Sandia Labs Director Paul Hommert testifies before Congress on importance of B61 LEP

By Cathy Ann Connelly

Long-term confidence in a critical element of the US nuclear deterrent depends on the success of the B61 life extension program (LEP) now underway at Sandia, Labs President and Director Paul Hommert said in recent congressional testimony.

"In order to sustain high confidence in the safety, security, and reliability of the B61 into the next decade, it is our technical judgment that we must complete the life extension program currently being executed," Paul told the US House of Representatives' House Armed Services Committee's (HASC) Strategic Forces Subcommittee during a 90-minute hearing on weapons modernization.

Paul testified that the B61 LEP must be completed because of well-documented technology obsolescence and aging issues that he called "not surprising for a system the oldest units of which were manufactured and fielded in the late seventies, with some components dating to the sixties."

He testified — along with Gen. C. Robert Kehler, commander, US Strategic Command; Madelyn R. Creedon, DoD assistant secretary for Global Strategic Affairs; and Donald Cook, NNSA deputy administrator for Defense Programs — during the hearing "Nuclear Weapons Modernization Programs: Military, Technical, and Political Requirements for the B61 Life Extension Program and Future Stockpile Strategy."

(Continued on page 4)

SANDIA PRESIDENT AND LABS DIRECTOR PAUL HOMMERT, right, was part of a panel testifying before the House Armed Services Committee's Strategic Forces Subcommittee on the importance of the B61 LEP. Paul was joined at the hearing by, from left, Madelyn R. Creedon, DoD assistant secretary for Global Strategic Affairs; Gen. C. Robert Kehler, commander, US Strategic Command; and Donald Cook, NNSA deputy administrator for Defense Programs. (Photo by Charles Votaw)

Powwow launches Sandia celebration of Native American Heritage Month

Story and photos on **page 5**.

Sandia LabNews

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Sandia National Laboratories

Converting natural gas to liquid fuel

SANDIA RESEARCHER EIZADORA YU prepares biomass harvested from liquid fungal cultures for nucleic acid analysis. The cultures come from the endophytic fungus Hypoxylon sp, which produces compounds potentially used for fuel. Read more about this challenging work in a story on page 3. (Photo by Dino Vournas)

Inside . . .

Sandia unveils 2 more research challenges

By Sue Major Holmes and Neal Singer

Sandia continues to roll out research challenges, holding the third in a series of introductory sessions Oct. 30 with overviews of "Engineering of Materials' Reliability" and "Detection at the Limits."

"Sandia excels in bringing together a wide variety of disciplines, going all the way from fundamentals to mission delivery, and we bring that together to focus on addressing a particular problem. The extent to which we can do that differentiates us from the rest of the pack."

JULIA PHILLIPS

VP and Chief Technology Officer Julia Phillips

VP and Chief Technology Officer Julia Phillips (7000) told a packed audience at the CNSAC auditorium that the research challenges are works in progress, and urged them to attend workshops associated with the latest challenges to help focus the work. "There are many opportunities to get involved," she said.

Research challenges are longer-term programs that could take a decade or more to mature and create results that highlight Sandia's unique national security capabilities. Sandia previously announced four challenges: "Beyond Moore Computing," "Data Science," "Trusted Systems and Communications," and "First to

(Continued on page 4)

That's that

Has there been an event in modern American history that has been so written about, so commented upon, as the assassination of President John F. Kennedy 50 years ago this month? I don't think so. And of course, the very fact that I refer to things that happened a half century ago as "modern" only goes to date me; to me, eighth-grader in 1963, the assassination still feels like current events. To my own adult children, it's ancient history.

Those of us of a certain age can — and will — tell you (and tell you and tell you and tell you) where we were when we heard our president had been shot. I happened to be in shop class at Bel Air Junior High School right outside Washington when our principal came over the PA system to announce the news to the entire school. This was shocking, horrible, unthinkable. We were young; we had grown up in the relatively placid 1950s-early 1960s, and didn't yet know that the world can take some very dark turns. This news confused us. How could this happen? Why would anybody do such a thing?

We shuffled off to our social studies class, still clinging to a hope that maybe President Kennedy had just been wounded, maybe he'd be okay. That was not to be. Our teacher in that class, Mr. Shelby, had the radio on and we all listened intently, in the way that maybe only eighth-graders can, poised between childhood and adulthood. And the official word came: The president was dead. Mr. Shelby's jaw clenched. There were sobs — not stifled, but open unapologetic sobs from around the class.

You have to understand. Kennedy was a hero to us kids. If he were around today, he would inevitably be called a rock star. As you get older, your perspective changes and your understanding of world events and of the leaders who shape them may become more nuanced. In junior high, though, you see things in simple terms: We knew our president was cool, the greatest leader in the world, the greatest president ever. He had stared down the Russians in the Cuban Missile Crisis, hadn't he? He had stirred us with his speech at the Berlin Wall. He had set us on a course to the moon. We were old enough to be filled with pride at the challenge he laid down in his inauguration: "Ask not what your country can do for you; ask what you can do for your country." And now he was gone. Like that. Lyndon Johnson was the president. Lyndon Johnson?! It just wasn't the same at all. Not if you were in eighth grade and had been inspired by President John F. Kennedy to reach higher, to dream bigger, to be better, and do more for your countrymen and the world. That's how we felt. It really was. And then it was just . . . gone.

I've written before, in the context of 9/11, about those singularities in history where the world on one side of that date and on the other seem to exist in different realities. It was like that with the death of President Kennedy. How different? George Lucas conveyed that sense of a lost world perfectly in *American Graffiti*. The movie, with its tag line of "Where were you in '62?' came out in 1973, just 10 years after the assassination, but it evoked a realm so removed from its own time that it seems a fantasy.

Did we really change so much between 1962 and 1973, between then and now? Yes, I think we did, and not all for the better. But not all for the worse, either.

It may be hardwired into our DNA to mythologize our past, to extol a golden age, an Edenic era of prelapsarian innocence, a dream time, a time of high adventure, a time of giants. Reality is more complicated than the tales we tell ourselves. Let's face it: there are whole classes of people, our neighbors and colleagues, who in that storied era would simply not be allowed to *be* our neighbors, our colleagues. Ask them if they'd like to turn the clock back.

* * *

I recall an interview with a historian who talked about why the Kennedy assassination spawned a veritable industry of conspiracy theories. It's difficult, he said, for people to accept that an act of such huge significance, with such immense ramifications, can be carried out by one rather pathetic figure of a man. The magnitude of the crime demands a conspiracy equal to the scale of the consequences.

Sherlock Holmes' operating dictum was "When you have eliminated the impossible, whatever remains, however improbable, must be the truth." And so it is here. Every conspiracy theory ever put forward has had its hearing, its day in court, and been found wanting, unsatisfactory. What it comes down to is this: However improbable that he could pull it off, Lee Harvey Oswald shot President Kennedy. Reality is often just that mundane.

See you next time.

— Bill Murphy (505-845-0845, MS0148, wtmurph@sandia.gov)

Dave Reedy named an ASME Fellow

Dave Reedy (1524), whose Sandia career spans 37 years, is highly regarded in the engineering community for developing improved techniques to predict the fracture of laminated, bonded, and coated materials. In recognition of his notable contributions to the field, Dave has been named a Fellow of ASME (previously the American Society of Mechanical Engineers).

DAVE REEDY

According to Dave's Fellowship citation, "the hallmark of his work is the coupling of rigorous analysis with carefully planned experiments." The citation notes that Dave is best known for his development of a technique to predict failure at bi-material corners. (He is the first author of 13 journal articles and one book chapter on various aspects on this topic.)

In being elevated to the position of ASME Fellow, Dave joins the ranks of just 3,224 engineers out of more than 124,000 ASME members worldwide.

Dave credits a large part of the attainment of this career milestone to his experiences at Sandia. "An honor such as this," he says, "certainly is also a reflection of all the opportunities I've had over the years. I've had the chance to work on many interesting problems, from composite material flywheels for energy storage in the late 1970s to modeling nanofabrication processes in recent years. Perhaps as important, I've also had the opportunity to work with very talented colleagues during my time at Sandia from whom I have learned a great deal."

With a BS in mechanical engineering from the University of Pennsylvania and MS and PhD degrees in the same field from Harvard University, Dave joined the Sandia technical staff in 1976. After spending the early part of his career in the materials science center, he has, since the mid-1980s, worked in the engineering sciences center. In 2003, he was named a distinguished member of the technical staff.

A long-time active member of ASME and the Adhesion Society (which awarded him the Robert L. Patrick Fellowship Award in 2012), Dave is a frequent contributor to peer-reviewed journals. His most recent paper, published this year in the *International Journal of Solids and Structures*, is titled, "Adhesion/Atomistic Friction Surface Interaction Model with Application to Interfacial Fracture and Nano-Fabrication."

Eliot Fang, Dave's manager in Solid Mechanics Dept. 1524, says, "Dave has made phenomenal contributions throughout his career at Sandia in so many key areas: developing novel simulation capabilities to predict interfacial fracture in engineering assemblies, identifying key physics that led to insights about nuclear weapons parts with suggestions of resolution, providing technical leadership to support management teams, and mentoring junior staff members on their career development. He is a true asset for us."

Sandia LabNews

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LOCKHEED MARTIN

Sandia salutes veterans for their service

I SALUTE YOU — During Sandia's Nov. 7 observance of Veterans Day 2013, keynote speaker Lt. Col. Antoinette Gant asked all veterans in the audience who had served in Vietnam to stand. She then snapped off a crisp salute, thanking them for their service, a note of thanks that, as she noted, many never received when they returned home from that unpopular war. In her remarks, Gant addressed the theme "What is a veteran?" A veteran, she said, "is someone who has made the choice to dedicate themselves to a greater cause: The cause of protecting our country. And for the past two centuries, the veterans of our nation have been willing to serve and to sacrifice for a country and a cause they love more than life itself." The ceremony, sponsored by Sandia's Military Support Committee, concluded with a veterans recognition presentation. (Photo by Randy Montoya)

California retirees reconnect and celebrate at annual luncheon

More than 200 Sandia/California retirees gathered in October for the annual Retiree Luncheon held at the Robert Livermore Community Center. The retirees appreciated the warm and inviting nature of the event, as well as the opportunity to socialize and reconnect.

Div. 8000 VP Steve Rottler and Transportation Energy Center Director Bob Carling addressed the audience, providing an update of the state of the lab, news about recent accomplishments, and exciting new directions. Community Relations officer Stephanie Beasly (8521) discussed the SHARE campaign kickoff and Family Science Night and invited the attendees to both events. Special guest Labs President Paul Hommert also attended the event to socialize and reminisce with the group.

The attendees enjoyed a "Then and Now" slide show that featured photos from the 1950s to present. The retirees also learned about ways to stay involved with Sandia through volunteering for activities like Family Science Night, joining the Retiree Association of Sandia/CAL (RASCAL), and attending events in the Livermore Valley Open Campus such as the Farmers Market. — *Krissy Galbraith*

Researchers converting natural gas to liquid transportation fuel via biological organisms

Sandia CaliforniaNews

2-year program is a tall order but do-able, says Labs' Blake Simmons

By Mike Janes

A multi-project, $34 million effort by the Advanced Research Projects Agency – Energy (ARPA-E) is aimed at developing advanced biocatalyst technologies that can convert natural gas to liquid fuel for transportation, and Sandia will use its expertise in protein expression, enzyme engineering, and high-throughput assays to help make it happen.

The ARPA-E program, known as REMOTE, or Reducing Emissions using Methanotrophic Organisms for Transportation Energy, involves 15 projects. Sandia is a part of a two-year, $1.5 million award led by MOgene Green Chemicals, a subsidiary of St. Louis-based MOgene, LC, and will work toward "sunlight-assisted conversion of methane to butanol."

The broad goal is to have another source of energy in the US that doesn't have to be imported and could lead to lower CO emissions than conventional fossil fuels.

Methanotrophs are microbes that can metabolize methane. Blake Simmons (8630) calls them the "poster child" of organisms capable of metabolizing and converting methane. The goal of the project is to engineer pathways from these organisms into another microbial host that can generate butanol. Butanol can be used as a fuel in an internal combustion engine and has, along with ethanol, long been considered one of the best biofuel options for transportation energy.

"The need for hydrocarbons that are non-petroleum in origin is still growing, including for applications such as aviation and diesel engines," says Blake. "But in its natural state, you're not going to readily burn natural gas in those types of engines, and the same goes for some combustion engines." Natural gas, he says, requires a special modification to be used effectively as a liquid fuel in vehicles, much like biomass needs to be converted before it can be used as a drop-in fuel.

"With biomass, we are essentially taking something that exists in nature and converting it into a low-cost, low-carbon, domestically sourced fuel. With this project, we're using natural gas as the input rather than biomass," Blake says. Natural gas extracted from the ground is not renewable, he points out, but is playing an increasingly important role for DOE and the nation's energy supply.

Blake says MOgene brings a great deal of organism expertise to the table, while Sandia offers enzyme engineering and other capabilities.

Improving on what nature has given us

Using organisms to convert natural gas into liquid transportation fuels isn't a new objective for the research community, Blake says. "There have been plenty of investigations into this in the past, since there are plenty of organisms in nature that thrive and survive and multiply off of natural gas metabolism. The problem, though, is that they exist in unique, tailored environments and are typically very slow at what they do." ARPA-E's projects, he says, are hoping to improve upon "what nature has given us" and develop new, more efficient pathways to speed up the process and convert gaseous feedstocks at a pace and scale that is commercially viable. Currently, there are no proven biological methods for converting gaseous inputs such as natural gas into butanol.

"What we and others are doing is looking at the core metabolism of these microbes," Blake says. "Then, we can either engineer it to make it faster in native organisms, or we can take the metabolism out of those organisms and put it in something more industrially relevant."

Though the research community has wrestled with this problem before without much success, Blake thinks Sandia might be up to the task.

"Time and time again, through various LDRDs [Laboratory Directed Research and Development projects] and our work at the Joint BioEnergy Institute [JBEI], Sandia has proven its ability to express proteins that are difficult to express," Blake says. The lab also possesses engineering and modeling tools as well as the ability to build high-throughput custom enzyme assays, significant proficiencies that can lead to better performance in enzymes. Few research organizations, says Blake, offer that package of technical capabilities to tackle a problem like this one.

Blake acknowledges that meeting the objectives will not be a simple or trivial endeavor. "People have been trying to express this class of enzymes for a couple of decades," he says. "So this definitely won't be a slam dunk."

But based on Sandia's work with membrane proteins and various tools developed over the years, he thinks the lab is up to the test. "It's been a confounding scientific challenge for the research community, and this is a notoriously difficult class of proteins," he admits. "But I think we have the collective experience and capabilities at Sandia to figure it out."

Paul Hommert testifies on importance of B61 LEP

SANDIA PRESIDENT and Laboratories Director Paul Hommert during testimony about the B61 LEP before the House Armed Services Committee's Strategic Forces Subcommittee. (Photos by Charles Votaw)

(Continued from page 1)

The B61 gravity bomb is the cornerstone of US extended deterrence to its allies. It is flexible and can be delivered by strategic B-2 bombers and select Dual Capable Aircraft in the North Atlantic Treaty Organization (NATO), as well as F-15 and F-16 fighters. The B61 also has some of the oldest components in the US nuclear weapons stockpile, which is safe, secure, and reliable, but aging, Paul said.

The hearing was intended to provide Congress with expert views on the B61 LEP and to advance discussion on the subject. Rep. Mike Rogers, R-Ala., the HASC Strategic Forces Subcommittee chair, opened the hearing by asking the witnesses to "help us understand the details of the programs, the requirements that are driving it, its history and current status, and its outlook for the future."

Funding uncertainties a challenge

Paul emphasized that the B61 LEP is essential, on cost, and on schedule, rigorously managed, and has the appropriate, focused resources and expert staff needed. However, Paul and the others who testified made it clear the biggest risk to the B61 LEP is not technical failure, but funding.

The impacts of fiscal year 2014 budget decisions haven't been applied to schedule and lifecycle costs, Paul said. Given the current budget uncertainties and reductions forecast due to sequestration, he added it is likely that the LEP will experience schedule delays and accompanying higher overall costs.

The B61 LEP addresses all known issues related to aging or technology obsolescence, and is the minimum program that meets DoD and NNSA requirements, he said.

Paul told the subcommittee that Sandia is well into the full-scale engineering development phase of the LEP. A baseline design review is scheduled for fall of 2015.

To emphasize the point of technology obsolescence, during his testimony Paul showed HASC members an outdated vacuum tube radar component and contrasted it with a new radio-frequency integrated circuit radar for the B61-12.

Paul said Sandia has spent $253 million of the $2.65 billion estimated incremental cost of design, engineering, development, and production allocated to Sandia for the B61 LEP, the amount specified in the Weapon Development Cost Report of June 2012.

"At Sandia, we met all major FY13 program milestones for the B61 LEP on, or under, cost — although sequestration caused some of the work scope to be deferred to FY14," he said.

Paul pointed to rigorous project management controls Sandia has put in place for all the Labs' weapons modernization work. Sandia also has drawn on resources, staff, and expertise nurtured through interagency work on broader national security challenges to meet the urgent demands of Sandia's core nuclear weapons mission, he said.

Last place for half-measures

Paul said that in his 37-year professional career he has had the extraordinary privilege to work at three institutions whose core responsibilities are nuclear weapons: the Atomic Weapons Establishment in the United Kingdom, Los Alamos National Laboratory, and Sandia.

"In that time, I have worked with many exceptional individuals who have dedicated their professional lives to the innovation, science, and engineering excellence required to ensure that these unique devices of mankind are safe, secure, and reliable," he said. "I fully recognize the fiscal environment in which we are operating, and throughout my written testimony I have indicated our focus on cost management and cost efficiency. However, my experience deeply reminds me that nuclear weapons are the last place for half measures or corner cutting."

Research Challenges

(Continued from page 1)

High-Yield Fusion."

Sandia's overall research objective is to enable its own missions now and in the future while advancing the frontiers of science and engineering. With that in mind, research challenges all have certain characteristics, including a long but finite life with impacts during the entire length of the work. The challenges require the expertise of a cross section of the Labs' multiple disciplines, ranging from fundamental science to technology application. They also must overcome technical obstacles critical to a mission area and leave a long-term science and engineering legacy for Sandia.

"Sandia excels in bringing together a wide variety of disciplines, going all the way from fundamentals to mission delivery, and we bring that together to focus on addressing a particular problem," Julia said. "The extent to which we can do that differentiates us from the rest of the pack."

Research challenges also couple to mission areas identified in the past year: nuclear weapons, the core of Sandia's work; global nuclear dangers; nuclear assessment and warning; cyberspace; synergistic defense products; global chemical and biological dangers; secure and sustainable energy future; and leveraged defense innovations.

Engineering of Materials' Reliability

The Engineering of Materials' Reliability research challenge is meant to move Sandia from the forensic analysis of failure to a future of predicting engineering reliability based on a fundamental understanding of the mechanisms of degradation and failure, said Justine Johannes, director of Engineering Sciences (1500).

The performance of materials over time can vary greatly, and predicting that will require experiments and modeling that take the intrinsic variability of materials into account, she said. The project is led by researchers in engineering and materials science, both in New Mexico and California, and Justine said the challenge will require participation from a much broader community.

"This is a really, really hard research challenge" because of the multiscale nature of materials behavior, so a broad base of expertise is crucial, she said.

The goal is to predict engineering reliability three times faster than is currently possible, while including important materials phenomena and behavior across different scales, Justine said. Such fundamental understanding is vital because much of Sandia's work has a high impact on national security and demands confidence in the ability to predict materials reliability, she said.

Detection at the Limits

The basis of Detection at the Limits is sensor research to develop sensor systems that perform far beyond anything now available — that are as sensitive as theoretically possible to whatever they need to detect, said Org. 2500 Director Anthony Medina, who outlined the research challenge along with senior managers Toby Townsend (5710) and Wahid Hermina (1710).

The goal is important because all of Sandia's Strategic Management Units and its seven research foundations do sensor work in some form and have demonstrated impact in their field, Anthony said. In addition, he said, Sandia has unique capabilities because of its Microsystems and Engineering Sciences Applications (MESA) facility.

Estimating that Sandia already spends at least $250 million annually on sensor system research, development, and production, Anthony said approximately one out of 10 Sandians already works on sensors. "With our silicon foundry and compound semiconductor microfabs, our more than 200 patents, and more than 40 R&D 100 awards, it's clear we have capabilities that almost no other single entity in the US can match," he said.

Better sensors require improvements in sensitivity and selectivity, smaller size, lower weight, and lower power, all enhanced by microscale and nanoscale features, Anthony said.

He foresees sensors "limited only by fundamental physical limits."

Toby said there's a need for intelligent sensors to detect at the intent level rather than the production level. "Massive single-sensor data products will be replaced by actionable-intelligence 'knowledge' products," he predicted. "Data analysis and decision making will no longer be predominately a human endeavor."

Wahid wrapped up the discussion by outlining Sandia's past successes in the sensor field and the need for improvements. He noted sensors could be located on a site or at stand-off ranges, including satellites, and said they might sense biological, atomic, physical, chemical/explosive, or radiation outputs.

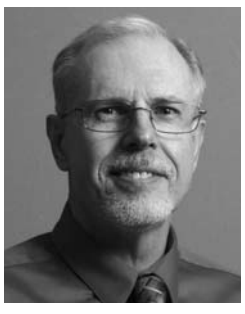
Wahid said Sandia has had great impact with sensors in the past, including the MicroChemLab, novel micropreconcentrators, and micro gas analyzer. He said he sees "a strong coupling" between sensor work and all of Sandia's research foundations and challenges.

Sandia marks Native American Heritage Month with powwow, other activities

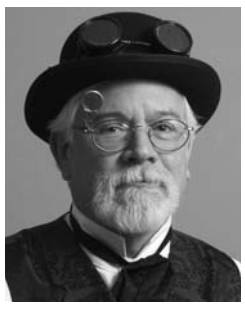
An opening ceremony powwow, the first of four events scheduled for Native American Heritage Month by Sandia's American Indian Outreach Committee (AIOC) in partnership with Sodexo, was held Monday, Nov. 4, in the Thunderbird Café patio area. In the photos here, the Church Family Dancers lead lively Sandians in the Round Dance, a familiar social dance, with accompaniment provided by the Red Road Crossing drum group. In another special event, Sandia's Diversity organization's Diversity Cinema screened "Games of the North," which follows four Inuit athletes as they compete in traditional sports activities that test skills that over the centuries have proven vital for surviving the unforgiving Arctic. Upcoming events include Leigh Cleveland demonstrating Navajo rug weaving (Nov. 18, 11:30 a.m., in the Steve Schiff Auditorium) and a closing ceremony featuring Sandia's own Ron Hoskie (4842), native flutist, on Nov. 25, also at 11:30 a.m. in the Schiff Auditorium. The AIOC says, "Thank you to all for joining in the celebration of our Native American culture."

Mileposts

New Mexico *photos by Michelle Fleming*



Tommy Cabe
40 5635



Michael Pendley
40 5632

Mary Cocco
35 10679

Recent Retirees

Howard Arris
40 1833

Stephen Slutz
35 1684

David Duggan
30 9516

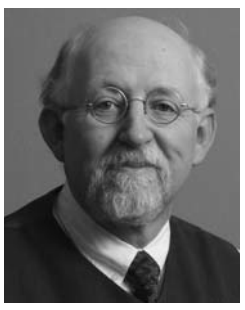
James Kajder
30 2728

Allen Robinson
30 1443

Randy Schmitt
30 1118

Henry Westrich
33 7910

Paul Romero
30 4143



Len Malczynski
25 2143

Susan Pickering
25 6230

Rafael Aragon
20 1674

Regina Deola
20 4143

Scott Hutchinson
20 1355

Tina Nenoff
20 1114

Jim Novak
20 5950

Jason Bolles
15 3655

Karen Haskell
15 9326

John Hewson
15 1532

Jonathan Rath
15 1525

Larissa Velasquez
15 10653

Joel Wirth
15 5956

Sandia Labs volunteers participate in many Make a Difference Day activities

By Stephanie Holinka

During a week when many Sandians could have been at home due to a shutdown, nearly 200 volunteers participated in a variety of service activities throughout Albuquerque as part of Make a Difference Day.

More than 30 Sandians — mostly from Surety Engineering Dept. 420 — volunteered at Roadrunner Food Bank, where they packaged breakfast cereal for Albuquerque's hungry children as part of the Kids Backpack Program, and prepared food boxes for seniors.

More than two dozen Labs volunteers also assisted in a complete upgrade of the computer rooms at the Boys & Girls Clubs of Central New Mexico, painting new computer cubicles, setting up computers, and installing software. Sandia also sponsored the installation of new cubicles and new flooring.

Around 20 Sandians worked on science-related activities with children at Explora's Science in the Park event and at Nuclear Medicine Day at the National Museum of Nuclear Science & History.

Another 15 recruits helped clean up a newly arrived cruise missile as part of Operation Preservation in the museum's sculpture garden.

BOYS AND GIRLS CLUB

ROADRUNNER FOOD BANK

Other volunteers painted a client's apartment at Crossroads for Women, a transition program for homeless women with addictive and mental health disorders.

This year Marcey Hoover (420) marked her third consecutive year organizing a Sandia group to help out at Roadrunner Food Bank as part of Make a Difference Day.

"The thought that children in our community may go hungry over the weekend without that backpack is sobering but the thought that I can do something to help, by just giving a few hours of time, is immensely satisfying," Marcey says.

Boys & Girls Clubs volunteer Stan Hall (9342) says the work is intended to ensure that the next generations of scientists and engineers have the needed education, tools, and development programs to be the best they can.

Make a Difference Day is the largest national day of community service, held annually at the end of October. Each year, Sandia volunteers, as well as volunteers throughout Albuquerque, work on service projects to improve the quality of life in the community.

NUCLEAR MEDICINE DAY

OPERATION PRESERVATION

CROSSROADS FOR WOMEN

SCIENCE IN THE PARK

Sandia Classified Ads

Note: The Classified Ad deadline for the January 10, 2014 paper will be 5 p.m. on Monday, Dec. 23. This change in the deadline applies only to the Jan. 14 paper.

MISCELLANEOUS

CARPET CLEANER, Bissell Pro-Heat 2X, used once, w/unopened, 128 oz., Fiber Cleansing Advanced Formula, $240. Joseph, 505-822-0536, audreyzen@msn.com.

DINING SET, counter-top height, w/leaf, 6 chairs, sleek design, light cherry finish, great condition, $650. Chavez, 459-5593.

COFFEE MAKER, Krupps, 12-cup, never used, $20; Dust Buster, never used, $20. Lewis, 323-7268.

COMPUTER DESK, w/printer stand, $35; electric weed eater, $30; 36-in. round bronze wall mirror; metal wall sculpture. Harrington, 235-6982.

SNOW TIRES, set of 4, on alloy wheels, for Toyota Corolla, get ready for winter, $200. Anthes, 379-3438.

SOFA, Design Warehouse, slipcovered, $450; matching easy chair, $200; king size futon, $75. VanArsdall, 268-1685.

ANTIQUE WARDROBE, $300; Santa Fe-style rustic cabinet, $350; 4-poster bed, wood, queen, Bombay, retails $1,299, asking $400. Thomas, 388-4071.

LAWN SWEEPER, tow-behind, fits various lawnmowers/tractors, for easy pickup of materials, $100. Pacheco, 877-8255.

HEATED HOSE, Pirit, 100 ft., provides constant source of water in freezing temps, new, $125. Kirk, 281-6668.

SCUBA GEAR, BC, octopus (2), regulators, dive computer, shortie wet suit (women's large), etc. all for $100. Mead, 323-2253.

PLAY KITCHEN, w/accessories, food, $30; kid's bicycle, 18-in., light blue, puppy paw designs, training wheels, like new, $60. Mowry, 238-0363.

DINING SET, Autumn Wood, solid oak, white wash finish, 91-in. table, 6 chairs, hutch, $1,995 OBO. Faculjak, 823-9686.

HOLIDAY CONDO RENTAL, Pagosa Springs, 2-bdr., sleeps 8, 4 nights, Dec. 28, no pets, $575 OBO. Fernandez, 505-238-4722.

COFFEE TABLE, Thomasville, solid pecan, 72"L x 22"Wx 20"H, $200 OBO. Hardin, 828-1502.

COUCH, beige, excellent condition, $75 OBO; chain-link gates, 3, 3' X 5', ideal for dog run, $50 OBO. Nunez, 505-404-8757.

COFFEE TABLE, wood, glass, $75; futon, $50; chest of drawers, $50; toy chest, $40; mattress box spring frame, $150. Barnaby, 255-5624.

Z-COILS, women's size 8, Freedom tennis shoe, blue & white, lightly used $100. Willis, 304-5034.

YARD SALE, Nov. 23, 6801 Vivian Dr. NE, near San Antonio & Louisiana, vintage, antique items. Whitehead, 505-332-6686.

OSCILLOSCOPE, Lecroy WaveAce 102, 2 channel, 60 MHz BW, 1-1/2 yrs. old, $1,000 new, asking $650. Weishuhn, 281-6980.

DEEDED TIMESHARE POINTS, 300K, Club Wyndam, great getaways worldwide, try before you buy, efairfield.com, $4,000. Yawakie, 505-228-0350.

CHRISTMAS LIGHTS, clear, C7 & C9, 5 ea., outdoor, new in box, $5 ea. Harris, 343-0683.

DVD MOVIES/TV SERIES, great shape; Lost; Dexter; ER; West Wing; 24; Friends; Lord of the Rings; more; various LPs; reasonably priced. Galbraith, 505-269-2889.

GARAGE EPOXY KIT, roll on rock, 500-sq. ft., professional grade, tan, $540. Chavez, 505-385-2574.

CLOTHING & SHOES, junior girl's, size 0, small etc., heels size 6 & 6.5, new/excellent condition. Velasquez, 610-3672.

FORCED-AIR HEATER, Remington 150, $50; Warferdale stereo speakers, walnut cabinet, 21" x 13" x 25"H, $100; OBO. Garcia, 280-5815.

RADIAL ARM SAW, 10-in., Craftsman, numerous accessories, excellent condition, $300. Sieradzki, 292-5049.

MIRROR, framed, beveled, 42" x 30", see at http://albuquerque.craigslist.org/for/4155556587.html, $100. Martinez, 274-2787, ask for Nadia.

HOME GYM, Bioforce 2.2, 220-lb. total capacity, w/extra adjustable bench accessory, $450. Hughes, 806-676-3584, lindseygloe@gmail.com.

GAS LOG FIREPLACE, used, built-in, complete w/logs, chimney pipe, valve, propane or natural, $400 OBO. Rector, 286-1217.

ELECTRONICS: Canon PIXMA iP6220D printer; Pioneer Elite DV-C36, 5-disc. DVD player; 300-disc CD player; $50 ea. OBO. Verley, 410-9885.

HAMMOND ORGAN, model L143, everything works, w/matching bench seat, you move, $200. Stephenson, 299-3914.

How to submit classified ads

DEADLINE: Friday noon before week of publication unless changed by holiday. Submit by one of these methods:

- **EMAIL: Michelle Fleming (classads@sandia.gov)**
- **FAX: 844-0645**
- **MAIL: MS 1468 (Dept. 3651)**
- **INTERNAL WEB: On internal web homepage, click on News Center, then on *Lab News* link, and then on the very top of *Lab News* homepage "Submit a Classified Ad." If you have questions, call Michelle at 844-4902. Because of space constraints, ads will be printed on a first-come basis.**

Ad rules

1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
2. Include organization and full name with the ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. We will not run the same ad more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

TRANSPORTATION

'11 TOYOTA 4RUNNER LIMITED, 4x4, fully loaded, 53K miles, priced < KBB & NADA, $29,900. Daniel, 505-238-3502.

'11 TOYOTA 4RUNNER, grey, moon roof, 3rd row, sonars, sat. radio, tow pkg, 33" Nitto Trails with lift kit, 27K miles, full factory warranty, $29,900 OBO. Solis, 331-8148.

'10 TOYOTA TACOMA, cab pickup, 2WD, AT, AC, power, sliding rear window, 28K miles, excellent condition, $20,000. Worden, 299-4915 or 259-2923.

'13 FORD FUSION, hands-free voice activated, 22-34-mpg, 20K miles, $18,500 OBO. Davis, 505-918-6469, ask for Rose.

'95 FORD F250 XLT PICKUP, 7.5L V8, AT, AC, 4WD, only 75K miles, sharp, runs great, $5,000. Johns, 858-1430.

'95 BMW 325i CONVERTIBLE, red w/black top, leather, 115K miles, great condition, well maintained, $5,200. Roybal, 505-792-2473.

'05 TOYOTA COROLLA S, 5-spd., silver, gray cloth, 1 owner, 118K miles, excellent condition, $6,000. Dwyer, 505-271-1328.

'01 PORSCHE 911 TURBO, 415-hp, silver, black leather, 6-spd. maintenance records, 37K miles, on autotrader.com, $41,000. Wareing, 505-652-2883.

'08 MAZDA 3, 4-dr., standard transmission, 60K miles, great condition, $10,500. Hunter, 340-4816, ask for Janese.

'00 VW BEETLE GLS-TDI, loaded, AT, sunroof, 32-36 mpg in town, used but not abused, <avg. miles, excellent shape, $4,995. Schaub, 263-1961.

'99 TOYOTA TACOMA SR5, 4x4, V6, 5-spd., tow pkg., new tires, bed liner, 213K miles, $7,900. VanGemert, 620-7145.

'07 JEEP RUBICON, 2-dr., AT, silver, new tires, T-Tops, 50K miles, $20,500 OBO. Blend, 831-9455.

RECREATION

'12 LANCE TRAVEL TRAILER, model 2185, loaded w/options, sleeps 7, like new, $24,500. Surran, 505-263-7571.

'08 5TH WHEEL BUNKHOUSE, 36-ft., 1-1/4 baths, '05 Dodge Dually 1-ton, quad cab, 4WD, $51,000 OBO; will sell camper separate. Rankin, 505-238-9963.

'02 5TH WHEEL, 25-ft., 1 owner, immaculate w/extras, clean title, $9,500 OBO. Marquez, 505-892-1013.

'12 ITASCA REYO 25T, Class A motor home, 14,456 miles, 26-ft., 11'H w/ 1 slide out. Lopez, 505-401-1422.

'79 AIRSTREAM, 21-ft., Safari Travel Trailer, mostly restored, still needs a few details, good condition, $7,000. Stinebaugh, 505-275-3170.

REAL ESTATE

4-BDR. HOME, 2-1/2 baths, 2,700-sq. ft., formal living & dining, loft, 2-story, huge yard, enclosed hot tub, $235,000. Maestas, 505-459-7650.

3-BDR. HOME, 2 baths, 3-car garage, single level, High Desert, MLS#801241. Schuster, 505-554-2342.

3-BDR. CONDO, 2 baths, 1,318-sq. ft., 1st floor, wood floors, tiled baths, garage, 2 pools, workout room, park & trails nearby, $142,000. Castro, 505-250-1445.

4-BDR. HOME, 4 baths, 3 living areas, 3,200-sq. ft., remodeled, beautiful, pool, Four Hills, $375,000. Cordova, 604-5307.

4-BDR. CUSTOM BRICK HOME, 3 baths, 3,867-sq. ft., finished basement, pool/spa, Foothills, great views, MLS#770605. Maestas, 505-239-1054.

WANTED

GOOD HOME, young prurient-minded roosters, Brahma/Rhode Island Red mix. Molley, 296-8653.

AIR COMPRESSOR, (>5-gpm at 90 psi) and/or power washer (>2-gpm). Koudelka, 856-7736.

MOVING BOXES, McDonald, 505-833-0332.

HANDYMAN, general on-going maintenance, house in Placitas (near the Merc). Sullivan, 805-794-0056.

FEMALE WATER POLO PLAYERS, new Master's team, no experience necessary, call for more details. Grady, 720-5364, ask for Debbie.

FREQUENT FLYER MILES, to visit new grandchild in Germany, can pay up to $600. Canaris, 505-264-5299.

WESTERN LEATHER COUCH, distressed-look, with/without loveseat, nice enough for company, comfortable enough for dogs. Burfeindt, 505-897-0179.

ROOMMATE, private bath, Volterra, 5 mins. from Eubank gate, $450/mo., utilities included. Guillen, 505-385-8189.

WORKING VCR, w/remote control & instructions. Chorley, 296-1454.

FOSTER COORDINATOR, for Lap Dog Rescue of New Mexico, volunteer position is POC/recruiter for animal foster activities. Spence, 934-2202.

HOUSE SITTER, for 2 indoor cats, very close to KAFB, Monday, Dec. 9-Tues. Jan. 7. Smith, 296-5353.

USED TENNIS BALLS, for strong chewing 2-yr.-old German Shepherd. Prior, 977-9008, after 6 p.m.

HOUSE SITTER, 3 mos., early 2014, NE Heights home. Smith, 301-0412, ask for Jeffery.

Squad Two

Sandia Emergency Management dedicates new Squad truck with traditional push

Why would you push a brand new truck?

Photos by Randy Montoya

Emergency Management Dept. 4236 has just *pushed* a new truck (squad) — dubbed Squad 2 — into service. The new vehicle will transport members of the Sandia Emergency Response Team and their equipment to perform their missions of emergency medical services, hazmat mitigation, and rescue. The new Squad 2 replaces a 1993 model, which was a gift from Los Alamos after they retired it. Sandia's only other new squad — Squad 1 — was acquired back in 2002.

"So why would you push a brand new truck?" asked Sally Uebelacker, senior manager in Security and Emergency Management, who attended Squad 2's dedication ceremony on Nov. 5 outside Gate 1. The practice has a history: Early hand-drawn fire wagons had to be pushed back into the station by hand. Later, horse-drawn steam engines also had to be backed up into the station by the firefighters because horses do not enjoy going in reverse.

The fire service, a tradition-steeped profession, continues the ritual of pushing a new truck into service.

Sandia does not have a station with stalls, but to honor the past, members of the Sandia Emergency Response Team pushed the new Squad 2 into service and into Gate 1. ERT Team Lead Rick Romero explained that the tradition holds that "if you push the truck in the first time it will always bring you back home safely."

Reading, writing, and radiation

Tech Area 5 course lets support staff explore nuclear engineering

By Nancy Salem

The people who work in Tech Area 5 share a mission but not a language. "Even though we're in the same organizations supporting the nuclear weapons complex, we use words differently because we don't all have the same technical backgrounds," says Shawn Howry (1382).

Warren Strong, manager of Nuclear Materials Management Dept. 1386, and Dave Wheeler, manager of Nuclear Quality & Requirements Dept. 1382, had talked about the need for differently trained people to understand the fundamentals of nuclear engineering. "We agreed that workers with various kinds of expertise in this division should know more about our product — providing unique radiation environments for materials and systems testing," Dave says. "We pride ourselves on being a learning organization. We can be more effective if everyone understands something about radiation and nuclear technology."

Warren and Dave envisioned a course that would offer nuclear engineering, radiation, and technology training to people without that educational background. Earlier this year, Dave and Shawn got to work on the idea. Their first stop was the University of New Mexico, where they approached long-time nuclear engineering professor Bob Busch, no stranger to Sandia. He had worked and interned at the Labs dating back to the 1970s.

Busch agreed to teach a nuclear engineering fundamentals course at Tech Area 5 over the summer. It ended up being designed for technical and non-technical people.

"A very diverse group of people showed interest in attending," Shawn says. "For some it was a refresher on the technical side of nuclear engineering and for non-technical people it was a great experience learning some of the language and giving insight into what they hear and do in their organizations."

CRITICAL INFORMATION — Bob Busch, center, a University of New Mexico nuclear engineering professor, goes over features of the Sandia Pulsed Reactor/Critical Experiments (SPR/CX), with Labs contractors Chris Hall (4126) and Cassandra Wilson (1385). Chris and Cassandra were students in a course Busch taught at Sandia over the summer that gave nuclear engineering training to Tech Area V staff who didn't have that background. (Photo by Shawn Howry)

Drinking from a fire hose

The course had 10 two-hour sessions held in Tech Area 5. Busch modified his sophomore-level introduction to nuclear engineering for a wider audience. "It was crammed full of information. At times it was like drinking from a fire hose," Shawn says. "We wanted a curriculum that would keep the technical people challenged but not overwhelm the non-technical students. Bob tailored the course to a happy medium."

The class drew a core group of 20 students from nine departments. Four were nuclear engineers. The students were assigned to teams with a mix of technical and non-technical people who got together outside the once-a-week classes to discuss lessons and make sure everyone was keeping up. Team leads helped answer technical questions and provide mentorship. "Having these small teams and being able to interact internally was huge," Shawn says. "We could help each other answer questions and work things out."

Among the curriculum topics were Nuclear Reactions, Radioactive Decay, Interaction of Heavy Charged Particles and Matter, Neutron Cross Sections, and Ranges of Betas. There were no tests or grades, and Busch provided problems of different difficulty that let students work at their own level and pace.

Chris Hall, a contractor in Dept. 4126, says he graduated in geosciences 25 years ago, "so it was a bit of a challenge to get back to that type of math."

"Then the light started to flicker on and stay on," he says. "It was fun — challenging, but fun."

Chris says the course broadened his perspective on safety. "I take all the radiation training, but this was much more comprehensive," he says. "And it was a lot more interesting to understand not just how radioactive material decays but how and why certain isotopes are used for certain experiments, and why certain thresholds can be reached or not reached. It was valuable."

Jamie Arnold, a mechanical engineer who worked in explosives and rocket testing, recently transferred to Nuclear Engineering & Maintenance Dept. 1385. "My background is technical but didn't necessarily lend itself to what we do here," he says. "This course gave me a really good overview and better understanding of what the nuclear engineers can do and why. I was learning from the first day even though I've been in engineering my whole career."

Shawn did not bring a nuclear background to the course. "It was tough, but in a good way," he says. "It was totally new content outside my profession of organizational learning. Sophomore-level nuclear engineering — it posed challenges for me. But in the end I understood more. It helped me listen differently. We were not expected to be experts, just more knowledgeable about the fundamentals."

Kelsey Curran, a contractor in Dept. 4126, says she enjoyed digging into the how and why of nuclear reactions. "I'm not a nuclear engineer so it was great to get a more in-depth understanding of that field," she says. "I came away with a better knowledge base to ask more in-depth technical questions and have a better base for understanding. I enjoyed the opportunity to connect with both academia and other organizations at Sandia to expand my knowledge and understanding of nuclear engineering."

Stronger relationship with UNM

The course built relationships within and between organizations, Shawn says. "What better way to share what we do than in a class like this where we get together on a regular basis," he says. "A lot of us interacted but didn't really know each other. You start putting names to faces and learn more about people across the Labs."

Warren says the course met his expectations and will help the organization. "We want to reach people in quality assurance, materials management, document control, and other fields so they can feel plugged into the nuclear part of the organization," he says. "People can be better at what they do if they know more about the end product."

Dave says a goal of the course was to strengthen Sandia's relationship with UNM. "There should be a very strong connection between the UNM nuclear engineering program and Tech Area 5," he says. "This was an opportunity to leverage their skills in teaching and educating our staff."

The course was successful enough that Warren and Dave say they will look at offering more classes, some more technical and others less. Busch says he would welcome the chance to teach more at Sandia. "It was a great experience, a learning experience," he says. "This was a different audience for me. They had questions I had never thought about. It was fun."

STUDENTS IN A NUCLEAR ENGINEERING COURSE at Tech Area V prepare to watch a nuclear reaction at Sandia's Annular Core Research Reactor (ACRR). The course helped differently trained people in TA-5 understand the fundamentals of nuclear engineering. (Photo by Shawn Howry)

The final class featured tours of two nuclear reactors used in research, the Annular Core Research Reactor (ACRR) and the Sandia Pulsed Reactor/Critical Experiments (SPR/CX). Lonnie Martin (1381) at ACRR and John Ford (1381) at SPR/CX talked to and showed the class in detail how the reactors work. "It helped bring together a lot of what we were talking about in the course," Shawn says. "We were able to place everything in context."

Jamie says his takeaway was a better understanding of how his group's work applied to the rest of the Tech Area 5 organization. "I could see the types of things we were designing and maintaining and how that actually makes a difference in the experiments taking place," he says. "After this course I wondered if maybe I'd chosen the wrong degree. I was surprised at how interesting nuclear engineering could be."