BORING IN ON YUCCA MOUNTAIN — After nearly 30 years of study and analysis, DOE last summer submitted to the Nuclear Regulatory Commission an application to open Yucca Mountain as a repository for the nation's high-level radioactive wastes. Sandia has been closely involved in the Yucca Mountain project since its inception and in 2006 was named the DOE Office of Civilian Radioactive Waste Management Lead Laboratory for Repository Systems in the Yucca Mountain Project. In that capacity, Sandia's job was to support DOE in preparing and submitting a credible and supportable license application for the repository, including its technical and scientific basis. For more on Sandia's work in the project, see the four-page section beginning on **page 7.**

Making Sandia's user facilities more user friendly

Sandia is adopting two new DOE model agreements that will simplify the way universities and industry use the Labs' facilities. See story on **page 16.**

Sandia LabNews

Vol. 61, No. 1 January 16, 2009

Managed by Lockheed Martin for the National Nuclear Security Administration

Sandia National Laboratories

Wei Pan and Bert Debusschere win nation's most prestigious 'early career' awards for scientists

Sandia recipients' leadership cited in condensed-matter physics, improved simulation methods

By Neal Singer

Among the 67 researchers selected to receive the Presidential Early Career Award for Scientists and Engineers (PECASE) at a White House ceremony in mid-December, eight awards were won by researchers from DOE's laboratory complex.

Of those eight, two were Sandians.

WEI PAN

Wei Pan (1123) was cited for leadership in the field of experimental many-particle physics, especially non-Abelian (i.e., noncommutative) states in ultraclean two-dimensional electron systems. Wei was also cited for broad scientific community outreach activities and leadership.

Bert Debusschere (8351) was cited for introducing rigorous mathematical methods to capture stochastic (nondeterministic) uncertainties in computational biology. The work helps bolster the framework of simulation-based discoveries. Bert's service to the Sandia Diversity Council and Foreign National Networking Group was also mentioned.

BERT DEBUSSCHERE

PECASE winners receive up to five years of funding from their agency to advance their research.

The award is the US government's most prestigious commendation for scientists and engineers at early stages in their careers.

In addition to citations and plaques presented by John Marburger, science advisor to the president and director of the Office of Science and Technology Policy,

(Continued on page 4)

Labs' second all-hands safety meeting outlines path forward

Turning safety into a value

By John German

Labs Director Tom Hunter and several members of Sandia's leadership team met with employees Dec. 17 to review recent progress on safety and outline future steps toward a stronger safety culture at Sandia.

It was the second all-hands safety meeting since the Oct. 9 accident at Sandia's 10,000-foot sled track, which resulted in a contractor being injured.

The accident resulted in an NNSA "Type B" investigation and a subsequent NNSA report on the accident, as well as numerous other reviews, many ongoing, of Sandia's safety performance and culture.

"We've learned that on our safety journey we were not as far along as we thought," said Tom.

He followed with this: "Sandia is a learning organization, and we've learned a lot. We will be a better laboratory because of this experience."

Principled approach to safety

Tom reviewed key concepts relevant to safety and asked Sandians to think deeply about their personal commitment to safety. He asked that everyone

(Continued on page 5)

SS&TP honored

The Sandia Science & Technology Park, which recently marked its 10th anniversary, has received the 13th annual Outstanding Research/ Science Park Achievement Award given by the national Association of University Research Parks.

Read about the award on **page 6.**

Inside . . .

That's that

Noticed a piece on the Slashdot website that made me stop and read. Turns out that Buffalo, N.Y.-based QMS Music Technologies has announced that after a 108-year run, it will no longer manufacture player piano rolls — the paper kind. Reportedly, when the last roll came off the die-cutting machine, the shop foreman scrawled across the production sheet, "End of an era." So it is.

On the subject of player pianos: Engineers have been designing automated musical instruments for some centuries, but a true self-playing piano that could play a variety of music posed some special challenges. Although predecessors of the "modern" player piano started appearing as early as the 1840s, and over the next several decades a number of competing inventors devised their own systems, it wasn't until around 1900 that all the pieces came together. The story of how this all played out (excuse the pun) is really kind of interesting: There were format wars, a bevy of undercapitalized startups trying to jump on the player piano train, an eventual consolidation and standardization of "software," and a golden age in the sunny uplands of automated music. By the 1920s, people were snapping up more than 10 million player piano rolls a year.

What does all this have to do with Sandia? Nothing, directly. But for me, it speaks to the heroic nature of invention and engineering, a subject we've had some experience with here over the years. Solving problems. Getting things done with the tools at hand. Engineers in the 19th and early 20th century were faced with a challenge: This piano is a box full of potential. There's music in there. How do you get it out so that anyone can enjoy it? And they figured it out.

* * *

A couple of side notes (excuse the pun again): The QRS Marking Piano, a device invented in 1912 by Melville Clark (of Story & Clark piano fame) that enabled a master roll to be recorded of a live performance, was designated a National Historical Engineering Landmark by the American Society of Mechanical Engineers in 1992. And, oh: Among musicians whose performances were captured by the device were a few dabblers like Igor Stravinsky, George Gershwin, and Duke Ellington.

* * *

And for those of you who might be wondering, the last new-issue piano roll that came off the QMS assembly line Dec. 31 was the company's 11,060th. The song was "Spring is Here," by Rodgers and Hart, recorded by Buffalo-based pianist Michael T. Jones.

* * *

Got a call the other day from Becky Campbell (10667). She wants to thank some good samaritans who helped her out when she took a spill a few days before Christmas. As she tells it: "On Dec. 18 at approximately 11:40 a.m. I fell in a puddle between two parked cars in the Bldg. 823 parking lot. A man helped me up and to my car and I was able to drive to Sandia Medical. Once I got there, I was able to get out of my car and stand up, but couldn't walk. I had to wait until someone came out of Medical. When I asked him to help me into Medical, he flagged down a passing delivery person and stayed with me while the Medical staff was summoned. After Medical personnel came out with a wheelchair, he was on his way, but I was in so much pain I don't remember if I thanked him or not.

"I am very, very grateful to all three of these men for helping me, but I didn't get their names, so I want to take this opportunity to thank them here." Consider it done, Becky.

See you next time.

— Bill Murphy (505-845-0845, MS0165, wtmurph@sandia.gov)

Nominations sought for 16th Annual Employee Recognition Awards

The Employee Recognition Awards program is a way for Sandians to recognize individuals and teams whose work or contributions in support of Sandia's mission and values have been exceptional. Nominations for this year's awards are being accepted through Feb. 2.

The ERA program recognizes excellence in four categories: three for individual nominees and one for teams.

The individual categories are: technical excellence, which recognizes individuals whose innovative science and predictive, science-based engineering capabilities contribute to the transformation of Sandia's business practices and provide solutions to national security problems; exceptional service, which recognizes those who are distinguished by their commitment and efforts to enable others to succeed; and leadership, which recognizes those who demonstrate exceptional creativity, courage, and integrity in leading others to the successful accomplishment of Sandia's works.

The team category recognizes teams whose exceptional achievements are critically enabled by teamwork and model the value of people working together toward a common goal.

Nomination forms with detailed instructions are available from Sandia's Techweb homepage or at www-irn.sandia.gov/era/09era.htm.

Each division has an ERA coordinator who is also listed via the link above. Any current, regular Sandia employee may nominate individuals or teams. A separate nomination form must be submitted for each individual and team nomination. A combined total of 122 individuals and teams will receive corporate Employee Recognition Awards.

ERA individual winners and designated representatives from winning teams will be recognized at the corporate Employee Recognition Night banquet in July.

Somuri Prasad named Fellow of American Society of Materials-International

Somuri Prasad (1813) has been named a Fellow of the American Society of Materials-International for "outstanding contributions to the filed of tribology, tribological coatings, and metal-matrix composites," according to his citation.

SOMURI PRASAD

Somuri, a Principal Member of Technical Staff in Materials Science & Engineering Center 1800, earned his PhD in materials science from the University of Sussex (England) in 1977.

Before joining Sandia in 1999, he worked at the Air Force Research Laboratory at Wright-Patterson Air Force Base in Ohio and at the Indian Council of Scientific and Industrial Research. Somuri has authored or coauthored more than 100 publications and holds three US patents. Somuri is also a Fellow of the Tribologists and Lubrication Engineers (STLE) and an adjunct professor of mechanical engineering at the University of Colorado, Boulder.

Retiree deaths

Edward J. Newman (age 86)	Oct. 1
Frank Duggin (80)	Oct. 8
Merejildo Gallegos (75)	Oct. 10
Gabriel V. Sanchez (70)	Oct. 16
Thomas A. Green (83)	Oct. 23
Francine Diane Island (59)	Oct. 25
Solomon Chavez (92)	Oct. 25
Henry Ray Welch (85)	Oct. 26
Willis R. Erwin (81)	Oct. 28
John Cotch (92)	Oct. 28
Beno L. Baerwald (92)	Oct. 31

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.

Bill Murphy, Editor 505/845-0845
Chris Burroughs, Writer 505/844-0948
Randy Montoya, Photographer 505/844-5605
Mike Janes, California site contact 925/294-2447
Michael Lanigan, Production 505/844-2297

Contributors: John German (844-5199), Neal Singer (845-7078), Stephanie Holinka (284-9227), Iris Aboytes (844-2282), Michael Padilla (284-5325), Julie Hall (284-7761), Patti Koning (925-294-4911), Michelle Fleming (Ads, Milepost photos, 844-4902), Dept. 3651 Manager Chris Miller (844-0587)

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

Published on alternate Fridays by Media Relations and Communications Dept. 3651, MS 0165

LOCKHEED MARTIN

Lab News Reader Service

The *Sandia Lab News* is distributed in-house to all Sandia employees and on-site contractors and mailed to all Sandia retirees. It is also mailed to individuals in industry, government, academia, nonprofit organizations, media, and private life who request it.

Retirees (only):

To notify of changes in address, contact Benefits Dept. 3332, Customer Service, at 505-844-4237, or Mail Stop 1021, Sandia National Laboratories, Albuquerque, NM 87185-1021.

Others:

To receive the *Lab News* or to change the address (except retirees), contact Michelle Fleming, Media Relations and Communications Dept. 3651, 505-844-4902, email meflemi@sandia.gov, or Mail Stop 0165, Sandia National Laboratories, Albuquerque, NM 87185-0165.

Employees:

To address concerns regarding delivery of the *Lab News* to your facility, call Mail Services Team 10268-4, at 844-3796. At Sandia/California contact the Mail Room at 925-294-2427.

Web users:

The *Lab News* is on the external web at www.sandia.gov/LabNews. *Lab News Interactive*, accessible on the internal web, is at: www-irn.sandia.gov/newscenter/interactive.

It's bowl time

. . . Science Bowl, that is

By Patti Koning

For football fans, Super Bowl Sunday is Feb. 1, but for science fans, the bowl date to remember is May 5. That's the day of the Department of Energy (DOE) National Science Bowl for high school and middle school students in Washington, D.C. If you aren't familiar with the DOE National Science Bowl, this may be the year to jump into the action.

The DOE National Science Bowl was conceived in 1991 as a way to encourage high school students to excel in mathematics and science and to pursue careers in those fields. The Science Bowl is a fast-paced, Jeopardy-style event in which four-person teams go head to head to see who can correctly answer more questions on science and math.

Science Bowl season actually begins in January, with regional competitions for high school and middle school students held across the nation. Last year teams competed for a chance to perform in the DOE National Science Bowl at 67 regional high school events and 39 regional middle school events.

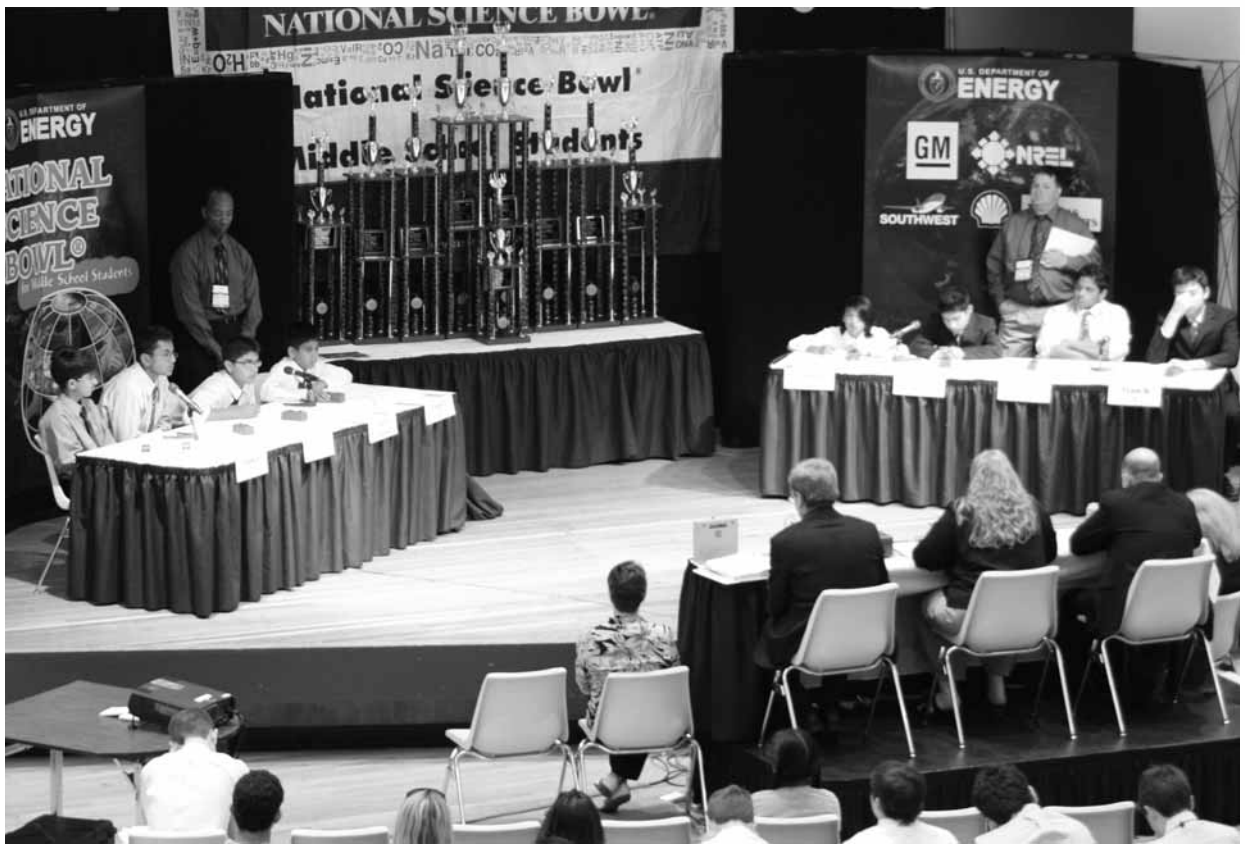
Max Wu, a senior at Mission San Jose High School and a Sandia intern, is looking forward to his fourth Science Bowl season this year. In 2007 Max and his team competed at the national event. "The competition is so exciting and you are up against really talented people," he says.

Learning science at a deeper level

Max feels like he has learned a lot of science as a result of participating in the Science Bowl. He's studied a variety of scientific subjects at a deeper level and often ahead of his high school program.

All eyes should be on the San Francisco Bay Area this year, as teams from the region dominated the 2008 DOE National Science Bowl for middle school students. Newark's Challenger School finished first, closely followed by Fremont's Hopkins Junior High School. Both teams earned their spot at nationals by winning Sandia-supported regional events.

Sandia/California has been involved in the DOE National Science Bowl since 1992. Ray Ng (8248), who was a member of Sandia's Educational Outreach Team at the time, was inspired to get involved with the program after hearing then-Secretary of Energy James Watkins speak about DOE's obligation to use its resources to support math and science education.



COMPETITORS GATHER for the finals of the 2008 National Science Bowl for Middle School Students, held at the Colorado School of Mines in Golden. Bay Area teams from Sandia-sponsored regionals placed first and second in the competition.

Sandia California News

Ray and Dean Williams (8945) organized the first regional competition for high school students in 1992. At the time, Lawrence Berkeley National Laboratory (LBNL) and Lawrence Livermore National Laboratory (LLNL) also sponsored regional high school competitions.

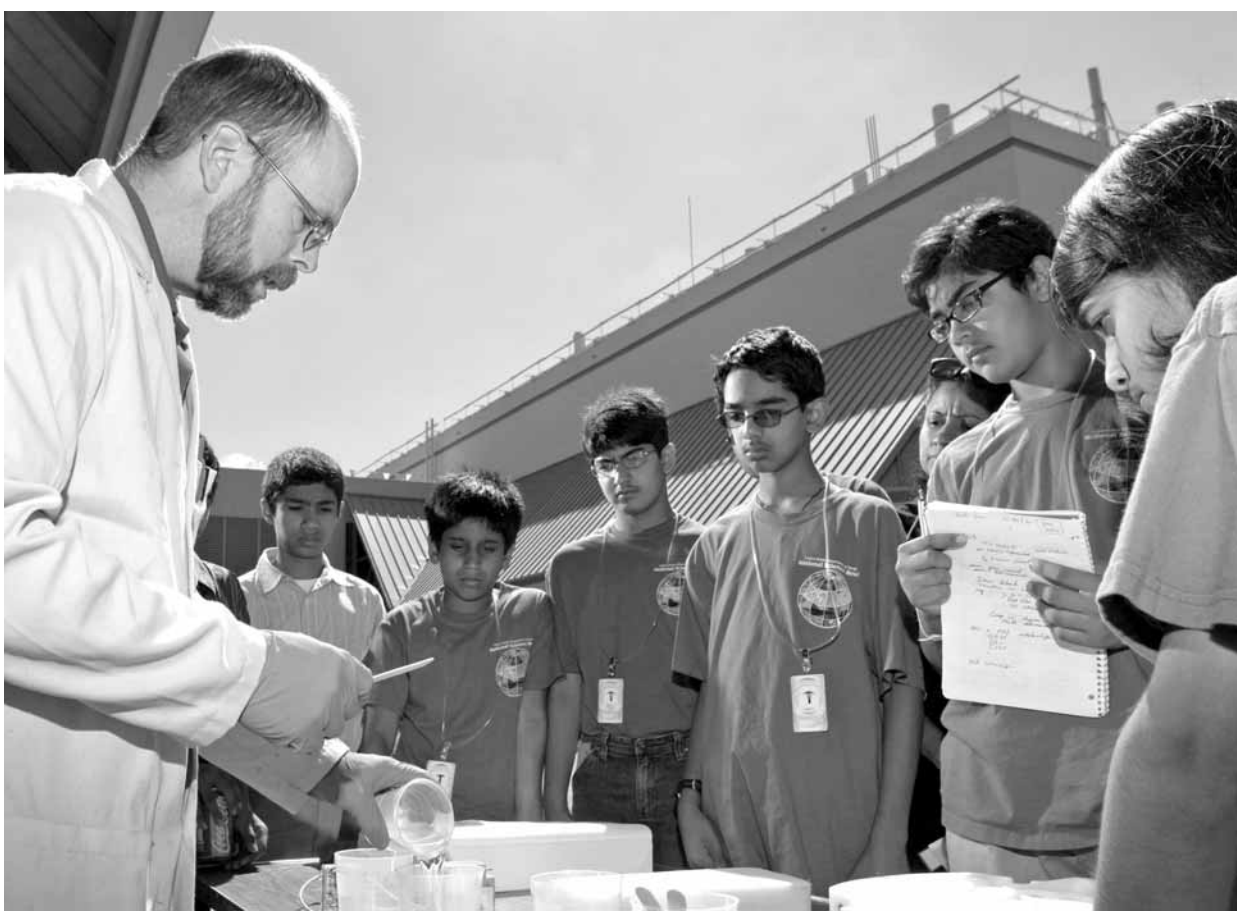
In 1995, DOE stopped providing support for regional competitions. This meant the end of LLNL and LBNL's regional events, but the volunteers at Sandia carried on.

"I wasn't willing to give up the Science Bowl, knowing that we had a way to help with high school science education," says Ray. "I saw the impact that it had on the high school students and how they and their teachers were getting excited about science and math. Students were getting very involved in studying the subjects and studying together."

A passion for education

Annette Hoff (8947), who joined Sandia's Science Bowl team in 1997, attributes Sandia's continued support to Ray's passion for education. But Ray didn't do it alone — other volunteers like Annette, Dean, Karen Cardwell (8944), and Martha Campiotti (8360) have

(Continued on next page)



IN AUGUST, the Science Bowl teams and coaches from Newark's Challenger School and Fremont's Hopkins Junior High School visited Sandia and LLNL for an up-close look at DOE science. Shown here, chemist Leroy Whinnery (8778) demonstrates the role a catalyst plays in balancing the gelation and gas-generation reactions when making a polyurethane foam. (Photo by Randy Wong)

Northern New Mexico Regional Science Bowl

Sandia/New Mexico cosponsors middle school and high school Science Bowl competitions for the Northern New Mexico region. The other cosponsors are Albuquerque Academy, which hosts both events, Los Alamos National Laboratory, and Lockheed Martin.

Sam Bono (3652), who chairs Sandia/New Mexico's Science Bowl activity, expects a total of 52 teams, including six from Colorado, to compete at the regional DOE Science Bowl for middle school students, which will be held Jan. 17. The high school event is scheduled for Feb. 28.

Albuquerque Academy is another team to watch this year. The school finished second in the DOE National Science Bowl for middle school students in 2006 and third in 2003.

If you are interested in volunteering, contact Sam at 505-284-3226 or sbono@sandia.gov.

Early career awards

(Continued from page 1)

Bert and Wei, along with other DOE PECASE winners, received Office of Science Early Career Scientist and Engineer Awards at a ceremony at DOE headquarters led by Under Secretary for Science Ray Orbach and NNSA Deputy Administrator of Defense Programs Robert Smolen.

Wei is principal investigator of "Quantum Electronic Phenomena and Structures," a large Sandia project funded out of DOE's Office of Basic Energy Sciences (BES). The project nanoengineers new types of quantum structures that produce novel collective-electron quantum states. Examples of such states are the widely reported Bose-Einstein condensates created several years ago, and the Wei Pan group's new fractional quantum Hall states — the manifestation of simple collective behavior in a two-dimensional system of strongly interacting electrons. In specific magnetic fields and at extremely low temperatures, the electron gas condenses into a state that displays liquid-like properties. The pursuit of such novel collective electron states has led to the discovery of new types of matter with new ranges of possible behaviors — work that pushes the frontiers of condensed matter physics. Wei has been a central participant in this project since his arrival at Sandia; he was chosen to become the leader of the project in 2007.

Among his supporters for the award were Jerry Simmons (1120), Sandia's program coordinator for BES projects; manager Daniel Barton (1123); physics Nobel laureate Daniel Tsui, Arthur LeGrand Doty Professor of electrical engineering at Princeton; and Horst Stormer, I. I. Rabi Professor in Experimental Condensed Matter Physics at Columbia University.

Bert is a staff member at Sandia's Transportation Energy Center in Livermore and is principal investigator of "Stochastic Dynamical Systems: Spectral Methods for the Analysis of Dynamics and Predictability" funded out of DOE's Office of Advanced Scientific Computing Research (ASCR). As part of this project, Bert develops computational and mathematical methods to study chemical and biochemical reaction networks.

Applications of this work are broad, ranging from combustion to aspects of the human immune system. Increased fundamental understanding of these reaction networks may enable improvements in energy efficiency, a lessened environmental footprint, and novel biomedical approaches.

One of Bert's projects analyzes reaction networks prevalent in inorganic and organic molecular systems. In both, small numbers of participating molecules may generate significant intrinsic noise. Based on spectral representations of stochastic processes and reduced-order modeling, Bert's group develops methods to improve investigative sensitivity techniques and to determine the confidence in reaction outcome predictions.

Significant areas of contributions from Bert's group include uncertainty quantification for microfluidic channel flow, classification methods for chemical and biological agent detection, and multiscale modeling for nanoporous membranes with application to desalination.

The high level of Bert's mathematical rigor — quantifying the role of errors and uncertainties in mathematical and computational models — "is critical for acceptance of computational modeling in new fields (such as biology) and is an essential ingredient for computation to be accepted as basis for critical decisions that may affect our nation's security, economic, and energy futures," wrote Scott Collis (1416), Sandia's point of contact for all ASCR activities, in support of Bert's successful application.

WEI PAN, left, and Bert Debusschere are congratulated by DOE Secretary Samuel Bodman during a ceremony at the White House in December honoring recipients of the Presidential Early Career Award for Scientists and Engineers. Of recipients of the PECASE awards from DOE laboratories, Secretary Bodman said: "These awards recognize some of the outstanding people affiliated with the Department of Energy whose extraordinary talents are discovering the solutions to power and secure America's future. Each honoree has made a unique contribution to fulfilling the department's mission and to enhancing scientific knowledge at large. I am proud of the awardees and appreciative of their efforts."

Science bowl

(Continued from preceding page)

pitched in year after year.

"It is hard to say what makes a volunteer want to keep coming back every year to the Science Bowl, other than the excitement and awe that you experience during the actual event," says Annette. "Being around teenagers who are this smart and witnessing their commitment to the sciences is unbelievable and is only surpassed by the experience at the national level."

Providing a foundation in science, math

Martha says she believes the DOE Science Bowl is one piece of providing our children with a strong foundation in math and science. "I went to the national event in Washington, D.C., and saw firsthand all the regional winners competing against each other. It was awesome to see a large auditorium full of scientists and engineers of the future," she adds.

Ray also helped start two other high school regionals in the Bay Area, one back again at LBNL (from a regional started in 1999 at the DOE Oakland Operations Office that moved to LBNL in 2004) and another at the Stanford Linear Accelerator Center (started in 2005), which Ray still directs.

A workforce development asset

He considers the Science Bowl a workforce development asset, as the event is often a student's introduction to Sandia. At recruiting events, college students approach Ray because they remember him from the Science Bowl. Vivien Lee (8944) and Markus Ong (8655) are two current Sandians who participated in the Science Bowl as high school students.

"I think the Science Bowl encourages the learning of science in a fun way, that gets away from textbooks and homework. It's also a really enjoyable experience."

— Participant Markus Ong

"Starting in the seventh grade, I participated in mock Science Bowl competitions at my high school. It was so exciting to hear about the results from our teams, so I was waiting for the day to represent my school at the DOE Science Bowl," recalls Markus.

That day came when he was a junior at Chinese Christian School in San Leandro. In Markus' senior year, his team took fourth place at the regional competition — a big accomplishment at a school with only 30 students in the graduating class.

Markus has been volunteering with the Science Bowl team at Chinese Christian since he graduated, helping the students study and running in-house competitions. "I think the Science Bowl encourages the learning of science in a fun way, that gets away from textbooks and homework," he says. "It's also a really enjoyable experience."

Launching the middle school program

In 2004, Sandia started the regional DOE Science Bowl for middle school students in partnership with Las Positas College. The regional competition proved so popular that Sandia helped charter a second regional Science Bowl for middle school students, held at the National Hispanic University (NHU) in San Jose and cosponsored by NHU, the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers, and Sandia.

A total of 24 teams can compete at the regional Science Bowls, but Ray says that in recent years the Las Positas/Sandia middle school event has been limited to 20 teams. "We haven't had enough volunteers to support 24 teams in the competition," says Ray. "If we have the volunteer support, we'll fill all 24 spots."

Science background not needed

Volunteers are needed for general setup, breakfast and lunch setup, registration, and to serve as moderators, timekeepers, and scorekeepers. The event begins at 8 a.m. and lasts until about 3:30 p.m. A new round of competition starts every 30 minutes. Each round lasts for 18 minutes — eight minutes of game time, followed by a two-minute break, and another eight minutes of competition.

As the day progresses, teams are eliminated and fewer volunteers are needed. Ray says ideally there would be a minimum of 40 volunteers from 8 a.m. to noon, with 20 volunteers staying through the afternoon.

The Sandia/Las Positas regional event for high school students will be held Jan. 31 at Las Positas College. The middle school regional events will take place Feb. 21 at Las Positas and at NHU on March 7. The DOE National Science Bowl for both middle and high school students is scheduled for April 30-May 5.

Regional competition winners receive all-expense-paid trips to Washington, D.C., for the team and their coaches. The actual competition is preceded by several days of workshops, lectures, and tours for all participants.

Interested in volunteering? Contact a member of the Sandia/California Science Bowl Committee: Martha Campiotti (mmcampi@sandia.gov or 925-294-2998); Karen Cardwell (kjcardw@sandia.gov or 925-294-1029); Annette Hoff (aesulli@sandia.gov or 925-294-2807) Ray Ng (rng@sandia.gov or 925-294-2124); or Dean Williams (drwilli@sandia.gov or 925-294-2346).

A science background is not needed. "I am not a scientist or an engineer but I have skills in event coordination and planning," says Martha. "I understand the workings of putting together large events and I can add numbers or work a stopwatch."

For more information, visit www.scied.science.doe.gov/nsb/ for the high school event and www.scied.science.doe.gov/nmsb/ for the middle school event.

Dates to Remember

Volunteer training:

Jan. 19, 21, 27, and 29 at 11:30 a.m. in the MO22 classroom. Volunteers must attend one session.

High School Regional Competitions:

Jan. 31 - Las Positas College (LPC) campus, 3033 Collier Canyon Rd., Livermore

Feb. 7 - Lawrence Berkeley National Laboratory (LBNL), 1 Cyclotron Rd., Berkeley

Feb. 28 - Stanford Linear Accelerator Center (SLAC), 2575 Sand Hill Rd., Menlo Park

Middle School Regional Competitions:

Feb. 21 - Las Positas College (LPC) campus

March 7 - National Hispanic University (NHU), 14271 Story Rd., San Jose

Training for high school and middle school: (Mark your calendar to attend one training session)

Safety

(Continued from page 1)

review what they are accountable for in their work, reflect on the individual's authority to start or stop unsafe operations, and question not only whether an operation is safe but how we know it is safe.

He added that he has asked the executive team to think about all of Sandia's activities in each policy area and assess whether we are implementing actions and processes in the most efficient, straightforward way possible.

Safety and mission success

Executive VP Joan Woodard described how safety is an integral part of, not separate from, Sandia's mission success. "Our success is associated not only with what we do but how we do it," she said. "Mission success requires excellence, it requires all of us as leaders, and all of us to think about it every day. Safety is one element of mission excellence that we must achieve."

"How often do we get these off-normal clues that we rationalize as being OK?"

She noted that improved safety at Sandia can and needs to be achieved by harnessing Sandia's collective technical and engineering talent.

She added: "All of us have to work the complexity issue. We recognize that it's not contributing in a positive way. So prioritizing, working to simplify processes, simplify requirements, is something that we take very, very seriously."

Lessons from the accident

Rick Stulen, VP for Science & Technology and Research Foundations, called the accident a "very sobering event" and reported that the contractor injured during the Oct. 9 accident is, "thankfully today, on the road to a full recovery."

He then reviewed the NNSA Type B review board's report about the accident and its high-level findings. Most notable, he said, were that the accident was preventable, that four of the five tenets of Sandia's safety program were not fully followed, that existing procedures were not consistently followed, and that insufficient oversight of operations contributed to the accident. (The five tenets of the Integrated Safety Management System are plan work, analyze hazards, control hazards, perform work, gather feedback, and improve.)

He detailed a half dozen off-normal technical conditions that existed at the time an LED indicator plug shorted to the rocket casing during pretest preparation — including inadequate grounding of the system as well as other equipment faults.

"Because all of these came into play, the rocket ignited prematurely," he said.

The full NNSA Type B report is available online via ILMS (the Integrated Laboratory Management System), under Policy Areas > ES&H > Announcements.

SAFETY TALK — Sandia Executive VP Joan Woodard (top image) addresses staff at the Steve Schiff Auditorium during an all-hands meeting on Labs safety. Sandia President and Laboratories Director Tom Hunter (center photo above) called the meeting to discuss safety issues in the wake of the release of the official NNSA report on the Oct. 9 accident at the sled track. Also speaking during the meeting were Executive VP Al Romig, left, and Div. 1000 VP Rick Stulen. (Photos by Randy Montoya)

But he acknowledged the human issues that contributed as well. Individuals involved in pretest operations missed clues that something may have been wrong.

"How often do we get these off-normal clues that we rationalize as being OK?" he asked.

A primary lesson from the accident, he said, is that Sandia needs to create a culture of continually questioning all operations, and that individual Sandians need to develop an inquisitive attitude, asking, for example: What's new that I haven't thought about? Have I assumed too much? What may be different that I am not recognizing? Am I recognizing off-normal clues? Are my controls working? And, most important, what's holding me back from challenging my peers when I see something that doesn't feel right?

Safety as a value

Acting Chief Operating Officer Al Romig detailed the actions Sandia has taken so far to address operational safety — suspension of sled track operations and energetics work, development of causal analyses and restart procedures, resumption of some work, formation of an advisory team, assistance with the NNSA investigation, and numerous other activities.

He thanked employees for their engagement in the Labs-wide department meetings that followed the previous safety all-hands in late October, and for the feedback that resulted from those discussions. That feedback, he said, came in two categories — systemic issues having to do with culture, leadership, accountability, and work controls, for example, and operational concerns about safety of specific facilities and operations.

This feedback now is being examined and prioritized, he said, and will result in follow-on actions early in the new year.

Then he outlined a path forward for Sandia's safety journey.

Plans are in the works to implement a "quick look" safety assessment for higher hazard operations, to be led by the VPs, followed by a process to ensure that the principles and tools of the Integrated Safety Management System are in place for all operations.

In addition, he said, simplifying safety requirements and developing a graded approach to safety for lower-risk operations are high on the 2009 agenda. "We need a single, simple set of actions that we follow to ensure our work is done safely."

To sustain safe operations over the long term, he said, "every Sandian must align actions, behaviors, and attitudes with how we do our work to achieve mission success."

This safety culture, he said, "has to start at the top, but every one of us must take it personally."

The all-hands meeting is available on-demand at http://ln.sandia.gov/safety-all-hands.

Sandia's ECP giving is successful and contagious

By Iris Aboytes

Sandia's Employee Caring Program (ECP) in 2008 reached 76 percent for the first time since 1994. Employees contributed/pledged $3,247,786, an increase of $141,693 over 2007. Sandia retirees have contributed $456,699 and contributions are still trickling in. Lockheed Martin contributed $50,000 to Corporate Cornerstones, making Sandia's total $3,754,485.

"Some of the keys to Sandia success in giving are public visible support from top management, a staff position dedicated to the campaign, representatives of high quality and excellent credibility, and a culture of community involvement developed over the years," says Jack Holmes, retiring president/CEO of United Way of Central New Mexico.

"When they get it, they participate. Sandians have driven many customer service improvements over the years, including monthly payouts beginning in January, online giving, retiree participation, and an open, competitive grant-making process," Holmes says.

"For the past several years there has been a friendly competition between Sandia and Presbyterian Healthcare Services (PHS) regarding which company will finish the campaign with the greatest number of Alexis de Tocqueville (ADT) members, [individuals who contribute $10,000 or more per year]," says Randy Woodcock, vice president and chief operating officer of United Way of Central New Mexico. "Last year Sandia and PHS finished in a tie at 48 members each. This year, Intel Corporation joined the competition and has recruited 48 members to date also. We won't know until the campaign celebration event on Feb. 28 who this year's winner is."

"This is one competition that has no losers," says Holmes, "The most vulnerable citizens in our community are the true winners of all three companies' incredible generosity."

Sandia Deputy Labs Director and Chief Operating Office Al Romig, in his communication to employees on behalf of himself and Labs management, said, "It is with a deep sense of gratitude that I thank each one of you for your generosity, your caring, and your community spirit. Individually, you all made a choice to help others and collectively we, as a laboratory, continue to make a positive difference in our community. I am honored to work in an organization where people think of others and consistently strive to find ways to help. Thank you for participating in this year's ECP Campaign."

* * *

Jack Holmes has been with United Way for 36 years; 11 of those years have been with the United Way of Central New Mexico. Holmes will be retiring at the end of February. "My whole adult career has been in the nonprofit sector, serving some 41 years," says Holmes. "What an honor and privilege to serve my adult life helping others and working with terrific community leaders and staff."

Sandia Science & Technology Park receives top achievement award; McCorkle cited for leadership

National group recognizes park for success, total community impact

By Michael Padilla

The Sandia Science & Technology Park has received the 13th annual Outstanding Research/Science Park Achievement Award given by the national Association of University Research Parks (AURP).

The award recognizes research parks that excel in bringing technology from the laboratory to economically viable business activities, promoting the growth of businesses, jobs, and public revenue.

"The successful park has been a role model for other parks in New Mexico and other national laboratory parks," reads the AURP award entry on its website.

"We are extremely honored to be the first national or federal laboratory research park to be recognized," says Jackie Kerby Moore, SS&TP executive director. "The recognition highlights the incredible public and private partnership that has contributed to the park's results and success."

Previous winners include the University City Science Center, Philadelphia; the University of Arizona Science & Technology Park; the Research Triangle Foundation of North Carolina; and the Purdue Research Park, Ind.

In addition, the AURP named Sherman McCorkle, chairman of the Science & Technology Park Development Corp., as recipient of the association's Community Leadership Award. The award is given to individuals who deliver outstanding contributions to the success and total community impact of a science park.

The awards were presented at the Association of University Research Parks' recent annual conference in St. Petersburg, Fla.

The vision for the campus-like park began in the mid-1990s when Dan Hartley, then vice president of development at Sandia, began discussing the idea of a tech park with various officials. Public landowners — including representatives from Albuquerque Public Schools, the State Land Office, and DOE — as well as private landowners then got together to discuss developing the property to bring start-up companies and Sandia industry partners to the area.

SANDIA SCIENCE AND TECHNOLOGY PARK Executive Director Jackie Kerby Moore and SS&TP Development Corp. Chairman Sherman McCorkle admire the achievement award presented by the Association of University Research Parks. McCorkle also won the association's Community Leadership Award.

The park comprises 18 buildings totaling nearly 900,000 square feet of occupied space. More than 2,000 employees are employed at the 28 organizations located at the park.

Since its inception, the SS&TP has had a $1.4 billion cumulative impact on New Mexico wage and salary disbursements attributable to park activities, according to an economic impact assessment conducted by the Mid-Region Council of Governments.

Park gets two new tenants

Moog Inc. and AEgis Technologies are the latest additions to the Sandia Science & Technology Park, says Jackie Kerby Moore, SS&TP executive director.

Moog has moved into 2,600 square feet of space in the Sandia Synergy Center adjacent to CSA Engineering, which Moog recently acquired as a wholly owned subsidiary. Moog is a worldwide designer, manufacturer, and integrator of precision control components and systems. Moog's high-performance systems control military and commercial aircraft, satellites, space vehicles, launch vehicles, missiles, automated industrial machinery, marine applications, and medical equipment. Moog will work closely with CSA in the development of electronics to support vibration suppression systems. Moog currently employs eight people locally with plans to expand operations in the park in 2009.

AEgis Technologies, one of the world's leading providers of modeling and simulation products and services, recently moved its Microsystems Group into 1,700 square feet of space located at 10501 Research Rd. SE, where it established the AEgis Laser Laboratory. The Microsystems Group is a multidisciplinary team of scientists, engineers, and technical staff colocated in Huntsville, Ala., the Redstone Arsenal, and Albuquerque. The group specializes in microsensors, photonics, electro-optics, and directed-energy sensors.

"We are pleased to welcome Moog and AEgis to the park," says Jackie. "These additions are yet another indication of the economic impact the park has on the community." — *Michael Padilla*

Sandians play key roles in nuclear power associations

By Chris Burroughs

Two Sandia employees are leading well-respected nuclear power associations, and a retiree has been honored by one of the top organizations in the country.

STEVE ORTIZ

Steve Ortiz (6484), a 29-year Labs employee, is president of the Institute of Nuclear Materials Management (INMM), and Tom Sanders (6063), manager of Sandia's Global Nuclear Futures Initiative, is president-elect of the American Nuclear Society.

In addition, Rip Anderson, who retired from Sandia in 2002 after 41 years, was recently honored by the American Nuclear Society with a Presidential Citation for his active engagement in the education of the public on nuclear issues.

Steve started at Sandia in 1980 as a Member of Technical Staff in the Nuclear Safeguards and Security Directorate and from 1988 to 1990 was the technical division supervisor for the Satellite Integration and Test Organization in the Space Systems Department. Since 1990 he has been manager of Security Technology Dept. 6484 in the Nuclear Security Systems Center.

TOM SANDERS

Over the years Steve has assumed growing responsibilities in INMM, including serving as chairman of the Physical Protection Technical Division, senior member of INMM, member of the INMM technical program committee, member at large of the INMM executive committee, INMM vice president from 2006-2008, and currently INMM president.

Tom is currently vice president of the American Nuclear Society and will become president in June. The 23-year Sandia veteran is the leader of the Global Nuclear Futures vision at the Labs. He led the development of topical meetings, policy papers, news articles, partnerships with other countries and nongovernment organizations, and caucus events on Capitol Hill to articulate that a healthy and thriving US nuclear energy infrastructure is key to global proliferation risk management in the future.

RIP ANDERSON

Rip is an internationally recognized expert in risk and performance assessment. As manager of the WIPP (Waste Isolation Pilot Plant) Performance Assessment Department at Sandia, he led the construction and preparation of performance assessment analysis for a compliance certification application to the Environmental Protection Agency that resulted in the opening of the facility. He joined Sandia in 1961 and while at the Labs he was acting director of the Nuclear Waste Management Programs Center, senior manager of the Program Development and Environmental Decisions Department, manager of the WIPP Performance Assessment and Nuclear Waste Technologies Department, and manager of the Subseabed Programs Department.

B-52 moves to new home

The National Atomic Museum last weekend moved its largest artifact, a B-52B bomber, to its new home at the museum's new location at Eubank Boulevard and Southern Boulevard SE in Albuquerque. The historic plane had been stored for many years at the museum's previous location on Kirtland Air Force Base. The plane wings and fuselage were moved separately by tractor-trailer two miles to the new location. The fuselage was towed on its own wheelgear by two special tow bars.

The museum's B-52 was always used in the special weapons program, where it was flown to the test site in Nevada; unlike most B-52s, it was never part of the US Strategic Air Command.

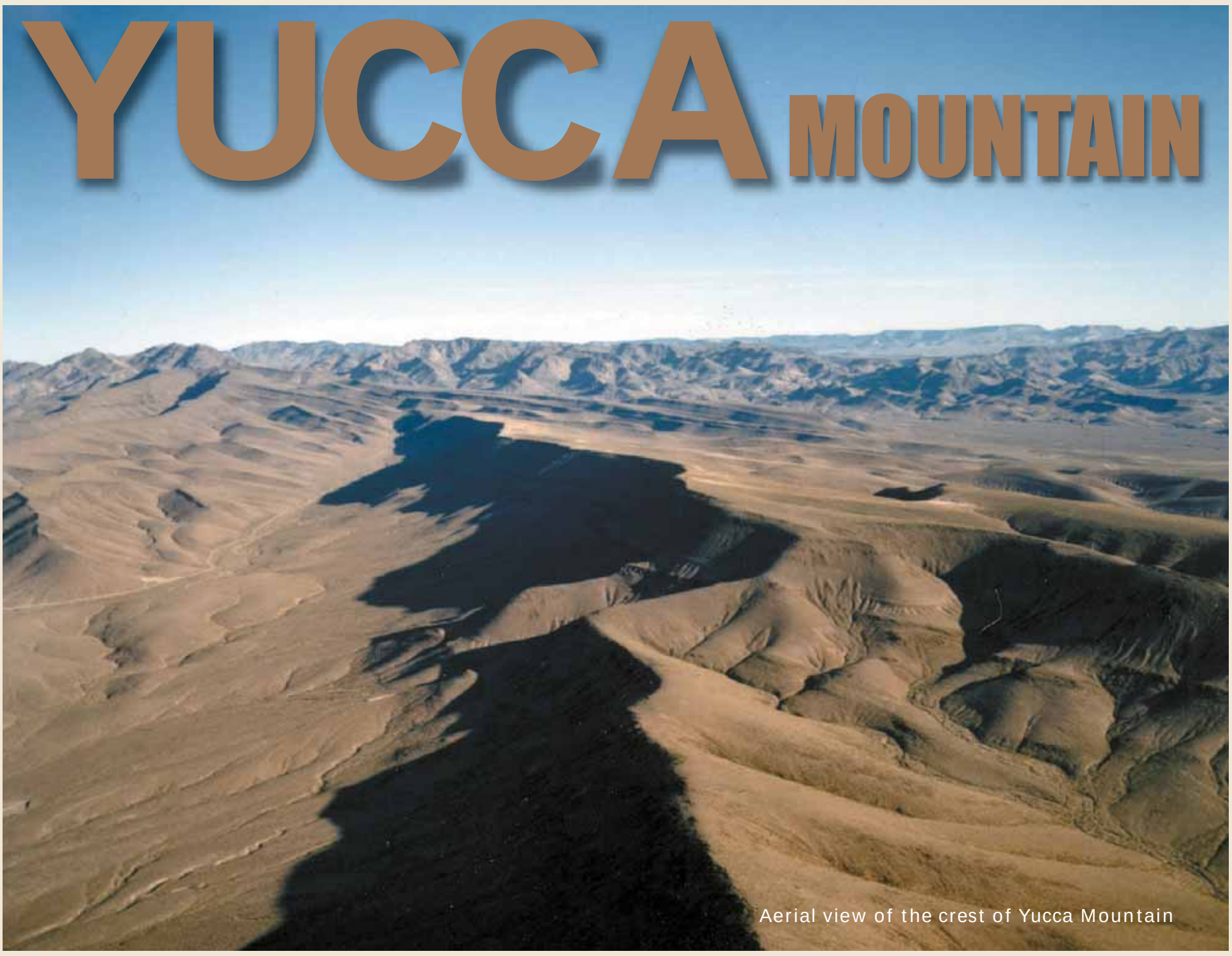
"Moving these significant artifacts represents a huge step toward becoming the National Museum of Nuclear Science and History," says Jim Walther, director of the museum. "We know the public will appreciate having these giants available for viewing. We hear repeatedly how eager people are to see these important historical aircraft."

Worldwide Aircraft Recovery has provided assistance in a number of projects, including the entire Strategic Air Command Museum and its B-52, B-36, B-58, and an Atlas missile. They will move eight pieces for the museum, four aircraft and four missiles. In addition to the B-52, the Bomarc, Mace, Matador, and Snark cruise missiles will be moved; three planes were moved in October 2008. There are also plans to relocate a MiG-21 from Tucson, Ariz., to the new site.

* * *

The National Atomic Museum opened in 1969 and was chartered by Congress in 1991. Located in Albuquerque near Old Town at 1905 Mountain Rd. NW, the museum's exhibits include nuclear medicine, nuclear power, pioneers of science, weapons history, and arms control. The museum's name will change to the National Museum for Nuclear Science & History in April 2009 when it moves to its new location. It will remain a Smithsonian affiliate. Visit the museum's website at www.atomicmuseum.org.

YUCCA MOUNTAIN



Aerial view of the crest of Yucca Mountain

Story by John German

Photos courtesy of US Department of Energy

Estimate, with defensible scientific rigor and full acknowledgement of uncertainty, the expected risk from radiation that a hypothetical farmer one million years in the future might receive from a planned deep underground nuclear waste repository.

That's the technical challenge — required by the US Environmental Protection Agency (EPA) and the US Nuclear Regulatory Commission (NRC) — met in June 2008 when DOE's Office of Civilian Radioactive Waste Management (OCRWM) submitted to the NRC the license application for Yucca Mountain. The more than 8,600-page application seeks authorization to construct the nation's first repository for spent nuclear fuel and high-level radioactive waste.

Then, on Sept. 8, the NRC docketed DOE's license application, accepting it as sufficiently complete to begin the NRC's technical review. This acceptance, in turn, began the expected three- to four-year license application review and public hearing phase, during which DOE and its experts will be asked to provide additional information and testimony in support of the application.

Steps forward

"We took several key steps toward opening a repository in 2008," says Tito Bonano (6780), Sandia's Yucca Mountain senior manager. "But we have a lot of challenges remaining."

As the OCRWM Lead Laboratory in the Yucca Mountain Project since 2006, Sandia's job was to support DOE in preparing and submitting a credible and supportable license application for the repository, including its technical and scientific basis.

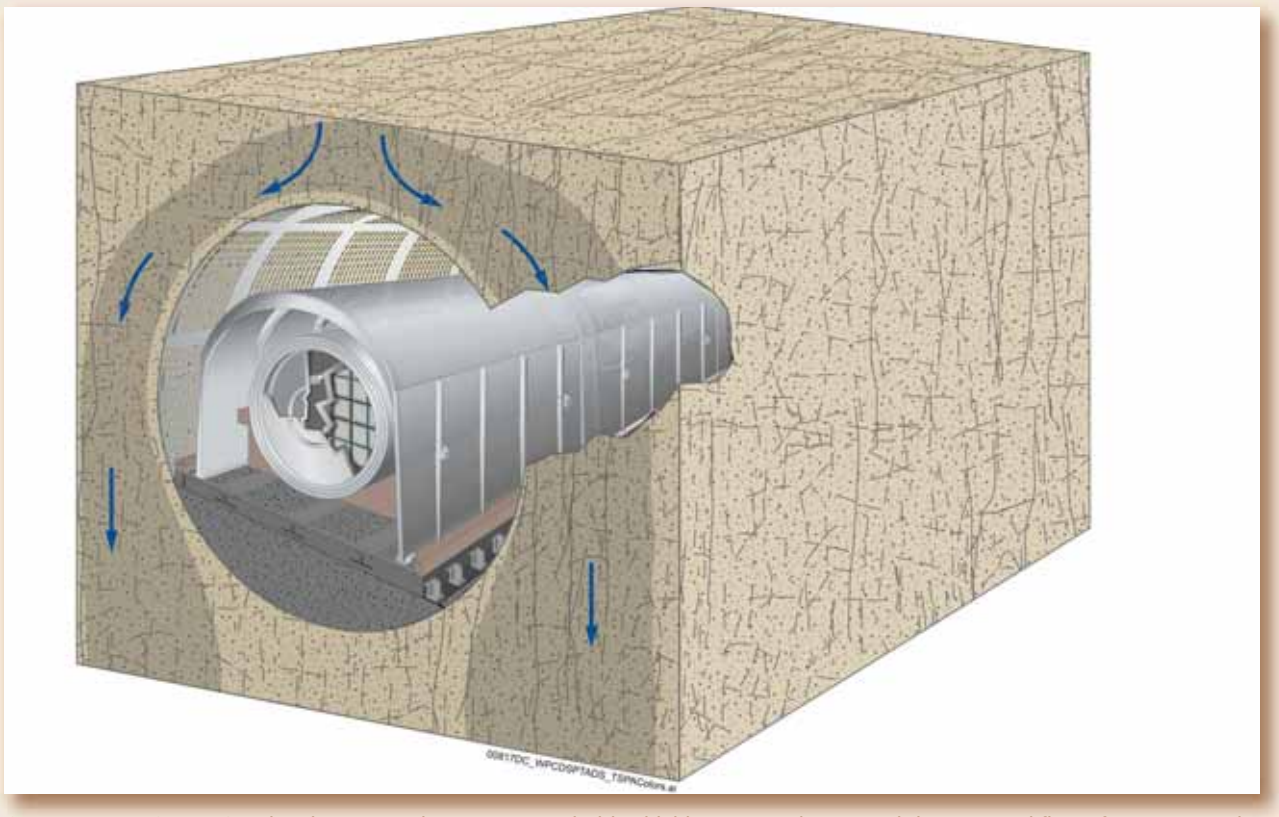
The proposed Yucca Mountain Repository would, for the first time, provide a place to put some 70,000 metric tons of waste from commercial nuclear power plants and defense activities. Currently 58,000 metric tons of commercial spent nuclear reactor fuel is in storage at 114 reactors in 39 states, with an estimated 2,000 metric tons of additional spent fuel generated each year at the nation's 104 operating nuclear power plants.

Yucca Mountain — a ridge of porous, fractured, volcanic rock located 90 miles northwest of Las Vegas — could be the most studied geologic feature on Earth. Bored into the side of the mountain is a 25-foot-diameter tunnel that reaches more than 1,000 feet below the surface.

Inside the repository's emplacement tunnels, called drifts, lined end to end would be specially designed cylindrical containers made of some of mankind's toughest metals and most corrosion-resistant alloys, confining the byproducts of six decades of nuclear power plant operations, defense research, submarine and ship propulsion, and other US nuclear activities.

Some of the radionuclides proposed for disposal at Yucca Mountain, such as cesium-137 and strontium-90, generate high levels of radiation but have relatively short half-lives of several tens of years. Other radionuclides such as plutonium-239 and -242, neptunium-237, technetium-99, and iodine-129 have half-lives in the tens of thousands of years.

(Continued on next page)



CUTAWAY ILLUSTRATION showing an emplacement tunnel, drip shield, waste packages, and the expected flow of water around a tunnel.

A MINING MACHINE excavates alcoves and niches for experiments.

(Continued from page 7)

Million-year performance

"Developing a license application for the site was a science and engineering problem unmatched in its complexity," says Tito. At its heart, the application assesses the likelihood that the repository system — the combination of natural barriers and man-made barriers working jointly and redundantly — would effectively isolate the waste for up to a million years, that estimated doses would comply with regulatory requirements, and that the site would ensure public health and safety.

"In a sense, this is the ultimate multidisciplinary program," says Tito. "It involved geology, hydrology, climate, physics, math, and engineering, all wrapped into one massive computer simulation, and culminating in a set of dose estimations."

Opening a high-level radioactive waste repository in the US is necessary for three reasons, he says: 1) DOE is required by federal law to take possession of spent fuel from the nation's commercial nuclear power plants; 2) expanded nuclear energy capacity in the future means the US soon must have a method of dealing with spent fuel; and 3) as the beneficiary of nuclear power, this generation has an ethical obligation to take care of its byproducts.

But the Yucca Mountain Project has not been without controversy, and this has been recognized in the oversight of the project.

"We live in a fishbowl of external review and scrutiny," Tito says. But the scrutiny is appropriate given the magnitude of the decision being made, he says.

Says Nuclear Energy Programs Line of Business Director Andrew Orrell (6800), who until July was Sandia's Yucca Mountain senior manager: "We recognized early on that the progress of the project is best served by credible and well-supported scientific work that is available for all to review and consider. This is why we have operated with such transparency, so all know we have worked through the science with the highest level of integrity."

30 years of study

Sandia has been involved in the Yucca Mountain Project since the late 1970s.

Initial work focused on gathering basic experimental data about the site, says Peter Swift (6780), Sandia's Lead Lab chief scientist. Researchers collected rock samples and tested them, described the site's geology, and sought to understand the site's hydrology and underground chemistry.

Field and lab tests helped describe how faults in the rock surrounding the repository offer potential pathways for movement of water and gases, and how temperature and humidity would vary inside the drifts once the tunnels were closed.

Teams of national lab, DOE, and commercial experts developed concepts for the barriers the repository would rely on: the soil and rock layers above the drifts, the engineered systems inside the drifts, and the rock layers between the drifts and water table through which groundwater may flow.

By the late 1990s, scientists were able to focus on the possible pathways along which radionuclides may be transported to the biosphere: routes to well water, crops, drinking water, and the air future humans would breathe. Along the way, they identified thousands of variables that could play a role in the dose a future human might receive.

Managing variables

Kathryn Knowles (6781), Sandia's post-closure science integration manager for Yucca Mountain, explains that such dose estimates are derived from a variety of scenarios, ranging from the possible to the highly unlikely.

Volcanic activity, for example, might cause igneous matter to intrude into the drifts. Climate change could alter the amount of water reaching the repository. Waste containers might deteriorate faster or slower based on a number of factors.

Thus, any models of Yucca's performance would need to take into account variables inherent in climate, weather, hydrology, drift temperature and humidity, container degradation, and hundreds of other factors.

What's more, the team identified a number of "coupled nonlinear processes" — chicken-and-egg relationships where one factor, say drift temperature, affects another factor, such as drift humidity, which in turn affects seepage into drifts, which in turn affects drift temperature.

Modeling likely outcomes

Because of these uncertainties, estimates of repository performance must involve probabilities.

Scientists ran computer codes describing various phenomena hundreds, sometimes thousands, of times, each time altering variables, to create a set of outcomes. Taken in total, this set of outputs describes which outcomes are more likely, which are less likely, and which variables most influence the outcomes.

In the end, tens of thousands of runs on some 250 computer codes were used to develop the annual dose estimates contained in DOE's license application — a "confederation of models," says Cliff Hansen (6787), one of several technical leads for the performance assessment.

Where the results of one model affected the inputs to another, assumptions were carefully examined to ensure that important uncertainties — those that affect outcome — were carried through the sequence of models

IN OCTOBER 1998, miners completed the 1.7-mile cross-drift tunnel built for scientific studies near the potential repository area.

SINGLE HEATER ASSEMBLY being installed in July 1996 to test repository conditions.

appropriately, he says.

"When working in a repository science environment, not only do you have to show you got the right answer, you have to show, step by step, how you got the right answer," he adds. "The documentation may at times seem burdensome, but its outcome is a product you can have confidence in when you meet the regulator to explain your results."

An umbrella code, GoldSim, brought all the simulations together in what's called the Total System Performance Assessment to generate the overall dose calculations, along with the accompanying probabilities and measures of confidence.

After running the models together, the researchers learned something: Some variables matter, but most don't affect the bottom line very much. In fact, only about seven variables, out of 329 used as input in the analysis, affect the estimated dose in a significant way.

Estimate of risk

Peter is careful to explain that the goal is not to model only conservative "worst-case" scenarios — a common misperception of risk-based modeling.

Instead, scientists work to model probabilities of outcomes to produce an estimate of risk that can be used by decision makers to determine if the expected risk is acceptable. Doing a thorough job of characterizing risk given the uncertainties, Peter says, increases the complexity of the Yucca Mountain science work.

And, with changes in climate, vegetative cover, groundwater flow, and other unknowns, "we'd be stretching to say that we have precise predictions of what those are going to be like in a million years," Peter says. "What we do is offer a model that provides a reasonable estimate of uncertainty in possible conditions during that time."

(Continued on next page)

DAVE BRONOWSKI (6315) tests fracture behavior of Yucca Mountain rocks. (Photo by Randy Montoya)

RON PRICE (6785) checks fracturing in Yucca Mountain rocks following experiments in Albuquerque. (Photo by Randy Montoya)

LIGHT AT THE END OF THE TUNNEL — the tunnel boring machine reaches daylight in April 1997.

(Continued from page 9)

What's next?

Docketing of the license application by the NRC marked the end of 25 years of scientific study and the beginning of a three-to-four-year regulatory phase during which Sandia's Yucca Mountain Project team will engage, side by side with DOE and other project participants, in a formalized public licensing proceeding.

Team members are likely to be asked to provide additional information supporting their scientific conclusions in the license application, Tito says.

"We will have staff asked to serve as expert witnesses," he says. "We will get challenged."

After three to four years of review and public hearings, the NRC could grant a license application for construction of the Yucca Mountain Repository, which would be followed by five to 10 years of construction, dependent on funding, after which DOE would request a license to receive nuclear waste at the repository.

The bottom line

So what dose would the hypothetical person near the repository (formally defined as the Reasonably Maximally Exposed Individual, or RMEI, and known to project workers as "Remmy"), receive one million years from now?

According to Sandia's estimates, average peak doses will be about 0.24 millirems per year in 10,000 years and 2.0 millirems per year in one million years. For comparison, the regulatory limits established by the EPA are 15 millirem per year at 10,000 years, and 100 millirem per year at one million years, respectively.

Furthermore, the license application demonstrates that no significant releases should occur for many tens of thousands of years if the repository site is undisturbed. Over hundreds of thousands of years, the estimated annual doses are well below those from natural background radiation sources. All estimated doses are within regulatory limits.

Kathryn's conclusion: "Yucca Mountain is a good site," she says. "If you wanted to find a better site, you might be able to, but you could spend $10 billion doing it."

"Now our job is to show everyone during the review of the application that, through sound science, we can dispose of nuclear waste safely at Yucca Mountain," says Tito.

WORKERS DELIVER the Yucca Mountain License Application to the Nuclear Regulatory Commission office in White Flint, MD, on June 3, 2008. Inset: The Yucca Mountain License Application.

A SCIENTIST CONDUCTS a hydrology experiment in niche #3 of the Exploratory Studies Facility (the underground laboratory inside Yucca Mountain).

A rail cask

The waste

A typical high-level waste package for Yucca Mountain would contain spent fuel rods encased in a protective matrix designed to keep the rods away from each other to minimize heat buildup.

The rods and matrix are encased in stainless steel inner canisters. An outer canister is made of one-inch-thick nickel chromium alloy. Typical waste packages are approximately two meters in diameter and five meters long and weigh as much as 80 tons when full.

The packages rest on specially designed nickel chromium alloy pallets. Following emplacement the packages are protected from above by titanium drip shields.

Yucca Mountain timeline

1957 — National Academy of Science study concludes deep geologic disposal is the "preferred alternative"

1970s — Evaluation of multiple repository sites begins

1982 — Nuclear Waste Policy Act provides a legal structure, specifies NRC as regulator, and requires DOE to receive waste at unspecified future date

1987 — Congress amends NWPA to focus on one site (versus three previously): Yucca Mountain

1998 — DOE reports to Congress that the Yucca Mountain site is viable

2002 — Site recommendation submitted by Secretary of Energy, approved by president, and ratified by Congress

2006 — Sandia named OCRWM Lead Lab for Repository Systems

2008 — (June) License application submitted to NRC

2008 — (September) NRC dockets license application

The Sandians of Yucca Mountain

Since 2006, more than 100 Sandians have been involved in the Yucca Mountain program at any given time, supported by nearly 300 contractors. In all some 350 Sandians contributed over the years, estimates Andrew Orrell (6800), who has been with Yucca Mountain since 1997 and was Sandia's Yucca Mountain senior manager from 2002 until July 2008.

"It takes a special kind of person to perform at a standard of excellence in the environment of budgetary pressure, political concerns, and scientific complexity that has often characterized the history of the Yucca Mountain Project," he says. "You can spend years doing the science, work that doesn't have an analog outside the national labs, and then you have to be prepared to support that work during a licensing proceeding that will last for several years. You sign up for a career here. These are special people."

Al Romig outlines 'Energy and Global Security in the 21st Century' in invited Royal Academy of Engineering lecture

By Nigel Hey

A sweeping picture of energy-related promise and pitfalls was painted by Al Romig, executive VP and deputy Labs director for Integrated Technologies and Systems, in an invited lecture on "Energy and Global Security in the 21st Century" at the Royal Academy of Engineering in London on Dec. 2. In a one-hour illustrated presentation before a VIP audience, he made four main points:

• Energy markets will become increasingly integrated and interdependent, along with the rest of the world economy.

• As economic competition and cooperation intensify, the scope for national public policies with major economic impact will become more limited.

• Energy infrastructure protection will continue to be a critical component of ensuring national security.

• International flexibility, cooperation, and partnering on many fronts, including defense, intelligence, nonproliferation, public policy, and science and technology investment, will be of growing importance.

Idea of energy independence is 'naive'

"Energy is a global commodity in a globalized world," Al said, adding that, "quite frankly, the concept of energy independence is rather naive. It is highly unlikely that any one region or any one country can be completely disconnected from world energy markets. What is more important is how we achieve energy security through geopolitical arrangements and technology." The bottom line, he said, is "getting the energy that is needed to ensure that society functions, continues to grow, and moves forward."

Does geopolitics have to get in the way every time?

SANDIA EXECUTIVE VP Al Romig shares a moment with Professor Dame Julia Higgins of the Royal Academy of Engineering and Imperial College London following his invited lecture at the Academy's London headquarters. Al spoke on the topic of "Energy and Global Security in the 21st Century."

Not necessarily. It's a popular misunderstanding that nations should not purchase oil (or other commodities) from countries that they "don't like," he said. "If we do not buy oil from some particular part of the world, somebody else will." Disputes will occur, and natural resources are unevenly distributed. However, "if you consider the mutual economic interests of Asia, Europe, Russia, and North America, there is room for collaboration and cooperation on issues like energy and the technology associated with energy."

Al noted that the world currently uses 462 quadrillion BTUs of energy per year "and that quantity is expected to double between now and 2050. Even between now and 2030 it will rise from the mid-400s to about 700.

"Fossil fuel will continue to be a dominant source of energy for most of this century," Al said. "Some believe that if the right laws were passed, and if the engineers created the right process, we could find a 'magic' biofuel, wind, or solar solution. However, this silver bullet does not exist." There are energy density issues with hydrogen storage — even liquid hydrogen, he said.

Closest thing to a 'silver bullet'

"Nuclear energy may be the closest thing we have to a silver bullet for energy security or mitigating climate change."

There are several associated problems — particularly in dealing with waste and the needs for reprocessing and limiting proliferation. "Yet," Al added, "there appears to be available technology to remove the barriers to expansion of nuclear power. It will be an important source of energy, because it has a high energy density and it does not stop when the wind stops or when the sun sets."

Al predicted technology innovations will enable advances in energy security — including infrastructure protection, energy supply, and conservation — through a wide range of tools and systems, such as high-performance computing (including quantum computing for ultra-secure communications), robotics, modeling and simulation, and microelectromechanical systems (MEMS).

He added that hydrogen could solve some key energy problems while achieving reduced (perhaps zero) carbon emissions, improving energy security, and reducing consumption of fossil fuels. He acknowledged that many hurdles are yet to be overcome in this area, for example in on-board hydrogen storage, lifetime of fuel cells, production economics, the need for a hydrogen infrastructure, and sequestration of carbon (if the hydrogen is derived from fossil fuels).

Role of disruptive technologies

Al stressed his expectation that disruptive technologies could transform conventional energy systems. Nanotechnology alone, he said, has the potential to bring fundamental change to energy supply and demand.

He illustrated his point with work under way at Sandia, as in the use of nanocomposite materials and zirconium hydride for hybrid solar cells. Solid-state lights for home use cost about $100 apiece at the moment but are nearly twice as efficient as fluorescent lights and 10 times as efficient as incandescents.

Using ultra-high-strength lightweight nanophase materials could improve auto and airplane efficiency. Al also expressed optimism that using nanoparticles and nanoarchitectures for energy conversion and storage will offer solutions for low-cost fuel cells and batteries.

"Science and technology are engines of economic growth," Al said. "Countries or regions that control science and technology are likely to have a dominant economic position. Yet, as science and technology are shared around the globe, the world will 'flatten.' Those parts of the world that are better able to [continuously] take advantage and market their science and technology will be economically prosperous. This economic prosperity is in the realm of the engineer who turns basic discovery into a marketable product, as well as the politicians who create regulations that impact competitiveness in the global marketplace."

Informatics on the horizon

"We believe that computing is about to undergo a major transition," said Sandia Executive VP Al Romig during an invited lecture at the Royal Academy of Engineering in London last month. "Much of the effort in computer development has been in parallel processing machines to solve partial differential equations, to run finite element models, and to simulate engineering systems.

"We believe the next big advance in computing will be in informatics — solving the big data problem. For example, London is the most heavily 'camera-ed' city in the world. What happens to all that [video] data? Somebody, sometime, must look at it and, if it [shows something of interest], it is a wonderful forensic tool. But imagine processing the video in real time and identifying patterns that could prevent the problem from occurring? We do not know how to do this at the moment, but we believe that informatic architectures, probably based on quantum computing, may be the key to processing such data.

"We are deep into the realm of information technology, searching for ways to analyze images and patterns. We believe that informatics will be the key and it has already become a major area of investment.

"Also the US is making major investments in cyber assurance and cyber security, and this is yet another piece of that giant puzzle."

SPOs honored for defusing potentially lethal incident

SSO Manager Patty Wagner honors officers Eric Chavez, Lawrence Jackson, and Eric Cain

Three Sandia Security Police Officers, Eric Chavez, Lawrence Jackson, and Eric Cain, were honored last month by NNSA Sandia Site Office Manager Patty Wagner for their role in defusing a potentially serious security incident last summer.

The incident began late on the night of July 25 when Sandia security personnel observed individuals acting suspiciously near Bldg. 825 in what appeared to be desert camouflage, tactical vests, and body armor and carrying M-4 carbine rifles. Security called for backup to investigate the scene. That's when Lawrence, Eric Cain, and Eric Chavez responded to the scene. They approached the area with standard tactical equipment (tactical vest, body armor, primary and back-up weapons systems), conducted a tactical search of the area, and ultimately detained the suspicious individuals without incident. It was soon determined that the individuals were members of an Air Force special tactics squadron on temporary duty to Kirtland Air Force Base who were conducting an unauthorized ad hoc training activity. The M-4 carbines were unarmed training weapons, but appeared very realistic.

In a letter to Labs Director Tom Hunter praising the actions of the Sandia SPOs, Wagner wrote that the three officers "displayed the utmost professionalism and expertly carried out [their] duties under extremely dangerous conditions in a manner that allowed this potentially lethal encounter to be brought to resolution without incident."

A JOB DONE WELL — NNSA Sandia Site Office Manager Patty Wagner congratulates Sandia Security Police Officer Eric Chavez for his part in defusing a potentially lethal security incident last summer. Wagner also personally thanked officers Lawrence Jackson (left inset photo) and Eric Cain for their roles in managing the incident "with the utmost professionalism." Wagner sent a letter to Labs Director Tom Hunter praising the officers.

On behalf of SSO, Wagner extended her gratitude to the three officers for their "dedication in carrying out the Sandia mission of providing protection and control of our national security interests."

Sandia and KAFB have cooperated to ensure that incidents like this don't happen again.

Climate and energy, engineering and careers

"I worry a great deal about having an adequate supply of engineers in the future," said Sandia Executive VP Al Romig during an invited lecture at the Royal Academy of Engineering in London last month. "Many of us became interested in science and engineering in part because of the space program and the Sputnik reaction, but that spark has gone.

"Perhaps one of the silver linings in the energy, carbon dioxide, and climate issues that we face today is that they may incentivize young people to study science and engineering as our generation did.

"I would ask you to consider that when you talk to young people. Use this as a vehicle to interest and excite them about careers in science and engineering."

54 Sandians move into Distinguished, Senior ranks

Divisions announce DMTS, DMLS, DTNG, DASA, Sr. Scientist/Engineer, Senior Administrator appointments

Sandia's special appointments represent employees from all areas of the Labs' operations: Senior Scientist/Engineers, Distinguished Members of Technical Staff, Distinguished Members of Laboratory Staff, Distinguished Technologists, and Distinguished Administrative Staff Associates. Fifty-four Sandians were honored with special appointments in 2008.

According to Corporate Process Requirement documents, "Placement in the Distinguished Level signifies a promotion to the highest level of the Technical Staff, Laboratory Staff, Technologist, or Administrative Staff Associate Ladder. This level is different from the other levels in that it is subject to a 10 percent population limitation to preserve the distinction of the level."

Traditionally, one of the Labs' key "total rewards" incentives has been the quality of the folks who work here. Being able to offer prospective employees the opportunity to work with the most highly regarded people in their fields is a powerful recruiting tool. The individuals pictured here represent the world-class quality of the Labs workforce at its best.

Employees selected for the new levels have been recognized with a special plaque and a nonbase salary award, in addition to this special mention in the *Lab News*.

The Distinguished and Senior levels are part and parcel of the Integrated Job Structure (IJS) goal of providing multiple career paths for employees. The IJS's dual-track structure — management and staff — makes it possible for employees to advance in salary, prestige, and recognition without following a management track.

As has been its tradition for many years, the *Lab News* presents photographs of Sandians who have received special appointments this year. Not pictured here are: Ron Akau (1512), DMTS; Charles Browder (4221), DTNG; Michael Hagengruber (9538), DMTS; Clifford Hansen (6787), DMTS; Frederick Hooper (2431), DTNG; Shanalyn Kemme (1725), DMTS; Randy Longenbaugh (5715), DMTS; Jack Mizner (4131), DMTS; Catharine Sifford (2719), DTNG; Peter Warner (9317), DMTS.

DMTS — Distinguished Member of Technical Staff
DMLS — Distinguished Member of Laboratory Staff
DASA — Distinguished Administrative Staff Associate
DTNG — Distinguished Technologist
Sr. Sci/Eng — Senior Scientist/Engineer
Sr. Admin — Senior Administrator

Douglas Bickel
DMTS 5354

Tim Bielek
DMTS 5342

Pavel Bochev
DMTS 1414

Dale Bradley
DTNG 6752

Thomas Brown
DMTS 12332

William Cordwell
DMTS 5635

Jo Cunningham
DMLS 10248

Phil Dreike
Sr. Sci/Eng 5713

Rhonda Dukes
DMLS 10241

Juan Elizondo-Decanini
DMTS 2735

Barbara Funkhouser
Sr. Sci/Eng 5537

Jennifer Gilbride
DMTS 2130

Carter Grotbeck
DMTS 5579

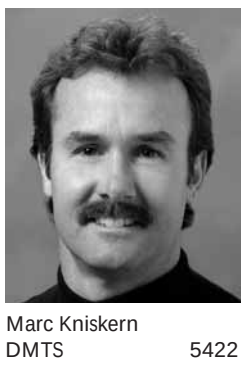
Jeffrey Kalb
DMTS 2664

Mike Kaneshige
DMTS 2554

Gary Kellogg
DMTS 1114

Dan Kelly
Sr. Sci/Eng 5400

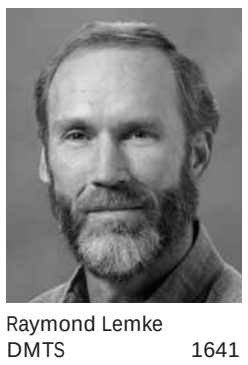
Ted Kim
Sr. Sci/Eng 5338



Marc Kniskern
DMTS 5422

Jeffrey LaChance
DMTS 6761

Kurt Larson
DMTS 5535



Raymond Lemke
DMTS 1641

Jim Locklin
DMLS 10657

Laura Loudermilk
DMLS 10618

Emily Lujan
DASA 10659

Steve Martin
DMTS 5935

Michael Martinez
DTNG 6473

Jeff Mason
DMTS 5354

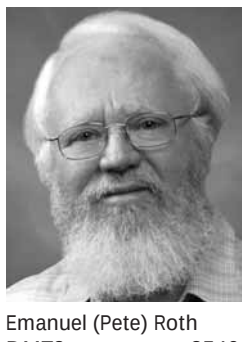
Kimball Merewether
DMTS 12346

Margaret Murray
DMTS 5342

Douglas Nicholls
DMTS 5632

Chris Rautman
DMTS 6312

Elizabeth Roll
DMLS 10624



Emanuel (Pete) Roth
DMTS 2546

Randy Shibata
DMLS 10245

Patrick Smith
DMTS 2625

Employee deaths

La Verne Sam had a quiet inner spirit with both inner and outer beauty

La Verne Sam (10263) died Dec. 17 after a long battle with cancer. She had been at Sandia more than 34 years.

LA VERNE SAM

"La Verne was an excellent worker," says her department manager Carolyn Lucero (10263). "She was the subject expert in the warehouse. There is potential for security incidents and environmental issues. La Verne trained all the clerks and was the go-to person for audits. She always passed with no findings."

"La Verne was very dependable. At times we had to remind her to take vacation or she would lose it. When she got ill and was out, she called me about donating her vacation. She was always thinking about others," says Jan.

La Verne was one of the top employees of team leader Jan Wallner (10263). "I would always ask for her opinion. She was a bright, wonderful, and very caring person."

La Verne's boyfriend Paul Apodaca (10268) says she loved working with animals and was really good at it. "She would anticipate what the cows or sheep would do and be ready for them to make their move," he says. "She helped me with my herd of cows and sheep. She looked after her and her family's stock in Arizona.

"George Strait was the love of her life. I would tease her that she had 10 pictures of George and only one of me. She used to say that he was the No. 1 man in her life. I settled for No. 2. La Verne loved working at Sandia and the people she worked with. She looked forward to seeing her friends and coworkers every morning."

Lacey Learson (10264) says La Verne never had a bad day. She always wore a smile on her face and a twinkle in her eyes. "She was a small person with a big heart," says Lacey.

"La Verne was an optimist," says Shannon Letourneau (10263). "She had several types of cancer in the last 15 years, and I never heard her complain or talk about her condition. If asked how she was doing, she always said 'fine.'"

"She was an angel, and I told her so," says Teresa Torres (10267-1). "She loved to run, and did so every morning. She helped me focus and motivated me to lose 145 pounds. She had a quiet, inspirational spirit."

Antonia Hernandez (10263-1) remembers a day when La Verne was very sick but came back to work. "When she got to the front office we all greeted her and asked about her," says Antonia. "Meanwhile, Ileen, one of our coworkers was telling us her neck was aching, so I rubbed Ileen's neck. After a couple of minutes I said sarcastically, 'Okay that's all you're getting!' La Verne got up and started to rub Ileen's neck. As sick as she was, she built up the strength to care for someone else. La Verne always surprised us with her strength and generosity."

La Verne rode the bus to work every day. "She would always save a seat for me," says her friend Mike Lanigan (3651). "One day on the way home we were surrounded by her Native American friends. She tells me to look around and then tells me in her own subtle, witty humor, 'Now you know how Custer must have felt.' She had me in stitches. She always enjoyed a good laugh."

"La Verne ran with a quick, determined pace. It was obvious she could go for miles," says Paul Homan (10264). "After the onset of cancer, instead of running, she would walk, but the determined pace was still there. Her gentle nature, quick smile, and quiet, measured voice impressed me.

"She was very intelligent and was able to learn new skills and adapt to new workplace technologies seamlessly without impacting the customers she always worked so hard to serve efficiently and effectively. She never gave any impression she was sick. She was the same gentle, understanding, and kind person," Paul says.

"La Verne was the sweetest person you'll every meet," says Kevin Romero (10263-2). "I will always remember La Verne for her extraordinary beauty — inside and out."

— Iris Aboytes

Tom Gallagher, patient yet candid journeyman, was respected by all

Tom Gallagher (2431-2) died Dec. 26 after a long illness. He had been at Sandia five years.

TOM GALLAGHER

"Tom fabricated ultra-high-precision miniature components in Sandia's machine shop," says his supervisor Joe Stephenson (2431-2). "From the beginning, Tom took a keen interest in the machinist apprentices. The journeymen will always respect Tom the man and his abilities, but the apprentices will remember the patient, yet candid, journeyman who taught them the art of machine shop quality — an art they will have for a lifetime."

"Tom was always very willing to share his knowledge, wisdom, and skill about our chosen trade [machining] and about life with everyone," says Ben Hanks (2431-2). "Tom always made me feel welcome and wanted when I would ask for his opinion and guidance. We all got along great."

"Tom was a very pleasant and nice man," says Tony Bruce (2431-2).

"I was an apprentice while Tom was working in Bldg. 840," says Peter Michel. "He was always willing to help me in my efforts to become a journeyman machinist. He would literally drop everything to assist me. I will miss his experience and good nature."

— Iris Aboytes

Harriet Lowden was a guru in Accounts Payable

Harriet Lowden (10503) died Jan. 5 from complications of diabetes. She had been at Sandia more than 24 years.

HARRIET LOWDEN

"Harriet was one of my most experienced invoice processors and could help at any of our desks," says her manager James Romero (10503). "She oversaw the Construction Invoices Desk and the Foreign Invoices Desk. She was viewed as guru or maybe more like a very kind and wise aunt/grandma. She had so much experience in accounts payable that when another processor got stuck, I'd tell them to ask Harriet. She seemed to have a solution for any invoicing problem."

"Harriet was a gentle soul, sweet and kind," says Jana Lichlyter (10503). "She was a hard worker. She was an early bird. She would come to work at 6 a.m."

"I met Harriet some 20 years ago when she was a receptionist in the lobby of Bldg. 800," says Carla Honeystewa (10503). "We remained friends throughout the years. Harriet was more of the traditional type. Whenever their traditional feast came around — Sept. 19 to be exact — she always prepared a ton of food and would invite family and friends to eat at her house. She would always tell us 'eat lots' and of course we did. She was the backbone of her family and loved her family very much."

"Harriet was so much fun," says James. "One of my favorite Harriet memories was about a team celebration we had at Hinkle Family Fun Center. Harriet racing on the go-karts looked like she was having the time of her life — even though she was going so slow the whole team passed her more than once. She raced go-karts like she approached work — carefully, conscientiously, and with a smile. When we were done she told me, 'That was fun!' She was always a good sport. Even when she was noticeably struggling with her illness, she never left my office without finding something for us to laugh about — mostly my parking."

"Our business relationship developed into a genuine friendship," says Renee Urquidez (10503). Harriet and I enjoyed lunches together. We took walks out on nice spring and summer days. She made the best salsa and shared it with all of us. Her candid sense of humor guaranteed putting a smile on your face. In spite of her hardships, she was always positive. She was a sincere and genuine friend. Many times she offered advice and inspiration. I'll miss her dearly."

"She was a kind and loving friend and our hearts are broken that she isn't around," adds James.

Harriet Lowden was a guru in Accounts Payable.

— Iris Aboytes

Distinguished, Senior ranks (continued)

Debbie Sode
DASA 8248

Terry Spraggins
DASA 8514

Todd Sterk
DMTS 2952

Bill Tedeschi
Sr. Sci/Eng 5923

Tan Thai
Sr. Sci/Eng 5625

Paul Vianco
DMTS 1813

Robert Waters
DMTS 12347

Gregory Wickstrom
DMTS 2123

New US Rep. Ben Ray Lujan visits Labs

REP. BEN RAY LUJAN, D-N.M., elected to Congress in November to represent New Mexico's third congressional district (filling a seat vacated by Tom Udall, who was elected to the US Senate), visits Labs Director Tom Hunter in Tom's office during a tour of Sandia in December. In addition to his meeting with Tom, Rep. Lujan, who took office in early January, received an overview briefing about Sandia from Div. 6000 VP Les Shephard and toured the National Solar Thermal Test Facility. Rep. Martin Heinrich, D-N.M., elected in November to represent New Mexico's first congressional district, also visited the Labs in late December. (Photo by Randy Montoya)

Mileposts

New Mexico photos by Michelle Fleming
California photo by Randy Wong

James Dishman
35 1711

Patty Jojola
30 10245

Jim Schwank
30 1731

Ronald Akau
25 1514

Barbara Boyle
25 9753

Scott Nicolaysen
25 5579

Michael Bredemann
20 5711

Walter Caldwell
20 5923

Harry Cincotta
20 12332

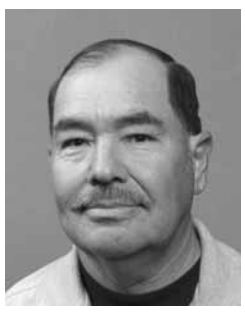
John Dye
20 5351

Paul Graham
20 10545

William Hossley
20 10653

Joe Jones
20 6772

Tim Knewitz
20 10680



Richard Lucero
20 4843

Kevin McMahon
20 6772

Philip Sackinger
20 5713

Charline Wells
20 3520

Nancy Aldridge
15 4234

Stanley Atcitty
15 6336

Susan Caffery
15 4126

Michael Eldred
15 1411

Brian Griego
15 4211

Debbie Kernan
15 5632

James Lucero
15 2739

Dominic Martinez
15 1521

Nicole Morgan
15 9343

Recent Retirees

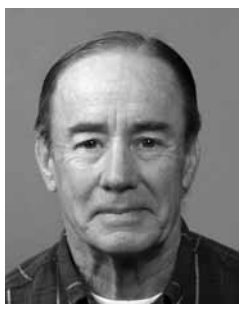
Geoff Mueller
42 5356

Ernest Sanchez
40 4122

Carl Peterson
39 1515

Gary Shepherd
39 9330

John Emerson
35 2453



Rick Weatherbee
38 4225

Mike Deveney
31 1734

Dennis Dunn
31 6315

Chris Christensen
30 2913

Janet Padilla
28 9329

Steve Bunn
26 8243

Wendy Cieslak
25 1010

Thomas Schara
21 3654

Goldie Piatt
25 10615

Nellie Ward
25 9317

James Tomkins
21 1420

Ginny Edmund
17 5925

BRUCE McWATTERS (1111) prepares Sandia's Cockcroft-Walton accelerator for its move to the now-under-construction Ion Beam Laboratory. The IBL, which will replace a "temporary" building that went into service in 1956, will be available to Sandia university and industry partners as an official user facility. Although the device seen here dates from the 1950s, it still finds use in certain particle acceleration applications/experiments. The original Cockcroft-Walton device, says Wikipedia, was named after the two men who in 1932 used this circuit design to power their particle accelerator, performing the first artificial nuclear disintegration in history. John Douglas Cockcroft and Ernest Thomas Sinton Walton used this voltage multiplier cascade for most of their research, which in 1951 won them the Nobel Prize in physics for "Transmutation of atomic nuclei by artificially accelerated atomic particles." (Photo by Randy Montoya)

Sandia adopts new DOE model agreements to allow universities/industry to use facilities

By Chris Burroughs

Sandia is adopting two new DOE model agreements that will simplify the way universities and industry use the Labs' facilities.

DOE recently finalized the agreement forms — one designed for proprietary research and the other for non-proprietary research — and is encouraging all of its laboratories across the country to begin using them.

Sandia, like many of the DOE laboratories, has unique facilities, called user facilities, that are made available to universities and industry to conduct research and work with Sandia researchers.

"This new approach will allow both university and industrial researchers greater access to our specialized, world-class facilities across the laboratory system and to work more closely with our scientists on real-world problems and potential solutions."

— DOE Under Secretary for Science Ray Orbach

"Industry and universities that want to use our facilities must sign an agreement form," says Mary Monson (1032), who heads up Sandia's user facility program. "In the past, the agreements were individualized across the DOE laboratories. This new method will standardize forms so that all agreements are alike, presenting a common DOE face to industry."

The new agreements are intended to require minimal, if any, further negotiation and to be quickly executable.

Mary says there are two agreement forms. The proprietary form allows industry to use and pay full cost recovery for the research and work done at the user facilities for proprietary work. For the other type of agreement — nonproprietary — DOE funds the Sandia researchers and the user funds its researchers. The results are shared openly.

DOE's Under Secretary for Science Raymond Orbach says the new agreements simplify the process for gaining access to DOE facilities and promote the transfer of cutting-edge technologies from DOE national laboratories.

"This new approach will allow both university and industrial researchers greater access to our specialized, world-class facilities across the laboratory system and to work more closely with our scientists on real-world problems and potential solutions," he says.

DOE has made Sandia's Center for Integrated Nanotechnologies (CINT) a designated science user facility. CINT will begin using the new proprietary and nonproprietary user agreements in the near future. For a number of other Sandia user facilities, known as Technology Deployment Centers (TDC), DOE is permitting the Labs to continue using the current User Facility Agreement (UFA). These include Advanced Battery Research, Engineering, & Evaluation Facility, Center for Security Systems, Combustion Research Facility, Design, Evaluation and Test Technology Facility, Electronic Technologies User Facility, Engineering Sciences Experimental Facilities (ESEF), Explosive Components Facility, Geomechanics Laboratory, Intelligent Systems and Robotics Center, Ion Beam Laboratory, Materials and Process Diagnostics Facility, Mechanical Test and Evaluation Facility, National Solar Thermal Test Facility (NSTTF), NUFAC Nuclear Facilities Resource Center, Photovoltaic Laboratories, Plasma Materials Test Facility, Primary Standards Laboratory, Pulsed Power and Systems Validation Facility, Radiation Detector Materials Characterization Laboratory, and the Shock Thermodynamic Applied Research Facility (STAR).

For more information about Sandia user facilities or for help in the selection of a user facility, contact Mary Monson at mamonso@sandia.gov or 505-844-3289.

Feedback

Selling blood to the military?

Q: *I [recently] read the article in the* Lab News *regarding the importance of donating blood. I've yet to donate blood on base to United Blood Services because I've heard a rumor that UBS sells blood to the armed services, as opposed to giving it to them at no charge. Is this true?*

A: With every blood collection, whether it is by a community blood provider or the military blood program, a cost is involved. The cost includes recruitment of the donor, collection of the blood, testing of the blood, processing the blood into the different components for transfusion, storage of the blood and frozen products, as well as all of the training, quality, and safety processes to ensure a safe blood supply. The only way that a blood center or the military blood program can provide this service is by charging a fee for getting the blood from one arm to another. Community blood providers like United Blood Services charge a fee to the hospital or clinic that orders the blood. That fee is usually passed along to the patient. The military blood program will pass along the fee in a similar way. Depending on the recipient of the blood, that fee may or may not be passed along to the patient. If the cost isn't passed along to the patient, then the cost will be passed along to the taxpayer because it is a government program.

I hope this helps answer your question. I appreciate that you wanted to know the truth rather than rely on rumor. I know that you want your donation to be respected and to go to toward saving lives. Both United Blood Services and the military blood program provide that service. The important thing is to give blood. The need for blood is constant and growing so your gift will not go to waste regardless of which organization receives it.

— Evelyn Bryant, United Blood Services