

Major retooling of MDL for MESA achieved without a slip

Timing, teamwork enable production increase in difficult circumstances



BUNNY-SUITED WORKERS complete hardware installations during MDL retooling effort.

By Neal Singer

For onlookers casually observing the spate of Sandia buildings rising, it may seem as though giant projects descend from the sky, funded from Washington, without history or future.

But the two-year MESA retooling project just completed for the Microelectronics Development Laboratory (MDL) derived from great need, say researchers. And —

Inside:

Big construction project in Area 1 will update communications infrastructure. See story and project map on page 12.

incredibly — even as machines and entire support systems were being ripped out and replaced in a massive, \$81.7 million upgrade, the teams involved not only continued MDL parts production but significantly increased the output of the key semiconductor fabrication facility.

Doing open-heart surgery in a marathon

“A DOE observer compared the process to doing open-heart surgery in a marathon,” said “Tool Man” Jim Beals (10822), who managed the physical side of the retooling effort. “The fab is like a living, breathing entity. The exhaust system is its respiration. Deionized water [for various processes] is like blood. We had to take these down and do a heart transplant.”

“Anyone with a lick of sense would have shut down the fab,” solemnly joked Don Cook (1900), Director of the MESA program office.

“Sometimes there were twice as many contractors working on installing tools as there were people using the tools themselves,” says Tom Zipperian (1740), overall manager of the Center 1700 effort. “Eighty million dollars worth of equipment was installed [almost] magically without any disruption of the production process.”

(Continued on page 4)

Researchers from Sandia, LANL achieve wireless nanocrystal breakthrough

Marriage of quantum well, quantum dots could produce white light

By Neal Singer

A wireless nanodevice that functions like a fluorescent light — but potentially far more efficiently — has been developed in a joint project between Los Alamos and Sandia national laboratories.

The experimental success, reported in the June 10 issue of *Nature*, efficiently causes nanocrystals to emit light when placed on top of a nearby energy source, eliminating the need to put wires directly on the nanocrystals.

The energy source is a so-called quantum well that emits energy at wavelengths most easily absorbable by the nanocrystals.

The efficiency of the energy transfer from the quantum well to the nanocrystals was approximately 55 percent — although in theory nearly 100 percent transfer of the energy is possible and might be achieved with further tweaking.

The work is another step in creating more efficient white-light-emitting diodes — semiconductor-based structures more efficient and harder than the common tungsten light bulb.

Reduction of lighting costs is of wide interest because on a world scale, lighting uses more electrical energy per year than any other human invention.

Nanocrystals pumped by quantum wells generate light in a process similar to the light genera-

(Continued on page 5)

Homeland Security SMU

marks first anniversary



California lab VP and SMU chief Mim John and colleagues speak frankly about the successes and challenges of Sandia's newest mission. Read the interview beginning on page 6.

Sandia LabNews

Vol. 56, No. 13

June 25, 2004



Managed by Lockheed Martin for the National Nuclear Security Administration

Desalination, removal of arsenic to be focus of H₂O research at Sandia for next few years

\$6 million appropriation makes research possible

By Chris Burroughs

Research in the areas of desalination and removal of arsenic in water will step up at Sandia over the next few years, the result of a \$6 million allocation in the FY2004 federal Energy and Water Development Appropriations bill.

The allocation includes \$3 million for desalination and \$3 million for arsenic cleanup. The American Waterworks Association (AWWA) and WERC — a consortium consisting of New Mexico State University, University of New Mexico, New Mexico Tech, and Diné College — will share the arsenic cleanup money with Sandia. Sen. Pete Domenici, R-N.M., secured the funding as chairman of the Senate Energy and Water Development Appropriations Subcommittee.

“Water issues are some of the most pressing and ominous facing New Mexico and the West, and that is not likely to change anytime soon,” says Domenici. “I have worked to provide the resources needed to harness the expertise at Sandia and other agencies to find better, more affordable ways to provide new resources of affordable potable water.”

Tom Hinkebein, Manager of Geochemistry

Groundbreaking set for June 29

A groundbreaking ceremony for the Tularosa Basin National Desalination Research Facility in Alamogordo is set for June 29 at 9:30 a.m. Sen. Pete Domenici, R-N.M., who was instrumental in obtaining funding for the facility, will give remarks. Also speaking will be Bureau of Reclamation Deputy Commissioner Mark Limbaugh, Alamogordo Mayor Don Carroll, and a Sandia representative.

Dept. 6118, says that both desalination and removal of arsenic in water are important to the economies of New Mexico and the country.

“Many areas of the US are experiencing water shortages, and desalination of brackish water will provide much needed additional water,” he says. “Also, new EPA standards for drinking water, which reduce allowable amounts of arsenic in drinking water, make research in the field essential.”

The \$3 million in support of the desalination research is consistent with the Desalination and Water Purification Technology Roadmap developed in partnership with the Bureau of Reclama-

(Continued on page 4)



President Harry S. Truman Fellowship in National Security Science and Engineering

Two MIT postdocs selected as first recipients of Sandia's prestigious Truman Fellowships Page 5

What's what

One of the more widely traveled Sandians has a long-time interest in language and says one of the peculiarities he's noticed during his travels is that people develop lexicons unique to their organizations. And Sandia is no different.

When you ask a Sandian a question, he says, the initial response noticeably begins with, "Well, let's see. . ." And after the question is analyzed, thoughts collected and sorted, and an answer formulated, he says, the response usually begins with, "So, . . ." "I don't know if this is due to Sandians being thoughtful, introspective, analytical people, or whether we are just copying what we may have heard from a friend, an associate, or an influential person," he noted. "I also don't know when it started, but it was clear to me as soon as I arrived." And he added, "Perhaps we could put together a Sandia phrase book."

Well, let's see now. . .

* * *

And on the matter of words, we in this quasi-government environment function daily in a world of acronyms and initialisms. Looking recently for the actual name of something I knew only by its initials, I wondered: If you like acronyms, are you an acronymophile, or maybe an acronymophobe, if you don't like them? If you're wildly enthusiastic about them, are you an acronymiac? If one is oddly different from others, is it an acronymaly?

* * *

Somewhere in a galaxy far, far away, Cosmic E-mailer hums efficiently in a vast subterranean complex, dispatching ba-zillions of random inexplicable messages to bewildered Earthlings. (Remember *Forbidden Planet*?) This one chirped unbidden into Bill Murphy's (12640) e-mailbox:

From: Nobody
Sent: Tuesday, May 25, 2004 2:06 PM
To: wtmurph@sandia.gov
Subject: SONIC TIMEWORKS AUTOMATED REPLY

This is an automated reply, no human has read or will read your message. Due to the current increase in virus related mailing activity the email address you tried to reach, mo@sonictimeworks.com, has been deactivated. Instead, please mail molson@Sonic Timeworks

Bill pondered existentially whether - since it came from "Nobody" - it really existed. And as for its "thank you" for understanding, he didn't.

* * *

Some really funny stuff shows up in the *Lab News*. Retired assistant editor Phyllis Wilson got a chuckle out of this "Wanted" ad in the June 11 issue: "'50'S BLONDE, dining room set." A punctuation stickler, she wrote, "Must the '50's blonde still have that same hair color, and is there an age limit? Also, must she be able to cook well enough to use the dining room set?" And reverting to training, she added, "My advice to ad editors: Watch your p's and q's - and commas."

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

Sandia LabNews

Sandia National Laboratories
<http://www.sandia.gov/LabNews>

Albuquerque, New Mexico 87185-0165
Livermore, California 94550-0969
Tonopah, Nevada • Nevada Test Site • Amarillo, Texas •
Carlsbad, New Mexico • Washington, D.C.

Sandia National Laboratories is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin company, for the US Department of Energy's National Nuclear Security Administration.

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Lab News fax 505/844-0645
Classified ads 505/844-4902

Published on alternate Fridays by Media Relations and Communications Dept. 12640, MS 0165

LOCKHEED MARTIN

Blue Star Mothers organizing chapter in Albuquerque June 26

Several military moms who have sons or daughters serving in Iraq are organizing a local chapter of Blue Star Mothers in Albuquerque. The first meeting is Saturday, June 26, at 10 a.m. at the Cottonwood Church at 10131 Coors Blvd. (behind the Alameda West Shopping Center).

Founded in 1942 and chartered by Congress in 1960, Blue Star Mothers encourage families of military members to display the Blue Star Flag in their window as a sign of support.

The flag is a symbol of hope and grave concern. It also symbolizes pride in the commitment of America's youth and serves as a reminder of the gravity of the entire war effort.

Membership is open to mothers who have sons or daughters serving in the military during time of war whether deployed or not, and to fathers, other family members, and friends.

Additional information is available at the national website: www.bluestarmothers.org/ and the New Mexico website: www.nmbluestarmothers.org/.

For more information about the organizational meeting, contact Carolyn Donnell at 299-7123.

Management promotions

New Mexico

Keith Bauer from PMTS, Collaborative Environments Dept. 6223, to Manager, Distributed Computing Dept. 6224.

Keith joined Sandia in August 1988, working in the Database Administration Department for two years before moving in 1990 to the MVS Systems programming group, where he specialized in operating systems performance and tuning.



KEITH BAUER

After leaving the MVS group in 1994, Keith joined a team working on the Interactive Collaborative Environments (ICE) project, where he developed collaborative solutions on many disparate Unix platforms and also worked on two different network intrusion detection systems. The first system was a tri-lab effort with Los Alamos and Lawrence Livermore national laboratories and was based on ethernet networks. The second system dealt with ATM network architectures. After leaving this group in 2001, Keith joined Information Systems Engineering Center 6500 and began development of the Policy and Processes Infrastructure System for customers in the Nuclear Weapons SMU.

He has a BS in mathematics from Western State College of Colorado and an MS in management science and information systems from Colorado State University.

* * *

Kelly Jorgensen from PMTS, Embedded Systems Engineering Dept. 5942, to Manager, Engineering and Manufacturing Software Dept. 15222.

Kelly's first experience with Sandia was as a student intern in May 1993. In 1995, she was hired as a limited-term staff member and later became a member of the technical staff in 1996.

From May 1993 until December 1997, she was a member of the Risk Assessments and Systems Modeling Department, working on the High Consequence Surety Code Suite used to perform risk assessments on nuclear reactors and nuclear weapons. In January 1998, she transferred to Embedded Systems Engineering Department, where she did computer and electrical engineering work on various systems and also worked as project lead for external sponsors.

Kelly has a BS in nuclear engineering and an MS in electrical engineering, both from the University of New Mexico.

* * *

Pat Manke from PMTS, Telecommunications Operations Dept. 9334, to Manager, Systems Analysis/Trouble Resolution Dept. 9338.



PAT MANKE

Since joining Sandia in July 1979, Pat has worked in weapons component development and testing, radiation effects on electronics used in a reprocessing environment, entry control systems development and testing, mobile command and control systems development and support, program office support for DOE non-proliferation technology development, and corporate network operations support.

He has a BS and an MS in electrical engineering, both from Oklahoma State University.



KELLY JORGENSEN

New DISL lab facilitates an information-technology approach to engineering

Dedication of \$37.9 million, 70,000-square-foot Distributed Information Systems Laboratory draws 400

By Nancy Garcia

Transformation was the theme of the dedication of the Distributed Information Systems Laboratory (DISL), which drew an audience of some 400 for a ribbon-cutting ceremony this month. Facilitating an information-technology approach to engineering, the building replaces an earlier

space in the new building. It is divided between classified and unclassified areas. The latter is designed to enhance collaborations with industry and academia. About 130 staff and 30 visitors will work in DISL.

DISL will house about half the staff of Center 8900 — those who work in computer sciences, said DISL Program Manager Dennis Beyer (8904). They will work on high-performance computing

and visualization, networking, information security and development of collaboration environments. The building is being occupied in phases, with the unclassified south and west wings beginning in May and being fully occupied by the end of this month. In the north wing, staff from centers 8900, 8200, and a small cadre from Center 8100 will occupy the classified space. This wing



IT'S OPEN — The National Nuclear Security Administration's David Crandall, second from right, cuts the ribbon. To the left are Mim John, Patty Wagner, and Dimitri Kusnezov of the Office of Advanced Simulation & Computing. At right is Ken Washington. (Photo by Randy Wong)

edifice that was a center of activity during nuclear weapons design, building, and testing.

The \$37.9 million, 70,000-square-foot project, sponsored by the DOE/NNSA Advanced Simulation and Computing (ASC) program, now occupies the heart of the California site.

"Not only is it in the center of the site," said Distributed Information Systems Center 8900 Director Ken Washington, "but it is also in the center of our minds and thinking."

David Crandall, NNSA's deputy assistant administrator for research, development, and simulation, said in his remarks that the facility embodies a new approach to manage the nuclear deterrent without testing. Modeling and simulation will be used to design changes for the stockpile in response to surveillance, through what is known as a responsive infrastructure.

That approach involves accessing data from throughout the weapons complex and facilitating collaboration between people and information.

"We're in a new era in which we no longer think of distance as a barrier," said Ken. He and California Weapons Engineering Center 8200 Director Doug Henson will share



SHOW AND TELL — Program manager Dennis Beyer, right, shows a poster in the building lobby to *Tri-Valley Herald* reporter Ian Hoffman, left. (Photo by Bud Pelletier)

"We truly are part of the transformation of how engineering is done."

also features a next-generation visualization design center.

"DISL will play a key role in this transformation by providing a facility to enable research, development, and prototyping of new technologies in a test-bed environment," said Senior VP Tom Hunter of Information, Computation, and Engineering Sciences Div. 9000. In charge of the California site when plans for DISL were first formulated, Tom lauded the enormous team who brought the building into creation, saying they deserved equally enormous praise.

"We truly are part of the transformation of how engineering is done," he told the crowd.

Mike Vahle, Director of Advanced Product Realization Center 9900, lauded the "truly remarkable success." He has characterized the new infrastructure as a way of enabling talented people to do great work.

Patty Wagner also came from New Mexico to speak at the ceremony. Manager of the National Nuclear Security Administration's (NNSA) Sandia site office in Albuquerque, she applauded the facility's being completed within its cost, scope, and schedule.

Sandia California News

Crandall exulted at being able to experience the substantiation of the vision, being able to "kick the tires and sit in the chairs." Crandall also recognized the courage of Sandia management who in the late 1990s made way for DISL by removing Bldg. 913, one of the first buildings at the California site, which had been a significant central hub during creation of the current weapons stockpile. Crandall said that decision permitted the new facility to be in the right place. He lauded its proponents for their trust in the government to follow through with authorization and funding.

Also on hand was Wilfred Pinfeld, director of Advanced Computing Programs at Intel.

"This building is a milestone," he said, ticking off several major collaborations Intel has shared with Sandia in the past. "We look forward to many collaborations in the future."

Ken recognized Sandians and others whose vision and efforts led to the building's creation, including the late Sandia computer science researcher Rich Palmer, who is honored by a plaque inside the lobby.

Introducing Ken at the outset of the event, California Laboratory VP Mim John (8000) took a moment to remember an influential figure who was being honored the following day in a national day of mourning — Ronald Reagan. She said it was fitting "on this truly glorious day . . . to remember . . . a truly great American."

Desalination

(Continued from page 1)

tion last year. Tom was the roadmap's editor.

Desalination

Tom says the desalination program will focus on the development of novel research projects. These projects can be tested at the Tularosa Basin National Desalination Research Facility in Alamogordo, now beginning construction. In 2002 Congress appropriated funds to Sandia and the Bureau of Reclamation to develop a conceptual design for the facility. The Bureau has been responsible for the engineering design and construction.

With the conceptual design "90 percent completed, it's ready to go," Tom says. Groundbreaking for the research facility is set for June 29 with completion scheduled for March 2005.

Mike Hightower (6202), the Sandian heading up the project, says the facility will focus on research and development of technologies addressing the technical, economic, and environmental issues associated with the treatment and utilization of inland brackish groundwater.

Several entities that fund desalination research, including Sandia, the Bureau of Reclamation, Office of Naval Research, and others, will use the facility to study new desalination technologies, salt concentrate management and reuse technologies, and use of renewable energy in the desalination process.

"Current emphasis has been in developing new technologies for removing salt from brackish water," Mike says. "But equally important is what to do with the salt once it is removed."

For example, if brine water contains a ton of salt per one million gallons of water and if a plant desalinizes 10 million gallons of water a day, some 10 tons of salt is generated a day.

This is not a problem in coastal communities because salt can be returned to the ocean. Inland, it becomes an issue because locations or methods to dispose the salt may not be available. For this reason, a major part of research at the facility will focus on concentrate management.

Another area of research at the facility will be using renewable energy to power the desalination. "One of the biggest costs of desalination is



Architect's rendering of Tularosa Basin desalination research lab.

PRELIMINARY ELEVATION RENDERING

energy," Mike says. "For that reason it is important that alternate ways to power these processes be developed."

The Tularosa Basin in south-central New Mexico was selected as the desalination facility location because it contains a range of brackish water — from almost fresh to twice as salty as sea water, all within a five-mile radius. A set of wells has already been drilled at different brackish levels in the basin.

The desalination facility will consist of six indoor bays where testing can be done side by side. Testing will also be conducted outside in three additional test pads.

Tom says the goal of the facility is to ultimately "improve economics of water production to meet expanding regional needs.

"This includes both quality and quantity concerns," he says. "Water desalination will be important, not only to southern New Mexico, but also West Texas, Arizona, Nevada, and California."

Arsenic removal

The \$3 million for research of arsenic removal from water stems out of new Environmental Protection Agency guidelines. The revised standards, which go into effect in 2006, change the allowable amounts of arsenic in drinking water from 50 parts per billion gallons of water to 10 parts.

"Many areas of the country are going from having no treatment of water to now having to do advanced treatment," Tom says. "Small and large communities alike will have to adapt to the new standards."

Albuquerque is one of the many communities affected by the new ruling. Arsenic concentrations

in drinking water in the area are highly variable but average around 20 parts per billion.

"The intent is to develop a 'Home Depot' approach to water cleanup," Tom says. "By 2008 we will have the technologies ready for the utilities to buy and install."

One of the best methods is the use of adsorbents, man-made materials that have been designed for the purpose of cleaning up arsenic. The material is placed in big vessels over which water is flowed. The arsenic adsorbs into the material and water comes out arsenic free.

Sandia researchers have already developed one type of adsorbent that has been shown to work, the Specific Anion Nanoengineered Sorbents (SANS). Others are also being researched.

Development of the new arsenic removal technologies is the responsibility of the American Water Works Association. Sandia's role will be to pilot promising new technologies as they get close to commercialization. WERC will transfer the technologies to companies that will commercialize them and sell them to the water utilities.

Malcolm Siegel (6118) is the project manager.

Tom says that besides the \$3 million for the arsenic project, Sandia will soon be receiving an additional \$1.8 million for other arsenic program research.

"The strict arsenic standards that take effect in 2006 are placing a tremendous burden on rural communities that simply can't afford to meet the standard," Domenici says. "With this appropriation, we are investing in scientific expertise at Sandia to try to develop technologies that will allow the standards to be met in the most cost-effective manner."

Retooling MDL

(Continued from page 1)

The number of parts shipped from MDL increased from a rough average of 200 yearly to 1,185 from April 2002-2003 to a dramatic 4,818 from April 2003-2004. The project began in April 2002 and was completed several weeks ago.

Estimates were that at times, roughly 100 construction workers were surrounding or intermixing with 50 researchers.

Says Dave Myers (1702), "I cannot think of any semiconductor facility that retooled and sustained deliverables as the MDL did during that period. We had no hiatus during the entire time we did the rebuild."

Says Bill Jenkins (1920), overall project manager, "It was a difficult, complex, well-run project that took a lot of people working together to make it happen. It involved production schedules, labor availability, delivery times of tools — it takes only one little thing to throw everything off."

The need for an upgrade was great.

"There's a world of difference [in the facility] between then and now," says Dave, Marion Scott's deputy on the project and a link to the nuclear weapons program. "How bad was it? In year 2000, there were wet-benches in such bad shape we had to put drip pans under the acid rinse tanks to keep from eating through the floor of the MDL. I don't think people realized how much we had stretched the infrastructure."

Earlier tool contributions, such as \$40 million in processing equipment from IBM in 1992, by year 2000 had reached the end of their life. Not even second-tier suppliers had parts, and newer computers couldn't run the old software.

Says one operations manager, Linda Cecchi (1747), "This was an essential investment by DOE. If it hadn't been made, we eventually would have had to shut down."

"Mini" construction zones

Unlike most commercial clean rooms, the reconfigurability of the MDL allowed the creation of "mini" construction zones within the Class 1 facility without disrupting operations. Plastic curtains created isolated areas in which technicians could work. Still, urgent parts requests coming in unexpectedly meant continual rearrangement of the schedules of electricians, plumbers, millwrights, pipe fitters, tin workers, and others. Forty-two new, large tools had to be installed and qualified while their predecessors were being shifted or removed, without a work stoppage.

"That's the miracle," says Jim, who says close coordination, daily meetings, and intense scheduling on a project with 6,000 activities scheduled was required.

In addition to daily meetings to iron out each day's problems, says production manager Dale Hetherington (1746), "We operations managers had meetings every week with the MESA team [who wanted the upgrade completed on time], the design team [of contractors who needed their work to proceed in orderly fashion], and in addition, three process engineers who were key tool owners who could look at details if we planned to move a tool from point A to point B."

Fortune had smiled early on the project when the market downturn in semiconductors of three years ago had permitted Sandia buyers to purchase semiconductor equipment at bargain prices. Incoming were wet-benches, metrology or lithography tools, and ion implanters. Much work was done on weekends by the construction

crews to minimize impact on parts production, and Sandia stayed open during Christmas-New Year's week for more construction.

Line size — the measure of how small a circuit can be fabricated — was decreased from 0.5 micron to 0.35 micron. (By comparison, a human hair is roughly 70 microns thick.)

Working in partnership with general contractor JB Henderson and B&D Electric among others, the complex project had only one minor accident over the two years. "We had a safety-conscious contractor," says Bill, who praised the contractors for their skill "in working with toxic gasses in tight quarters.

"They're in a pretty dangerous situation, and they respect that."

"We looked at our contractors as true partners, not adversaries [as some relations between contractors and owners can become]," said Jim. "When we felt a little overwhelmed, with construction workers going everywhere, we limited construction to a certain number of bays until everyone felt good about it. It was like a chess game."

Tom Zipperian commented that it had taken "a cast of thousands" to make the project a success.

The success was summarized in a brief write-up led by Ron Jones (1741), who wrote that ICs for the nuclear weapons programs were completed, deliveries in MEMS for research and surety increased, and various prototype mirrors and sensors were completed. "The retooling project was complete four months ahead of schedule and under budget, while experiencing zero unscheduled shutdowns and zero reportable occurrences."

The project used a minimum of its contingency funds, which can then be channeled back to mitigate future risks, says Bill Jenkins.

Youssef Marzouk, Gregory Nielson named first Truman Fellows

By Michael Padilla

Two Massachusetts Institute of Technology (MIT) postdoctoral students have been selected as the first recipients of the President Harry S. Truman Research Fellowship in National Security Science and Engineering at Sandia.

Youssef Marzouk and Gregory Nielson were selected after an intensive nationwide search. The Truman Fellowship is the only position at Sandia where the candidate proposes a research project, presents it, and, when selected, gets to do it for the next three years.

"We are indeed fortunate to have selected Youssef Marzouk and Gregory Nielson as Sandia Truman Fellows," says Sandia's Chief Technology Officer Pace VanDevender (1000). "Youssef and Gregory set a strong precedent for excellence as the first class of Truman Fellows.

They will work with other engineers and scientists at both the New Mexico and California sites as corporate-wide fellows addressing the national security challenges of the new century."

Truman Fellowship candidates are expected to have solved a major scientific or engineering problem in their thesis work or have provided a new approach or insight to a major problem, as evidenced by a recognized impact in their field.

Youssef will be working in Reacting Flow Research Dept. 8351 at Sandia/California, and Gregory will be in MEMS Device Technologies Dept. 1769 at Sandia/New Mexico. Their work is funded by Laboratory Directed Research and Development (LDRD).

Youssef received his bachelor's, master's, and PhD degrees from MIT. He was the recipient of the Fannie and John Hertz Foundation Graduate Fellowship. He received the Young Researcher Fellowship



YOUSSEF MARZOUK



GREGORY NIELSON

Fellowship attracts nationally recognized candidates

After nearly 10 months of a nationwide search, Sandia has completed the first selection of the prestigious President Harry S. Truman Research Fellowship in National Security Science and Engineering.

More than 20 applications were received from various universities throughout the country including Caltech, MIT, Harvard, Berkeley, University of New Mexico, Georgia Tech, Stanford, Arizona State, Washington State, University of Utah, and others.

The Truman Fellowship offers new PhDs in science and engineering an opportunity to conduct independent research of their own choosing within a national security context. The fellowship also represents a continuation of Sandia's long-standing practice of seeking out the best science and engineering talent in the nation to work on problems of pressing national interest.

Candidates for the fellowship were asked to have expertise in any of the Labs' research focus areas. Candidates were asked to present a research proposal describing the scientific importance of the proposed work and a description of the

research plan and data to be obtained. Application packages were reviewed, and a team of Sandia senior scientists and engineers interviewed candidates. Final selection was made by Sandia's Chief Technology Officer Pace VanDevender (1000).

The Truman Fellowship is a three-year appointment commencing on Oct. 1.

Sandia's University Research Office and Human Resources/University Partnerships teamed more than two years ago to create the new post-doctoral position and guide the CPR revisions, search, and hiring processes necessary to implement the prestigious position.

The Truman Fellowship selection committee chair was Ron Loehman (1843). Members of the committee included Jeff Brinker (1002), David Chandler (8350), Peter Feibelman (1114), David Gartling (9100), Larry Rahn (8350), Anita Renlund (2554), and Norman Warpinski (6116).

Sandia's Truman Fellowship honors the memory of President Harry S. Truman, who challenged Sandia at its founding as an independent laboratory in 1949 to provide "exceptional service in the national interest."

Award at the MIT Computational Fluid and Solid Mechanics conference, and was the recipient of the Barry Goldwater Scholarship. Recently, he was awarded the Joseph H. Keenan Prize for outstanding graduate student in the thermal sciences at MIT. His research experience includes work at the MIT Reacting Gas Dynamics Laboratory, the MIT Fluid Mechanics Laboratory, and the Sandia/California Combustion Research Facility. He also did research at Washington University and at the Monsanto Company in St. Louis.

Youssef says he excited to be joining Sandia as a Truman Fellow, and particularly excited to be chosen for the program's first year.

"This will be a great opportunity to enhance my technical skills, establish collaborations with excellent people working on meaningful projects, and extend my research into new areas," Youssef says. "I look forward to working with members of the technical staff and contributing to the research environment at Sandia."

His research at Sandia will focus on Bayesian

inference for inverse problems and optimization, with applications to fluid dynamics, source inversion, and gene regulatory networks.

"I would like to establish a strong program of fundamental, mostly computational research on thermofluid and biological systems," Youssef says.

Gregory received his bachelor's degree from Utah State University, and his master's and PhD from MIT. He has received numerous scholarships and awards including an MIT Entrepreneurship Competition Award, a National Science Foundation Graduate Research Fellowship, and the Sandia Technology Transfer Merit Award. His research experience includes graduate work at MIT designing optical microelectromechanical systems (MEMS) devices as a PhD candidate, and studying and applying micro-scale plasticity material models as a master student. He has also conducted research at Sandia's Parallel Computing Sciences Department and at Utah State University.

Gregory's research project at Sandia will be a continuation of his doctoral research. As part of his thesis, he invented and developed the theory for a completely new actuation technique for MEMS switches that will allow switching speeds 10 to 1,000 times faster than current MEMS devices.

The new actuation technique also reduces the voltage and energy required for switching. For example, currently the fastest RF (radio frequency) MEMS switch operates at about one microsecond and needs 70 volts for actuation. His technique will allow an RF MEMS switch that switches in 100 nanoseconds and uses less than 10 volts.

While at Sandia, he will implement and refine the actuation technique and then apply it to both RF and optical MEMS switches.

"One thing that I really like about the fellowship is that it gives me the opportunity to independently pursue research in an environment of world-class researchers," says Gregory. "As a Truman Fellow I'll be able to pursue research that I'm really excited about at a place that is particularly well-suited to supporting the research. I wouldn't be overstating it by calling it a dream job for me."

The Truman Fellowship provides the opportunity for recipients to pursue independent research of their own choosing that supports the national security mission of Sandia. The appointees are expected to foster creativity and to stimulate exploration of forefront science and technology and high-risk, potentially high-value R&D.

"We senior scientists and engineers on the Truman Fellowship selection committee are extremely pleased with the outcome," says Ron Loehman (1843), chair of the selection committee. Attracting such exceptional young scientists to Sandia makes all the time we spent in the reviews and interviews worthwhile. I expect Youssef and Greg to make important contributions to Sandia during their time here."

Nanocrystals

(Continued from page 1)

tion in a fluorescent light bulb.

There, a captive gas permeated by electricity emits ultraviolet light that strikes the phosphor-coated surface of the bulb, causing the coat to emit its familiar, overly white fluorescent light.

The current work shows that the nanocrystals can be pumped very efficiently by a peculiar kind of energy transfer that does not require radiation in the usual sense. The process is so efficient, reports LANL researcher Marc Achermann, because unlike the fluorescent bulb, which must radiate its ultraviolet energy to the phosphor, the quantum well delivers its energy to the nanocrystal very rapidly before radiation occurs.

Because the emissions of nanocrystals (a.k.a. quantum dots) can be varied merely by controlling the size of the dot rather than by the standard, cumbersome process of varying the mix of materials, no known theoretical or practical barriers exist to pumping different-sized quantum dots that could individually emit blue,

green, or red light, or be combined to generate white light.

The quantum well, about three nanometers thick, is composed of a dozen atomic layers. It coats a wafer two inches in diameter and is composed of indium gallium nitride. The film is not fabricated but rather grown as crystal, with an energy gap between its different layers that emits energy in the ultraviolet range at approximately 400 nm.

In this proof-of-principle work, the energy in the quantum well was delivered with a laser. Although the difficulties of inserting energy into the quantum well using an electrical connection rather than laser light are significant, it is considered to be feasible.

The thin-film quantum well crystal film was grown at Sandia by chemist Daniel Koleske (1126).

"My role was small," jokes Daniel, "but they couldn't have done it without me."

Sandia personnel are reputed to be among the finest epitaxial crystal-growers in the world.

LANL researchers Achermann, Melissa Petruska, Simon Kos, Darryl Smith, and Victor Klimov attached the semiconductor nanocrystals, made the measurements, and created the theory.

LANL's LDRD program funded the Sandia work.

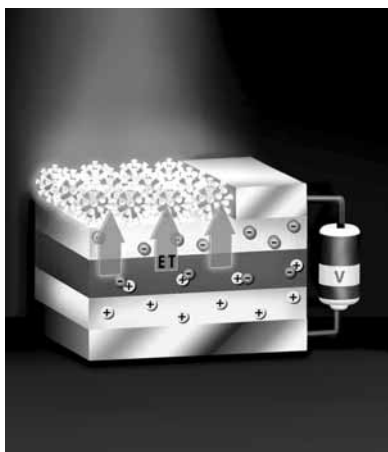


DIAGRAM shows energy transfer from nano-thin layers of Sandia-grown quantum wells to the LANL nanocrystals above the nanolayers. (Image courtesy LANL)

Homeland Security SMU reaches its first anniversary: Mim John, TJ Allard, and Rick Stulen talk about the issues

This is part of an occasional series of interviews appearing in the Lab News over the past year or so examining the various Strategic Management Units (SMUs) at Sandia. For this interview, Mim John, who heads the Homeland Security Strategic Management Unit and is vice president of the California Laboratory 8000, sat down with her DHS deputy, TJ Allard, and Rick Stulen, who handles DHS investments and commercialization. They were interviewed by Nancy Garcia and Mike Janes.

Lab News: *The Homeland Security SMU at Sandia is still a rather new one. What were your initial thoughts, Mim?*

Mim: We had an initiative, not formally designated at the time, which the former Division 5000 Vice President Dave Nokes was leading. The question on the table, as we were doing strategic planning in the Laboratory Leadership Team a year ago, was whether it was time to formalize the initiative into a management business unit consisting of the programs that we were either already pursuing as legacy activities or starting to be asked to pursue. There was also a decision to underwrite it (with program management funds) until it could stand on its own. We came to a further agreement that I was probably the right person to lead that.

Rick: This was in the context of [Executive VP and Labs Deputy Director] Joan Woodard looking at the whole SMU structure and recognizing that enough had changed in the country with regard to Homeland Security that it was time to reevaluate how we were managing the set of relevant activities.

TJ: We looked at the issue right after the September 11 attacks and about every six months after that.

Mim: The activities were spread across all of the existing SMUs before there was a focal point in the Department of Homeland Security.

TJ: Other SMUs are continuing to contribute to Homeland Security-related activities . . . it gives us a broader response as a laboratory.

Lab News: *Some employees still wonder what it means to have an SMU centered at Sandia/California.*

Mim: It is not centered in California. I am the Sandia executive leading the Laboratory's Strategic Management Unit in Homeland Security. I

happen to have parallel responsibilities in charge of the Sandia/California laboratory, a very different job. Now, having said that, there are programmatic elements at both sites — just like other SMUs. When we first set up the original Strategic Business Unit structure, the VP who was in charge of the Nonproliferation and Assessments area, as it's called now, was Tom Hunter when he was the VP of the California division. So this is not groundbreaking.

Lab News: *Are there any particular challenges or opportunities in managing the SMU from this site?*

Mim: Understanding that we really had a major part of the program in New Mexico, the first thing we did was set up a structure to make sure that there was a day-in and day-out management presence in New Mexico. TJ is my deputy doing that. He does a marvelous job, not just with the New Mexico element of the SMU but also with the interface to the local site office of the Department of Energy.

As with any SMU, we have business management activities. Roy Fitzgerald (10763), who is also in Albuquerque, has the lead in trying to help us on our business practices and planning. Carl Skirrod (8529) has assumed the financial reporting responsibility, and Rick has the director lead in interfacing with the other laboratories. So we have an office team balanced between the two sites. Ron Stoltz will be joining our SMU team to help with



LEADING THE WAY — Mim John, left, Rick Stulen, center, and TJ Allard pose in the Homeland Security display room at Sandia/California. (Photos by Randy Wong)

our LDRD strategy and management, and also to develop a more persistent interface with regional officials in both New Mexico and California.

A few more words on Rick's role — the legislation for DHS established an Office of National Laboratories with the intent that DHS would not create its own labs from scratch, but instead tap into the national labs. The leadership we deal with

Northwest, and Oak Ridge] on the FY04 program. We had a really good foundation with the three NNSA labs from which we moved into the five-lab relationship. Today we are in the process of making yet another transition as we head into FY05. DHS is doing a capabilities assessment among all of the relevant DOE labs to determine mission assignments for the future.

It's been an interesting journey with the other labs, one which we started by laying down principles around how we would interact with each other, and that set of principles has been driving our behavior. And we come back to those principles periodically, especially when there is disagreement on how to proceed.

TJ: One of the key principles was that we wanted competition to be for ideas, and not for funds. That's in the best interest of the nation. I think we've held true to that.

Rick: There is enough of a common set of capabilities in certain areas that there is healthy competition. In the end, you don't want to simply divide by "n" in determining who gets funded for what. You really do want to have the best ideas and capabilities, as TJ says.

Lab News: *What are some of your long- and short-term objectives?*

Mim: Our corporate strategic planning document on the internal Web sets out a vision of being not only a critical factor in the success of the DHS, but also in the success of the nation as evidenced by our work with the department that involves other federal, regional, state and local entities. Homeland security is a problem that transcends the federal government, and we've got to engage that wider constituency if we're going to have any impact at all.

Our vision also establishes the focus that we're good at — providing systems solutions. We are setting our sights high — in 10 years, we hope the SMU will be 40 to 50 percent of the size of the nuclear weapons program today.

We may be overly ambitious because there are a number of things that have to happen first, and how much is within our control is a question. S&T
(Continued on next page)



"What I've really been touched by in this SMU is how many people are willing to participate and help — giving that precious 'sweat equity.' We don't yet have that much money to fund people to do things."

at DHS has asked the labs to try to work among ourselves not only to create our work plans but also to bring them the strategic issues that need to be addressed. Rick has represented Sandia in the DHS laboratory forum and has emerged as the nominal spokesperson of what we call the senior management council for the national laboratories.

We have a lot of dimensions to this job that don't exist in the other SMUs because of that complication with the other laboratories. But a major positive is that our relationship with DHS is intended to be more enduring and more robust than is the "task order" norm with other agencies.

Lab News: *What's that new dynamic been like?*

Rick: Let me start from where we were a year ago. As DHS stood up, as the laboratories began to engage, it was almost spontaneous that the three nuclear weapons laboratories that had done business together for years began talking about what made sense in terms of working together.

TJ: And that was really in response to a DHS request. They didn't assume the DOE model, but asked us, what's the best way? And that led to the set of activities that Rick's talking about.

Rick: As time went on, the leadership within DHS felt that it was important to broaden beyond just the three laboratories. So we've gone through a period over the past year in which we've been working closely with a set of five laboratories [Sandia, Lawrence Livermore, Los Alamos, Pacific

Homeland Security SMU

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“The department is under pressure for near-term deliverables. . . . They’re past the honeymoon period. Congress is asking, ‘What have you done?’ If we don’t provide some solutions to today’s problems the department will be at risk. But if we get too near-term and aren’t preparing for tomorrow’s problems, we’re also in trouble.”

(DHS’s Science & Technology Directorate) is not a dominant factor in the Department of Homeland Security — DHS is very operationally focused. In fact S&T is hardly noticeable in the total DHS \$37 billion budget; S&T is about \$1 billion of that. But S&T is the home of the Office of National Laboratories and our principal “hook” into the department. S&T was put in by legislative action, not because the Administration necessarily saw it as needed, although they’ve come to embrace it. In that environment, so dominated by an operational perspective, we will have to prove and reprove the worth of S&T and work for gradual budget growth. That’s in contrast to the DOE where R&D is the basis from which everything else that it does springs.

Rick: It’s a different culture. It’s first an operational culture, and then, oh, by the way, let’s bring our R&D forward to help. Our job is to keep the focus on the future while at the same time responding to the day-to-day needs.

Mim: Because of that strong operational focus, there is a leaning toward a short-term focus on R&D: “What can you get me next year? Oh, you can’t do it in a year, maybe I’ll be patient enough to wait two or three years.” But some of these problems are just so hard — like building a national defense against biological or nuclear terrorism — that it’s going to take sustained effort over many years’ time.

Lab News: And we would like to influence them to better understand that long-term need, perhaps?

Mim: Oh, absolutely.

TJ: I think we have to do both. The department is under pressure for near-term deliverables. They’re new. They’re past the honeymoon period. Congress is asking, “What have you done?” If we don’t provide some solutions to today’s problems the department will be at risk. But if we get too near-term and aren’t preparing for tomorrow’s problems, we’re also in trouble.

The other piece I want to add is that we have opportunities in those operational directorates outside of S&T. We have fairly good ties into the Information Analysis & Infrastructure Protection Directorate, through our NISAC [National Infrastructure Simulation and Analysis Center] work and having Clyde Layne back there as an IPA. We don’t yet have as much in Emergency Preparedness & Response or Borders & Transportation Security, but there are opportunities there we are working on.

I think we have growth opportunities as the other directorates see the value of Science & Technology. For Borders & Transportation, something like three-quarters of the personnel at DHS are in that directorate so they tend to think about things from a people perspective — it’s guards and guns. But we’re hoping to help them see ways in which technologies can improve that, because people alone can’t provide all the security needed.

Mim: What I’ve really been touched by in this SMU is how many people are willing to participate and help — giving that precious “sweat equity.” We don’t yet have that much money to fund people to do things.

TJ: And prior to the SMU, we had no money specifically for homeland security.

Mim: We had no money, but we still found ways to contribute.

Lab News: What is the budget forecast?

Mim: We set a revenue goal of \$200 million in five years. Now the team leaders in this area are absolutely optimistic that we’ll be there sooner than that. I’m not so sure. It’s going to take not

only increasing our “market share” within the department, but it’s also going to take overall growth in the S&T budget.

And the only way that’s going to happen is when some real products get out there, over the next two or three years, that the department and Congress will then say yes, boy, this is really worth it. But those products in the next two or three years will be things that have come through the legacy programs that DHS inherited. So if they don’t keep feeding the pipeline to develop new ideas . . .

TJ: And actually that’s one of the challenges, because much of that work was paid for by the Department of Energy, for example, so they feel some ownership too.

Lab News: How is the budget now?

Mim: What is officially DHS work this year we project to be somewhere between \$55 and \$65 million. A chunk of that is legacy work that was transferred into the department. Real growth amounts to about half of that total, which isn’t bad for a start-up. The exciting thing is the S&T Directorate is fully intending to make not just programmatic investments, but longer-term institutional investments, and has had a call to the laboratories for what sort of facilities we might need in

“It’s a different culture. It’s first an operational culture, and then, oh, by the way, let’s bring our R&D forward to help. Our job is to keep the focus on the future while at the same time responding to the day-to-day needs.”



the future. Starting in the ’06 time frame, they’re going to begin adding a wedge to the budget for infrastructure investments in the laboratories.

In contrast to almost every other sponsor that we’ve had outside of DOE, these guys are not just saying “we want to buy your intellectual horsepower,” but “we also want to invest so we have the best facilities for our work.”

Rick: In fact the word they use is “enduring stewardship.” It’s a word that is very much a part of the lexicon in the office of research and development.

Lab News: Is it too early to reveal any new facilities?

TJ: Sandia’s requests include new SCIF [Secured Compartmentalized Information Facility] space for expanded threat and intelligence work and buildings that allow interactions with state and local law enforcement. Our top requests are for more space for commercialization of bio-related technologies, a systems analysis facility with the ability to work regional issues with state and local representatives and for explosives detection development.

Rick: One of the things that I’m seeing as I interact with the DHS leadership is how often the word “systems” comes up. They really do think of Sandia differently in that context. The day-in and day-out interactions that TJ, Mim, and I have had with the DHS leadership have emphasized this, not only from the perspective of systems engineering, but also systems analysis. So I would hope and expect that as we move into the stewardship phase and facilities begin to be placed at Sandia, they will be looking at that part of the mission in making their decisions around how to invest.

As a recent example, recently Chuck McQueary, the DHS undersecretary for S&T, was testifying to Congress about what’s being done to understand infectious response, and he spontaneously highlighted our WMD-DAC [Weapons of Mass Destruction - Decision Analysis Center], work which takes a systems approach to understanding preparedness.

TJ: We’re doing some good work to help the department understand threats.

Mim: We also ought to talk about one of the real centerpieces in the program which is NISAC, our partnership with Los Alamos on understanding critical infrastructure interdependencies. One of the things that the NISAC folks have learned and that I am only just becoming aware of is how something can happen in the energy sector that cascades then into transportation, power, telecom, and so on. Energy disruptions really could lead to some pretty catastrophic effects across the nation. The ability to understand those interrelationships, model them, and provide the analytical capability for assessing the “what ifs” before they happen is proving to be enormously valuable to the infrastructure protection part of the department.

I met Assistant Secretary Bob Liscouski, who’s the Assistant Secretary for Infrastructure Protection, a couple of months ago. I’m co-chairing a Defense Science Board task force on infrastructure protection related to DoD. As soon as I walked in, he said, “You’re here to talk about the Defense Science Board study, but I want to tell you that I have promised to get to Sandia to meet the NISAC folks. I have every intention of doing it. Every time I plan it, something else gets in the way.” I didn’t have to prompt him. It had risen to that level on the radar screen of a man who barely has time to sleep every day.

Overall though, DHS is not telling the story about all that the national laboratories are contributing, but our contributions, quite frankly, are the source of many of their successes today. And I don’t think I’m overstating the case.

Lab News: And what about cyber?

Mim: Based on both Parney Albright’s and his boss Chuck McQueary’s visits here, and the back-

ground talks we gave them, it’s led to the assessment in their minds that Sandia really has one of the top, if not the top, capabilities in cybersecurity — both operations and research — because our network defenses are strong, and because we’re investing continually and getting better and better at it, to keep pace with threats that are getting more and more sophisticated.

We had from the start identified cyber as one of our team areas. Ron Trelue (5501) was the lead for that and Barry Hess (8941) was working with him. He and Barry decided that Barry should assume the direct interface with DHS to work that dimension of our cybersecurity activity program development.

Rick: There is a perception among some in DHS that industry can do it all — industry *a la* Symantec and some of the other sophisticated companies. They do have incredible capabilities. What I’m seeing happen now, through the awareness of Chuck McQueary and others, is that a different dimension of the cyber discussion is being brought to the table through the national laboratories based on the attacks and threats we deal with every day. So I’m hoping that the laboratories are going to be playing much more of a valued role within the department with regard to cyber.

Another part of our strategy is forming stronger relationships with companies, the key companies, that DHS is looking to for future solutions.

Mim: There’s one other thing to mention and that is the efforts of the Advanced Concepts Group that Gerry Yonas (VP, 16000) leads. Since

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Paul Robinson addresses challenges, possibilities for post-Cold War strategic deterrence

In remarks to think tank group, Paul makes case that deterrent capability still vital for national security

Editor's note: On June 10, Labs Director C. Paul Robinson addressed the Center for Strategic and International Studies' Project on Nuclear Issues on the subject of deterrence. Specifically, his speech asked: "Is there a purpose for deterrence after the Cold War?" In his remarks, Paul offered a historical overview of deterrence, noting that "the concept of deterrence has been applied for millennia." He spoke in broad terms of the vital role deterrence played in keeping the Cold War from ever erupting into total nuclear war. His remarks then turned to the subject of post-Cold War deterrence. Here are some excerpts. (The entire presentation can be read at <http://www.sandia.gov/news-center/publications/white-papers/index.html>):



C. PAUL ROBINSON

I believe that when the history of the Cold War is written, it will show that — on the whole — the thinkers and planners of that day should be commended by all of us who came afterwards, for their accomplishment in developing a strategic deterrence formulation which has endured remarkably well to usher us to today. Moreover, the Cold War never became "hot" — at least not with "nuclear heat."

A number of years ago, as it finally seemed clear that we could place the Cold War into history and begin facing whatever was to come next, the Commander in Chief of the United States Strategic Command — then Admiral Hank Chiles — tasked the Policy Committee of the Strategic Advisory Group (which I led) to examine the fundamentals of the deterrence that had served us so well during the Cold War and try to sort out what lessons or principles might be used going forward. . . .

As we examined how deterrence had emerged and how it matured in its effectiveness during the Cold War, we began to see deterrence not as a theory, a concept, a doctrine, or even just a strategy, but as an active and dynamic process. . . . Use of the terms "active" and "dynamic" as modifiers for the deterrence process is meant to capture the thought that, just like human history, deterrence has no end point. Each generation must try to understand, adapt, and apply it to the unique circumstance and the world actors of their times. . . .

We . . . concluded that communication with an adversary is central to deterrence. Just as it is said that a "voodoo hex" will not work unless the target of the hex knows of the enmity plotted against them, so in deterrence we must communicate in a convincing manner to adversaries our capability to hold at risk what they value. . . .

While it is crucial to explicitly define and communicate the acts or damages that we would find unacceptable and, hence, what it is that we are specifically seeking to deter. We should not be very specific as to exactly what our response would be. . . .

Without saying exactly what the consequences will be if the United States has to respond, or whether the reaction would either be responsive or preemptive, we must communicate in the strongest ways possible the unbreakable link between our vital interests and the potential harm that will be directly attribut-

able to anyone who damages (or even credibly threatens to damage) that which we value. . . .

Thus, our deterrence plan must always be country-specific and leadership-specific. . . .

We must be ambiguous about details of our likely actions if what we value is threatened, but it must always be made clear that our actions would have terrible consequences. Because of the value that comes from the ambiguity of what the United States may do to an adversary if the acts we seek to deter are carried out, it hurts deterrence if we portray ourselves as too fully rational and cool-headed. . . . This essential sense of fear is the working force of deterrence. That the United States may become irrational and vindictive if its vital interests are attacked should be a part of the national persona we project to all adversaries.

Finally, we pointed out that without perceived national will, and actual military capability, none of the above steps work. An adversary must always perceive that we have the national will to carry out decisive responses. . . .

. . . I believe we can improve our deterrence message by declaring and meaning the following: (1) The United States will never directly target civilians or non-war-fighting populations. (2) We do not maintain nuclear weapons for war-fighting purposes, but as "weapons of last-resort." (3) We keep our nuclear arsenal only to ensure any potential adversary that our capability to destroy those four essential categories of their military power is so certain that it will restrain them from committing aggressions in the first place. It is in this prior restraint that we want them to have no doubts about as they contemplate our deterrent message. . . .

There will be those in the audience who will notice that I did not mention terrorist groups and other non-state actors. . . . [I]f there is no "return address" or lands or sanctuaries with physical assets to be targeted, the deterrent becomes hollow. Acts by terrorists apparently cannot be directly deterred with nuclear (or other) weapons.

However, we can substantially cap the level of violence by ensuring that any nation-state that gives either assistance or sanctuary to terrorists will be held directly responsible should major aggression occur. The threat of retaliation to any state regimes that support terrorists can be a powerful disincentive to such adventurism, and we should not rule out any weapons in order to give maximum effectiveness to our deterrent message.

As a final comment in that regard, those of us who watch these rogue states have noted that, for several decades, they have been seeking ways to escape the otherwise sure United States deterrent by either hiding their valuable targets or burying them so deeply underground that they are out of reach to attack by United States weapons. Uninformed (or uncaring) critics have falsely attributed United States motives in developing new nuclear weapons (to deal with these changes) as a desire to build new "tactical or battlefield weapons." That is not the case. Our interest is clear: We need to have some of these weapons available that could strike strategic targets to make sure that no aggressor can escape our deterrent and its effects in securing peaceful behaviors. Earth penetrators prevent anyone from breaking the deterrent equation — thus they are needed to preserve the peace.

Homeland security

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9/11 they have been seized with how to get a handle on "pre-terrorism" — stopping it well before anything happens. A goal would be that it never even gets to the point that we are focused on intercepting the e-mail traffic before an attack occurs and taking the appropriate defensive posture. It really is trying to address a very fundamental understanding of what these folks are motivated by, seeing how they come together and form groups, being able to follow them as they evolve in their maturity as an entity poised to take action. All along we should be trying to back our way into the root causes — why do they hate us so much and what can we do about it. That's a really hard problem, and that is a problem we're not going to solve for some time to come.

Also, things are going on in one of the Grand Challenge LDRDs [Laboratory Directed Research and Development projects] called "aug cog," augmented cognition. It's a very interesting effort that is aimed at providing some fairly sophisticated capability to help pick the wheat from the chaff among all the information that the analyst is confronted with and present it into the decision-maker's environment in a way to assess its credibility.

Lab News: What are some of the most frustrating, and/or most rewarding things that you're finding as part of your work with the Homeland Security effort?

Mim: One of the most rewarding things was all of the grassroots efforts around the laboratory, the sweat equity efforts I mentioned earlier. Peo-

ple are quite seized with this part of our mission as being something very important to work on.

At the national level, the combined reward and frustration is the newness of the department. It was born, now it's starting to crawl, and none of us have experience with agencies that are so newly formed. So there's a lot of starts and stops, re-do, that sort of thing, which is incredibly frustrating from the staff all the way to me. The staff has, at times, threatened to just walk out if they weren't so committed to the mission, wondering how many times they have to re-do our proposals before a decision for funding is made. Plus the parts of DHS we deal with do not yet have much of the normal, assumed infrastructure to do simple business things like write a contract and get money out.

On the other hand, DHS S&T leadership is intent on having the national labs be integral players on their team so they don't have to replicate expertise that already exists. Those factors have given us a position that we don't find with other agencies outside of the NNSA [National Nuclear Security Administration] in that we're part of the planning, we're part of understanding the questions that are facing them and are helping with problem-solving on strategic issues, as well as specific projects. It's a tremendous opportunity to feel like we're contributing in a direct way to help a new and important government function.

Rick: The other dimension which I find exciting and a very new thing for the laboratories is completing the loop back to the state and local responders. This mission is about engaging with the federal sector, helping guide the programs, helping produce results that provide value to the nation in terms of both services, like threat analysis, and products that end up coming back to the state and

local level. It's sort of a unique holistic role.

TJ: For me, it has been rewarding to see the level of commitment within Sandia. I've never run into anyone that put even a slight roadblock into what we were trying to do. It's also interesting that this is an area that almost everyone outside of the Labs has some insight into. It's personal to them. And it's different from other areas we work in, like nuclear weapons, where the number of players is limited. I think that probably helps keep everyone energized with what we're doing.

Lab News: Last question — anything that keeps you awake at night?

Mim: Absolutely. That it happens again. And we missed seeing it coming or we just didn't do all that we could — as a lab and as a nation.

TJ: I thought [National Security Advisor] Condoleezza Rice said it just right, that we have to get 100 percent on all the tests. The terrorists only have to be successful on one test. It's very tough for us to do that. How do you make sure with the variety of threats that are out there that we are working the right ones?

Mim: How do you get them before they ever get too far down the line, so you dissuade them or persuade them in another, more positive direction? How do we build up defenses that are so strong — and that the probability for success is so greatly diminished — that the terrorist is deterred, and, eventually, disappears?

I can't close without giving enormous credit to the Sandians on temporary assignment at DHS — John Vitko, John Cummings, Holly Dockery, Clyde Layne — they've jumped into chaos to create the programs for the future to ensure that the nation has indeed done all it can to make the threat of terrorism obsolete.

Construction

(Continued from page 12)

ECIM project began in 1999. This included locating existing utilities throughout Area 1 from previous plans and “as built” drawings, and “potholing” to exactly locate buried utility lines. Using a high-pressure water jet, more than 1,800 potholes were bored. Most of the spray paint graffiti on the sidewalks and streets in Area 1 that have appeared over the last few years was surface marking to identify the location of underground utilities.

“We needed to find the exact location of all existing utility lines (gas, water, and power) so as not to damage them during excavation,” says ECIM Project Manager Steve Fritz. “However, it is inevitable that we will find many unknown lines.”

16,500 feet of underground ducts

A major part of the project will be the construction of 16,500 linear feet of new underground duct bank. If you may have a hard time picturing a “duct bank,” it is buried concrete-encased conduits used to transmit underground power and/or communications. ECIM’s duct banks will contain only high-grade fiber optic and copper cabling communication lines (no power lines).

The project’s planners decided to install new duct banks as opposed to upgrading the existing duct bank system because the old duct banks have neither the capability nor capacity for expansion. For example, some of the older duct banks are made of clay and ceramics and have collapsed in places, making cable repairs difficult or impossible. In the northwest corner of Area 1, all communication pathways have already been filled to capacity.

The primary duct bank will consist of nine 5-inch PVC conduits (ducts) arranged as a three-wide by three-high cross section and encased in a concrete block. The system will also include 51 large precast manholes (generally measuring 12

Construction Safety

Watch your step! Trenches will be up to 16 feet deep

ECIM Project Manager Steve Fritz stresses that pedestrian and vehicle safety during construction will be a top priority.

“During past street excavation projects with open trenches, a few people routinely crossed through our blocked off areas, creating a hazard for both themselves and our workers,” he says. With trench depths on the ECIM project varying from 5.5 to 16 feet deep, safety is paramount. He adds: “Gravity will take you from the street floor to the trench basement in a second!”

But the point is that the potential for serious injury or even death by crossing into ECIM construction areas is very real. Taking shortcuts through the construction sites, which will be marked off by orange plastic fencing, flagging, and other barricades, may also result in serious disciplinary actions (CPSR400.1). So please, Steve says, “For your own safety, stay out of the construction area!”

by 12 feet in area and 7 feet high) that will be emplaced at various points in the duct bank system at street intersections and mid-block at approximately 400-foot intervals. Very large holes up to 18 feet deep and up to 20 feet across will be excavated for the installation of these manholes.

Streets, sidewalks, parking lots to be torn up

The exterior (duct bank/manhole) component of the project will tear up large areas of streets, sidewalks, and parking lots in Area 1. As shown by the dotted lines on the map, this component will include six major phases that will install a total of 21,200 linear feet of duct banks.

Each of the six phases is further divided into sub-phases to limit the amount of street and sidewalk being torn up at any one time. The exterior work on the ECIM project will be the most disruptive for vehicle and pedestrian traffic, as well as building occupants since it will involve connecting the communications infrastructure to the buildings.

Specifically, 4,700 linear feet of underground service entrance laterals will be installed to 51 Area 1 buildings. Prior to construction activities occurring near each building, the ECIM project team will coordinate with each facilities building manager to ensure that impacts are kept to a minimum and that building occupants are kept aware of access issues. The ECIM exterior work will begin with trenching activities and end in March 2006 (21 months). This component of the ECIM project was awarded to Gardner-Zemke Co.

Interior work proceeds at same time

The interior component of the ECIM project will install interior raceway systems in 51 Area 1 buildings and then will install fiber optic cables in both the interior building raceway systems and in the exterior communications duct bank and manhole system installed during the exterior project work.

This interior component of the project will also proceed in six phases as shown by the different building colors on the map. The interior modernization work will proceed simultaneously with the exterior upgrade work and will be completed by May 2006 (23 months). The interior upgrades are expected to have minimal impact to vehicular and pedestrian traffic or to building occupants. The contract for the interior component and the installation of the fiber optic and copper voice telecommunications cabling was to be awarded by June 18.

For the next couple of years, the ECIM project will result in some navigational challenges for vehicles and pedestrians in Area 1. However the project’s plans say with patience and tolerance for construction detours, Sandia’s new state-of-the-art telecommunications infrastructure should be well worth the short-term inconveniences.

Laptops, ‘burn’ bags, and old equipment: Reapplication needs your help

Getting rid of your old laptops. As laptop technology dramatically changes and availability increases, more and more laptop computers are sent to Reapplication. To make these laptops available, the Reapplication people ask you to ensure the following is done: prior to sending your laptop to Reapplication, have the CSU folks remove the boot-up and log-on password. This will save time when processing laptops for reutilization.

Laptops will be available only via Shopping Cart/Excess Assets Search found on-line under “Reapplication” on the Sandia Home Page.

If the password is not removed, then the laptop’s property number will not be transferred into Reapplication status.

Need your bags burned? Did you know that bags of classified waste are not burned? They are actually macerated or shredded. In the past, Sandia

burned classified as a means of destruction, but now the process uses a large shredder for paper and plastic items and a degaussing process for electronic media. So, “burning” is just a word from the past. With that in mind the information below is important.

Due to the large increase for destruction requests of classified and sensitive items/material, the pick-up request schedule is being changed to better meet rising demands.

Red Burn bags will now be picked up on Tuesdays and Thursdays. White Burn bags will be picked up Monday through Friday.

What can you do to help expedite the pick-up process? List all control numbers/serial numbers and any identifiers of all REM (Removable Electronic Media) on RCI (Receipt for Classified Information). All barcodes must be physically located on the hard drive and not on the hard drive removable housing. Remove all paper clips, binder clips, and metals from paper and separate paper sheets from plastic viewgraphs. No hazards of any kind are permitted in burn bags.

Preparing other equipment for reapp. As new technologies become available and old, outdated equipment is sent to Reapplication Services, the need to better manage the assets requires your help.

Here are a few things to keep in mind when preparing items to be sent to Reapplication Services:

Hazards of any kind are prohibited — be sure that all containers that have been previously used in a hazardous capacity are cleared by the Radiation Control Tech or Hazardous Material Inspector, and labeling/markings are obliterated or removed from containers. Containers larger than 5 gallons capacity will not be accepted. (If unsure, contact your EH&H coordinator for help.)

Please put asset bar-coded items (“S” and “R” numbers) together (remember to include a release memo for “R” numbered items that are not decontrolled). If you are sending a laser, include the laser protocol form: <http://www.irn.sandia.gov/corpdata/corppforms/formhp.html>.

If you shrink-wrap a pallet of items, be sure to have the “S” or “R” numbered bar codes facing outward and clearly visible. Also be sure to place the reapplication white labels displaying the pick-up request number on boxes and items — this is for tracking purposes — and always keep a copy of the Transportation/Reapplication pick-up request form.

Keeping accountability of property will reduce the pick-up time and provide a quicker turnaround time for asset reuse back to the line.

If you have questions about any of these matters, contact Philip Rivera, the reapplication administrative staff supervisor, at 844-7785 or Judy Chavez at 844-0206.

Retirees gather for annual picnic



RETIRES Joe Silva, left, Glenn Morehouse, and Pat Brinkley discuss old times and old friends during the recent Sandia Retiree Picnic at the Coronado Club. A perennial favorite among retirees, the picnic will be seeking a new venue in 2005 due to the decision to close the historic Coronado Club.

(Photo by Randy Montoya)

Mileposts

New Mexico photos by Michelle Fleming



Robert Bradley
35 12334

Recent Retirees



Bob Eagan
33 6000



Don Blanton
28 3000



Charles Greenholt
35 4132



Brian Joseph
35 2112



Magdelene Lucero
35 4213



Gerald Quinlan
35 9224



Mitchell Ruebush
35 15331



Keith Matzen
30 1670



Donald Moore
30 6223



La Verne Sam
30 10263



Samuel Varnado
30 5500



Mark Bishop
25 6952



Larry Clevenger
25 3300



Timothy Dubay
25 5714



Rick Hartzell
25 10863



Florian Lucero
25 4136



Patrick Manke
25 9338



Edward Binasiwicz
20 5744



Dennis Floyd
20 9134



Philip Kahle
20 2334



David Keese
20 15404



Kevin Marbach
20 5735



Perry Molley
20 2331



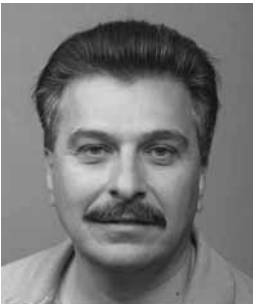
Edward Mulligan
20 2554



John Nagel
20 2137



J. Alan Nichelason
20 1101



Richard Rodarte
20 4211



Lawrence Sanchez
20 15331



Warren Sceiford
20 12336



Epifanio Waquiu
20 10263



Darlene Wright
20 4211



Daniel Vortolomei
20 2996



Alice Baltz
15 12620



Robert Case
15 2913



Dennis Helmich
15 2132



Thomas Hendrickson
15 2137



Ronald Kidner
15 2666



John Linebarger
15 6224

Big construction project in Area 1 begins this week to update communications infrastructure

Some streets, sidewalks, parking lots to be trenched during next two years; watch for hazards

By Diane Duncan (10825)

The ECIM project — Exterior Communications Infrastructure Modernization — will be like a troop of “mice on a mission” tunneling through all of the streets, buildings, and byways of Tech Area 1 west of 14th Street.

The \$25 million project will begin late this month and is to be completed in the summer of 2006. The construction project will affect to some degree everyone in Area 1. You’re going to notice a lot of digging, a lot of holes, and suffer some temporary disruptions.

The oldest portions of the communications cabling, which has been in service for more than 50 years, is located in the northwest corner of Area 1. On the east side of 14th Street, only Bldg. 897 will be connected to upgraded telecommunication systems. Other buildings will be connected in future communication system upgrade projects.

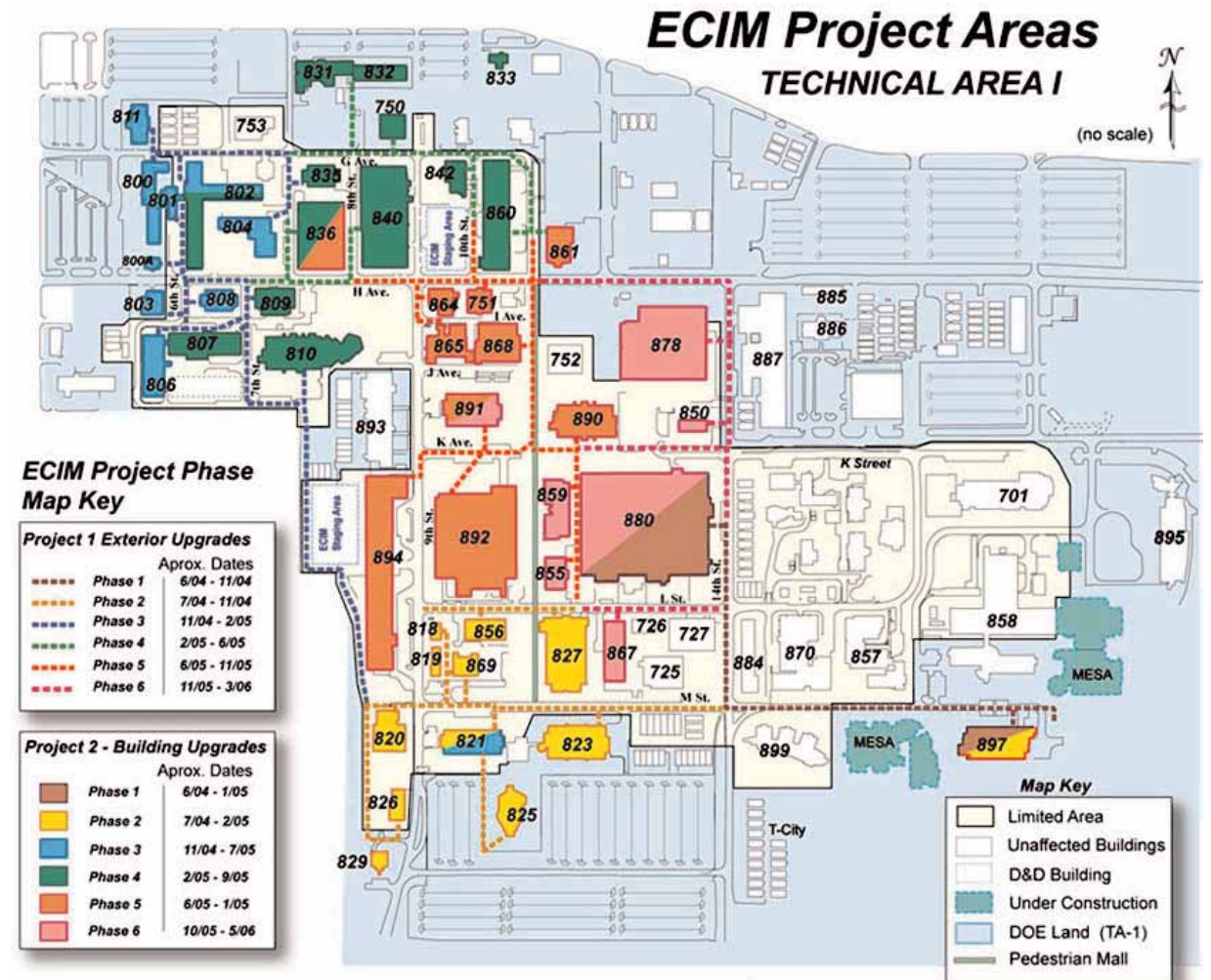
ECIM is divided into two major work components: Exterior upgrades and Interior building upgrades with the installation of new telecommunications cabling. Overall, the project will replace and upgrade the obsolete and aging communications backbone in Area 1 with state-of-the-art, reliable, high-speed, high-bandwidth telecommunication lines.

The project will also involve “behind the scenes” cut over of systems from existing fiber optic cables to the new cable infrastructure and will upgrade Sandia’s intrusion alarms and access control lines. The Gas System Upgrade General Plant Project is a sister project that will take place in tandem with ECIM. The gas project will bury 4-inch and 6-inch natural gas lines in approximately 60 percent of ECIM’s trenches.

Why is it needed?

The limited capacity, lessening reliability, and increasing maintenance problems of Area 1’s old communications infrastructure, compounded by a surge in new and emerging requirements, led to the need for a major telecommunications system upgrade. The urgency to upgrade eventually reached a critical point with NNSA’s rapidly expanding mission work, which requires huge volumes of data to be transferred quickly and efficiently among collaborating groups in Area 1.

Recognizing the looming communications



infrastructure crisis back in 1998, the Corporate Sites Planning Council added the ECIM project as a top priority in Sandia’s Ten Year Comprehensive Site Plan. The need for ECIM is also documented in Sandia’s Telecommunications Infrastructure Master Plan (April 2003).

The new upgraded infrastructure will allow Sandia to fully leverage new state-of-the-art computational facilities such as the Joint Computational Engineering Laboratory, the Super Computing Annex, and the Microsystems Engineering Sciences Application Complex, as well as the new

Distributed Information Systems Laboratory at Sandia/California. After completion of the project, Area 1’s telecommunications infrastructure will meet long-term technology requirements. It should sustain a modern communications infrastructure over the next 20-30 years while taking into account expected technological advances.

1,800 holes drilled to locate lines

The conceptual planning and design for the
(Continued on page 9)

Groups mark J. Robert Oppenheimer centennial

The Atomic Heritage Foundation, Los Alamos Historical Society, Los Alamos National Laboratory, National Atomic Museum (NAM), and other groups will present a two-day program honoring the centennial of J. Robert Oppenheimer June 25-26 in Los Alamos. Tickets are available in Albuquerque at the NAM gift shop. The program will include narrations by historians, veterans, and children of the Manhattan Project, tours, and a number of other events. Participants will include Sens. Pete Domenici, R-N.M., and Jeff Bingaman, D-N.M., NNSA Deputy Director Everett



Beckner, Pulitzer Prize-winning author Richard Rhodes, former students, life-long friends and colleagues, and Oppenheimer family members. For more information, go to www.atomicheritage.org/oppenheimer_centennial.htm.

Bldg. 805 falls to wrecking crew



DOWN IT COMES — Building 805, which combined office and laboratory space and was home to many Sandians for many years, comes down under the experienced hand of Coronado Wrecking.