson delivered the closing comments.

T.J. says if the public is well prepared, and if the adversary knows that and doesn't look at New Mexico as a target, then success has been achieved.

"If for whatever reason they choose New Mexico as a target and they're able to carry out something, but we're able to mitigate that because our first responders are better prepared, again, we've accomplished what we need to," he says.



**FIRST RESPONDER EXERCISE** — APD crowd control personnel demonstrate unit maneuvers they would use in responding to a civil disturbance.

# Two Sandia organizations receive Lockheed Martin Straight-to-the-Top Awards

**Procurement and neutron generator production teams apply Lean/Six Sigma techniques**

Two Sandia Lean/Six Sigma organizations have received a Straight-to-the-Top Award from Lockheed Martin. The awards were distributed by Executive VP for Technology Services (LMTS) Michael Camardo.

The two organizations are Procurement with its Supply Chain Management Value Stream Mapping (VSM) Event, and Neutron Generator (NG) Production with its Final Tube Assembly Standard Work Cell Kaizen Event. Sandia was among the first three sites with LMTS to receive one out of the first four awards in 2003.

The award recognizes a team in making significant improvements in its processes and in cost avoiding millions of dollars. The purpose of the Straight-to-the-Top award is to recognize those companies and teams who have applied Lean/Six Sigma as part of their "get-to-excellence" plan and as a result have had a significant impact on how the company/organization does business.

"The impact is normally measured in terms of percent improvements in various areas being measured and dollars saved or cost avoided," says Kim Mitchiner (9725), Sandia's Lean/Six Sigma Program Corporate Program Lead for Non-Production. "In Sandia's case, it is dollars cost avoided."

The award was initiated in the first quarter of calendar year 2003, and only four awards are

given each quarter. Sandia has won that award twice now out of the eight different companies within LMTS vying for the award.

"As more of our events come to completion and we are able to measure their impact, we will submit additional candidates for this award," says Kim.

Procurement received the award in the CY03 first quarter, and NG Production received the award in the CY03 third quarter. The data on the awards given out respectively include:

For the Supply Chain Management VSM, the total dollars cost avoided were \$1.4 million. Improvements were a 64 percent reduction in overall processing time from 123 days to 45 days; a 65 percent reduction in the number of handoffs from 91 to 32; and a 77 percent reduction in internally generated governance constraints from 30 to 7.

For the NG Final Tube Assembly Standard Work Cell Kaizen, the total dollars cost avoided were \$5 million. Improvements were a 98 percent reduction in total cycle time (labor hours + queue/wait time) from 664 hours/job to 9.8 hours/job; and a 94 percent reduction in distance traveled for the product from 11,000 feet to 900 feet.

A Kaizen Event is a three-to-four-day-long Lean/Six Sigma event, which focuses on making changes to a process that week or within a

few weeks after the event. They are narrowly scoped events typically identified as part of the action items from a value stream mapping event. The other means are through projects (changes made over a period of several weeks or months) or Just Do Its (changes that can be made in a couple of days).

Kim says these two events are examples of the impact that Lean/Six Sigma is having on changing the way we do business at Sandia.

"In the past year we have conducted 45 Value Stream Mapping Events and Kaizen events across the site, which produced more than \$12.4 million in validated cost avoidance this year alone. Since we started conducting events in FY01, we have conducted over 80 VSMs and Kaizens," Kim says. "Because it often takes six months to a year to realize cost avoidance from these events, we are just now beginning to see the impact of last year's events on Sandia."

In addition, in the NG Production area they have completed more than 22 "6S" events this year. These events focus on sorting what you need from what you don't use, straightening (finding a place for everything), shining (cleaning), standardizing (coming up with methods to keep things neat), safety, and sustaining (having a monitoring system to make sure you don't slip back into old habits).

— Michael Padilla

## Lean/Six Sigma: How it came to Sandia

The Lean/Six Sigma program came to Sandia from Lockheed Martin in 2000. In 2001, the first productivity improvement event began. In November 2002, Sandia's executive management including President, EVP, all VPs, and 20 directors were trained in Lean / Six Sigma. Since then, the number of continuous improvement events has increased from less than 10 in 2001 to 61 events across the laboratories for 2003 with a validated cost avoidance/return on investment from completed events of greater than \$12.4 million for 2003.

The program identifies its practitioners depending on the length of their training. A green belt is a person who has received one week of full-time training in the Lean/Six Sigma principles and tools. A black belt is a person who has received three weeks of full-time training (including the one week for green belt training). A master black belt is a person who has received more than eight weeks of full-time training.

Currently at Sandia, there are one master black belt, 43 trained black belts, of whom 14

are certified, and 345 trained green belts, of whom 15 percent or more are certified.

"Having these change agents is a great step toward adopting Lean/Six Sigma as the Laboratory's approach to continuous improvement," says Cindy Longenbaugh, lead Black Belt for Neutron Generator Production (14408).

Nonproduction questions about Lean/Six Sigma should be directed to Kim Mitchiner, 844-2222. Production questions should be directed to Tamara Deming, 284-4521.

## Feedback

### 'Not the medical plan I was promised when I was hired in 1954 and retired in 1993,' says retiree; Sandia says some of cost burden must be passed on

**Q:** Sandia has recently implemented co-pay for office visits by Medicare primary patients. This action places a one-sided payment responsibility upon retirees in my category.

Sandia pays nothing for office visits to a Primary Care Doctor until the seventeenth visit or until the eleventh visit to a Non-Primary Doctor (Reference Section 5-2 of the Summary Plan Description).

I wrote a letter to the Sandia Benefits Department on 6/19/03 and received a follow-up phone call, which essentially said, "You should be happy that your medical costs are so low — many people pay a lot more, etc . . ."

Well I am happy that my medical costs are so low, but I am not happy with the inequity of the patient co-pay for office visits for Medicare Primary Patients that was implemented.

While I understand the facts of life concerning financial considerations during budget planning in today's world, fair is fair, and this isn't.

1) This is not the health plan I was promised when I was recruited in 1954, nor is [it] the health plan I was promised when I retired in 1993.

2) Sandia has changed the health plan so that it penalizes members that do not have catastrophic illnesses.

3) Please consider a balanced plan that lets us split the amount that Medicare will not pay. I pay half, and Sandia pays half. This way both

of our budgets get some relief.

For example:

Doctor charge for office visit	\$65.00
Medicare allowed amount	\$55.44
Medicare payment (70% of allowed)	\$38.26
Medicare primary patient liability	\$25.00
Sandia payment	\$00.00

**A:** Rising healthcare costs lead to higher costs for employers that provide healthcare benefits. For example, average total health benefits costs rose 14.7 percent between 2001 and 2002. The rise in costs from 2002 to 2003 is projected to be 16.3 percent. Unfortunately, when the burden of these rising costs becomes too great for employers to bear on their own, they must pass on some of the cost increases to those of us who participate in the healthcare plans (employees and retirees).

While Sandia has been to date absorbing a larger portion of the healthcare cost increases than we pass on to plan participants, changes were still necessary to accommodate these rising costs. Therefore, Sandia implemented plan changes in 2002 that impacted premiums and costs such as co-pay amounts and out-of-pocket expenses. These changes affected employees and non-Medicare retirees.

In 2003, in order for Sandia to continue to keep costs affordable, plan changes were implemented for Medicare-primary retirees. These changes included co-payments for certain services up to the first \$250 per year as well as an increase in premiums for those who retired after Dec. 31, 1994. Those who retired prior to Dec. 31, 1994, are still not paying premiums. However, Sandia has always reserved the right to change the design of the healthcare plans.

Even though Medicare primary retirees have been asked to pay \$250 of their expenses per year, Sandia still shares in the cost of health care as in the following example:

Specialist office visit approved charge	\$160
Medicare deductible	\$100
Medicare payment (80% after deductible)	\$48
Balance after Medicare payment	\$112
Patient liability	\$25
Sandia-Mutual of Omaha's liability	\$87

As you can see in this case Sandia pays more than half of the medical expense.

We certainly appreciate your frustration with your rising out-of-pocket costs, but these are unfortunately necessary in order for Sandia to continue to afford the cost of offering healthcare benefits.

— Larry Clevenger (3300)

# NNSA, Technology Ventures Corp. reach out to investors, researchers with new publishing venture

## TechComm magazine aims to boost tech commercialization efforts

The National Nuclear Security Administration and Lockheed Martin's Technology Ventures Corp. (TVC) are teaming up in a unique publishing venture aimed at fostering commercialization of technologies developed in NNSA laboratories.

TVC is the not-for-profit corporation

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launched by Lockheed Martin in 1993 to foster technology commercialization, primarily for work done in the national laboratories.

Volume 1, Number 1 of *TechComm: The National Journal of Technology Commercialization* has hit the street, filled with a lively mix of stories and information aimed at both investors seeking new technology-based business opportunities and laboratory-based inventors and entrepreneurs.

Everet Beckner, a former Sandia VP and NNSA's deputy director for defense programs, offered a congratulatory note to *TechComm* on the occasion of its first issue. The note, published on the inside front cover, praises TVC for its success in helping move technologies from NNSA laboratories in New Mexico and California into the private sector. *TechComm*, he said, will help build on that success.

"*TechComm* will be calling attention to the significant opportunities that exist in and around NNSA facilities. This magazine will highlight the many opportunities that exist at these facilities and support and encourage their commercialization. . . . We are pleased to promote *TechComm* as a means to showcase NNSA's exceptional staff, unique facilities, and technologies."

According to publisher Coleman Travelstead, the TVC/NNSA collaboration on *TechComm* stems from a 2002 NNSA grant awarded to TVC. The grant was specifically aimed at helping TVC expand its operations from Albuquerque to Los Alamos, Las Vegas, Nev. (home of the Nevada Test Site and DOE/NNSA's Nevada office), and

Livermore, Calif. Part of that grant included funding for *TechComm*, which was seen by both parties as a tool to help TVC and NNSA advance their tech commercialization mission.

The first print run of 5,500 copies is being distributed to the venture capital investment community and to laboratory-based researchers with potentially market-worthy technologies, Travelstead says. Over the next few issues, he says he expects the circulation to reach approximately 9,000. In addition, he says, "we're also going to go electronic, which should help us keep our print budget down."

The timing is right, Travelstead says, to get proactive in telling the investment community about the technologies being developed in NNSA labs. (And in other facilities, as well. Travelstead notes that although *TechComm's* primary focus at first will be on NNSA laboratory work, the publication will feature work being done in the region's other public-sector research facilities.)

"Venture capital has not dried up," Travelstead says. "VC firms actually have a humongous backlog of money, because they continue to raise their funds but they haven't been spending them. And that money's not earning them a whole lot just sitting there. We think *TechComm* is an excellent vehicle to introduce the community to new investment opportunities in some of the nation's most exciting and promising new technologies."

*TechComm*, Travelstead says, answers key questions that investors are interested in:

- What are the technologies coming out of the national labs?



- What are the trends in the scientific and engineering communities?
- Who holds the patents? Are there entrepreneurs interested in bringing inventions to the market?

And, for aspiring entrepreneurs in the laboratories, *TechComm* addresses their biggest concerns:

- Are there investors and strategic partners willing to provide financial support?
- Who are they and what are they looking for?

— Bill Murphy

## Favorite Old Photo

### A Liberal dusting: Dust bowl pix evoke images of Steinbeck novels



A DARK AND HEAVY WIND — Here are some pictures of the dust bowl in action in Liberal, Kan., circa 1935. My parents met in Liberal and were married in 1938. I heard stories of the dust bowl while growing up in Lawrence, Kan., but didn't fully appreciate its power until I found these pictures in a family album.

— Jackie Blackburn (10001)

## Management promotions

### New Mexico

**Darren Hoke** from PMTS, Electromechanical Engineering Dept. 2614, to Manager, Electro-mechanical & Sensor Subsystems Dept. 2615.

Darren joined Sandia's NM Weapons Systems Center in April 1995 as a postdoctoral appointee investigating the behavior of rigid polyurethane foams and penetrator steels under shock loading.

He later went on to become a product engineer on the B61-11

earth penetrating weapon, a systems integration and test engineer on the B61 common radar nose program (Alt 350), and was briefly involved in the W76-1 Phase 6.2/6.2A life extension activity. Darren joined the Surety Components and Instrumentation Center in September 2000 to work in the areas of microelectromechanical systems (MEMS) and conventional munition fuzing. For the past three years he has led several projects focused on the development of advanced miniature and integrated fuzing components and sensors designed for hard and deeply buried target defeat. Darren also represents Sandia as a technical advisor on the National Fuze Integrated Product Team led out of the Office of the Secretary of Defense.

He has a BS in materials engineering from the New Mexico Institute of Mining and Technology and an MS and PhD in materials science from the University of California, San Diego.

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**Bill Slosarik** from Manager, Information Systems Architectures Dept. 6521, to Level II Manager, Software Product Realization Dept. 6520.

Bill joined Sandia's satellite program in 1981. Over the 22 years with this program, he has served as software engineer, lead engineer,



DARREN HOKE

project leader, program manager, and department manager. He has been responsible for delivering several ground systems related to the US Nuclear Detonation Detection System Program and has specialized in managing large-scale software development. Before his recent promotion, he was the lead manager of software development for the Integrated Correlation and Display System.

Before coming to the Labs, Bill worked at Raytheon from 1974 through 1976 as a software engineer on the Patriot missile system. He was a software consultant at Dikewood Industries from 1976 until 1981, working on numerous DoD programs including the Air Force's Air Combat Maneuvering Range, F-111 weapons systems, and nuclear weapon radiation affects.

Bill has a BA in statistics and a BS in computer science from State University of New York, Buffalo, and an MS in computer science from the University of New Mexico.

\*\*\*

**Tom Wunsch** from PMTS, Primary Electrical Standards Dept. 2542, to Manager, Primary Electrical Standards Dept. 2542.

Tom's first experience with Sandia was when he worked the summer of 1987 as part of the Outstanding Student Summer Program.

He joined the Labs in February 1988 as a member of the Microelectronics Development Laboratory, where he worked on parametric measurements, circuit



BILL SLOSARIK

simulation, and modeling of radiation effects in integrated circuits until 1995.

In 1995, Tom went to the Primary Standards Laboratory, where he developed thin-film standards for ac-dc transfer measurements, worked on time and frequency standards, pulsed current and pulsed high-voltage measurements, and temperature measurement standards. He was most recently project leader for the AC Electrical Standards Laboratory.

Before coming to Sandia, he worked in metrology for the US Air Force.

Tom is Vice President of NCSL International, an international professional organization for metrology. He has a BS in electrical engineering from New Mexico State University, and an MS in electrical engineering and a PhD in engineering from the University of New Mexico.

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**Jody Smith** from PMTS, Remote Sensing & Exploitation Dept. 5712, to Manager, Remote Sensing & Exploitation Dept. 5712.

Jody has been a member of Remote Sensing and Data Exploitation Department since joining Sandia in April 1999. Her area of research has been optical remote sensing. Jody has worked on the Multi-spectral Thermal Imager along with other remote-sensing imaging systems.

She has a BS in physics and an MS in optical science from the University of Arizona.

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**Dennis Miller** from Manager, NNSA NDS Satellite Payloads Dept. 5733, to Level II Manager, DOE/NN R&D Programs Dept. 5730.

Dennis joined Sandia in October 1985 as a mechanical and systems engineer in the Systems Test Equipment Design Department, where he worked on several of the stockpile laboratory test systems fielded at the Pantex facility, including centrifuge and air turbine spinner systems.

He joined the Space Nuclear Thermal Propulsion Program in 1991 as a manufacturing engineer responsible for executing the production of a nuclear rocket test assembly.

From 1992 to 1994, he worked on the Accelerator Production of Tritium (APT) project, where he was task leader responsible for developing the basis for the safety and environmental protection programs for the APT project. Dennis worked on the Medical Isotope Production Program (MIPP) from 1994 to 1998 as task leader responsible for the Environmental Assessment and Environmental Impact Statement for the MIPP project. Dennis also worked from 1997 to 1998 in the Tanks Focus Area as Deputy Project Manager at Sandia for the Tanks Focus Area technology development initiative sponsored by DOE/EM-50.

Dennis has been with the Monitoring Systems and Technology Center since 1998, initially as manager of the Testers and Experimental Ground Systems Department and manager responsible for the operation of the Multispectral Thermal Imager satellite. He was Manager of NNSA NDS Satellite Payloads Dept. 5733 when he received his recent promotion, and was program manager responsible for the Nuclear Detonation Detection System payloads developed for the Global Positioning System and Defense Support Program satellite constellations.

Dennis has a BS and an MS in mechanical engineering, both from Oklahoma State University.



JODY SMITH



TOM WUNSCH



DENNIS MILLER

## Long-time partner Ktech celebrates new digs



**KTECH CELEBRATES** — Ktech Corporation, one of Sandia's nine strategic partners, dedicated its new headquarters and celebrated the company's growth, achievements, and commitment on Nov. 6. The new 83,400-square-foot headquarters is situated on five acres at the corner of Eubank and Gibson adjacent to Albuquerque's Sandia Science and Technology Park. Ktech employs more than 390 people, of whom 200 work at Sandia. Ktech was founded in 1971 as a research and engineering firm focusing on the study and simulation of nuclear weapons effects. Ktech is a leader in highly specialized areas such as pulsed power, polymer research, and cold spray technology with both government and commercial applications. Ktech built Sandia's Z accelerator in the mid-1990s.

## Are the stars out tonight? Astro-images of New Mexico

The LodeStar Astronomy Center and The Albuquerque Astronomical Society (TAAS) have opened the second annual "Astro-Images of New Mexico: Portraits from the Foothills of Space" astrophotography contest exhibition. The exhibition features 26 celestial images taken throughout the state of New Mexico, from Carlsbad to Chaco Canyon, by amateur photographers.

And wouldn't you know: The 2003 contest award winner for Best of Show is a Sandian in Carlsbad, Randall Roberts. His photo, at top right, captured the dramatic image of a lightning storm and the constellation Cassiopeia. Randall is a hydrogeologist in Repository Performance Dept. 6822 in Carlsbad and an amateur photographer of less than two years.

Serendipitously — and not as part of the LodeStar show — *Lab News* photographer Randy Montoya captured the full moon in eclipse in the sky over Los Alamos on Saturday, Nov. 8. Randy reports that he shot the eclipse image using a tripod-mounted Nikon digital camera with a 600mm f4 lens at 1/2 second and an ASA setting of 1600. Randy notes that any exposures longer than a half-second would actually show some blurring from the motion of the moon across the sky.

Here's how Randall (not Randy) captured his contest-winning image (in his own words, courtesy of the Lodestar, the TAAS, and Randall): "I had photographed my first thunderstorm only a week before I took this image, and I liked the results — dark clouds illuminated by bolts of lightning. When thunder shook my house, I stepped outside onto the driveway to see if I might get another chance. I started shooting while the storm was almost directly overhead and kept shooting as the storm moved away. Downloading the first round of images from my Nikon Coolpix, I noticed faint stars along with the clouds and lightning. So, back out to the driveway to make a deliberate attempt to capture both stars and lightning. Some days you get lucky — the well-known "W" shape of Cassiopeia and the thunderhead were side by side. I opened the shutter for 60 seconds each time to record the stars and hoped that the lightning would make an appearance. After 25 attempts, I got lucky."

For the contest, images were submitted in three categories: Land & Sky, Plate/Film/Digital, and CCD (very light-sensitive digital imaging).

Randall's photo and the other selected 25 images are on display through February 2004 at the LodeStar Astronomy Center, located in the New Mexico Museum of Natural History & Science in Old Town Albuquerque. The exhibit is open daily from 9 a.m. to 5 p.m. and is included with LodeStar admission.



SANDIAN RANDALL ROBERT'S Best in Show image of a lightning storm and the constellation Cassiopeia. You might be able to just see W-shaped Cassiopeia in the center left of the sky (it shows up faintly but clearly in the digital file).



LAB NEWS PHOTOGRAPHER Randy Montoya captured the Nov. 8 lunar eclipse in this half-second exposure.

### Sandians help edit two more MRS volumes

Sandia researchers have served as editors for two more volumes just published by the Materials Research Society.

Albert Baca (1742) helped edit *New Applications for Wide-Bandgap Semiconductors*, a collection of 60 papers in 430 pages.

David Stein (1748) helped edit *Chemical-Mechanical Planarization (CMP)*, with 45 papers in 348 pages.

Today's applications of wide-band semiconductors are so diverse, yet so well-known, that it's

hard to approach Albert's volume without feeling one is meeting old friends and learning more about them. Silicon carbide, related alloys of gallium and boron nitride, zinc oxide, and other materials find new applications in solid-state lighting, sensors, filters, high-power electronics, biological detection, and spintronics.

Topics include bulk and epitaxial growth, processing, device design, and understanding of the physics of transport in heterostructures.

CMP has emerged as a critical fabrication technology for advanced integrated circuits. David's volume — the most recent in an MRS series on the subject — reviews past successes and discusses future challenges. Input from academia, government labs, and industry focuses on CMP modeling, science, and slurries and particles of copper, oxide, and other materials. Planarization applications include shallow trench isolation, copper damascene, and novel devices.

The volumes are available electronically on the MRS Web site ([www.mrs.org](http://www.mrs.org)), with free access for all members. All others pay cash (in whatever form you chose) for hard copies: \$99 for CMP, and \$106 for the semiconductor volume. Members desiring hard copies pay \$86 and \$92, respectively.

— Neal Singer

### Take Note

Retiring and not seen in *Lab News* pictures: Bernard Alexander (10848), 26 years; Collette Herrick (2331), 11 years; and William Moore (1645), 27 years.

### Congratulations

To Liz (12332) and Lorenzo Gallegos, a daughter, Melody Angel, Oct. 16.

To Valene Begano (2102) and Doug Clark (2115), married in Albuquerque, Oct. 18.

### Feedback

#### Feedback Web site gets new look

The Feedback Program has a new look on the Internal Web (<http://www-irm.sandia.gov/newscenter/news-frames.html>) and then click on "Feedback.")

The redesigned page (Janet Carpenter, 12640, did the redesign) offers an easy-to-reach fact sheet and response guide.

It also offers a tutorial targeted to Sandians who provide responses to submitted Feedback questions. This guide, recently updated following some informal focus groups conducted by the Integrated Enabling Services SMU, counsels against lecturing and "upside down answers" to questions. It counsels for "straight answers to straight questions."

Unchanged is a listing of the most recent Feedback questions and answers and an archive of older items, organized by topic, e.g., accounting, benefits, human resources, labor relations, salary administration, and services/work environment.