Sandia LabNews

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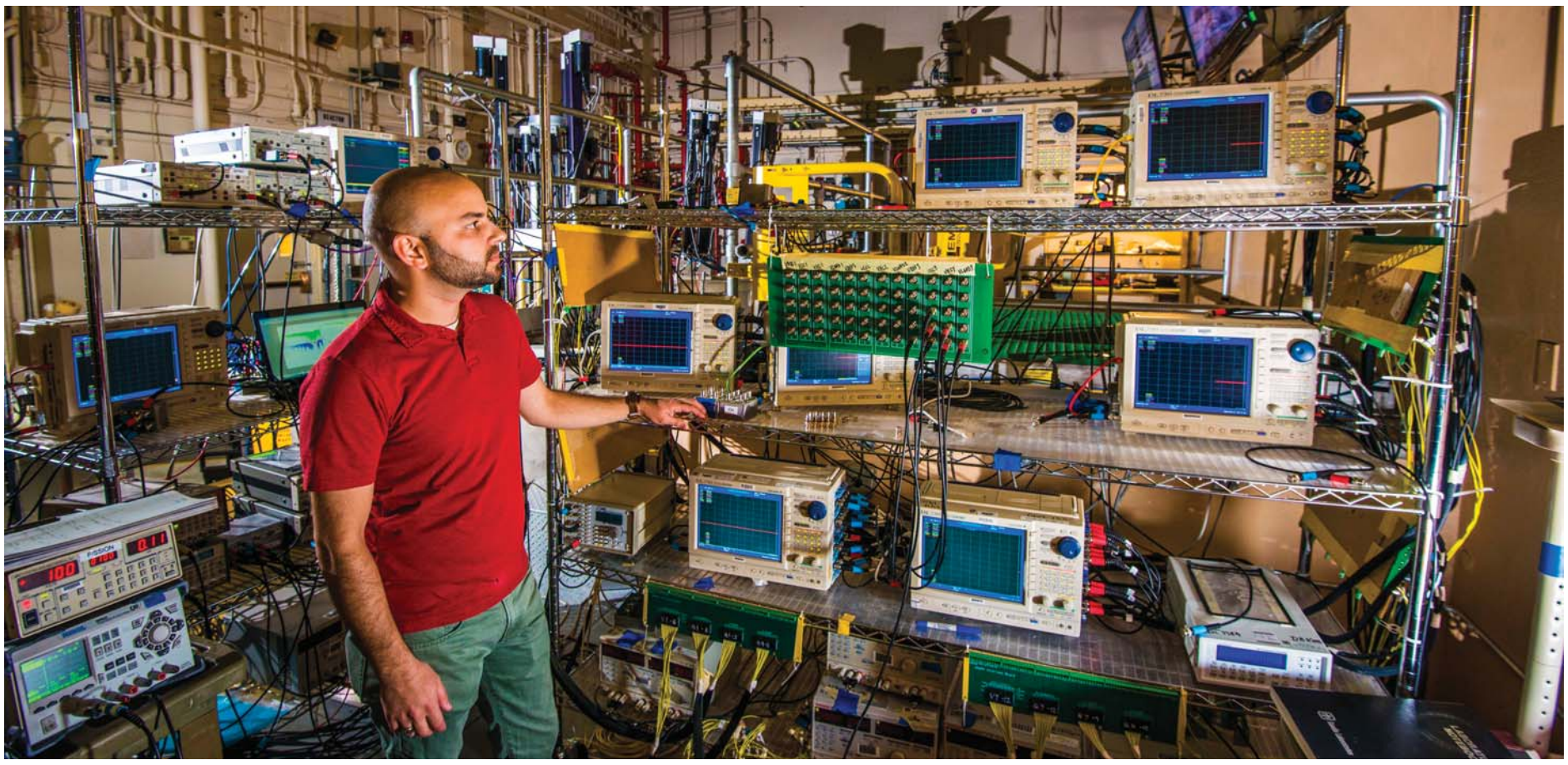
Sandia National Laboratories

R&D 100 52 Years of Invention

2014 R&D 100 Awards

Sandia wins three awards

Story, photos on page 6



WORKING WITH QASPR — Billy Martin (6221) looks over diagnostics as part of Sandia's QASPR program, developed as a way to ensure the nation's stockpile is safe, secure, and effective after the closure of the Sandia Pulsed Reactor. For more about the QASPR program, **see page 4.** (Photo by Randy Montoya)

Paulette Solis wins national recognition with annual NNSA security award

Security professional Paulette Solis (4249-1) has received the National Nuclear Security Administration (NNSA) Bradley A. Peterson Contractor Security Professional of the Year Award.

Susan Christian-Payne of the Nevada Field Office was also honored with the NNSA's Bradley A. Peterson Federal Security Professional of the Year Award.

PAULETTE SOLIS

The awards recognize one contractor and one federal employee whose contributions to security programs within the NNSA enterprise exemplify excellence and commitment. Paulette and Christian-Payne will receive formal recognition at an upcoming ceremony.

"Ms. Christian-Payne and Ms. Solis exemplify NNSA's commitment in improving and enhancing its security across the enterprise," said Doug Dearolph, NNSA acting chief and associate administrator for the Office of Defense Nuclear Security. "I applaud the dedication of Susan and Paulette for their commitment in helping to protect NNSA's resources. Our security culture continues to see improvement in accountability and vigilance as we continue to implement controls that expand accountability and cooperation across the enterprise."

Chief Security Officer and VP of Infrastructure Operations Div. 4000 Mike Hazen says Paulette is "simply outstanding" and a perfect selection to win the award.

"Paulette is a positive leader who inspires the cooperation and confidence of others by her sincere and selfless service to people and mission," Mike says. "How proud we all are."

With more than 20 years of experience, Paulette exemplifies the consummate security professional. In her position as team lead for Contract Security Management and the Badge Office/Clearance Office, Paulette is a strong believer in continuous improvement and program integration.

Her efforts in 2013 resulted in cost savings and avoidance of close to half a million dollars and improved performance with shortened processing times for clearances with fewer rejections.

Paulette also is actively building the next generation of security professionals and leaders. She has fostered a learning environment for her staff and promoted an interdisciplinary and integrated program that allows for process improvements while ensuring sound security principles are applied.

"I am honored and humbled to win the award. I have a really great team, and this award is the culmination of six years' worth of work," Paulette says. "We redesigned the program and went from being considered marginal to being best in class. Most important is the growth the team experienced and the growth I experienced. I'm not the same person today as a leader that I was when I first got the job."

Paulette says she has a very supportive management team that motivates her and provides feedback.

"It wasn't always easy, which makes this recognition more meaningful. There's a great sense of satisfaction," she says.

Engineered Safety

Thinking through the way to work safely

Editor's Note: Anthony Chavez, facilities manager for Org. 4878, shares his story about watching a fellow Sandian take the time to do it right.

By Anthony Chavez

Several weeks ago, I watched Facilities Management Operations Center electrician Rick Roybal begin work near my trailer office in an area of uneven, sloping ground covered with landscaping gravel.

ELECTRICIAN Rick Roybal's safety awareness has led to important safety improvements for craftspeople. (Photo by Anthony Chavez)

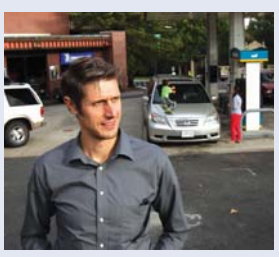
Rick (48426) swept away the gravel and worked to level four areas for his ladder's feet. He tried several times to set up the ladder, each time testing its stability. On the final attempt, he paused, seemed to ponder his predicament, set the ladder down, and left.

A short time later, he returned with another person. Together they leveled the ground some more, finally achieving a stable foundation for the ladder. At that point, I walked out of my office, approached them, and congratulated them for taking the time and effort to do their job safely.

Then I asked Rick to run me through his thought process. Rick said it was simple: He had set up his ladder on uneven ground before and had worked from it without incident. But Sandia's recent stepped-up awareness of critical thinking and understanding the consequences made him decide to seek help to make sure the ladder was steady. "It's nice that you guys care about safety," he told me.

Now, as part of Engineered Safety efforts, crews have installed asphalt to create a stable, flat surface for craftsmen to work on around that entire area.

Inside . . .



Study shows many California gas stations ready for era of hydrogen fuel. Story on **page 3.**

Permeable reactive barriers have 'apatite' for radionuclides. Story on **page 5.**

Sen. Martin Heinrich and Rep. Michelle Lujan Grisham visit Sandia. Photos on **page 7.**

Remodeled Bldg. 840 gets new role in support of B61-12 LEP. Story on **page 8.**

That's that

Lockheed Martin created Space Day in 1997 as a special time to celebrate the excitement of space exploration in all its forms. And I say good for them. But I was way ahead of them on this. I created "National Space Day" in 1994, when my kids were 8 and 6. While Lockheed Martin chose to celebrate Space Day during the first week in May in honor of Alan Shepard's 15-minute suborbital flight in 1961, my National Space Day was — and is — celebrated on July 20, the day Neil Armstrong and Buzz Aldrin landed on the moon 45 years ago this week.

At our household, we started our National Space Day activities with an early, early wake-up call followed by the traditional astronaut's breakfast: steak and eggs, toast, and orange juice. My wife and I would have coffee, but that's where I drew the line for the kids.

After breakfast, we'd listen to our "mission briefing," which happened to be an old 33 rpm vinyl LP published by CBS within days of the successful completion of the Apollo 11 mission. The record, artfully (maybe a bit ponderously) narrated to a rousing musical score by Walter Cronkite, a man with a voice nicely suited to seriousness of the occasion, featured highlights of the flight, vividly evoking the high drama and excitement of the occasion.

The high point — and I think I was pretty good at conveying this to my kids: Listen to this! Listen to this! — was the excruciatingly thrilling exchange between *Eagle* and Mission Control in Houston as the lunar lander approached the moon. With Neil Armstrong at the controls, Buzz Aldrin guided him to a landing, rattling off a steady stream of radar readings from the instrument panel. Neil and Buzz: totally cool even in the face of computer alarms, low fuel warnings, and unanticipated boulder fields right where they had planned to set down. Neil and Buzz: totally cool even as they prepared to land on the moon. The moon! The ever-lovin' moon! The utter audacity of it still gives me goose bumps. That approach and landing, ending with the historic transmission: "Houston, Tranquility Base here. The *Eagle* has landed." is the most exhilarating single audio recording I've ever heard.

For me, that piece of our "mission briefing" was more exciting, then and now, than the actual famous first small step for man. By the time Neil walked on the moon, we knew — or at least in 1969 we 19-year-old "experts" thought we knew — that the astronauts were safe until lunar lift-off. But we *didn't* know if they'd actually be able to land, if the systems — or the men — were really up to the challenge. Of course they were. How could we have thought otherwise?

Thus we'd spend National Space Day looking through books about projects Mercury, Gemini, and Apollo, and yes, giving the Russians due, if grudging, credit for the many space successes they enjoyed. We'd usually end on a bittersweet note, one my kids and wife learned to expect from me: "Why aren't we back on the moon!? Why aren't we on Mars by now?" Oh, I'd lament the sorry situation, and not just on National Space Day, either.

But we'll go back. We'll go back to the moon, and beyond. The compelling reasons that sent us there in the first place are ancient history, but we'll find new reasons and we'll make the investment, either alone or in partnership with others who wish to become space-faring nations. We'll find new reasons to go back, but they'll all just be excuses, rationalizations, because me and my kids (and you) know why we really go: For the sheer adventure. We go in the spirit of Capt. James T. Kirk, who, at the end of *Star Trek, The Motion Picture*, when asked by Mr. Sulu where to take the *Enterprise*, said "Out there. Thataway." And off we'll go, after a hearty breakfast of steak and eggs.

See you next time.

Bill Murphy (MS 1468, 505-845-0845, wtmurph@sandia.gov)

IEEE Nuclear and Plasma Sciences Society Merit Award honors Jim Schwank

By Sue Major Holmes

Sandia radiation effects researcher Jim Schwank has won the 2014 IEEE Nuclear and Plasma Sciences Society Merit Award, which recognizes outstanding technical contributions to the fields of nuclear and plasma sciences.

JIM SCHWANK

"I feel highly honored," says Jim (1767), who is the second active Sandian to win the award and only the sixth person in radiation effects community to win since the award's inception in 1972. The winner was announced earlier this month during the IEEE's Nuclear and Space Radiation Effects conference.

The citation reads: "For significant and sustained contributions to the understanding of radiation effects in semiconductor devices and to the development of radiation-hardened technologies." The award is based on the importance of individual technical contributions, importance of technical contributions made by teams the individual led, quality and significance of publications and patents, years of technical distinction and leadership, and service in the fields of nuclear and plasma sciences and related disciplines.

Jim, an IEEE Fellow, has been with Sandia for 35 years. He has worked in radiation effects for most of that time as part of the advanced microelectronics and radiation effects department.

He has won 16 conference outstanding paper awards, nine conference meritorious paper awards, a DOE Weapons Award of Excellence, a *Discover* Magazine Technology Award for Computer Hardware and Electronics, an Industry Week Technology Award, an R&D 100 Award, and three Sandia Employee Recognition Awards. He is on the Thomson-ISI top 250 Highly Cited Researchers list worldwide for 1983-2002. His papers have been cited more than 5,700 times in refereed journals.

Colleague Paul Dodd (1767) nominated Jim. His nomination letter said that for three decades, Jim has "performed leading-edge research to expand the understanding of the fundamental physics behind total ionizing dose and single-event effects in microelectronics," applying the work to developing radiation-hardened devices for military and space systems and contributing to the development of reliable and cost-effective hardness assurance test methods. Noting Jim's 13 Nuclear and Space Radiation Effects Conference Outstanding Paper Awards, Paul wrote that one such award is a significant accomplishment, but winning 13 is exceptional.

Retiree deaths

Kenneth Harrington (age 94) . . . . . Feb. 27
Benny M. Garcia 83 . . . . . Apr. 30
Kendall L. Mulkey 77 . . . . . Apr. 30
Odelio J. Otero 81 . . . . . May 1
Max K. Linn 94 . . . . . May 3
Grace G. Campbell 90 . . . . . May 5
M. Dean Terry 73 . . . . . May 10
John A. Garcia 78 . . . . . May 15
Hubert H. Patterson 93 . . . . . May 15
James Bluett 93 . . . . . May 21
Louise A. Lewis 96 . . . . . May 22
Emilio T. Torres 87 . . . . . May 29
Edgar F. Richardson 88 . . . . . May 30
John Anaya 87 . . . . . May 31
Edward A. Kociscin 79 . . . . . May 31
Yvonne Lassiter 63 . . . . . May 31
John R. Lenz 92 . . . . . May 31
Donald G. Wagy 66 . . . . . May 31
Charles V. Ladig 81 . . . . . June 1
Dwayne L. Mozey 88 . . . . . June 1
Monte C. Nichols 76 . . . . . June 4
George T. Kolesar 76 . . . . . June 6
John P. Weber 83 . . . . . June 6
Donald C. McFall 88 . . . . . June 7
Donnell E. Jerome 79 . . . . . June 8
Virgil Erbert 89 . . . . . June 9
Fedelino Edwell 92 . . . . . June 9
Paul D. O'Brien 90 . . . . . June 9
John J. Bahlman 87 . . . . . June 15
Floyd L. McFarling 92 . . . . . June 19
Marcella Noble 91 . . . . . June 20
Don Mark Anderson 57 . . . . . June 23
Charles E. Guthrie 80 . . . . . June 24
Philip D. Thacher 77 . . . . . June 30

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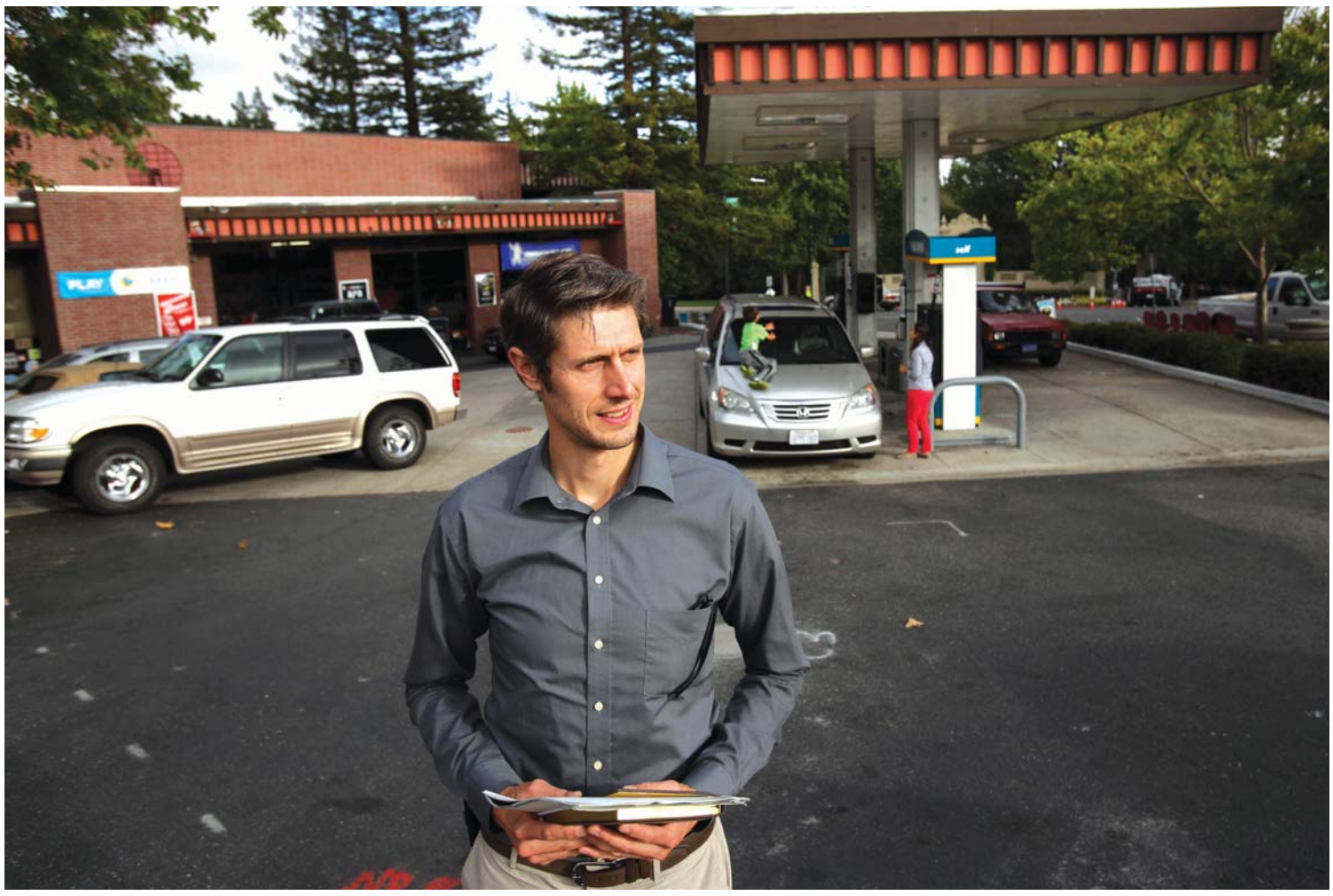
More California gas stations can provide H2 than previously thought, Sandia study says

A recent report by Sandia asks whether hydrogen fuel can be accepted at any of the 70 California gas stations involved in the study, based on a new hydrogen technologies code. Here, Sandia's Daniel Dedrick visits a station in Oakland, Calif.

(Photo by Dino Vournas)



By Mike Janes

A study by Sandia researchers concludes that a number of gas stations in California can safely store and dispense hydrogen, suggesting a broader network of hydrogen fueling stations may be within reach.

The report examined 70 commercial gasoline stations and sought to determine which, if any, could integrate hydrogen fuel, based on the National Fire Protection Association (NFPA) hydrogen technologies code published in 2011.

The study determined that 14 of the 70 gas stations could readily accept hydrogen fuel and that 17 more possibly could accept hydrogen with property expansions. Under previous NFPA code requirements from 2005, none of the existing gasoline stations could readily accept hydrogen.

The current code, known as NFPA 2, provides fundamental safeguards for the generation, installation, storage, piping, use, and handling of hydrogen in compressed gas or cryogenic (low temperature) liquid form.

This work is aligned with Hydrogen Fueling Infrastructure Research and Station Technology (H_2FIRST), a new project established by DOE's Office of Energy Efficiency and Renewable Energy.

Science, risk-informed analysis accelerate deployment

The development of meaningful, science-based fire codes and determinations such as those found in the report will help accelerate the deployment of hydrogen systems, says Daniel Dedrick (8367), hydrogen program manager. "This work shows that we can reduce uncertainty and avoid overly conservative restrictions to commercial hydrogen fuel installations by focusing on scientific, risk-informed approaches.

"It turns out that the number of fueling stations able to carry hydrogen can be quantified," Daniel adds. "We now know that we can build more hydrogen fueling stations if we examine the safety issues within a sound, technical framework that focuses on the real behaviors of hydrogen."

Sandia's hydrogen safety, codes, and standards program is a diverse portfolio of activities funded by DOE's Fuel Cell Technologies Office to provide the technical basis for developing and revising safety codes and standards for hydrogen infrastructure, including the NFPA 2 code.

The study focuses on California, which has more hydrogen fueling stations than any other state. A key factor in the codes that Sandia examined was the separation distances required for fueling infrastructure, including fuel dispensers, air intakes, and tanks and storage equipment. The code defines required distances between such components and public streets, parking, on-site convenience stores, and perimeter lines around the site.

All fueling facilities are susceptible to fire due to the presence of flammable liquids and gases, says Daniel. According to the NFPA, more than 5,000 fires and explosions a year occurred at conventional gasoline stations from 2004-2008. "Whether you are filling your car with gasoline, compressed natural gas, or hydrogen fuel, the fueling facility first of all must be designed and operated with safety in mind," he says.

"If you have a hydrogen leak at a fueling station, for example, and in the event that the hydrogen ignites, we need to understand how that flame is going to behave in order to maintain and control it within a typical fueling station," says Chris San Marchi (8252), manager of Sandia's hydrogen and metallurgy science group. A scientific understanding of how such flames and other potential hazards behave is necessary to properly determine and mitigate safety risks, he says.

"We're comfortable with the risks of natural gas in our homes and under our streets," Chris points out. "We want to be just as confident of the safety of hydrogen in our fuel tanks and on our street corners."

Sandia researchers at the Combustion Research Facility for years have studied and modeled the intricate workings of the combustion engine and, more recently, hydrogen behavior and its effects on materials and engine components, Chris says. The knowledge gained by Sandia's work on the physical behavior of hydrogen and risks associated with hydrogen fuels provided the scientific basis to revise the separation distances in the NFPA 2 code for hydrogen installations.

As safe as or safer than gasoline stations

Under the previous code, virtually no hydrogen fuel cell stations could be sited at existing stations. The reason, says Chris, is simple: Those codes were developed via an "expert opinion-based process" and not the risk-informed process developed by Sandia researchers and now used in the code. The previous code was developed for flammable gases in an industrial setting, which carries different risks compared to hydrogen fuel at a fueling station.

"The distances set forth in the code, therefore, were much larger than we now know they need to be," Chris says. The risk metric used to develop the new NFPA code, he adds, was that the stations accepting hydrogen fuel needed to be proven as safe as or safer than gasoline-only stations.

Some gas stations still may not be able to accept hydrogen under the new code because gas station lot sizes vary greatly, and many smaller sites — particularly those in dense, urban areas — cannot be properly configured, he says.

"Certain smaller gas stations, especially those in cities, have unusual shapes that aren't going to accommodate the right separation distances," Chris says. For example, he says, the required distance between a high-pressure tank carrying hydrogen and the property boundary would be too great for a "skinny" station or a wedge-shaped lot. While larger lots naturally work better in the current environment, Chris says, there are opportunities to develop risk mitigations that could allow even wider deployment of hydrogen fueling stations.

Sandia CaliforniaNews

Enhancing performance-based parts of hydrogen code

One of Sandia's next objectives is to work with all parties to look more closely at the underutilized performance-based parts of the NFPA 2 code, rather than the prescriptive-based elements that focus on rigid distance requirements.

"While the prescriptive sections of the code are typically implemented, there are also sections of the code that allow for the use of more risk analysis to optimize the fueling facility," Chris says. If station developers and others take a more performance-based approach, he says, more existing fueling facilities will be able to integrate hydrogen systems and support the developing fuel-cell electric vehicle market.

Sandia is also in the process of developing a risk-informed approach for shortening the separation distances for liquid hydrogen storage at fueling stations, as current efforts only examined separation distances for gaseous hydrogen. Liquid hydrogen is attractive because it takes up less space than gaseous hydrogen and allows fueling stations to accommodate larger numbers of fuel-cell electric vehicles. However, there are additional issues associated with the low temperatures required for liquid systems installed on small properties.

"We need to do more experimental and modeling work to understand and evaluate the science and physics of liquid hydrogen," says Chris. "By evaluating the risks quantitatively, we believe we can shorten the separation distances required in the code for liquid hydrogen just as we did with gaseous hydrogen. That could then lead to even more fueling stations that can accept hydrogen and support the continued growth of the fuel-cell electric vehicle market."

QASPR: Making sure the nation's nuclear weapons offer effective, credible deterrence

By Sue Major Holmes

It may sound strange to say that nuclear weapons must survive radiation. But as part of Sandia's role in ensuring the nation's stockpile is safe, secure, and effective as a deterrent, it must make sure crucial parts can function if they're hit by radiation, especially a type called fast neutrons.

Sandia is responsible for non-nuclear components in all US weapons systems and for overall system engineering and integration: pulling together thousands of components into a weapon. It qualifies systems — ensuring their safety and effectiveness — through computer simulations and testing at unique facilities that mimic radiation environments a weapon could face during deployment or an accident.

Sandia developed a new way to do that after the Energy Department shut down its facility for creating fast neutrons, the Sandia Pulsed Reactor (SPR), when security concerns over its highly enriched uranium increased after 9/11.

The Labs created a science-based project called QASPR, Qualification Alternative to Sandia Pulsed Reactor. QASPR combines computing modeling and simulation, experiments, and technology development, and draws on expertise throughout Sandia, from materials science to transistor fabrication to sophisticated computer science. The idea is to create better radiation-hardened microelectronics for high-voltage transistors, part of a nuclear weapon's safety electronics, and to offer a way to qualify the electronics without SPR.

Sandia does more modeling and experimental work than ever before to qualify components to survive fast neutrons produced by a nuclear burst, either from an enemy weapon or one of our own exploding nearby, says QASPR project manager Len Lorence (1341).

Both modeling, experimental work vital

"It's very important both in the modeling and the experimental worlds that you not only get the right result but you get it for the right reason," Len says. "It's very important to understand the physics of what's going on."

"It's very important both in the modeling and the experimental worlds that you not only get the right result but you get it for the right reason. It's very important to understand the physics of what's going on."

— QASPR project manager Len Lorence

Experiments don't simply validate computer models. They are key to developing models in the first place. QASPR didn't have the models it needed when it began in 2005. But researchers had time to work on them because the next reentry system that needed the tools and expertise for qualification was still years away.

QASPR focuses on how transistors that provide gain, which are crucial in some circuits, react to fast neutron radiation and what happens to its gain in less than a second — an eternity in nuclear weapons work. Transistor gain is the amplification of current passing through the device.

Neutron damage can cause gain to plummet. Designers can compensate for that in their circuit designs, but used SPR to check whether their designs operated correctly.

QASPR uses unique facilities for studies

QASPR does similar studies at Sandia's Annular Core Research Reactor (ACRR), its Ion Beam Laboratory and two non-Sandia facilities. Each provides unique tests and complementary data that improve computer models.

One of the outside facilities is a fast-burst reactor similar to SPR and the second facility tests response to gamma radiation. ACRR, a long-pulse reactor, creates high levels of damage, although its long pulse makes it less ideal. Still, it provides a calibration point, which simplifies modeling and lets researchers concentrate on phenomena associated with rapid changes in transistor gain. The Ion Beam Laboratory acts as a surrogate for neutron radiation because ions can impart the same kind of neutron displacement damage as neutrons. It combines high damage levels like ACRR with short pulses in one facility. However, it only can irradiate a transistor or a few transistors together, rather than a circuit or component like the larger ACRR can.

QASPR also is creating better radiation-hardened microelectronics in Sandia's Microsystems & Engineering Science Applications (MESA) fabrication complex. Some of those transistors are based on compound semiconductors, known as III-V for combining elements from the periodic table's columns III and V. Such compound semiconductor transistors are much more resistant to neutron radiation.

QASPR turns in success story even in early years

Researchers spent QASPR's early years combining modeling and experiments to understand the basic mechanisms of the silicon commercial-off-the-shelf components then in use and studying III-V devices. The III-V technology has matured to the point it has been chosen for current and future reentry system lifetime extension and alteration programs, Len says. The improved technology, along with more robust modeling and experiments, mitigates risk from the loss of SPR.

"It was a success story for QASPR," Len says. "We are able to provide information that ended up affecting the design for the future stockpile modernization effort."

Researchers are interested in the design phase because "we can catch things earlier, we can help guide the design, and ultimately do better qualification," he says.

QASPR's computer modeling is hierarchal, beginning with studies of materials inside transistors, using fundamental physics modeling and quantum mechanical tools to understand how radiation damage occurs and evolves. Then researchers create a model of how transistor gain changes during and after radiation exposure, using a Sandia-created transistor model code, Charon. Radiation exposure is modeled with a Sandia code, NuGET. Next, the analog circuit level aggregates transistors and devices such as resistors and capacitors as well as ever-changing voltages — a complex world where some devices respond to gamma radiation but not neutrons. Researchers use another Sandia code, Xyce, to model circuit behavior under radiation.

"The hierarchical approach is very powerful, since it allows traceability from a high-level circuit response all the way down to the most fundamental atomistic material level," Len says.

Thus, QASPR offers important information. "At the circuit level we can be very impactful, so much so that we can help the system qualification process, which was our goal," Len says.

Three programs fund QASPR. Advanced Simulation and Computing funds modeling, the Nuclear Survivability Engineering Campaign supports much of the experimental work, and the Readiness in Technical Base and Facilities program provides support through MESA, focusing on new radiation-hardened technologies.

QASPR and similar efforts to blend experiment and modeling will be needed as long as nuclear weapon electronics continue to evolve, Len says.

"It's hard to put in the stockpile the exact same thing that was originally put in the stockpile. At some point it's not possible, not cost-effective," he says.

Dream Catcher program reaches 56 students this year

Program inspires STEM dreams

The annual Dream Catcher Science Program is designed to inspire young minds through science, technology, engineering, and math (STEM) experiences. Dream Catcher, which focuses on American Indian middle and high school students, was started more than 15 years ago by Sandia's American Indian Outreach Committee. The 2014 program was held June 7, 14, and 21 at the NexGen Academy in Albuquerque.

This year the Dream Catcher program reached 56 students and had 19 volunteers who either served as lead instructors or classroom assistants. The program continues to touch and influence many students in the state of New Mexico and the local Albuquerque community. In the photo here, volunteer Shayna Begay (2153), at left, helps students construct a spaghetti crane, a project that introduces students to basic principles of engineering design. In the process of designing and fabricating a spaghetti crane, students learn about the theory behind a pulley system to maximize weight lift with a limited motor torque, structural truss design for strength and stability, how to convert a battery-powered motor into a solar powered motor, and how to integrate all of these systems into a final design. (Photo by Rachel Baros)

An 'apatite' for radionuclides

Sandia-developed permeable reactive barriers may be deployed at Fukushima

By Stephanie Holinka

A technology developed at Sandia to protect groundwater in sites that have been contaminated with radionuclides is being evaluated for use at the Fukushima site in Japan to prevent radioactive strontium from reaching the ocean.

Under a program funded by Tokyo Electric Power Co. (TEPCO), Sandia, Pacific Northwest National Laboratory (PNNL), and Savannah River National Laboratory will provide recommendations for permeable reactive barrier design, implementation, and monitoring at the Fukushima site in an effort to prevent contamination of groundwater.

Barrier technology at Hanford

The same technology, a calcium apatite-based permeable barrier has been in use at the DOE Hanford site for eight years, says its inventor, Sandia chemical engineer Robert Moore (6915). The Hanford barrier is sequestering mobile strontium-90 that threatens the Columbia River, a major source of water for three states.

Hanford, a decommissioned World War II-era nuclear production complex in southeastern Washington State, is contaminated from materials left over from reactor operations and decommissioning activities.

Jim Szecsody, a geochemist at PNNL, says PNNL contacted Robert in 2003 about his patented technology, wondering if it could work at Hanford.

"Before the barrier could be used, we had to figure out how to pump a solution to precipitate apatite without 'flushing' the mobile strontium-90 and making it more mobile," Szecsody says.

A collaboration between Sandia and PNNL tested the calcium apatite barrier using small and then scaled-up lab experiments that looked at reaction rates and pumping rates, intended to customize the geochemistry and delivery for the Hanford site, using some of the calcium available in the subsurface sediments and less injected calcium, which resulted in less flushing of the strontium-90.

"In some ways, it's like growing crops. You need to know what's there before you can figure out what nutrients you need to add," Szecsody says.

The customized barrier was then field-tested by Fluor, the prime contractor for cleanup of the Central Plateau at the Hanford Site. From 2005 to 2011 the barrier was placed along a 300-foot-long section of Columbia River shoreline in Washington state.

The results were impressive: After six years, monitoring wells placed between the barrier and the Columbia River indicated that the barrier sequestered more than 95 percent of the strontium, preventing it from traveling into the river.

The initial work was so successful that CH2M HILL Plateau Remediation Company began expansion of the barrier in 2012 to protect 2,500 feet of Columbia River shoreline, and additional barriers are being considered at Hanford.

How the barriers work

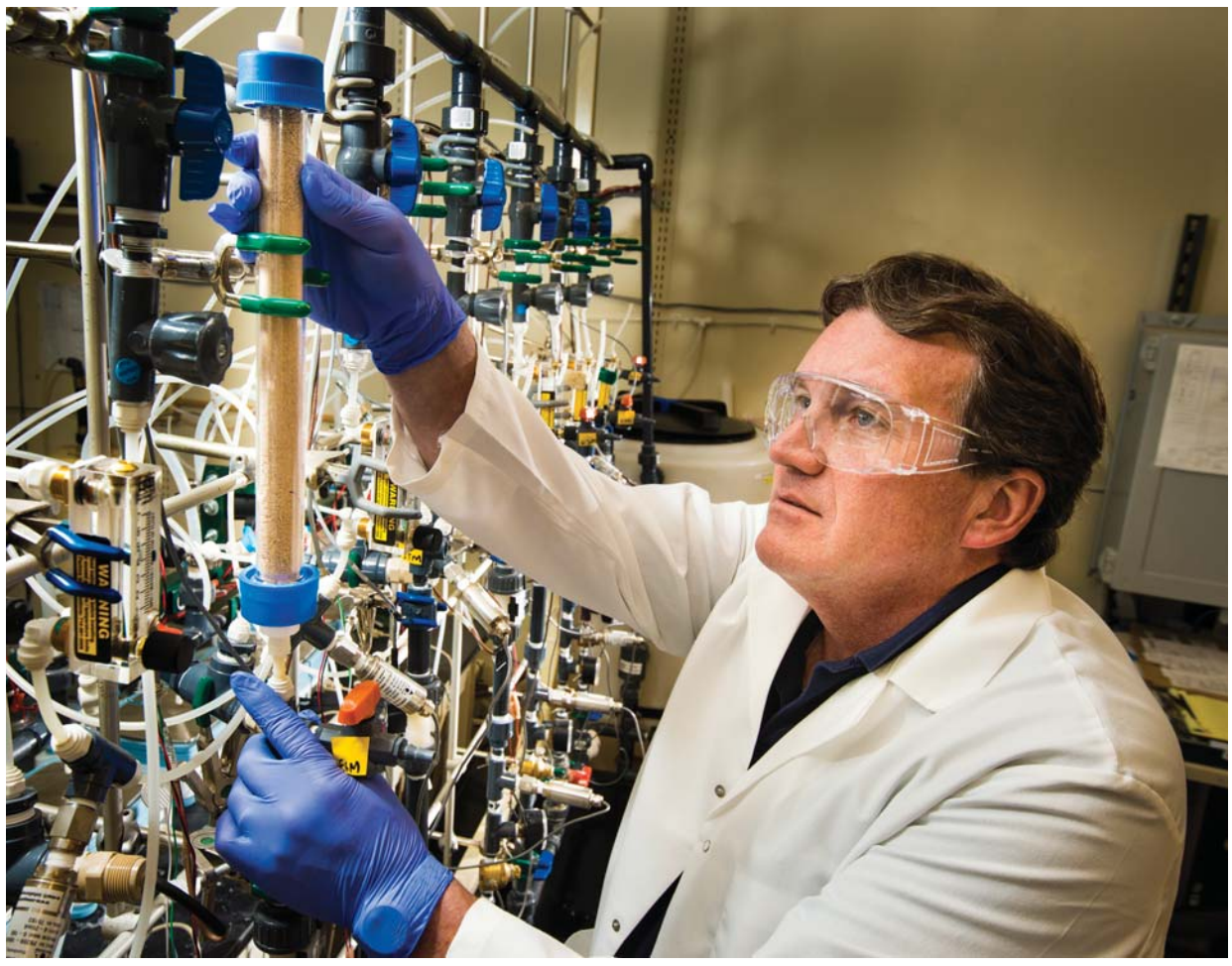
Robert says the barrier can be formed in a few ways, depending on the specific types of contamination and the characteristics of the soil. One way is by pumping an aqueous solution containing a calcium citrate compound and sodium phosphate into the ground.

As groundwater passes through the barrier, nano-size apatite crystals bind to contaminants and immobilize them, allowing groundwater to flow through the barrier, eliminating the need for groundwater treatment, Robert says.

"The indigenous soil bacteria biodegrade the calcium citrate compound, leaving calcium apatite, an insoluble and stable mineral which can immobilize contaminants," Robert says.

The barrier approach shows several positive advantages over alternative technologies:

- The solution flows into areas with highest soil porosity, so more apatite forms in areas with more groundwater, where greater protection would be needed.
- Leaving the contaminants fixed underground eliminates the costly process of removing contaminated soil and disposing of it as hazardous waste.
- Once in place underground, the barrier requires no ongoing maintenance, eliminating operational expenses for equipment such as ion exchange and filters, though it can be monitored with optional equipment.
- Because there is less contamination exposed above ground, workers are not exposed to contaminants as they would be using conventional trenching and backfilling with a reactive media.



THE PERMEABLE reactive barrier's inventor, Bob Moore, examines the apatite barrier forming during a lab test. (Photo by Randy Montoya)

"The barriers work well in locations where conventional solutions are not feasible or are excessively expensive, such as deep underground and under large obstacles such as buried waste tanks and piping systems where conventional construction techniques are not possible," says Robert.

For example, one such chemical reactive barrier is a 2,300-foot-wide chemically reduced barrier for chromate remediation at the Hanford 100D area. This technology was developed at PNNL and then upscaled to full-scale field tests. After 15 years, this 100D reactive barrier is still 80 percent to 90 percent effective. This barrier technology was then implemented at sites in other states.

Other types of remediation methods are expensive, can only be used in certain locations, and expose workers to contaminated soils and construction hazards. One commonly used current method involves excavating a trench perpendicular to the contaminated groundwater flow-path and then backfilling with the reactive media. Another method is high-pressure injection to force the reactive media into the soil. Both methods are disruptive and, in some instances, have actually altered the site geohydrology, resulting in a portion or all of the contaminated groundwater flowing around the barrier instead of through it.

Immobilizing contamination from Hanford's tank farms

Sandia has signed a Government Use agreement with CH2M HILL to allow Washington River Protection Solutions (WRPS), a contractor charged with cleanup of Hanford's tank farms, to use a tin(II) apatite barrier to help prevent the radionuclide technetium, a highly mobile radionuclide with a long half-life, from travelling into the environment.

The Hanford site has 177 underground storage tanks in its "tank farm," many of which date back to World War II. Because many of the tanks have outlived their anticipated design life, some are leaking.

Some tanks are being grouted to prevent the movement of materials out of the tanks. Unfortunately, the grouting doesn't prevent technetium from moving out of the tanks since few things bind to technetium.

"Technetium is a difficult problem to solve. It's a long-term dose driver at the Hanford site because it has long half-life. It's a challenge because technetium binds to nothing we've tried, except this barrier," says Robert.

Robert says a stannous-treated tin(II)apatite barrier, which is particularly effective for technetium, might be used.

"With some research to determine soil pH, amounts of free calcium, and soil porosity, the same technology could be used in areas around Hanford's tank farms to contain radionuclides from tank leaks," Robert says.

> *"The barriers work well in locations where conventional solutions are not feasible or are excessively expensive, such as deep underground and under large obstacles such as buried waste tanks and piping systems where conventional construction techniques are not possible."*
>
> **—Sandia chemical engineer Robert Moore**

So far, the results are promising.

"In tests performed recently by WRPS the a stannous-treated tin(II)apatite bound the technetium into the apatite crystal lattice immobilizing the radionuclide even when subjected to leach testing," says WRPS senior scientist Jim Duncan.

Other potential uses

Barriers can also be used with a wide variety of radionuclides and heavy metals.

"The method could be used prophylactically to protect groundwater during drilling, hydraulic fracturing operations, or other excavation activities where the potential exists for groundwater contamination," says Robert.

Thousands of sites throughout the world are contaminated with radionuclides, heavy metals, and natural contaminants that threaten groundwater, surface water, and food supplies.

A 2012 report from the US Geological Survey says approximately 50 percent of the population relies on groundwater as their primary drinking water supply. It is therefore of vital importance to keep contaminants out of groundwater.

One unanswered question is the longevity of the barrier; research is ongoing to assess how long contamination remains in the bound form.

"So far, the results indicate that the contaminants will remain sequestered for a long time," says Robert.

The work was funded under Sandia's Laboratory Directed Research & Development (LDRD) program.

Sandia researchers win three R&D 100 awards

By Neal Singer

Sandia researchers captured three R&D 100 Awards in this year's contest, competing in an international pool of universities, corporations, and government labs.

Said Secretary of Energy Ernest Moniz, "These awards recognize the tremendous value of our national labs, where research and development continues to help our nation address its energy challenges and also pursue the scientific and technological innovations necessary to remain globally competitive."

R&D Magazine presents the awards each year to researchers who its editors and independent judging panels determine have developed the year's 100 most outstanding advances in applied technologies. Winners have produced innovations that later became well-known, such as the flashcube (1965), the automated teller machine (1973), the halogen lamp (1974), the fax machine (1975), the liquid crystal display (1980), the Kodak Photo CD (1991), and HDTV (1998).

The awards focus on practical impact rather than pure research. Winners are selected for the design, development, testing, and production of their innovations. The sole criterion, according to the magazine, is "demonstrable technological significance compared with competing products and technologies." Qualities judged include smaller size, faster speed, greater efficiency, and environmental efficiency and sensitivity.

The winners of the awards, sometimes referred to "the Oscars of invention," will receive plaques at a formal banquet this fall.

This year's winning entries from Sandia are:

Portable diagnostic device for *Bacillus Anthracis* detection in ultra-low resource environments, submitted by Melissa Finley (6825).

The anthrax bacillus is not only a tool of terrorists but also is found naturally in farms and remote areas around the world. Like abandoned live ammunition, it waits to cause problems. In an emergency or in a distant country far from a medical laboratory, how would anyone detect its presence? The Sandia anthrax detector cartridge, about the size of a pocket-sized music cassette, might be one answer. The inexpensive, throwaway device works much like a pregnancy detector: The presence of certain chemicals causes a positive reaction in antibodies installed inside the detector. Previous attempts to devise analogous detectors for anthrax lacked the needed sensitivity. The Sandia system achieves this through an ingenious microculture chamber that encourages a sparse sample of microorganism to grow to a detectable amount. The device does not require any power or extra equipment to store, operate, or read; users need minimal training; and its self-destruct feature sterilizes the device after each use.

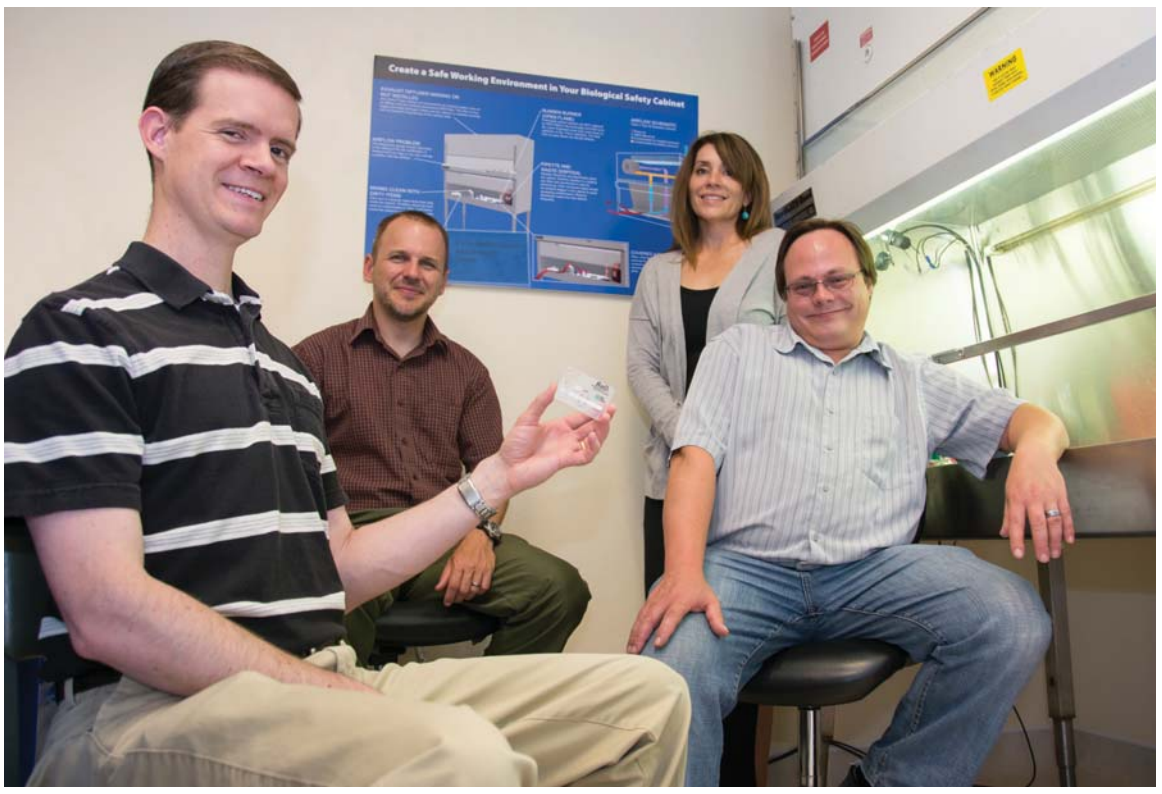
International Biological Threat Reduction Dept. 6825 identified the problem; staff members of Depts. 8622, 1714, and 1132 developed the solution.

Triplet-Harvesting Plastic Scintillators, submitted by Patrick Feng (8126).

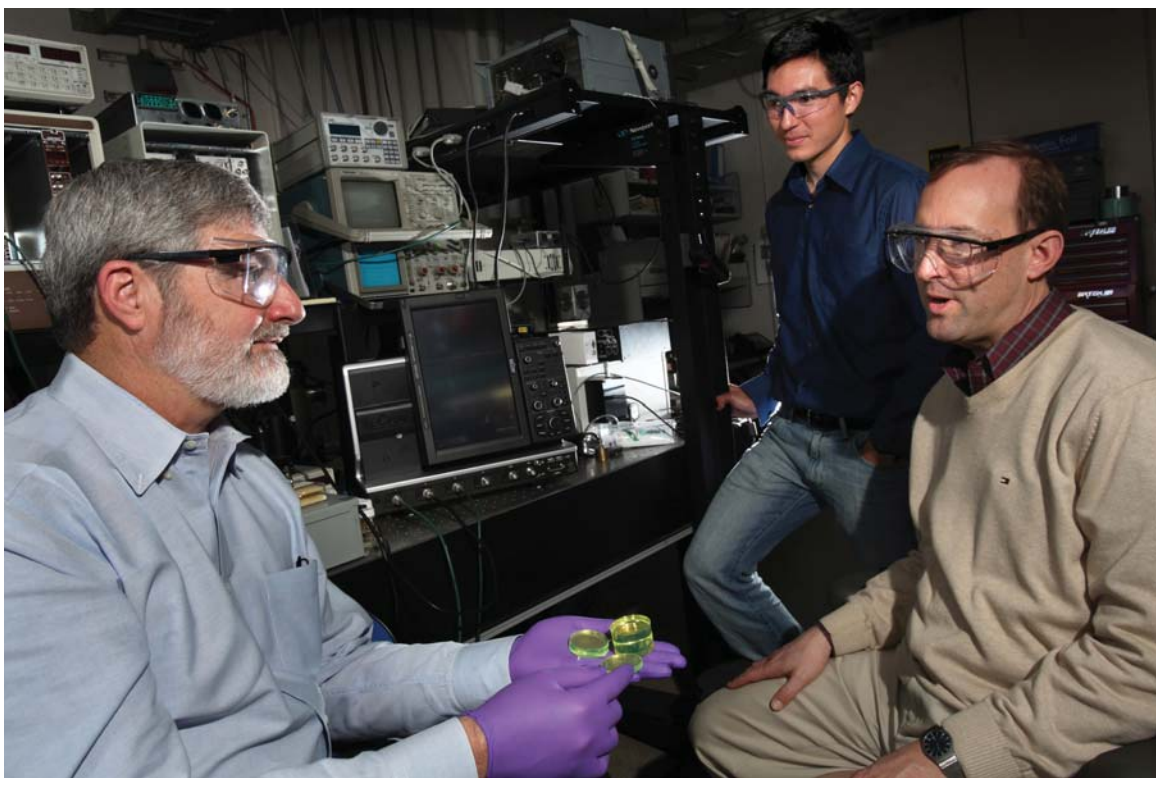
Millions of barrels of cargo are unloaded from ships to US soil every year. Automated sensors screen cargo at ports of entry for controlled radiological materials that could be used to make a nuclear bomb. The detectors scintillate (glow) when they pick up tell-tale emissions. Sandia researchers Patrick Feng and his team have developed a new plastic scintillator — solid, instead of inconvenient liquid — that gives off more light at less cost, and responds faster than current scintillators. The unique timing response also provides the ability to discriminate threat materials from benign radiation sources. Triplet-harvesting refers to a process that converts energy from an organic polymer matrix to highly luminescent triplet energy states on organometallic dopant complexes.

Goma 6.0, submitted by Randall Schunk (7911) and Rekha Rao (1513).

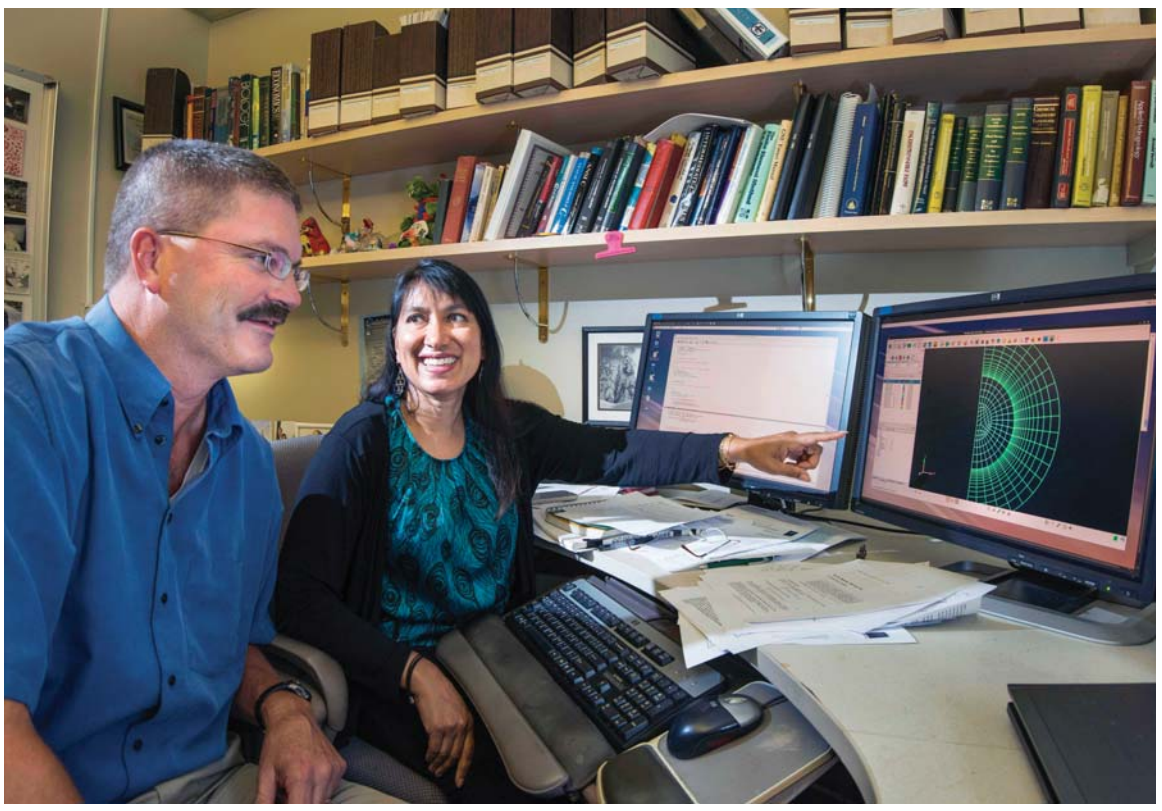
Goma 6.0 is open-source software available to those interested in simulating manufacturing processes. For example, the creation of plastic wrap involves a complex interplay between energy, fluid flow, and complex material response that helps determine the force needed to pull the wrap into existence. The resulting sheet should be transparent, without lumps and bumps, and strong but not so strong that it can't be cut. For this and other material-processing problems, such as making flat-panel glass, producing reinforced materials for power lines, and drying polymers, Goma 6.0 efficiently solves the underpinning equations of mass, momentum, energy, and chemical species transport. The program has unprecedented flexibility for mixing and matching physical-chemical interactions and for developing specialty physics models. Goma excels at problems in capillary hydrodynamics, such as coating flows and liquid absorption by a porous material, and has extensive models as well for polymer and metal processing. Goma's ease of use makes it valuable for graduate students learning the benefit of code development for research as well as high-end analysts in topical manufacturing and related industries.



FROM LEFT, Sandia team members Jason Harper, George Bachand, Melissa Finley and Bryan Carson. The group led invention of the anthrax detector held by Harper. (Photo by Jason Bolles)



LABS RESEARCHER Patrick Doty, left, holds a few examples of Triplet-Harvesting Plastic Scintillators in his gloved hand, as lead investigator Patrick Feng, center, and Mark Allendorf contemplate their achievement. (Photo by Dino Vournas)



SANDIA RESEARCHERS Randall Schunk and Rekha Rao discuss an image generated by the Goma 6.0 program. (Photo by Randy Montoya)

Sandia Classified Ads

MISCELLANEOUS

CHROME RIMS, 22-in. w/tires, tires have been driven <800 miles, 245/30Z/22, $700 OBO. Sandoval, 238-8998.

OAK BDR. FURNITURE: queen headboard, metal frame, dresser w/mirror, chest w/fold-up mirror, nightstand, hard wood, can sell individually, $450. Brewster, 238-4704, ask for Julie.

DLP TV, Mitsubishi, 57-in., great condition, $200 OBO. Valdez, 999-0100.

CAMPING/HUNTING EQUIPMENT, call for details. Plumb, 681-1846, ask for Russ.

END TABLE, oak, very good condition, $80; end table lamp w/shade, $30. Hussong, 505-332-3523.

OLD WOODEN DIXON APPLE CRATES, 7, $10 ea. or $60/all. Bonzon, 828-1066.

ALFALFA BALES, $8 ea.; oat, $5 ea.; PSE Vendetta compound BLK, RH, #60-70, 27-32-in. draw, sight, soft case, 6 arrows, $365 OBO. Schroeder, 869-2243.

TALL CORNER CABINET, top has solid doors, bottom has louvered doors, w/Goodmans HiFi loudspeaker, $100. Hawley, 299-2516.

DINING ROOM TABLE, antique, $200 OBO; dresser, $100 OBO; sofa, $100 OBO; bookshelves, $25 ea. Pollock, 505-948-1110.

TREADMILL, Vision Fitness T9350 HRT, excellent condition, original price $1,200, asking, $550. Crespin, 505-610-1084.

2014 BALLOON FIESTA POSTERS, signed & numbered by the artist, $125. Novak, 505-264-2511, ask for Sam.

PIE SAFE, early 1900's, $400 OBO; hand-crafted table, 81" x 40", 6 chairs, cushions, whitewash finish, $500 OBO. Kepler, 296-0402.

POCKET CAMERA, Panasonic DMC-LX3, 24-60 mm wide angle zoom, F2.0-F2.8, Leica lens, $200 OBO. Poulter, 503-9803.

SONY TV, SXRD KDS R60XBR1, w/brushed stainless Sony stand & Sony DVD player, $500. Hennessey, 505-269-6243.

COUCH & LOVE SEAT, brown micro suede, $250; new portable AC, SoleusAir 8000BTU, $150. Burfeindt, 897-0179.

GOLF CLUBS, a ton of different iron sets, prices vary from $10-$50/set. Azar, 505-604-3786.

CANON 7D BODY, w/new battery, 4 lenses w/protective filters, call for details, $1,300. Dalton, 797-1199.

TABLE SAW, 10-in. 3-hp, $400; Panasonic surround sound system, $150; antique wall clock, $150. Bobbe, 505-350-9544.

KING BED, complete, $150; lightweight 4-drawer file cabinet, $25. Mozley, 884-3453.

PIANO, black Conober Cable, w/matching storage bench, DAMPP-chaser installed, $1,499 OBO. Pound, 505-899-8522.

GE PROFILE APPLIANCES: 23.6-cu.ft. refrigerator; XL44 gas range; microwave oven; KitchenAid dishwasher; sink, Kohler, white, cast iron. Hannigan, 505-280-9090.

HDTV, Vizio, 22-in., 1080P, w/remote, 1 USB port, 2 HDMI ports, original box, $125, Geer, 505-265-2094.

FORGED CUTLER SET, Farberware, 22-pc., like new, missing sharpener, $50. Petersen, 717-7289, ask for Matthew.

DOUBLE STORM DOORS, Larson, dark red, sliding screens, all hardware, excellent condition, $250. Stubblefield, 263-3468.

MOTORCYCLE STANDS: Pit Bull, front Headlift, $80; rear one arm (Honda VFR), $80; RKA saddlebags, $20. Levenhagen, 505-280-5507.

'CHART OF THE NUCLIDES,' 32" x 55", in silver metallic frame, under Plexiglas, published by Knolls Atomic Power Laboratory, 15th edition, $20. Robinson, 252-2264.

MOTORCYCLE HELMET, HJC model CS-2N, XXL, w/neck curtain, matte black, new-in-box, don't like fit, $30 firm. Cocain, 281-2282.

COUCH, w/matching throw pillows, great condition, photos available, $125. Elmazi, 505-856-2197, ask for Theckla.

CARGO/LUGGAGE TRAILER, small, titled & registered, $675; 5-1/2' x 10' trailer, single axle, titled & registered, $1,095 or $1,500/both. Willmas, 505-281-9124, evenings.

DINING ROOM SET, formal, 59" x 41" table, 18-in. leaf, carved legs & chairs, $225. Norwood, 331-8608.

TRANSPORTATION

'73 FORD F350 ONE TON, w/9-1/2 ft. Mitchell camper, 9,400-lb axles, 4-spd., 95,879 miles, $4,500. Gibson, 505-898-3529.

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.

'02 VW NEW BEETLE GLS, AT, yellow, clean, AC, AM/FM/cassette, cruise control, 116K miles, $4,200. Beard, 828-0673.

'99 PORSCHE 911, black/black coupe, 34K miles, good condition, $17,750 negotiable. Hardin, 702-630-4468.

'05 CHEVROLET COLORADO, red, extended cab, 5-cyl., 5-spd., 2WD, bed liner, Tonneau, trailer hitch, clean, 1 owner, 64,750 miles, $11,500 OBO. Wartman, 400-5467.

'78 VW CONVERTIBLE, red, very good running condition, front seats need recovering, NADA $5,695, asking $4,500. Martin, 505-690-2104 or 505-983-2356.

'10 TOYOTA TACOMA TRD SPORT, 4.0L V6, 2WD, double cab, 30K miles, top-notch condition, $24,000. Braithwaite, 872-9285.

'72 CHEVY 1/2-TON, 4x4, w/4 alloy wheels, $4,500. Overall, 220-4139.

'13 NISSAN ALTIMA SL, 2.5L, fully loaded, white, factory warranty remaining, 25K miles, $21,500. Trujillo, 505-450-9605.

'06 HONDA ODYSSEY ELX, w/DVD, AT, 140K miles, well maintained, $10,000. Arp, 505-239-9785.

'02 MUSTANG, V6, 5-spd., upgraded stereo, almost new tires, 129K miles, very good condition, $4,000 OBO. Woodall, 505-797-7702.

'87 OLDSMOBILE CUTLASS CRUISER, V6, all power, cold AC, seats 7, great condition, $2,600. Morgan, 505-452-6137.

RECREATION

'93 HONDA GOLDWING INTERSTATE, black, carbs rebuilt, factory manuals, cover, trunk lid, 121K miles, $4,600. Smith, 366-4031.

'85 SUZUKI QUADRACER LT250R, bored w/new piston, 38 mm Mikuni, ext. swing arm, 3 sets rear tires, Maier plastic, $1,875 OBO. Clark, 505-401-5610.

MOUNTAIN BIKE, Bridgestone MB-2 classic, 1989, 1 owner, white, good condition, $200. Cuoco, 280-4310.

'00 PACE ARROW MOTOR HOME, 37-ft., 2 slides, stored inside, lots of power, $39,000 OBO. Hibray, 821-3455.

REAL ESTATE

3-BDR. HOME, 3-1/2 baths, 3,350-sq. ft., 2.08A, Los Lunas, 5kW solar PV, fully landscaped, 3-car garage/workshop, MLS#815204. Hartwigsen, 865-7836.

5-BDR. HOME, 3 baths, 2-car garage, 2,400-sq. ft., near KAFB, Volterra, great mountain views, decks, beautiful yards & upgrades, $285,000. Scott, 505-304-2994.

3-BDR. HOME, move-in ready, >10 min. from base, 824 Pawnee NE, reduced to $150,000 OBO. Sanchez, 500-400-0030.

4-BDR. HOME, 3 baths, 3,059-sq. ft., Pueblo-style, Four Hills, w/outdoor therapy pool, MLS#817837. Henry, 505-319-5923.

2-BDR. HOME, 2 baths, 3 acres, water rights included, great Bernalillo home, MLS#810384. Ordonez, 604-7345.

3-BDR. HOME, 2 baths, 1,616-sq. ft., Southwestern-style, AC, energy efficient windows, re-stuccoed, Taylor Ranch, MLS#817747. Lojek, 904-814-5432.

.57 ACRE LOT, Mariposa community (Rio Rancho), asking $154,900, all offers considered. Trujillo, 505-293-8568.

PAAKO GOLF COURSE LOT, great view, utilities, best deal in Paako, $89,500 w/plans. Sikorski, 505-573-1503.

4-BDR. HOME, 2-1/2 baths, 2,529-sq. ft., Sandia views, great yard, excellent schools, MLS#817048. Mehlhorn, 505-363-6106.

RECREATIONAL LOT, in Jemez, w/privacy, electric & community water, $50,000 w/real estate contract. Valdez, 505-266-1729.

3-BDR. HOME, 1-3/4 baths, 1,826-sq. ft., 2-car garage, large backyard, storage shed w/electricity, new stucco, Montgomery/Tramway, $269,900. Jaramillo, 505-228-0636.

2 ACRES, Richland Heights, paved roads, water membership included, underground utilities, restrictive covenants, $69,900 OBO. Wolf, 505-934-6753.

WANTED

PORTABLE OXYGEN CONCENTRATOR POC, continuous flow, not pulse, lightweight, &/or pull cart for carry-on plane, plug to outlet. Williams, 299-3108 or wsuewilliams@q.com.

ROOMMATE, share w/med student/resident, completely remodeled 3-bdr. home, 2 baths, near SanPedro/Constitution, 10 mins. to UNM, $400 mo. +utilities. Hillman, 505-850-3024.

ROOMMATE(S), Volterra, 5 min. from KAFB, no pets, mid-August, $550 mo., utilities & WiFi included. Guillen, 505-385-8189.

HAVE FREEZER BURNT GAME?, I'll take it for my dogs. Beggs, 414-2757.

SWING DANCE INSTRUCTOR, teach me during my lunch break, in Tech Area 1. Trujillo, 505-385-0137.

HAND-HELD CASSETTE RECORDER/PLAYER. Underhill, 294-5774.

Elected leaders visit Labs

Sen. Martin Heinrich

SEN. MARTIN HEINRICH, D-N.M., tries his hand on the controls of the nanomanipulator at the Center for Integrated Nanotechnologies (CINT) Core Facility during a recent tour, coached by Asst. Prof. Julio Martinez of the New Mexico State University's College of Engineering. Martinez is the principal investigator of a user project at CINT, a DOE Office of Science national user facility jointly managed by Sandia and Los Alamos national laboratories. CINT provides universities and businesses access to world-class capabilities for nanoscience research. More than 120 employees of the two labs along with 450 visitors annually work in the CINT Core Facility at Sandia and Gateway Facility in Los Alamos. During his tour, Heinrich advocated for science, technology, engineering, and math (STEM) education and for expanded technology employment opportunities. (Photo by Randy Montoya)

Michelle Lujan Grisham

REP. MICHELLE LUJAN GRISHAM, D-N.M., checks out energy storage solutions being developed at Sandia's Distributed Energy Technologies Laboratory during a visit to Sandia earlier this week. At right, Senior Manager Charles Haney explains the technology and other work being done at DETL. Also joining Lujan Grisham are Sandia Chief Government Relations Strategist Karl Braithwaite, left, and NNSA Sandia Field Office Senior Program Manager Dan Sanchez. During her visit, Lujan Grisham also toured the MESA facility, the Cooperative Monitoring Center, and received a briefing on Sandia's mission work from Labs Director Paul Hommert. (Photo by Randy Montoya)

B61-12 organization move to remodeled space helps meet schedule requirements

DISCUSSING THE B61-12 PROGRAM — Labs Director Paul Hommert talks to workers about the B61-12 program's importance to Sandia. On Monday, he toured Bldg. 840, where the program moved last November. The spacious quarters are allowing the group to meet NNSA and DoD schedule requirements leading to the first production unit in the B61-12 Life Extension Program. (Photo by Randy Montoya)

By Sue Major Holmes

For Sandia's B61-12 design and engineering support organization, moving operations across a street meant far more than just changing an address. Relocating allows the group to meet NNSA and DoD schedule requirements leading to the first production unit in the B61-12 Life Extension Program.

The organization moved from Bldg. 809 to remodeled space in Bldg. 840 last November, substantially increasing the square footage for its work and freeing its old location for other programs.

The move significantly increased capabilities by adding three assembly stands for B61-12 assembly/disassembly operations to the two it already had. "Without that we would not be able to execute the LEP in accordance with NNSA and DoD schedule requirements," says John Wharton (2155/6512), manager of the B61-12 Hardware Management & Assembly Operations department. "And if that's delayed, then putting the weapon system in the warfighters' hands is also delayed."

He also says three areas cannot be compromised in executing the program: safety, security, and engineering excellence. "This new facility helps us achieve all three," he says.

Labs Director Paul Hommert toured the space Monday, July 21, along with Deputy Labs Director and Executive VP for National Security Programs Jerry McDowell and Div. 2000 VP Bruce Walker. Paul, in brief remarks to workers, emphasized the importance of the B-61 program. He said it was hard for him not to be a little emotional about what the building represents, because the program has consumed so much of his time within the Washington, D.C., environment in the last two years.

The message he gave Washington was "I knew my lab would come through," he told workers. "At times it felt like nobody in the room believed me saying our lab would deliver. You have delivered. You should be proud of what you do for the Laboratories and for our country, and even a little bit for me."

The new work area has two overhead cranes for heavy lifting, in contrast to the single crane shared by all programs in the previous building, says team lead Ron Maes (2155-1). The work area also is safer because the program no longer has to move things around in cramped quarters each time it's ready to assemble a test article, he says. Bldg. 840 also has a top-notch electrical lab, which increases the program's ability to conduct electrical functionality and performance testing that's critical to developing and qualifying the weapon system; space for handling and test equipment storage; and room to house piece part inventory, making security and accountability for shipping and receiving easier.

New space designed for efficiency, gives program much more room

The space is designed for efficiency. Hardware deliveries come through garage-bay doors configured like an airlock, so the first closes before the second opens. Parts move from delivery to staging, receiving, and storage. When they're issued for assembly, the B61-12 test unit is put together, then shipped to various test locations, Ron says.

Each of the four assembly stand areas in Bldg. 840 — the fifth is housed elsewhere — is roughly the size of the total area the program had previously for assembly and handling. The areas replicate one another for safety and efficiency, so tools are stored the same way and assembly stands are positioned in the same place on the floor, with secure staging areas, Ron says.

"Before, there was no real room for staging, and you had to wait until the crane was free," he says.

Facilities project lead Rico Ortiz (4822) says the move gave the B61-12 program about 23,000 square feet. Ron says most of it is work or storage space, but it includes offices and conference rooms. In contrast, he says, the entire program had about 4,000 square feet previously.

Ron started working with Rico in April 2011 to identify and remodel space for the growing program. With help from Facilities Planning Dept. 4850, the program acquired part of Bldg. 840, built between 1949 and 1952 and vacated by Sandia's machine shop in March 2011. The contractor worked extended hours and on weekends to meet an extremely aggressive construction schedule, Rico says.

Although remodeling essentially gutted the interior, the exterior preserves the original 1950s-era look because 840 is designated as historic.

The B61-12 LEP will continue its engineering development efforts for several years, but John points out that once it ends, Sandia is positioned to take on whatever comes next since the $4.49 million remodeling project created space that can support the next LEP or other R&D program.

B61-12 organization move to remodeled space helps meet schedule requirements

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He also says three areas cannot be compromised in executing the program: safety, security, and engineering excellence. "This new facility helps us achieve all three," he says.

Labs Director Paul Hommert toured the space Monday, July 21, along with Deputy Labs Director and Executive VP for National Security Programs Jerry McDowell and Div. 2000 VP Bruce Walker. Paul, in brief remarks to workers, emphasized the importance of the B-61 program. He said it was hard for him not to be a little emotional about what the building represents, because the program has consumed so much of his time within the Washington, D.C., environment in the last two years.

The message he gave Washington was "I knew my lab would come through," he told workers. "At times it felt like nobody in the room believed me saying our lab would deliver. You have delivered. You should be proud of what you do for the Laboratories and for our country, and even a little bit for me."

The new work area has two overhead cranes for heavy lifting, in contrast to the single crane shared by all programs in the previous building, says team lead Ron Maes (2155-1). The work area also is safer because the program no longer has to move things around in cramped quarters each time it's ready to assemble a test article, he says. Bldg. 840 also has a top-notch electrical lab, which increases the program's ability to conduct electrical functionality and performance testing that's critical to developing and qualifying the weapon system; space for handling and test equipment storage; and room to house piece part inventory, making security and accountability for shipping and receiving easier.

New space designed for efficiency, gives program much more room

The space is designed for efficiency. Hardware deliveries come through garage-bay doors configured like an airlock, so the first closes before the second opens. Parts move from delivery to staging, receiving, and storage. When they're issued for assembly, the B61-12 test unit is put together, then shipped to various test locations, Ron says.

Each of the four assembly stand areas in Bldg. 840 — the fifth is housed elsewhere — is roughly the size of the total area the program had previously for assembly and handling. The areas replicate one another for safety and efficiency, so tools are stored the same way and assembly stands are positioned in the same place on the floor, with secure staging areas, Ron says.

"Before, there was no real room for staging, and you had to wait until the crane was free," he says.

Facilities project lead Rico Ortiz (4822) says the move gave the B61-12 program about 23,000 square feet. Ron says most of it is work or storage space, but it includes offices and conference rooms. In contrast, he says, the entire program had about 4,000 square feet previously.

Ron started working with Rico in April 2011 to identify and remodel space for the growing program. With help from Facilities Planning Dept. 4850, the program acquired part of Bldg. 840, built between 1949 and 1952 and vacated by Sandia's machine shop in March 2011. The contractor worked extended hours and on weekends to meet an extremely aggressive construction schedule, Rico says.

Although remodeling essentially gutted the interior, the exterior preserves the original 1950s-era look because 840 is designated as historic.

The B61-12 LEP will continue its engineering development efforts for several years, but John points out that once it ends, Sandia is positioned to take on whatever comes next since the $4.49 million remodeling project created space that can support the next LEP or other R&D program.

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