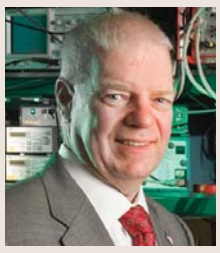
AS THE YEAR WINDS DOWN, sandhill cranes soar above Bosque del Apache. The return of the cranes to New Mexico each year coincides with the beginning of the holiday season. (Photo by Randy Montoya)

Al Romig: Sandia Blue through and through



After more than 30 years at the Labs, Executive VP Al Romig is headed to Lockheed Martin's legendary Skunk Works. Read about Al — and what his friends have to say about him — in a story beginning on **page 6.**

Sandia LabNews

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Sandia National Laboratories

World's smallest battery created at CINT nanotechnology center

Snake-like 'Medusa front' offers 'a view never before seen' to improve lithium batteries

By Neal Singer

A benchtop version of the world's smallest battery — its anode a single nanowire one seven-thousandth the thickness of a human hair —has been created by a team led by Jianyu Huang (1132).

To better study the anode's characteristics, the tiny rechargeable, lithium-based battery was formed inside a transmission electron microscope (TEM) at the Center for Integrated Nanotechnologies (CINT), a DOE research facility jointly operated by Sandia and Los Alamos national laboratories.

Says Jianyu of the work, reported in the Dec. 10 *Science*, "This experiment enabled us to study the charging and discharging of a nanobattery in real time and at atomic-scale resolution, thus enlarging our understanding of the fundamental mechanisms by which batteries work."

THREADING THE NEEDLE — Jianyu Huang demonstrates insertion of a sample holder into a transmission electron microscope at CINT. (Photo by Randy Montoya)

Because nanowire-based materials in lithium ion batteries offer the potential for significant improvements over bulk electrodes in power and energy density, more stringent investigations of their operating properties should improve new generations of plug-in hybrid electric vehicles, laptops, and cell phones.

"What motivated our work," says Jianyu, "is that lithium ion batteries [LIB] have very important

(Continued on page 4)

Paul Hommert All-Hands

Introducing new leadership and looking to Labs' future

By Darrick Hurst

Sandia President and Labs Director Paul Hommert hosted an all-hands gathering in the Steve Schiff Auditorium on Monday, Dec. 6, covering a range of topics from a strategic issues update, cost austerity efforts at the Labs, the recent retiree policy changes, and a question-and-answer dialog with members of the work force.

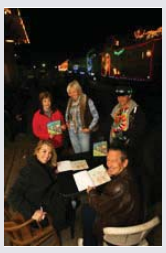
PAUL HOMMERT

However, first on Paul's agenda was the introduction to the work force of incoming Deputy Labs Director and Executive VP for Mission Support Kim Sawyer.

"I've actually admired Sandia from afar for a long time," Kim (0003) said. "I never imagined I would have the honor to be here, but sometimes dreams do come true."

Kim described for the audience her diverse professional background, holding leadership and technical

(Continued on page 5)



Train of Lights

On a recent Friday evening, Sandia retiree Dick Jones was at the Sunol, Calif., depot of the Niles Canyon Railway with Juliette Goodrich, a television news anchor, signing copies of their new children's book, *Train of Lights*. Read about it on **page 3.**

Inside . . .

Innovators honored

Greg Nielson could have been annoyed by a caller who telephoned him by mistake, thinking he was a different former Truman Fellow, but instead Greg engaged the man in conversation, and a collaboration was born. See **page 9.**

That's that

Light bulbs — the incandescent kind — are a disposable commodity item with built-in obsolescence. They burn for their allotted 700 hours or whatever and then die, just as they are designed to do. But it doesn't have to be that way. Over on the next page Patti Koning offers a story about Sandia retiree and photographer Dick Jones. Since his retirement, Dick has collaborated with a local television reporter on a couple of children's books, including one about the incredible bulb in a Livermore, Calif., fire station that has been burning almost continuously since it was turned on back at the dawn of the century — the last century. The little bulb that could — it's only four watts — was first flipped on 109 years ago during the Roosevelt administration — the Teddy Roosevelt administration — and has shone through wars and peace, depression and good times, decade in and decade out. Since this modest little light was first powered up, man learned to fly and went to the moon. The power of the atom was explained, then demonstrated, then weaponized. Automobiles and telephones and movies, novelties at the time, became woven into the fabric of American life. Television. Computers. Maps redrawn and redrawn again. Borders changing. Nations disappearing. Nations being born. Social and societal change so sweeping as to be almost impossible to recount. Has there ever been a century in human history when so much happened? And during all the change, the bulb in the Livermore fire station has stayed on, a little beacon of continuity in a world where it often seems change is the only constant.

We don't expect things to last that long, certainly not electrical things. And certainly not light bulbs, whose manufacturers have elevated planned obsolescence from a fine art into a quite precise science. (Of course, the US is now out of the incandescent lightbulb business; the last lightbulb factory — a GE plant in Winchester, Va. — recently got its death warrant. The replacement bulbs, compact fluorescent lights, are mostly made in China.)

As a writer, I want to find a moral to the story of the miracle bulb; it just feels that there ought to be one. And maybe the moral isn't about the light bulb itself, but about the town. To me, it sounds awfully good to be able to say you're from Livermore, the town where, in John Lennon's phrase, we all shine on - or at least our lightbulb does.

* * *

What would you say if I told you that in our own community there are kids whose feet will be cold this winter because the only shoes they have are worn out, holey, tattered, literally falling apart at the seams? Kids who'll get sick — or have a higher likelihood than other kids of getting sick — because their toes are almost frostbitten by the time they get to school? More than 50 years ago, several Sandians who were aware of this persistent problem decided — in typical Sandia fashion — to do something. Instead of exchanging Christmas gifts in the office that year, they pooled their money to buy shoes for kids. And thus was born a program that in the intervening 54 years has provided shoes to more than 12,000 deserving school children.

There are so many worthy giving opportunities out there — and Sandians give so generously in so many ways — that it might seem a bit arbitrary to single out Shoes for Kids for special mention here. But Shoes for Kids is a homegrown effort, Sandia born and bred; to me that counts for something. It's a tradition at Sandia to support this program, and a good one. And I like tradition. Are we changing the world one pair of shoes at a time? I don't know about that. But I do know this: there are kids out there who need shoes and we can help.

The publicity for Shoes for Kids has traditionally centered around the Christmas season, but the program accepts donations at any time and shoe fittings for schoolchildren go on through February.

If you want to contribute something — and I hope you'll at least consider it — you can donate via Sandia Laboratories Federal Credit Union at account number 223180,90-01 lastname=shoes.

* * *

Finally, happy holidays to all of you, our faithful readers; may your days be merry and bright.

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

Sandia LabNews

Sandia National Laboratories

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Employee death

Bob Turman will be remembered for his absolute devotion to our nation's security

Bob Turman (5440) died on Nov. 29. He was 66 years old and had been at Sandia 30 years.

Bob was deputy director and senior program manager for Directed Energy Systems in Integrated Military Systems Development Center 5400. He was responsible for research and technology development over a broad range of applications for military and civilian uses of directed energy. He managed program funding of approximately $30 million.

BOB TURMAN

"Bob was a visionary," says Sandia retiree Ken Prestwich. "He could always see possibilities of new technology. He was very thorough and articulate in his documentation. Bob was very team-oriented and always positive."

Ron Kaye (5445) says Bob loved physics. "He always wanted to know how it worked, why it worked, and how to make it better. When we were working on pulsed power, he would say, 'You might be making pulsed power, but you can't compete with lightning yet.'

"One of the most significant experiences I recall was Bob's work with the White House Office of Science and Technology Policy on an urgent response team. The team was charged with developing an emergency capability for processing District of Columbia mail, and he spearheaded an implementation strategy to safeguard the mail nationwide against future anthrax attacks. Many projects here stopped in October 2001 as he pulled together the Sandia team to support DOE in the national response to the anthrax attacks. I was fortunate to have served on Bob's team that supported that national task force. While working at the field sites, it was reassuring to hear Bob's strong voice and technical leadership at the multi-agency telecons to Washington. When we had challenges in the field, I remember his careful listening, recommendations, and directive, 'Make it happen.' The national team developed the process, and the mail got delivered safely. Bob and his team won a 2002 Lockheed Martin NOVA award for the work.

"Bob fostered relations with the DoD R&D organizations," Ron continues. "His message was clear: 'How can we work with them and help them succeed with their initiatives?'"

Bob loved gadgets, Ron says. On a trip to Arlington, Va., he and Bob had a GPS device for their car. "I also had a paper map," recalls Ron. "The traffic was bad, but Bob knows the shortcut on the small residential streets. Uh oh, school traffic guards, school busses, garbage trucks, but we're not any closer to our destination. It's time to get the GPS out. Don't need a paper map. Now there are three of us in the car: Bob, me, and the lady inside the GPS. After four bad turns, he stuffed the lady in the GPS back in the bag, and said, 'Where's the map?'

"It was typical Bob; he was stressed but not angry. We arrived at our meeting in laughter. We had just shared a comical adventure. It was funny.

"The way he handled that little adventure was the way Bob handled his projects. When things did not work, he always found a positive aspect."

Colleague Guillermo Loubriel (5443) says, "Bob was firm and caring; teacher and listener; focused and amiable. His contributions were national in scale."

Ron remembers another aspect of Bob's personality. "He loved the University of Texas Longhorns," Ron says. "You could tell how they were doing in sports by the color of the shirts and ties Bob would wear. He was in burnt orange when they were doing well. He was a dedicated fan. He was also a defender of the Dallas Cowboys.

"Bob loved aircraft. If you mentioned an aircraft or space museum, Bob had been there. His sketches of aircraft ranged from doodles on meetings notes to framed wall hangings in his office. He also had a large collection of miniature aircraft models prominently on display near his desk that he was proud to show you.

"I will always remember Bob for his absolute devotion to this nation's security. I will miss seeing the PULS PWR license plate on his car." — *Iris Aboytes*

In retirement, Dick Jones creates children's books

By Patti Koning

On a recent Friday afternoon, Sandia retiree Dick Jones was at the Sunol, Calif., depot of the Niles Canyon Railway with Juliette Goodrich, a television news anchor, signing copies of their new children's book, *Train of Lights*. "This is not something I ever expected to do," Dick says. "But some of the best things in my life were unexpected."

Train of Lights celebrates the Niles Canyon Railway's annual holiday train. From Thanksgiving through Christmas week each year, the historic railway's vintage cars are decorated inside and out with thousands of holiday lights, each with its own theme like candy canes, penguins, and skiing. The train runs between Niles and Sunol, Calif. More than 25,000 people ride the Train of Lights each year.

Goodrich wrote a fanciful tale, illustrated by Dan Cooper, about how the Train of Lights came to be. Santa, Mrs. Claus, and Rudolph all play a role. The book ends with 12 pages of photographs by Dick and the true story of how the Train of Lights comes to life each year.

"Dick inspired me to write The Train of Lights in his subtle but encouraging manner," Goodrich says. "To know Dick is to have a friend for life. He is one of those people who give all the credit to others when he is truly the one who deserves all the kudos."

The *Train of Lights* is Goodrich and Dick's second collaboration — the first was T*he Little Light Shines Bright* about Livermore's centennial light bulb that has been burning for a world record 109 years (see "Who left the light on?" at right).

So how did a design engineer join forces with a local celebrity to commemorate Bay Area landmarks in children's literature? To find the answer, you have to look back 40 years, when Dick first became a photographer.

DICK JONES never expected to spend his retirement at book signings, yet here he is with Juliette Goodrich, an anchor for a local CBS station, publicizing their book *The Train of Lights* at the Niles Canyon Railway Sunol Depot. Dick and Goodrich also collaborated on *The Little Light Shines Bright* about Livermore's centennial light bulb, which has been burning for 109 years and counting. (Photo by Dino Vournas)

He joined the Air Force in 1960, a year after graduating from high school, but stayed on the ground, chasing parts in England. He finally got off the ground after leaving the Air Force, when the GI Bill enabled him to attend flight school.

"I went through private, commercial, instrument, and multi-engine flight school. I decided I didn't want to be a pilot and fly people from point A to point B — I was already a better engineer, so how would I pay for a very expensive airplane just to fly around?" Dick explains. "So I started taking aerial photographs of ranches and houses. I was going door to door and selling pictures, but it took up a lot of time."

That all changed when Taco Bell asked Dick to take photographs of all of their sites. "I flew for them for over 20 years," he recalls. "They wanted north, south, east, west, and overhead."

He began working for other fast food chains and for commercial real estate companies, providing photographs to help scout locations. Dick was already working at Sandia — with an associate's degree in mechanical engineering, he hired in as a technician but quickly moved to design. "This was something I could do while working at Sandia, because it was all on the weekends," he says. "I never really made any money at it. I earned enough to cover the plane rental and invest in new equipment."

Over the next 30 years, Dick continued to fly and photograph on the weekends. Then in 2001, Barry Schrader, Sandia/California's public relations officer at the time, told him about Livermore's famous light bulb, which was nearing 100 years of continuous illumination. "That captured my attention. I went to the firehouse, got on a ladder, and took pictures of the bulb," Dick recalls.

After seeing those photos, Sandia draftsman Steve Bunn (now retired) made a website for the bulb. Dick and Barry helped form the Centennial Light Bulb Committee with Steve, Sandia technician Tim Sage (also retired), Lawrence Livermore National Laboratory public relations officer Scott Wilson, and Stewart Gary, Tom Bramell, and Lynn Owens of the Livermore-Pleasanton Fire Department.

The bulb had already received some recognition. In 1972, Ripley's Believe it or Not researched the light bulb and declared it the world's longest burning. That same year, Charles Kuralt featured it on his show "On the Road with Charles Kuralt." (The bulb also gets a mention in Kuralt's 1985 book of the same name.) A few local news stories on the upcoming 100th birthday brought it back into the public eye.

Goodrich first learned about the bulb when she reported on it. She offered to emcee the celebration, never imagining that was the first step toward becoming an author. All she did was mention to Dick that she'd always wanted to write a children's book.

"She said the wrong thing to the wrong guy," Dick recalls. "I said, 'Why not about this?' We exchanged email addresses and a few months later I checked to see if she'd started. She told me that she needed inspiration, so I went down to the fire station and took pictures of bells, badges, hoses, anything fire-related."

He read drafts of the book as Goodrich put it together. But when *The Little Light Shines Bright* was published, he was surprised to find his photographs in the book. "He's a wonderful photographer and because of his local roots in the Tri-Valley and connection to the Light Bulb Committee, it was only natural to feature the photographs in the book," Goodrich says.

Dick retired from Sandia in 2003, but quickly returned to work on the Atmospheric Radiation Measurement-Unmanned Aerial Vehicle (ARM-UAV) program where, among other tasks, he took aerial photographs and video.

Word got out about his many experiences and skills — his long history with airplanes and photography. So when he was asked by the Niles Canyon Railway to take some pro bono photographs of their historic trains, he said yes and even wound up shooting some video too.

He and Goodrich had stayed in touch and when she mentioned that she was thinking of writing a book on the Train of Lights, he already had the train pictures for inspiration. From the start of this project, Goodrich planned to include Dick's photographs.

Another collaboration is likely, as Goodrich is already planning her next book, probably on the Special Olympics, and says she looks forward to more projects together. "I left myself free because I don't want her to get locked in and feel like she has to have me," Dick says. "Other photographers have shot lots of pictures of Special Olympics and I'd have to start from scratch. But if she wants my help, sure, why not?"

He's also involved in the 110th birthday celebration of Livermore's world famous light bulb. Already scheduled for June 18, 2011, the celebration will include a screening of the documentary "Century of Light" by Hollywood stuntman Chris Leps at the Vine Cinema.

To see samples of Dick's photography, visit http://rjaerial.smugmug.com or www.rjaerial.net. To learn more about the Train of Lights, visit www.ncry.org.

Sandia CaliforniaNews

Who left the light on?

How is it possible for a light bulb to burn for 109 years? And why would you leave a light bulb on for that long?

THE 109- YEAR-OLD LIGHT BULB currently resides in Livermore's Fire Station No. 6.

Maybe it's because the bulb is only four watts and has a carbon filament, which burns longer than a tungsten filament. The light bulb has never been subjected to power surges — it has its own power source to prevent this — and it's been turned off just three times, twice for moves and once for a fire station renovation.

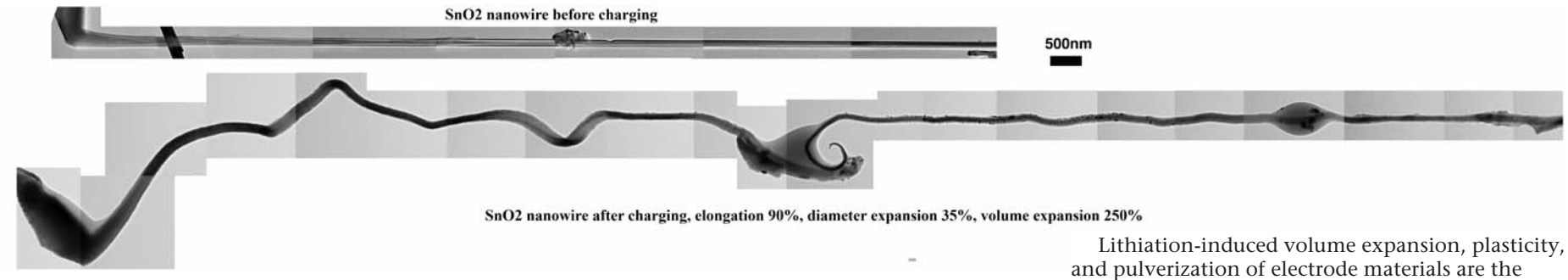
The last time it was turned off was in 1976, when the light bulb was moved between fire stations under full police and fire truck escort. It currently resides in Livermore's Fire Station No. 6, just a few miles from Sandia on East Avenue.

In a 2003 National Public Radio interview, then-deputy fire chief Tom Bramell acknowledged to *Morning Edition's* Bob Edwards that "the reality is that it's probably just a freak of nature. This is just one in a million light bulbs that is probably just going to keep going and going." Bramell also predicted in that interview that the light bulb would still be going long after he retired — which has proven true as he retired in 2003.

MythBusters visited in 2006 for a show on the myth of keeping light bulbs on longer to prolong longevity and save energy. The light bulb has been featured on many network news shows and written about in *USA Today*, the *Chicago Sun-Times*, *Via*, the *National Enquirer*, and the *Albuquerque Journal*. It's recognized in the *Guinness Book of World Records* and *Ripley's Believe it or Not*. Supposedly the San Francisco Ripley's Museum has asked for the light bulb when it finally burns out.

The Centennial Light Bulb website (www.centennialbulb.org) is packed with information on the bulb, including video from the 100th birthday party, links to news coverage, facts, and a BulbCam that updates every 10 seconds (go to the "videos" page). This extensive *website devoted to a small glass orb prompted Christian Science Monitor* writer Jim Regan to comment in a 2001 story that the website "demonstrates the Livermore Light to be almost as much a sociological as an engineering phenomenon - after all, how many celebrity light bulbs are there?" — *Patti Koning*

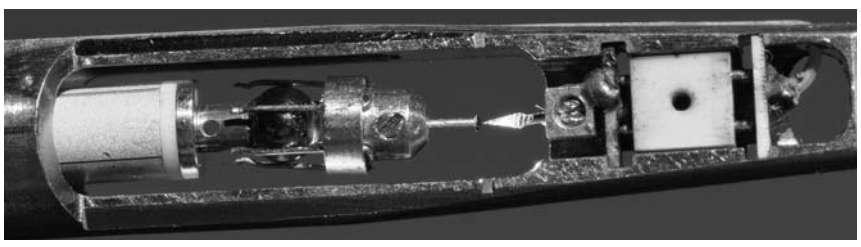
World's smallest battery displays surprising properties



THE MEDUSA TWIST: a formerly unobserved increase in length and twist of the anode in a nanobattery. (Courtesy DOE Center for Integrated Nanotechnologies)

(Continued from page 1)

applications, but the low energy and power densities of current LIBs cannot meet the demand. To improve performance, we wanted to understand LIBs from the bottom up, and we thought in-situ TEM could bring new insights to the problem."



HOW TO CATCH A NANOWIRE (the empty holder, above, demonstrates the procedure) — A mass of nanowires would be glued to the tip of the sword-like shape at the right-center of the device. The STM selector-tip, here represented by a silver-colored metal wire touching the tip of the sword-like holder, can be manipulated forward or backward by shrinking or expanding the far-left cylinder via the piezoelectric effect. The hat with six-pronged device (resembling a sideways octopus) clamped to the metal ball holds the STM tip steady. The operator, controlling the STM tip movement in 3 dimensions, aligns the STM tip with a nanowire. "Once the tip touches one nanowire, we can focus an electron beam on the touched spot. Then amorphous carbon, formed from decomposition of hydrocarbons in the TEM column, grows to bond the STM tip and the nanowire tip," says Jianyu. The right-hand side of the device holds electrical wiring. (Photo by Randy Montoya)

Battery research groups around the world use nanomaterials as anodes, but in bulk rather than individually — a process, Jianyu says, that resembles "looking at a forest to try to understand the behavior of an individual tree."

Observing change in atomic structure

The Sandia-led design consists of a single tin oxide nanowire anode 100 nanometers in diameter and 10 micrometers long, a bulk lithium cobalt oxide cathode three millimeters long, and an ionic liquid electrolyte. The device offers the ability to directly observe change in atomic structure during charging and discharging of the individual "trees."

An unexpected find of the researchers was that the tin oxide nanowire rod nearly doubles in length during charging — far more than its diameter increases — a fact that could help avoid short circuits that shorten battery life. "Manufacturers should take account of this elongation in their battery design," Jianyu says. (The common belief of workers in the field had been that batteries swell across their diameter, not longitudinally.)

Jianyu's group found this behavior by following the progression of the lithium ions as they travel along the nanowire and create what researchers christened the "Medusa front" — an area where the high density of mobile dislocations causes the nanowire to bend and wiggle as the front progresses. The web of dislocations is caused by lithium penetration of the crystalline lattice.

"These observations also prove that nanowires can sustain large stress — greater than 10 GPa [gigapascals] — induced by lithiation without breaking, indicating that nanowires are very good candidates for battery electrodes," says Jianyu.

Still, the researchers were surprised to see the lengthwise elongations and the dislocations. Says Jianyu, "No one had ever seen either before. But our observations tell battery researchers how they are generated, how they evolve during charging, and offer guidance in how to mitigate them. This is the closest view to what's happening during charging of a battery that researchers have achieved so far."

A video available at http://tinyurl.com/28xn8vj shows the in-situ visualization of the battery charging process, "a view never before possible," says Jianyu.

Lithiation-induced volume expansion, plasticity, and pulverization of electrode materials are the major mechanical defects that plague the performance and lifetime of high-capacity anodes in lithium-ion batteries, Jianyu says. "So our observations of structural kinetics and amorphization [the change from normal crystalline structure] have important implications for high-energy battery design and in mitigating battery failure."

The electronic noise level generated from the researchers' measurement system was too high to read electrical currents, but co-author John Sullivan (1132) estimated a current level of a picoampere flowing in the nanowire during charging and discharging. The nanowire was charged to a potential of about 3.5 volts, Jianyu says.

A picoampere is a millionth of a microampere. A microampere is a millionth of an ampere.

Functioning in a vacuum environment

The reason that atomic-scale examination of the charging and discharging process of a single nanowire had not been possible was because the high vacuum in a TEM made it difficult to use a liquid electrolyte. Part of the Huang group's achievement was to demonstrate that a low-vapor-pressure ionic liquid — essentially, molten salt — could function in the vacuum environment.

Although the work was carried out using tin oxide (SnO_2) nanowires, the experiments can be extended to other materials systems, either for cathode or anode studies, Jianyu says.

"Our experiments lay a foundation for in-situ studies of electrochemical reactions, and will have broad impact in energy storage, corrosion, electrodeposition, and general chemical synthesis research field as well," he predicts.

Other researchers contributing to this work include Xiao Hua Liu, Nicholas Hudak, Arunkumar Subramanian (all 1132), and Hongyou Fan (1813); Li Zhong, Scott Mao, and Li Qiang Zhang of the University of Pittsburgh; Chong Min Wang and Wu Xu of Pacific Northwest National Laboratory; and Liang Qi, Akihiro Kushima, and Ju Li of the University of Pennsylvania.

Funding came from Sandia's Laboratory Directed Research and Development Office and DOE's Office of Science through CINT and the Energy Frontier Research Centers program.

Sandia researchers awarded more than 65 million supercomputing simulation hours by DOE INCITE program

By Mike Janes

Two projects led by researchers at Sandia's Combustion Research Facility (CRF) and Computer Sciences and Information Systems Center have been awarded 65 million hours on two DOE supercomputers through DOE's Innovative and Novel Computational Impact on Theory and Experiment (INCITE) program. The research projects utilize two world-leading supercomputers with a computational capacity roughly equal to 135,000 quad-core laptops.

"The Department of Energy's supercomputers provide an enormous competitive advantage for the United States," Energy Secretary Steven Chu said when the awards were announced. "This is a great example of how investments in innovation can help lead the way to new industries, new jobs, and new opportunities for America to succeed in the global marketplace."

Awarded on a competitive basis, many of the new and continuing INCITE projects aim to further renewable energy solutions and advance understanding of the environmental impacts of energy use. The program, open to all scientists, is supported by DOE's Office of Science and managed by the DOE Leadership Computing Facilities at Argonne and Oak Ridge national laboratories, which host some of the world's fastest supercomputers.

INCITE projects could help speed the development of more efficient solar cells, lead to improvements in biofuel production, and help identify more effective medications to slow the progression of Parkinson's disease.

This year's INCITE awards are the largest-ever awards of the department's supercomputing time. A total of 1.7 billion processor hours were granted to 57 innovative research projects that will use computer simulations to perform virtual experiments that in most cases would be impossible or impractical in the natural world.

Joe Oefelein (8351) is the principal investigator on "High-Fidelity Simulations for Advanced Engine Combustion Research," with his colleague, Jackie Chen (also 8351), serving as co-investigator. Joe and Jackie were awarded 60 million hours on the Cray XT5 ("Jaguar") machine at Oak Ridge National Laboratory.

Their project aims to provide new insights into the dynamics of turbulent combustion processes in internal combustion engines, and to maximize the collective benefits of those insights through collaborations among the researchers involved.

David Evensky (8966) is principal investigator for "Trace Collection for Simulation-Driven Co-design of Exascale Platforms and Codes." Curtis Janssen (8953) serves as co-investigator. The project was awarded 5 million hours on the IBM Blue Gene/p ("Intrepid") machine. Their project focuses on "exascale" computing and is the validation part of a larger effort to help researchers co-design applications, runtimes, and systems for future exascale computing, considered the next great leap in size for computers.

A third Sandia researcher, Mark Taylor (1442), is participating in two other proposals that were granted 110 million and 35 million hours. Mark is a co-investigator on "Climate-Science Computational Development Team: The Climate End Station II," led by the National Center for Atmospheric Research, and on "Numerical Study of Multiscale Coupling in Low-Aspect Ratio Rotating Stratified Turbulence," led by Los Alamos National Laboratory.

Paul Hommert all-hands meeting

(Continued from page 1)

roles in a career that has spanned more than 30 years across multiple companies and corporations, with responsibilities in leading organizational changes and business process improvements.

In her new role, Kim is responsible for enabling mission execution through the integration of efficient operations with best business and operational practices, as well as developing and implementing appropriate measures and standards for the Labs' performance.

"I strive to be a good leader for the organization," Kim said. "I will be listening a lot — I'd like to do some brown bag lunches, I probably will do some small group interactions and find out what's important and what I need to do to make sure I support Sandia. . . . I look forward to getting to know all of you and… doing what we need to do to serve the nation."

TotalComp

In his address to the workforce, Paul provided an update on the on going efforts around Sandia's TotalComp project, the initiative that is examining the Labs' entire system of performance and compensation.

"If we're going to make a change that affects everyone in the laboratory, I will talk it through first, in front of you. If I can't explain it and be comfortable with the 'why' and explain it with conviction and passion for why we're doing it, then we won't do it."

— Paul Hommert on TotalComp

"This is a topic that is going to touch everyone," Paul said. "In my view, change is necessary here. . . . My commitment is that by the middle of January we will have made a decision on how to move forward."

Paul said that employees could expect a dialog session in early 2011 that will be dedicated to discussing the decisions made in regard to the implementation of a new TotalComp system.

"If we're going to make a change that affects everyone in the laboratory, I will talk it through first, in front of you," he said. "If I can't explain it and be comfortable with the 'why' and explain it with conviction and passion for why we're doing it, then we won't do it."

Operational effectiveness efforts

Among the financial challenges addressed earlier this year in connection with the changes to the pension plan, Paul said, was the aspect of extracting efficiencies in the operation of the Labs that will lead to cost savings.

"We're going to change the way we operate and it will have as a result, savings," Paul said. The change "can't be something in which you see degradation in the environment in which you work — that's not what we're about."

Areas that Paul said the Labs' leadership is reviewing for efficiency improvements are:

- Eliminating redundancies in compliance training
- Reevaluating the deployment of the leadership structure
- Considering a move to thin client environment
- Redefining the strategic thrusts
- Changing the way the policy arena interfaces with organizations
- Improving the Labs' work force acquisition efforts

KIM SAWYER, Sandia's new deputy Labs director and executive VP for Mission Support, introduces herself during a Dec. 6 all-hands meeting. In her remarks, Kim said she intends to conduct brown bag lunches and other small group interactions to "find out what's important and what I need to do to make sure I support Sandia." (Photo by Darrick Hurst)

"The leadership here is really responding and we've identified a number of areas that we will be working through," he said. "You should, over the next several months, start to see some of these impacts and you will know this is the reason why — to generate a better work environment, [which] also saves money that can be used to support our pension."

Retiree change

"I'm fairly confident there's some impact from this change," Paul said in reference to the recent revisions Sandia made to the corporate policies that govern the use of services performed by Sandia retirees and vested former employees as contractors.

Paul explained the changes were motivated by two broad areas of concern: intent to use retirees in the correct way and the objective of clearly defining the distinction between an individual drawing a pension and that of continued employment in an active way.

"We want to make it clear that while an individual is employed at the Labs we take fullest advantage of their ability to mentor, that we give conscious consideration to succession planning and knowledge transfer," Paul said.

Strategic planning

Paul also provided an overview of the status and planning process flow of objectives and goals for the Labs' strategic planning. The latest update of the strategic plan is on hold while the Labs' leadership engages in intensive discussion about the objectives that will matter to Sandia over the next five to 10 years, and to develop a framework that integrates the work done at Sandia.

"It's important to me that there's connectivity between where you operate, in delivering milestones," Paul said. "You'd like to have a sense of how [your work] ties back to an overarching, long-term goal for the laboratory. If strategic plans are just sitting on the shelf, and you don't reference them, then they're not very useful in making decisions, and I want something that helps leadership make decisions."

If strategic plans are just sitting on the shelf, and you don't reference them, then they're not very useful in making decisions, and I want something that helps leadership make decisions."

— Paul Hommert

Paul outlined five draft strategic goals in development for the new plan:

- Deliver with excellence on Sandia's commitments in its unique nuclear weapons mission
- Amplify Sandia's national security impact
- Reinvigorate and evolve Sandia as a model 21st century federally funded research and development center
- Excel in the practice of engineering
- Commit to a learning, inclusive and stimulating work environment

Before taking questions from the work force, Paul explained that the issues he covered in the all-hands gathering are significant subjects that have occupied the senior leadership's time over the past several months. Paul invited feedback from the work force on the topics discussed and emphasized that an open dialog is an important, motivating principle of his leadership philosophy.

Al Strouphauer honored by Secretary of Defense

Recognition comes for work in support of 2010 Nuclear Posture Review

Al Strouphauer has been awarded the Secretary of Defense Medal for Outstanding Public Service for his work on the 2010 Nuclear Posture review (NPR). The medal is the second highest civilian award presented by the DoD chief.

Al, with his family looking on, was presented with the award during a ceremony at Sandia last month by Bradley Roberts, deputy assistant secretary of defense for Nuclear and Missile Defense Policy. Al was honored for his service from April 2009 to May 2010 as executive secretary of the Stockpile and Infrastructure Working Group for the NPR, the largest of several similar teams that worked on various aspects of the review. Al led the development of options for the president regarding stockpile sustainment, force structure size, infrastructure modernization, and the skilled nuclear workforce.

According to a citation accompanying the award, Al's contributions were essential to the successful completion of the NPR and the New Strategic Arms Reduction Treaty, the New START. His technical and operational expertise, the citation said, were "crucial in developing stockpile sizing strategies to reduce the risk from a warhead technical failure or an adverse geopolitical change in the security environment. His efforts were pivotal in the analysis that led to the NNSA receiving an increase in funding for the life extension programs (LEPs)."

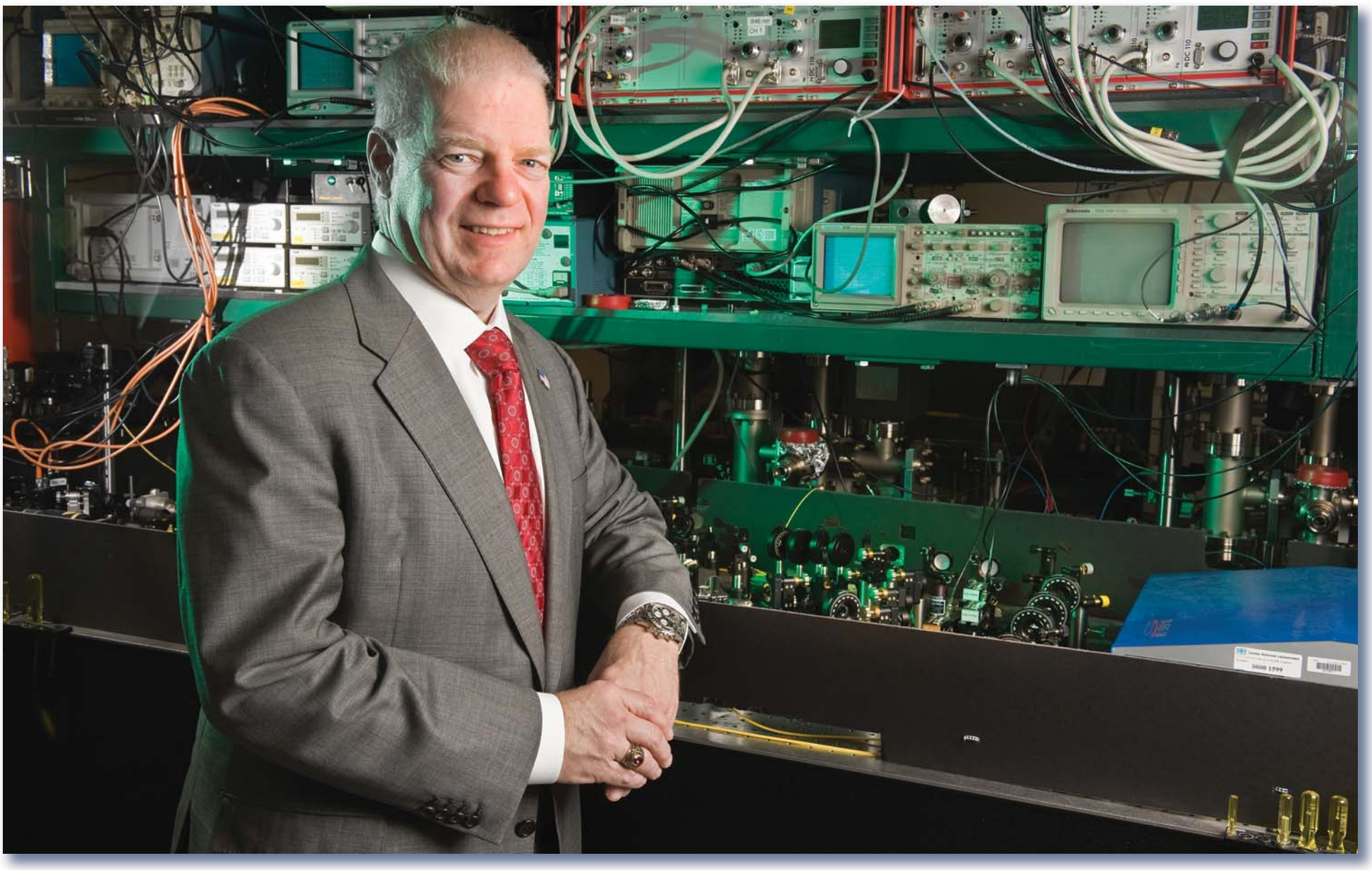
The citation noted the importance of Al's assistance in resolving differences and obtaining the interagency cooperation to resolve and gain concurrence on the critical NPR report for the nation.

The work done by Al's group for the NPR were used also by the New START negotiators, and were helpful to long-term strategy development for support of life extensions for the nuclear arsenal and modernization of the NNSA infrastructure. As a result of the working group's findings, the Obama administration has proposed multibillion dollar budget increases for NNSA's mission for fiscal years 2011 through 2015..

AL STROUPHAUER, left, accepts congratulations from deputy assistant secretary of defense for Nuclear and Missile Defense Policy Bradley Roberts after being presented with the Secretary of Defense Medal for Outstanding Public Service. (Photo by Johanna Hartenberger)

Al came to Sandia in 1983 as a US Army nuclear weapons officer; he was the first military research associate at Sandia/California from 1983-1987. Then he went on to the European Command supporting NATO nuclear forces, and at DOE headquarters as director of weapons planning implementing President George H.W. Bush's nuclear initiatives.

After he retired from the Army in 1994, Al joined Sandia's technical staff in Albuquerque with assignments that focused on long-term strategic management and integration of the nuclear weapons complex to sustain the nuclear arsenal. These included the Defense Programs Analysis Group, the Integration Studies and Support Group, and the Systems Integration Technical Support Organization (510), where he was promoted to manager in 2003. He was one of the co-creators of the Stockpile Life Extension Program that laid the foundation for refurbishment planning for the entire arsenal.



SKUNK WORKS-BOUND — Executive VP Al Romig, soon to leave the Labs to head up Lockheed Martin's Skunk Works, is seen here with an experimental apparatus at Sandia's MESA facility that is used to observe individual calcium ions that have been loaded and laser-cooled in the device. Through a collaboration with multiple universities, Sandia researchers are working to design and fabricate an ion trap capable of storing and moving multiple ions for use as a quantum computer. A trap layout is generated using sophisticated computer simulations and then lithographically fabricated in Sandia's MESA facility. Al was an early, passionate champion for the MESA complex from its very beginnings. (Photo by Randy Montoya)

Al Romig leaves Sandia to lead Lockheed Martin's fabled Skunk Works

Story by Iris Aboytes

Executive VP Al Romig is leaving Sandia at the end of December to head Lockheed Martin's Advanced Development Programs (ADP) — the Skunk Works®.

Based in Palmdale, Calif., ADP is the front end of all Lockheed Martin's aeronautics business, responsible for evolving Lockheed Martin product lines and creating new products and technologies.

Some of the nation's most celebrated and unique aircraft have come out of the Skunk Works, which has been responsible for the aircraft designs of the U-2, the SR-71 Blackbird, the F-117 Nighthawk, and the F-22 Raptor. Its largest current project is the F-35 Lightning II, which will be used in the air forces of several countries around the world.

"An opportunity presented itself where I can continue to serve my country," Al says. "I am energized and excited as I take the next step in my career. I have enjoyed all my positions and my roles during my more than 30 years at Sandia. I have always felt that if you stay in a position too long, you can become stale and don't come up with new ideas. I have been in essentially this job for almost three years. I am leaving before I can no longer contribute to Sandia the way that it deserves.

"I have eight to 10 years of my working career left and I have an opportunity to make an impact on a new organization."

Al came to Sandia because he felt it was the place where he could best use the skills and talents he had acquired through eight years of post-secondary schooling.

"It turned out that although I had contacts at Sandia, I was actually recruited by the Bell Labs system," Al says. "I was fortunate to be interviewed and was offered a job at four Bell Labs sites. I chose Sandia because of the nature of the work. Being an offspring of the Cold War, a child of Sputnik, I felt a calling to come to work at Sandia in defense of my country. I was attracted by the quality of the work, the quality of the people, and the mission of the Laboratory."

Work/life balance

Al has been accused of being a workaholic. "I just have a different work/life balance," he says. "There is a fine line between my vocation and my avocation. My spare time is spent doing volunteer work, both for community agencies and professional committees."

Al has served in many positions, including president of ASM — the American Society for Metals — and numerous committees for the National Academy of Engineering.

"I don't expect others to do what I do. It is my way of life."

To unwind, Al plays golf. "Mike Cieslak taught me," he says. "He won't admit to that because I am a terrible golfer."

When Al first came to Sandia he was on an intramural basketball team with Jim Gosler and John Williams, among others.

"We were terrible," Al says. "I was the worst one. I kept getting accused of trying to play football and fouling out."

Al's hobby is reading, says his wife, Julie. "He is an avid reader," she says. "Al is amazing in that if he reads, hears, or sees something, he knows it. He also has a knack for fixing things. He can fix anything. Al is looking forward to moving to a new house because that means a new set of tools.

"Saturday night is our date night. He always preserves our special time."

Heart and soul

"My dad has an incredible amount of energy," says his son, Chris. "He can work all day and teach all night. He loves teaching. He is pretty amazing.

"When I was growing up, my dad was my soccer coach. He was athletic and used to be a 5K runner. Now we go hiking. That's my favorite time with my dad now."

Daughter-in-law Sara is touched by Al's generosity of spirit. "Alton is a very caring and selfless person," she says, "who is always willing to help those he cares for or those who are in need. We are very fortunate and lucky to have him in our lives."

"My dad loves Sandia with his whole heart and soul," adds Chris. "He loves to go to work."

One of the most important people in Al's life today is his 6-year-old granddaughter, Alexandra. She has a special bond with Bubba, her name for him. "I like to play with Bubba and go to the museum," she says, "especially the one in Albuquerque, because they have the snakes there."

Al's gregarious and generous spirit was apparent to his mother, Chris, even when he was a child.

"Even as a little boy Al loved people," she says. "When we would go out to eat, he would talk with the people at the surrounding tables."

"He is the best thing that has happened to us," says his dad, Al.

'Al truly is my brother'

Al does not have any brothers or sisters, but he and his cousin Donna, who are about five months apart in age, are like brother and sister.

"Al wanted to be an astronaut," Donna says. "He loves to fly and is actually a pilot."

Al was in the Air Force ROTC and learned to fly, but with the Vietnam War over, the military didn't need any more pilots, and he was not commissioned. He flew privately until his many commitments took over.

Al adds: "Flying when your skills aren't sharp is dangerous. Safety always comes first."

Donna isn't surprised he ended up at a weapons lab. "What you don't know about Al is that even as a child, he made bombs," she says. "We would get a cookie tin, fill it with dirt, add berries from the evergreen shrubs, and water, then put the lid on, throw it up in the air, and watch it explode when it hit the ground. His career path didn't deviate far from his childhood.

"Al truly is my brother. We are cousins by birth, but brother and sister by choice."

Julie and Al will be heading to their new home in the Palmdale area during the holidays. Their home in Albuquerque is being remodeled. They want to make sure it is ready for when Al retires in a few years and they return home.

"I am excited for Al as he approaches his new challenge," Julie says. "I am happy to be going to a different place with my absolute best friend."

'I will be back'

"I will have mixed emotions when I leave Sandia. It is with sadness that I close this chapter of my life, but I look forward with excitement to my challenges," Al says. "The work that I will be doing will continue to touch Sandia. There is no doubt in my mind that I will be back on occasion to support our joint work.

"I will miss the people most," he says. "Sandians will be in my heart, my mind, and my soul for the rest of my life. Nothing will ever replace them. It is an old cliché, but I would die for the people in this Lab."

AL ROMIG Sandia Blue through and through

Al ROMIG and wife Julie.

It has been more than a pleasure to be a close friend of Al Romig. I consider it one of the great good fortunes of my life. I met Al when I interviewed at Sandia. We hit it off immediately, both professionally and personally. As staff members together in Center 1800, we collaborated on research, wrote joint publications, and gave co-authored presentations.

But our connections only began with our technical work. My wife, Wendy, and I asked Al to be godfather to our first child, Jacqueline. We then asked his wife, Julie, to be godmother to our second child, Linda. So Al and Julie are forever connected to our family through our children. They have been outstanding godparents in every way imaginable.

FOR MORE tributes, reminiscences, and best wishes from Al's friends and colleagues, see next page.

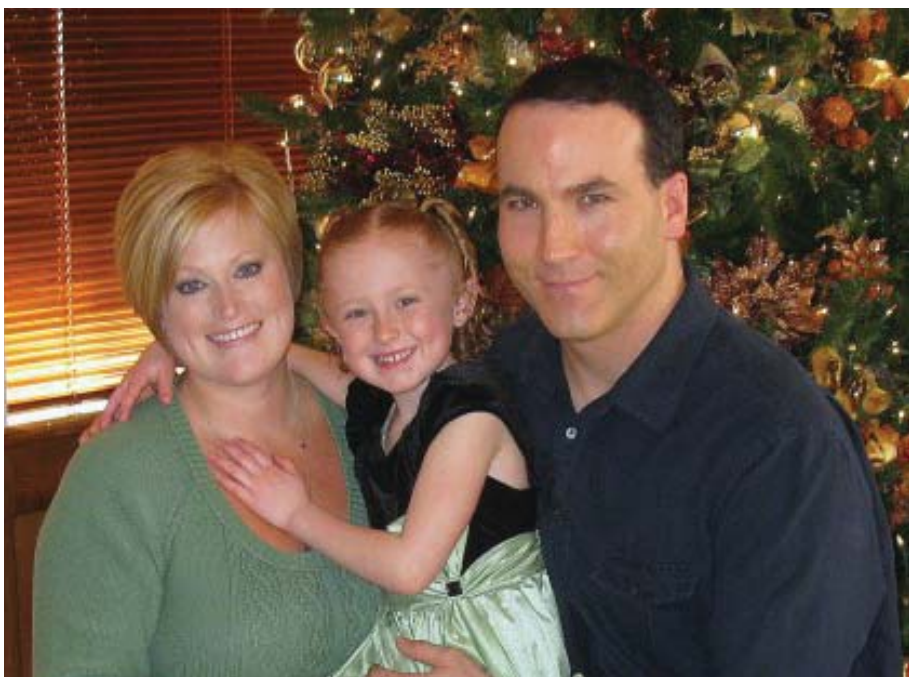
As time went on, Al was promoted to ever higher levels of management at Sandia. He turned out to be my direct supervisor on a couple of occasions. One time, during my performance evaluation, he suggested a goal for the upcoming year to teach him how to play golf. At the time, I had a certain level of competency in playing, but I deferred on the idea of teaching him, reminding Al that some goals were beyond the "stretch" category. While I can't say that Al will ever make the Seniors' Tour, I can say that almost no one I know took on the task of learning with more vigor.

And that really describes Al in a very fundamental way. He takes on everything he does with great enthusiasm. There has been no one I know who has given more to Sandia Laboratories than Al Romig. I believe that Gov. Bill Richardson often referred to him as "Dr. Sandia." That is how most people will remember him, as someone who gave his all for our lab.

I am not the only one who believes that if he was cut, Al would bleed "Sandia blue." We will all miss his sense of optimism, his friendship, and his leadership. At Sandia, there will not be another one like Al Romig.

— Mike Cieslak, 2800

BABY, Bubba, and the bomb!



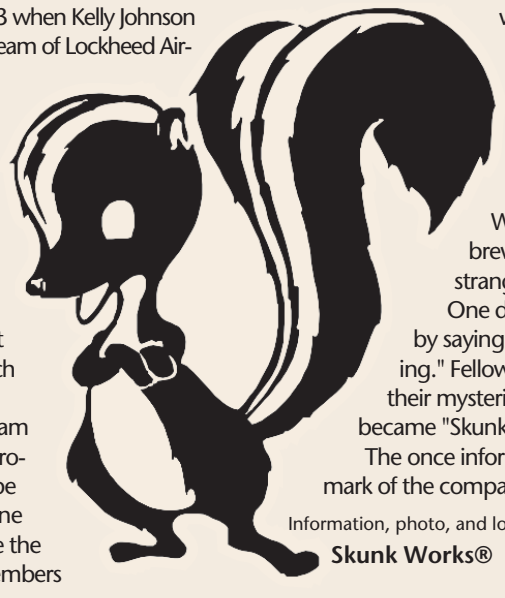
A HAPPY FAMILY — Al Romig's son, Chris, and Chris' wife, Sara, with daughter, Alexandra, who likes to go to the museum with "Bubba."

AL ROMIG (that's him in the red shirt) doesn't consider himself a guest when he visits Hilary and Bill Bledsoe at their cattle ranch in Colorado. He gets right in and helps during the branding.

How the Skunk Works got its name

It was the wartime year of 1943 when Kelly Johnson brought together a hand-picked team of Lockheed Aircraft Corporation engineers and manufacturing people to rapidly and secretly complete the XP-80 project. Because the war effort was in full swing there was no space available at the Lockheed facility for Johnson's effort. Consequently, Johnson's organization operated out of a rented circus tent next to a manufacturing plant that produced a strong odor, which permeated the tent.

Each member of Johnson's team was cautioned that design and production of the new XP-80 must be carried out in strict secrecy. No one was to discuss the project outside the small organization, and team members were even warned to be careful how they answered the phones.



A team engineer named Irv Culver was a fan of Al Capp's newspaper comic strip, "Li'l Abner," in which there was a running joke about a mysterious and malodorous place deep in the forest called the "Skonk Works." There, a strong beverage was brewed from skunks, old shoes and other strange ingredients.

One day, Culver's phone rang and he answered it by saying "Skonk Works, inside man Culver speaking." Fellow employees quickly adopted the name for their mysterious division of Lockheed. "Skonk Works" became "Skunk Works."

The once informal nickname is now the registered trademark of the company: Skunk Works®.

Information, photo, and logo from Lockheed Martin's Skunk Works website.

Skunk Works®

SKUNK WORKS is noted for its development of aircraft, dramatically advancing aerospace technology, including the F-117 Nighthawk stealth fighter, the 2,000-mph SR-71Blackbird, and the U-2 reconnaissance aircraft.

Friends pay tribute to Al Romig

Al first impressed me when he was director of Center 1300 and I was detailed to support him for six months. His attention to every detail of the job, from the administrative requirements to the management of a center, was amazing. His dedication made me think that if he were to bleed, his blood would be thunderbird blue!

Al actually looks forward to performance management meetings so he can mentor his staff. His victims are usually greeted with a warm "Welcome to the woodshed!" He has a big heart and is always helping people. Even with his demanding schedule, he finds time to help when asked — and when not asked, he volunteers. His high energy level earned him the nickname of Tasmanian Devil.

Al has been an influential mentor in my life. I will miss his integrity, dedication, friendship, and passion for life.

Chrissy Casias, Org. 3

* * *

I met Al when Lockheed Martin, then Martin Marietta, was awarded the contract to run Sandia National Laboratories. Al had taken time to read the new contract and had a lot of enthusiasm when it came to the gifts and grants program and the focus on technology commercialization. Al is still a champion today.

Al is known in the community not just for being a Sandia leader, but for writing personal checks to community agencies. He truly leads by example.

Sherman McCorkle, Technology Ventures Corporation

AL ROMIG backed by an image of a Sandia-developed micromachine. (Photo by Randy Montoya)

Al is responsible for my being at Sandia. I got to know him through our mutual involvement in the Materials Research Society (MRS). Al was an indefatigable instructor in MRS's short-course program. He was a passionate advocate for Sandia. (He does bleed Sandia turquoise, after all). Before I worked here, he would say something like, "We really need to get you out to Sandia," pretty much anytime I ran into him.

I took Al up on his standing offer to interview. The rest is history. Al hired me as a manager in his organization (1800). When I have needed to think through complex work-related issues, Al has been the first one I would call. Al remains the fastest on the draw in response to an email of anyone I've ever known.

How to describe Al and his impact on me? The best I can do is six words: recruiter, boss, mentor, counselor, cheerleader, and most of all, friend.

Julia Phillips, 1200

* * *

I met Al in 1981 while I was working on my master's degree in materials science at New Mexico Tech. He was a great instructor who was always prepared, but more than that, he got along really well with students and we became close friends. It was also pretty obvious just how hard he worked, and that continues to this day.

Through all those years and management levels, Al has remained a strong mentor and supporter, but far more importantly he has remained a close friend. Perhaps that's the thing about Al. He is not only comfortable in many worlds — technical, managerial, and personal — he's exceptional in all of them.

Charlie Robino, 1831

Al has always had lots of energy. When he was a member of the technical staff, he would come in to work at about 9 a.m. and work until about 4:30 and drive to teach at New Mexico Tech in Socorro. He would drive back to Albuquerque and go back to work until 3:30- 4 a.m., make fresh coffee for his officemate Fred Yost, go home, and return to work by 9 a.m. He always came in to work four or five hours on Saturday and Sunday, a practice that continues to this day.

Al has a very competitive spirit. When he was a VP in 1000, he participated in a Center 1800 watermelon eating contest. Al and I were the only competitive participants. I broke my watermelon in three pieces and beat Al, who splashed more than he ate. To this day, Al insists I cheated.

Al is a true patriot, and approaches everything with the mindset that he is working to help his country. He takes pride in all Sandia accomplishes and goes out of his way to acknowledge excellent work.

As you can tell, Al is not just my colleague. He is my friend.

Gil Herrera, 1700

* * *

It has been a delight working with Al Romig. I enjoy his passion, his competitive spirit, the fact that he responds to email at 3 a.m., and his great Jerry Garcia neckties. Al has been a champion for the ECP campaign for many years. Under his leadership we have seen the number of Alexis de Tocqueville members, those active and retired Sandians who contribute $10,000 per year or more, grow to 85 members this year.

The United Way of Central New Mexico has grown tremendously under Al's leadership over the past several years; first as the chairman of our strategic planning process, and for the past year as the chairman of the board of directors of United Way. Al has created a legacy of caring that will never be forgotten.

Randy Woodcock, Vice President & Chief Strategic Officer, United Way of Central New Mexico

* * *

While Al and I were in the leper colony (a place for new employees without clearances to work) together, we started a basketball team in a Sandia league. I'm confident that this is the worst basketball team in the history of Sandia. Although Al jokes about being the worst member on the team, he really was. There began our friendship.

In the mid-90s, I left Sandia and went to work for the CIA. From that position, I had the opportunity to meet and work with thousands of people dedicated to supporting US national security objectives. As bad as he was as a basketball player, there is no person on the planet more eager to support activities that "stick it to the bad guy" better than Al. He is an incredible patriot.

By the way, he is a much better golfer than he is a basketball player. Without cheating and on a good day, I'm confident he could break 120.

Jim Gosler, Org. 2

* * *

Sen. Pete Domenici founded The Mind Research Network (MRN) more than 12 years ago with the vision of leveraging brain imaging technologies that were being developed in the national labs with clinical neuroscience research, in the hopes of finding new ways to diagnose brain disease. Al Romig has been instrumental in shepherding this vision through his extensive and continued service to the organization.

His management and scientific leadership have played a critical role in MRN's transformation from a fledgling start-up organization to a viable, self-sustaining institute that is now primarily funded by competitive research grants.

Dr. Romig's devotion and service to MRN has been critical to its success. Al has provided both scientific leadership and management experience to MRN as it evolved from just a few employees 12 years ago to a thriving, 200-employee neuroscience research organization.

John Rasure, PhD, President and CEO, The Mind Research Network

* * *

Al brings an unparalleled energy and devotion to the multiple facets of his work for Sandia. He is not nicknamed the Tasmanian Devil for nothing. He has the ability to switch from techno-geek, to business savvy, to soft-hearted people person, in the whirl of a moment.

His support for diversity and inclusion is heartfelt. At last year's Outreach Committee Recognition event, Al teared up while thanking all the members of the various committees. Al is an effective leader because he is an authentic leader. I know he will be successful in all his future challenges, and I wish him all the best.

Becky Kraus, 11000

AL ROMIG emphasizes a point during this 2006 interview. (Photo by Randy Montoya)

I came to Sandia in 1990. Al had been a teaching assistant at Lehigh University and encouraged me to come at Sandia. We were selling our house so my wife did not come right away. During this time Al and I worked on a paper together.

I had forgotten his late-night work habits and assumed (wrongly) he worked regular hours. One evening I stayed until about 5:30 to complete some revisions on the paper, and I ran it up to his office and put it on his desk. The next morning I came in at about 7:30 a.m., and the paper was back on my desk with Al's suggestions and comments. I made changes and put it on his desk about 6:30 p.m., and I went home.

The next morning I came in early and the paper was back on my desk with further changes and revisions! I started to think that Al was still up to the work schedule that he kept in graduate school. That night I made the changes and went home. I came back to work at about 10 p.m. and snuck up to Al's now dark office and slipped it under his door.

I got to work early the next day thinking I would be at my desk before he put the paper back on my desk. To my utter amazement and disappointment, there was the paper sitting on my desk with the final set of revisions! I made the final changes, walked up to Al's office and handed it to him and said, "You win."

Al looked at me and said, "What?" He did not even think or realize what had gone on was out of the ordinary for me!

Joseph Michael, 1822

* * *

Working for Al Romig the last three years have been the busiest, most fast-paced years of my life! In an effort to try to keep up with Al, I have learned to check my BlackBerry, during the off-hours, at all times of the day/night. Yes — seven days a week!

It has been a wonderful experience. I have learned much from him. He never ceases to amaze me. As busy as he is, he manages to think of every single little detail. There are so many things I admire about Al. He's brilliant; he's honest; he has a sense of humor; he listens; he cares; etc. And what about his energy level?

I'll miss our Monday morning chats. Did the Dallas Cowboys win? How did the Philadelphia Eagles do? I won't need to make sure he's logged in to his computer so that when he sprints into the office he can check his email one last time before leaving for his first meeting.

What about having to prepare Fed-Ex packages with all his reading material for the plane ride home, I'll miss all the printing — not.

I thank Al for providing me with job security if/when I leave Sandia. There's no doubt in my mind that I qualify for employment with a local travel agency.

I'll miss coming in on Monday mornings and finding huge piles of work, along with binder/paper clips all over my desk. He used to smile and ask, "Was your pile big enough?"

Jacque Ramirez, Org. 3

Wrong number leads to new way to collect solar power, Up-and-Coming Innovator recipient says

By Heather Clark

Greg Nielson (1749-2) could have been annoyed by a caller who telephoned him by mistake, thinking he was a different former Truman Fellow, but instead Greg engaged the man in conversation, and a collaboration was born.

"It was a wrong number, but I heard he was from the solar group and he was looking for another Truman Fellow, so I gave him the name and then said, 'Actually, I have this idea. It could be useful for solar power,'" Greg says.

Five years later, Greg, the caller, Vipin Gupta (6124), and more than two dozen other researchers developed tiny glitter-sized photovoltaic (PV) cells that could revolutionize the way solar energy is collected and used.

Nielson is among 15 Sandians who were honored with the first Up-and-Coming Innovator awards this year at the Innovation and Intellectual Property Celebration at the Albuquerque Museum. They were nominated by their directors for displaying enormous potential for innovation, entrepreneurial talent, and their ability to develop unique solutions to complex scientific challenges.

A laboratory that values innovation

Div. 1000 VP and Chief Technology Officer Steve Rottler, who spoke at the ceremony that also honored new patent holders and researchers who received copyrights and licenses, welcomed efforts to make innovation part of the culture at the Labs.

"What we want as a key characteristic of our culture, meaning the attitude and behaviors of everybody who works at Sandia, is valuing innovation. We want to have a work environment and we want to have a laboratory that values and expresses innovation in everything that it does," Steve said during his speech.

Encouraging younger researchers to be innovative is part of that effort, says Mark Allen of Intellectual Property Management Alliances & Licensing Dept. (1931).

Director Gil Herrera (1700) says he nominated Greg because of his intellectual leadership and his ability to work well with people, to manage a project, and to keep a team of about 30 people together.

"The complexity of modern-day inventions requires somebody who can broadly understand the concept and the components of the invention, as modern inventions tend to be made from integrated systems," Gil says. "Greg is an outstanding example of how you do innovation into the future, as he combines this systems-level vision with excellent leadership and teamwork."

The tiny PV cells are fabricated using microelectronic and microelectromechanical systems (MEMS) techniques. They are expected to be less expensive and more efficient than current photovoltaic collectors.

Greg says he came up with the idea while talking with a friend, Mike Watts, a former Sandian who is now a professor at MIT. At the time, research had been done on how MEMS devices interacted with coherent light — for example, lasers — but the two researchers discussed looking into how MEMS devices interacted with incoherent light, like sunlight, Greg says.

Working at the boundaries

"At the time I started my PhD, I was realizing that working at the boundaries of MEMS, microsystems, and optics, there's a lot of unexplored things there," Greg says. "It's really exciting because you are bringing these technologies together that are fairly new, so you can do things that just weren't possible to do before. It's fun. There's a lot of creativity there."

The Up-and-Coming Innovator awards were given to 15 Sandians who displayed potential for innovation or entrepreneurial talent. Twenty-five center directors were asked to nominate newer staff members who had great potential for innovation. The nominees were people who would benefit by knowing how much the Labs appreciates and rewards innovation and by seeing all the innovative activity around the Labs. The nominees were awarded at an Innovation and Intellectual Property Celebration in August that was organized by Intellectual Property Management, Alliances & Licensing Dept. (1931). The event, which is expected to be held annually, was part of Sandia's first Entrepreneurial Spirit Week to foster a culture of innovation and entrepreneurism in the Labs. Watch for several of these awardees who will be profiled in upcoming issues of the *Lab News*.

ALL THAT GLITTERS — Greg Nielson is part of a team of Sandia researchers that developed glitter-sized photovoltaic cells that could revolutionize the way solar power is collected and used. Greg is a recipient of Sandia's Up-and-Coming Innovator award.
(Photo by Randy Montoya)

Because the solar cells are so small — about 20 microns thick — they are flexible, which has enormous advantages for manufacturing and efficiency.

Greg says his team is working on how to put solar glitter into products and hopes to create some functional demonstrations of solar glitter prototype systems, possibly within the next year.

Talking in his office, Greg pulls a container off the top of his desk that contains what looks like a bubble of oil with glitter inside it floating in water. Greg explains researchers are looking at self-assembled monolayers using different chemicals, so they can coat either the metal or the other face of the solar cell to orient the glitter in a certain direction.

"So basically you can get them sunny side up," Greg says. "The reason this is cool is that we're working to create a system where you use these very small solar cells as a sort of photovoltaic ink. We want to print them onto a flexible substrate or wherever we want, thousands at a time, like a Xerox copying process. We've made some progress down that path. We've done some things there that people have not done before."

Working on self-assembly of cells

Greg says his team has been successful at working within the confines of current manufacturing techniques and improving the efficiency of the solar cells, but they are still working on the self-assembly of the cells.

Greg emphasizes that nearly 30 people worked on solar glitter, which has helped move the innovation along.

"Sandia is definitely a place where people are inclined to work together and that really does help," Greg says. "You can come up with really great solutions in your own little area and that's fantastic, but if you can bring together people from a variety of areas to come up with a solution, then that's even more powerful."

Greg first encountered Sandia as an undergraduate intern working with the Cubit Group, which works with an enabling technology for high-performance computer modeling and simulations. Rob Leland (1400) was his manager at the time and helped him consider different options for graduate school, Greg says.

After getting his bachelor's degree in mechanical engineering from Utah State University, Greg went to MIT, where he received a master's in mechanical engineering and a doctorate in mechanical engineering with a focus on optical microsystems.

One of the first Truman Fellows

Greg was one of two researchers to become the first Truman Fellows at Sandia in 2004. He worked on improving the energy efficiency and performance of optical MEMS switching, which would make the switches more appealing for applications in, for example, computing or telecommunications.

Greg says he came up with some ideas that led to faster switching using less power. The result was a switch that operates at 225 nanoseconds and needs 22 volts, and was about 10 times faster than the fastest switch on the market at the time.

After the Truman Fellowship, Greg became a member of technical staff in the same organization.

Asked whether he views himself as an entrepreneur, Greg says he enjoys creating new things and solving problems.

"Being able to spin Sandia's technology out to companies, so that those things can be commercialized and benefit society, that's great," Greg says. "If at the end of my career, I had come up with some things that people find useful, I'd feel like I'd done good things."

The 2010 Up-and-Coming Innovators are:

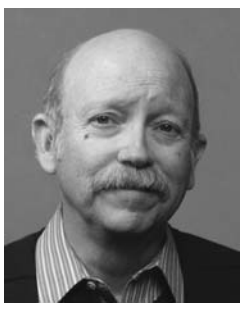
Benjamin John Anderson (1833) • Nicolas Bikhazi (5719) Jason David Bradbury (5747) • Shawn Dirk (1821) Nathan J. Edwards (5622) • Prabal Nandy (5717) • Gregory Nielson (1749-2) • Shawn Pautz (1341) • Tabitha Peyton (5919) • Ronen Polsky (1714) • Thomas Quirk (1384) • Ann Marie Raynal (5354) • Karen Waldrip (2546) • George Wang (1126) • Greg Wickstrom (2141)

Mileposts

New Mexico *photos by Michelle Fleming*
California *photos by Randy Wong*

Steve Haney
40 8133

Wilfred Jaramillo
35 1746



Michael Young
35 6232

Henry Abeyta
30 6000

Nora Armijo
30 10221

Bobby Corbell
30 5736

Philip Dreike
30 5710

Kevin Linker
30 6630

Steve Orth
30 8517

Recent Retirees

New Mexico *photos by Michelle Fleming*
California *photos by Randy Wong*

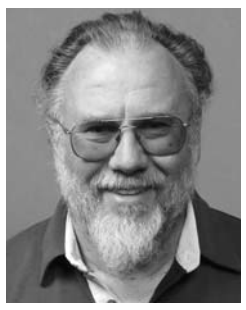
Charles Greenholt
41 6621

Sam Wallace
41 6912

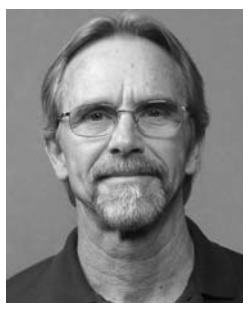
Charlie Warren
39 5355

Steven Johnston
35 2950

Terri Oloscoaga
35 6800



William Wenrich
35 9342



Duane Patrick
33 1535

Kathryn Sedlacek
33 9547

Tony Chen
32 8246

Pamela Barr
31 8116

Jerry Crowder
31 6623

David Klassen
30 10656

Evelyn Moore
30 10648

Ronald Price
30 6225

Evelyn Baca
26 8500

Martha Ernest
25 5526

Lynn Fitzpatrick
25 10667

Catherine Houf
25 8945

Karen Jefferson
25 8112

Sam Miller
23 5644

Pam Tyler
20 10501

Darlene Rutan
18 10507

Linda Groves
16 8112

Jeanne Wallace
11 10248

Fredrick Trussell
30 412

Teresa Antolak
25 8521

Martina Baca
25 4211

Bruce Bunker
25 1816

Barbara Cochrane
25 10530

Ray Finley
25 6210

Leonard Martinez
25 1653

John Scott
25 4824

Tommy Serna
25 4211

Douglas Weiss
25 2122

Kathy Alam
20 2555

Joseph Ehasz
20 5933

Valerie Mascarenas
20 10626

Stephanie Perea
20 6221

At Sandia, giving is just a way of life

SANDIA GIVING AT ITS BEST — Members of Community Involvement Dept. 3652 display toys donated by Sandians for the New Mexico Children, Youth, and Families Department. (Photo by George Kaempf)

BIRDS AND BALLOONS — Kathleen Bowers (3512), left, and Cheryl Garcia (3652) show up early for Take a Turkey to Work Day. (Photo by Rachel Baros)

The item came out in the *Sandia Daily News*: Four hundred and one gifts were needed for children in the care of the New Mexico Children, Youth and Families Department. The department serves and supports children and families, and supervises youth in a responsive, community-based system of care.

The requests weren't elaborate — dolls, trucks, and gift cards. Less than two days later, Sandians had signed up to give the gifts. "I requested and was given a list of 88 more," says Patty Zamora (3652). "Twenty minutes after the announcement came out in the *SDN*, Sandians had already signed up for the last 88.

"A quote by Eileen Elias Freeman in *The Angels Little Instruction Book* says 'It isn't the size of the gift that matters, but the size of the heart that gives it.' The writer could have been thinking of Sandia, where giving is a way of life. Sandians realized long ago that only together are we the most powerful and making the biggest difference, and Sandians work at making that difference."

In November, Sandia Office Professionals' Quality Council (OPQC) teamed with Community Involvement Dept. 3652 to collect 237 turkeys and 69,478 pounds of food for the Albuquerque Roadrunner Food Bank's Holiday Food Drive.

Shoe fittings are ongoing through early next year. Needy children are identified by their school officials. More than 500 children are fitted through the generosity of Sandians. Sandians contribute more than $13,000 yearly.

Sandians' crowning glory is the Employee Caring Program, or ECP, where Sandia employees and retirees have pledged more than $4.26 million to the United Way of Central New Mexico. That translates into more than 70 percent of the Sandia population contributing generously. Sandia has been the No. 1 donor to the United Way since its inception more than 50 years ago. Final numbers will be revealed in February.

Donating, especially at this time of year, is not dedicated to just Sandia-sponsored programs. Drives for needy families are ongoing and are held by various Sandia departments. Corporate giving at Sandia is coordinated and administered by Community Involvement. — *Iris Aboytes*

Sandia Lab Singers make every occasion special

SANDIA LAB SINGERS, a group of Sandians who love to sing, entertain members of Sandia's executive offices. Led by Bob Miltenberger, the group sings at various Sandia and community events throughout the year. The group is open to anyone working at Sandia. For more information on the group, go to sharepoint.sandia.gov/sites/Singers/default or contact Bob at rpmilte@sandia.gov or Cynthia Graham at cgraham@sandia.gov. (Photos by Randy Montoya)