A small world: Sandia Wounded Warriors discover they were united in battle years ago

By Nancy Salem

Jason Shelton and John Bailon left a recent Sandia Military Support Committee meeting side by side, sharing stories of combat in Iraq. John (5627) talked about a day in the summer of 2005 when his Marine unit was called to help a small Joint Special Operations team holed up and taking mortar and gunfire in a house next to a school booby-trapped with explosives. The hair stood up on Jason’s neck. “It sounded really familiar,” Jason (2998) says. “I asked if the mission involved bombing the building. He said it did. It was crazy. There could not have been two missions involving a Marine unit supporting a Special Operations team at a school at that exact time in Iraq. I was on the team that John’s unit came to help.” John says it became clear as he and Jason talked that they were

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NATO group tours Sandia

By Sue Major Holmes

NATO delegates toured Sandia during a three-day visit highlighting the Labs’ programs that support extended deterrence to US allies, as well as broader national security programs ranging from homeland security to preventing the proliferation of weapons of mass destruction.

The visitors included more than 50 representatives from 23 European countries, along with officials from the Department of Defense, the NNSA, the State Department.

(Continued on page 3)

Paul Hommert addresses Senate subcommittee regarding status of stockpile work

ON May 7, Sandia President and Laboratories Director Paul Hommert testified before the US Senate Armed Services Subcommittee on Strategic Forces along with his counterparts from Los Alamos National Laboratory (LANL) and Lawrence Livermore National Laboratory (LLNL). Paul and the other lab directors’ testimony provided guidance to the subcommittee as it prepares the fiscal year 2014 National Defense Authorization Act. The annual bill provides congressional guidance for national defense programs, including the nation’s stockpile. During the hearing, Paul showed senators a Sandia-designed B61-12 component to make the point the Labs is underway with full-scale engineering, design, and testing for the program. Paul also testified the component will be utilized in other key Sandia weapon-related programs. Paul told the Senate panel that Sandia is meeting the B61-12 schedule and milestones, and is on budget in FY2013. He emphasized that stability in funding and planning is key to Sandia’s execution of its life extension programs and ALT programs. The subcommittee is chaired by Sen. Mark Udall, D-Colo. In the photo here, Paul, center, is flanked by LANL Director Charles McMillan (on Paul’s right) and LLNL Director Parney Albright.

A small world: Sandia Wounded Warriors discover they were united in battle years ago

BROTHERS IN ARMS — Jason Shelton (2998), left, and John Bailon (5627) reminisce while walking in terrain at Sandia Labs that reminds them of Iraq. They both fought for the US military in Operation Iraqi Freedom. (Photo by Randy Montoya)

THIS WEEK is Armed Forces Week, which culminates with Armed Forces Day on Saturday, May 18. The week and day honor members of the nation’s five military branches: Army, Navy, Marine Corps, Air Force, and Coast Guard.

(Continued on page 4)

Faces of Sandia

Meet eight newer members of the workforce who chose to join Sandia early in their careers. They come from around the country and bring with them a wide range of skills and interests. The eight are just a few of the many newly minted professionals hired by Sandia each year. See brief profiles, photos on pages 6 and 7.

• Our safety journey continues: The high costs of the ‘hero culture’
Before I go anywhere else with this column, let me strongly encourage you to read the story beginning on the top of page 1 about two Sandians who brought into the Labs as part of our Wounded Warrior Career Development Program. I don’t want to give away too many details here; just please read it; it’s the darnedest story you’ll come across for many a moon.

And not only is the story a compelling human drama in its own right, it also gives you a good sense of the caliber of people we are bringing into the Labs. It reminds us that our veteran employees, including those here as part of the Wounded Warrior program, are an extraordinary asset for us. With their life experiences, so different from what most of us encounter in our daily lives, they give us a perspective and a grounding that serves us well as a national security laboratory. They have seen the world and its threats in ways that, thanks to them, remain largely an abstraction for most of us.

It happens every spring. That happens to be the title of a silly 1950s baseball movie that I loved as a kid. And it also applies to my annual midwinter adventures with my evaporative cooler.

There I was, a few days ago, humming my head as I crawled over to the spot in the attic where the duct work from the cooler on the roof interfaces with the duct work from the central heating system. In our house, there’s a baffle that you slide into place that opens or blocks the air path from the cooler: closed in winter, open in summer. It’s a bit of a nuisance but you only do it twice a year, closing it as winter descends and opening as summer blooms.

That is, in theory you only do it twice a year. In practice, well . . .

There I was closing the duct work. Yes, closing it. I had opened it just days before, fooled once again by the false promise of summer. Late April seems to throw us these curve balls that I fall for every year. You get a few 80-degree days in April, the house is getting hot during the day, and the next thing you know, you’re on the roof, and in the attic, bringing the cooling system on-line. You’re pretty pleased with yourself. Yep! Got ‘er done early this year!

And then . . . the betrayal. That little foretaste of summer goes away in a gust of wind. Next thing you know, the nighttime temps are down in the 30s again, upper 50s during the day, the house is cold and the furnace is off-line. And try sleeping when the wind is blowing at 60 miles an hour, rocking the hinged baffles on the cranks sounds like an alien invasion on the roof. You try cut out for day or two, figuring the weather’s bound to turn around. And it will. It will. But in the meantime, there I am . . . bumping my head in the attic. And I’ll be up there again next week, when the temperatures’ hitting 90 degrees in the shade.

Some people have their lawyer, their stockbroker, their accountant. As in, “I need to speak to my accountant about that.” Or “My stockbroker thinks I ought to sell.” My wife and I have our mechanic. As in “Our mechanic says . . .” And usually, what our mechanic says is, “Gonna cost you $3,000.” That seems high. I’d talk to my accountant about the best way to pay the bill . . . if I had an accountant. But I don’t. My mechanic does.

Did you see the headline the other day: “It’s Time to Get Serious About Going to Mars, NASA Says”? NASA administrator Charles Bolden was quoted in the story as saying: “Interest in sending humans to Mars I think has never been higher. Going to Mars, NASA Says”? NASA administrator Charles Bolden was quoted in the story as saying: “Interest in sending humans to Mars I think has never been higher. We now stand on the precipice of a second opportunity to press forward to what I think is man’s destiny — to step onto another planet.” The “D” word, destiny. It’s still a teenager. It was written by Russian rocket pioneer Konstantin Tsiolkovsky: “Earth is the cradle of humanity, but one cannot remain in the cradle forever.”

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See you next time.

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

Congresswoman Lujan Grisham visits Labs

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

Albuquerque, New Mexico 87185-1468
Livermore, California 94550-0999
Tonopah, Nevada  Nevada National Security Site
Amarillo, Texas  Carlsbad, New Mexico  Washington, D.C.

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Bill Murphy, Editor — 505-845-0845
Randy Montoya, Photographer — 505-844-5605
Mike James, California site contact — 925-294-2447
Michael Lamiglio, Production — 505-844-2297
Contributors: Michele Fleming (Ash, Mike photo, 844-4902), Nancy Talbot (Bob, 844-7038), Pam Kunsig (925-294-4613), Steve Fryer (284-622), Darnell Hunt (844-8009), Stephanie Hobbs (844-0948), Heather Clark (844-3151), Sue Holmes (844-3162), Nancy Talbot (844-2739), Jennifer Ave (284-8977), Cathy Ann Connelly (284-7676), Jim Danneskiold, manager (844-0587)

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That’s that
Assessing the economic potential of advanced biofuels

By Patti Koning

Biofuels hold great promise for the future of transportation energy, but the day that biofuel completely replaces gasoline at the pump is still a long way off. How far off it is, at best, an educated guess with many variables at play.

A new study led by Scott Paap (8114) takes a close look at the biochemical production of fatty acid ethyl esters (FAEE), one of several candidate biofuel molecules, and how it measures up against the biochemical production of ethanol. The study is detailed in a paper, "Assessing the economic potential of advanced biofuels" published in Biomass and Bioenergy in February 2013.

The study found that the biochemical production of ethanol outperforms the biochemical production of FAEE under the current state of technology development in terms of both economic and environmental metrics. However, the study also identified pathways for improving the FAEE process and evaluated the prospects for its potential as an alternative to gasoline and diesel.

**Fermentation efficiency is key**

Water is most relevant to the production process. In contrast to petroleum-derived fuels, ethanol and the relative immaturity of the FAEE fermentation technology, says Scott Paap. "The difference in fermentation efficiency is the primary driver of ethanol's current advantage over FAEE. The study found that ethanol production per metric ton of dry biomass, the yield, is about 2.5 times higher than that of FAEE. The minimum fuel selling price of ethanol is approximately ½ that of FAEE. The amount of electricity and water used in the production of FAEE are significantly higher than in the production of ethanol. Ethanol production greenhouse gas emissions are also substantially lower than those from FAEE production. The study identified two primary areas for potential FAEE process improvements: increasing the fermentation yield and switching from aerobic to anaerobic fermentation. By improving the fermentation parameters to match ethanol’s, the FAEE processes can make up most cost, fuel production, GHG emissions, and water use differences and produce a fuel with a higher energy density than ethanol. Switching to anaerobic fermentation will significantly decrease electricity consumption. However, even if these improvements in the FAEE process are achieved, the processing advantages from immiscibility with water are at least partially offset by a lower minimum fermentation yield when compared to ethanol.

**Results broadly applicable**

The comparison between the processes to produce ethanol and FAEE is imperfect, says Scott, because ethanol is a gasoline additive/replacement and FAEE is intended for diesel engines. However, the results are broadly applicable to other water-immiscible biofuels, most of which suffer from similarly low maximum theoretical fermentation yields when compared to ethanol.

This point also underscores the need to extend the scope of such comparisons beyond the biorefinery to the production plant and ultimately to combustion in engines. Further study is needed to explore the question of whether potential advantages in infrastructure compatibility and combustion efficiency for advanced biofuels will be sufficient to overcome the apparent process limitations of producing FAEE for fuel via biochemical pathways.

"The process model allows you to take a step back and analyze how a specific technology fits into the bigger picture. When a process is in the early stages of development, any estimates of energy use or greenhouse gas emissions, for example, will have a large degree of uncertainty. So, the model is useful for comparing different options and their relative performance rather than arriving at absolute numbers," says Scott.

Scott applied the same modeling approach to a follow-up project for Lockheed Martin to compare processes to produce biomass-based aviation fuels, completed in October 2012. He is currently conducting cost and energy analyses for an LDRD Grand Challenge on affordable photovoltaics and an LDRD on metal organic frameworks for oxygen purification. His modeling approach is also part of a proposed LDRD analyzing a natural-gas-based process to produce liquid fuels.

"I would like to do this kind of study on all major research projects relative to bioenergy," says Blake. "Economic analysis and experimental work must be considered together. In a research environment, you can't target the right things on a topic with as broad an impact as commercial-scale production of biofuels if you don't have the economic focus."
within 100 yards of each other during the tense conflict. "It was a weird, strange coincidence," Jason says. "For the next few days we both kept saying, 'I can't believe it.'"

Both John and Jason are in Sandia's Wounded Warrior Career Development Program, which opens specific jobs at the Labs to military veterans injured in combat. The program offers training and education, allowing combat-injured veterans to catch up to their peers who entered the civilian workforce instead of the military. "It was a very effective program," John says. "He alerted, and the handler could see that they had booby-trapped the school with trip wires and explosives and built firing positions in stairwells with extra ammunition. We didn't know how many people were in there waiting for us. It was bad."

The team retreated to a small house next door and called for help. "It was too dangerous to send guys into a situation like that," Jason says. "When things happened at that scale we request a kinetic strike in which the Air Force comes in and destroys the building. It was the middle of the night, so there were no kids around." The sun started rising as the decision was being made on the strike, not a good sign for Jason and his team, who, for the safety of support aircraft, did not go out in daylight. "We knew if we stayed there much longer we'd have to stay all day and into the next night, and we didn't have provisions," he says. "We couldn't leave because there were enemy troops in the building, and someone had to keep 'eyes on' the school until a decision could be made whether or not to destroy it."

**Marines take control**

John's nearby Marine unit had a Quick Reaction Force (QRF) on standby to help whoever was in trouble in the area. "They had assets we didn't have," Jason says. "With their numbers and tanks they could secure the area better than we could." Jason's team asked the QRF for help and at the same time began taking mortar and machine gun fire from near the school. "They knew we were there because our team had discovered and destroyed a vehicle-borne improvised explosive device near the school," he says.

The team held on while Marine tanks rolled in and secured the area. "They surrounded the school for us," Jason says. "We were taking fire, we were getting mortared. John and his guys got there and took control. It's nice when people bring tanks. With the Marines there our helicopters could come and get us out." John says his unit had attached assets, such as jets, choppers, tanks, and plenty of Marines, while Jason worked in a small team. "They needed our help and we all got down there," John says. "It was a dangerous situation." Jason says the house that sheltered his team didn't provide much protection, especially against mortars. "Having those guys show up was huge," he says. "Our small group was limited on what we could do." John says the Marines received permission to destroy the building. "It was obviously being used for something other than a school," he says. The story has a tragic postscript. The Marines left six snipers to watch the school site after the mission ended. They were later ambushed and killed. Five of the bodies were recovered by the Marines, but the sixth was missing. Jason's team went into a nearby city and recovered the body. "We leveraged all our assets to find him and we did. We brought him back to the Marines," Jason says.

**Different paths to Sandia**

Jason, who joined the Air Force after graduating from high school in Indiana in 1995, left the service in 2007 after doing four combat tours in Iraq and three in Afghanistan. His first deployment was 10 days after 9/11.

He moved to Wyoming with his wife, whom he met in the Air Force, and in 2011 relocated to New Mexico, where he heard about Sandia's Wounded Warrior hiring program from the Veteran's Administration. He went to work in January as a mechanical designer. "I love it," Jason says. "I do miss the guys I was with in the Air Force, but I wanted to further my education and do something different with my life."

John, a native of Shiprock, enlisted in the Marines in 2001 with his brother Cheston Bailon (5635), who served with him in Iraq and who also is in Sandia's Wounded Warrior program. The brothers studied business at Arizona State University and were deployed to Iraq in March 2005. They returned in October and went on reserve status through 2008. John completed a bachelor's degree in sustainability economics from ASU and in 2010 went to work for Oracle.

He learned about the Wounded Warrior program when Cheston was hired. John started at Sandia in 2012 and works in cybersecurity. "It was pretty shocking," Jason says of learning that he and John were in the same battle in Iraq. "It's a very small world to know we were that close over there and now we're both working at Sandia and in the Wounded Warrior program." John says it's amazing that he and Jason were yards apart "in a country thousands of miles away eight years ago."

"To randomly stumble upon it is very interesting and awesome," he says.

The shared experience has brought John and Jason closer. "Things like that always do," Jason says. "It doesn't matter who you were with in the military or how long ago, having the same experience is powerful. You might not see someone for 10 years but run into them again and remember that one night, and you're best friends again."
Sandia designs and delivers new, safe, and secure vehicle to transport nuclear material

By Stephanie Hobby

Moving nuclear material is always a delicate operation, and when the Y-12 National Security Complex at Oak Ridge, Tenn., needed to replace the 30-year-old vehicles it had been using to move materials within the site, Y-12 leadership turned to Sandia for its expertise in safe and secure transport.

Y-12 entered into a WFO project with Sandia to design and build two new Special Nuclear Material Vehicles, or SNMVs, to replace the existing models. Remarkably, the Sandia team went from conceptual design to finished product in only 18 months. The project was funded in September 2011, construction started in May 2012, and the first truck was delivered on April 2. The second truck arrived in Tennessee May 8.

“We were especially pleased with how quickly we were able to deliver the trucks, since many of the necessary tasks had never been done before. Due to cost and schedule constraints, we weren’t able to develop a complete drawing set or build a prototype before fabrication of the production units,” says project manager Marc Ahsen (6623).

The Sandia team used the same basic vault construction as used in other secure transport vehicles. The Sandia team designed a compact 16-foot vault and had it bolted to a heavy-duty truck chassis similar to those already used at Y-12.

Sandia engineers designed a stronger floor structure to accommodate an 8,000-pound cargo capacity as well as loading equipment, such as a forklift, weighing up to 8,000 pounds. The wall structure was strengthened to allow cargo tie-down tracks to be mounted on the front and side walls. Additionally, the trucks required a few safety modifications, such as preventing high speeds while turning to keep the top-heavy trucks upright. The updated models also offer electronic access control; they require two-person control and have updated security features over the previous models. In addition, the team worked with General Plastics in Tacoma, Wash., to fill the walls with a proprietary polyurethane foam to better protect SNMV cargo from heat and fire.

Once Sandia’s modifications were designed and finalized, team members worked with New Mexico-based MCT Industries to build the units. Sandia had designed, developed, and sustained other secure transport vehicles, and MCT Industries had done the fabrication for some of them, so both teams knew the previous design well. With such expertise, the project came together quickly. They were able to meet the ambitious deadline and now have the experience needed to quickly build more.

“This project helps support Y-12’s mission while upholding high standards of safety and security,” Marc says. “This vehicle could also very likely have a place at other sites similar to Y-12, such as Savannah River and Los Alamos national laboratories, where they need to do similar transport within their sites. We’ve essentially built prototypes with the Y-12 vehicles.”

With a working prototype designed, built, and delivered, sites needing a similar vehicle in the future would not have the added engineering expense, so costs for future models would be significantly lower. The design sent to Y-12 cost roughly $4.5 million for the two vehicles, but Ahsen estimates that the cost could drop considerably for subsequent vehicles. The WFO project was funded by the NNSA through Y-12.
When Sandia President and Laboratories Director Paul Hommert talked to the Albuquerque Economic Forum recently about the state of the Labs, he introduced to the group eight newer members of the workforce who chose to join Sandia early in their careers. They come from around the country and bring with them a wide range of skills and interests. The eight are just a few of the many newly minted professionals hired by Sandia each year. Here they are:

Julia Craven Jones is from Red Bluff, Calif. She got her first taste of scientific research and development as a high school intern at Sandia in 2001. Julia completed her bachelor’s degree in physics at San Diego State University in 2006 and her master’s and doctorate in optical sciences at the University of Arizona in 2008 and 2011. Her dissertation research, funded by the NNSA, focused on the development of a novel infrared imaging device. Julia interned at Los Alamos National Laboratory in 2004 and the Air Force Research Laboratory in 2007. She joined Sandia after grad school and is principal investigator on two technical projects. She was recently named an evaluator for the Comprehensive Nuclear-Test-Ban Treaty Organization. Julia is a volunteer at the National Museum of Nuclear Science and History and in her free time enjoys cross-country skiing and hiking with her dogs.

Albuquerque native Alice Muna first came to Sandia in 2004 as a high school Science, Technology, and Research, or STAR, intern and continued to work at the Lab through her senior year. She also interned at Cisco Systems in San Jose, Calif., and was a summer research assistant at Stanford University. Alice graduated from Stanford in 2009 with a bachelor’s degree in electrical engineering and worked as a cyberanalyst for the federal government in Washington, D.C. She returned home to Albuquerque and Sandia in 2011. She now works in the Labs’ Fire Protection and Assurance group and is earning her master’s degree in fire protection engineering from CalPoly San Luis Obispo. In her little bit of spare time, Alice enjoys trying new restaurants, reading, and playing with her new puppy.

Matthew Denman grew up in a military family and lived in cities around the world, from Langley, Va., to Ramstein, Germany, and Okinawa, Japan. He earned a bachelor’s degree from the University of British Columbia in 2007 and a doctorate from MIT in 2011, both in nuclear engineering. He joined Sandia two years ago in the Risk and Reliability group, where he led a multilaboratory review of safety and licensing gaps for the Sodium Fast Reactor and helped rewrite a Nuclear Regulatory Commission document on low-level radioactive waste disposal. Matt is now doing research into risk assessment methodologies. In his free time he likes to travel the world to sample local food and drink.

Nathan Elliott is an Albuquerque native who served in the US Navy. He worked for several years on naval reactors, leading to a job in Sandia’s Radiation Protection Department. While at Sandia he earned a bachelor’s degree from New Jersey’s Thomas Edison State University and a master’s from the University of New Mexico, both in nuclear engineering. He works in the Radiation Protection Dosimetry Program. Nathan is the father of twins and managed while working and studying, both full time, to maintain an active role in the comic book community, for which he frequently travels to national conventions.
Sharlotte Kramer was born in Albuquerque on Kirtland Air Force Base, a stone's throw from where she now works at Sandia. The child of an Air Force officer, she lived in several places in the United States and abroad. Sharlotte earned a bachelor’s degree in aerospace engineering in 2004 from the University of Virginia. She received a master’s in aeronautics in 2005 and a doctorate in aeronautics with an applied physics minor in 2009 from the California Institute of Technology. She was an intern at Booz Allen Hamilton, SAIC, and Lockheed Martin, and a postdoc research associate at the University of Illinois Urbana-Champaign. Sharlotte returned to Albuquerque in 2011 to join Sandia’s Structural Mechanics Laboratory. Her expertise is in experimental solid mechanics. Sharlotte volunteers as a worship music leader at her church and enjoys travelling, baking, jewelry making, and spending time with friends and family.

Chris Jenkins was born and raised in Peoria, Ill. He earned a bachelor’s degree from the University of Illinois and a doctorate from the University of Wisconsin, both in computer engineering. His research focused on accelerating algorithms in modern high-performance microprocessors. Chris did internships in information technology and mining truck radar research. He spent time in Taiwan with the National Science Foundation’s East Asia and Pacific summer institutes. Chris joined Sandia in early 2012 and is studying new ways to design computer systems to mitigate malware damage. His technical interests include computer architecture, low-level software and firmware, mobile computing platforms, and security analysis. Outside work he practices Spanish and Mandarin Chinese, salsa and bachata dancing, cooking, and auto mechanics.

Danielle Sedillo-Cafferty was born in Albuquerque and raised in Los Alamos. She earned a bachelor’s degree in business administration with a concentration in international management from the University of New Mexico, and spent time in Japan to reinforce her studies. She worked in human resources for Fidelity Investments in Albuquerque then returned to UNM to get an MBA in management of information systems with the cyber focus of information assurance. While in school Danielle interned with Sandia’s Intellectual Property group as a systems analyst for patents and licensing. She was hired as a full-time staff member of the Collaborative Information Environments group where she now works as an information systems analyst developing SharePoint solutions. Danielle has the travel bug and also enjoys reading and hiking with her dogs.

Russell Gayle, a Texas native, earned bachelor’s degrees in mathematics and computer science from the University of Texas at Austin in 2003. He moved on to graduate school at the University of North Carolina at Chapel Hill and a master’s in 2006 and a doctorate in 2010, both in computer science. His research focused on robotics and computer graphics and simulation. Russell’s first exposure to Sandia was as a fellow in the DOE High Performance Computational Fellowship program. He worked in Chicago at the high-frequency trading company Optiver in computing performance and later in big data analytics at Google. Sandia drew him back, and he joined the Interactive Systems, Simulations, and Analysis group. He does projects in areas from data sciences to gaming technologies and says his work at Sandia has been a fun ride. Russell enjoys running, tennis, racquetball, and bouldering, and spending time with his wife and 1-year-old baby.
Radiation detection to go

MRDIS technology deployed at international ports

By Stephanie Holinka
Photos by Greg Stihel

In late March, a Sandia team traveled to the Port of Salah, Oman, to conclude the acceptance testing of the Mobile Radiation Detection and Identification System (MRDIS), a technology intended to make it more difficult to sneak illicit radiological materials into a country.

Typical radiation detectors are fixed-in-place at port entrances and exits, so they aren’t able to scan transshipment containers, says Greg Stihel of Systems & Mission Assurance Dept. 6813. This makes transshipment an enticing option for those who might want to bring radioactive substances into a country for terrorist activities like making dirty bombs, he says.

“In 2006 or so, NNSA recognized the need to also scan cargo that is taken off a ship and, in a short period of time, put on a second ship,” Greg says.

Greg says port security is a huge international concern, but that port operators and shippers are also concerned about time delays, because they negatively impact their bottom line.

“If the system creates time delays, that costs shippers and port operators money, and the detectors won’t get used,” Greg says.

Based on the need to scan transshipped containers quickly, Sandia engineers developed the idea for MRDIS. Under direction by the National Nuclear Security Administration’s (NNSA) Second Line of Defense (SLD) Program they set about making it happen.

Two MRDIS prototypes were developed around 2006, and were field tested in Oman. Engineers worked with port operators to refine the MRDIS based on its performance.

After the prototypes proved their worth, 12 MRDIS devices were ordered, which represents a tremendous investment in the idea, Greg says. Two years later, the first production unit of the second-generation MRDIS was complete.

Engineers then created a detailed set of requirements for subsequent production models, allowing the project to move forward quickly.

The work was done in partnership with Pacific Northwest National Laboratory (PNNL), and with Cincinnati firm DRS Technologies.

Not like driving a tractor trailer

To date, eight MRDIS units have been deployed worldwide. The first set of four went to Panama in November 2012. The four in Oman arrived last summer and, after some delays, completed the final acceptance testing in late March.

Greg says driving MRDIS “feels strange because it’s so big, and because the operator sits sideways, facing the trucks going through the center. The MRDIS is big enough for a truck carrying shipping containers to pass through, so it’s not like driving just a tractor trailer track.”

In addition to port facilities, the team says that MRDIS-like platforms could be used at any location with “pinch points” that traffic passes through.

The work was funded by NNSA’s International Material Protection & Cooperation Office under the Second Line of Defense Program, which installs radiation detection equipment at land border crossings, airports, seaports, and international checkpoints all over the world.

Team members estimated that cumulatively they spent almost a full year in Oman. Greg says working in Oman for long period of time wasn’t a hardship. “Oman is interesting. It’s traditional but also it’s pretty and friendly and comfortable.”

Nearly 90 percent of imported and exported goods worldwide travel by shipping container. Approximately 500 million 20-foot-equivalent units (a maritime shipping unit of measure) transit the globe annually through the maritime system.

Two more MRDISs are slated to be deployed at international airport sometime next year.
Ease up on the hero culture of “deliver at all costs” and recognize that some things require more than a fast-and-furious approach. A big step is shifting safety thinking and behavior from predominantly a “checklist” approach to the critical thinking required for Engineered Safety,” Sid says.

And a recent NNSA and Sandia joint comprehensive review of national and military safety culture also calls for changes in our collective behavior.

Completed in February by Sandia and the DOE/NNSA Sandia Field Office (SFO), the Final Report: Integrated Safety Management Implementation Utilizing Safety Culture Analysis and Engagement (ISMIUSCAE) points to solid progress along the safety journey in the past three years, but identifies ingrained cultural issues that must be addressed, Sid says.

“It is unique in its partnered approach and its focus on trying to identify a current benchmark of the specific challenges still facing Sandia and the Sandia Field Office (SFO) regarding improvement of its safety culture,” says Geoffrey J. Reusoldt, SFO manager.

Last month the Sandia division VP's held Engineered Safety (ES&H) at the National level and NNSA/Sandia Field Office points to solid progress along the safety journey in the past three years, but identifies ingrained cultural issues that must be addressed, Sid says.

Major climate forcer is CO2, lively invited speaker asserts

By Cathy Ann Connelly

RICHARD ALLEY

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עשיה על העו' הת putting of all costs” in Cedar and at all points of the way we do our work at Sandia — line through management. That’s the priority, Sid says. “We need to address these issues and walk the talk to move to the next level along our safety journey.”

As the report concludes, “Finally, the review team strongly recommends that both SFO and Sandia use the results of this review to catalyze a major step forward in addressing safety culture-related weaknesses within both organizations. By leveraging such an approach, coupled with findings from this and other research, a broader and safer, sustainable climate can be achieved.”

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As data from the study is reviewed, more opportunities to improve may emerge. Sandia is not a homogenous organization. It is a “collection of diverse, distinct subcultures interconnected in some cases only through linkages of labels and compensation systems.”

The report continues, “It is unique in its partnered approach and its focus on trying to identify a current benchmark of the specific challenges still facing Sandia and the Sandia Field Office (SFO) regarding improvement of its safety culture,” says Geoffrey J. Reusoldt, SFO manager.

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Major climate forcer is CO2, lively invited speaker asserts

By Cathy Ann Connelly

RICHARD ALLEY

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Alley dismissed water vapor’s effect in warming as secondary. “In the air, it forms clouds, which rain and then the sky is clear again. Even though the water vapor is doing work in blocking heat emissions, it’s CO2 that’s the big player because it controls the temperature that sets the stage.”

Perhaps Alley’s appearance more resembled a three-dimensional sphere emerging from a digital screen than the real-world National Academy of Sciences member and American Physical Society Fellow, as he used a geologist's green eyeshield given him by a friend of his, as he usually does. “I’ve got that thing that you humans are changing in ways that things that are in your computer are not!”

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CRADA opens new doors for Sandia and Boeing

By Nancy Salem

A new umbrella Cooperative Research & Development Agreement (CRADA) expands Sandia’s partnership with the Boeing Company into a wide variety of technical areas.

Sandia has had an umbrella CRADA with Boeing Commercial Airplanes since 2002 that focuses on Boeing’s private-sector work. The new umbrella CRADA is with Boeing Research & Technology, encompassing the company’s government-funded work.

“This is a major breakthrough,” says Vic Weiss (10012), CRADA specialist and team lead, who helped negotiate the five-year agreement. “For a number of years, Sandia and Boeing have been searching for a way to enable both partners to collaboratively work together on Boeing’s government-funded work.

“Without DOE’s and DTRA’s help this umbrella CRADA and the first Project Task Statement (PTS) may never have happened,” he says.

Vic credits both DOE and DTRA with promoting the umbrella CRADA with Boeing Research & Technology and Sandia can now cooperate on externally funded projects, such as our current task for the Defense Threat Reduction Agency (DTRA).”

Boeing is the world’s leading aerospace company and the largest manufacturer of commercial jetliners and military aircraft. The company also designs and manufactures rotorcraft, electronic and defense systems, missiles, satellites, launch vehicles, and advanced information and communication systems.

“Boeing has been working with Sandia National Laboratories for many years in various areas of advanced technology development using internal development funding,” says John Kuhn, a Boeing project lead. “With the creation of this new CRADA, Boeing Research & Technology and Sandia can now cooperate on externally funded projects, such as our current task for the Defense Threat Reduction Agency (DTRA).”

Umbrella CRADAs have a broad scope covering multiple projects in a variety of categories. The new agreement authorizes projects in materials and process science, modeling and simulation, sensors, tags, and associated electronics, microsystems science, technology, and components, logistics and supply chain management tools, intelligent systems and robotics, manufacturing technologies, test techniques and facilities, pulsed power, and safety.

“Sandia and Boeing each have technologies, processes, and unique facilities that can benefit each other,” Vic says. “Sandia technologies cross a wide technical spectrum and are applicable to Boeing in its space, missile, and aircraft research.”

The first project, funded in part by DTRA, is studying aerosol-based decontamination of airplanes. The goal is to test, evaluate, and develop a prototype decontamination system.

"Under this task we are developing new innovative decontamination delivery and application approaches for decontamination of chemical and biological warfare agents," Kuhn says. "By using the skills and experience available in both organizations we are able to provide the customer better value for their research investments. I have worked with many people at Sandia and have always found them to be bright and motivated people with some amazing technology."

Vic credits both DOE and DTRA with promoting the umbrella CRADA and the first Project Task Statement (PTS). “Without DOE’s and DTRA’s help this umbrella CRADA with Boeing Research & Technology, and the first PTS may never have happened,” he says.

Veronica Lopez (8532), who provided project support, says the umbrella CRADA takes the partnership into exciting new areas. “This is a great collaboration between Sandia and Boeing,” she says.
Japaneseencer journeys to end furor over Sandia Z tests

By Neal Singer

Yasuyuki Kaneko left his wife and two small children at the end of April to fly from the northern Japanese city of Sapporo, population 200,000, to Albuquerque, to host a tour of the International Neutron Physics Facility at Sandia National Laboratories. As the head of the Sandia Life-long Learner Awards program, Kaneko said he was “and...
Mileposts on the path to sustainability

Environmental Management System honors four with awards of excellence

By Katrina Wagner

Sandia President and Labs Director Paul Hommert welcomed members of the workforce who excel at conserving natural resources, recycling, and minimizing waste at Sandia during the Environmental Management System Excellence Awards ceremony on April 25. Sandia honored four projects across the Labs with awards of excellence for their efforts in managing risks, reducing Sandia’s environmental footprint, and being good stewards of the environment.

“We received nine excellent nominations this year, most from people who don’t have ‘environmental’ in their job title, demonstrating that Sandians care about how their work impacts the planet,” says Stephanie Salinas (4143), EMS coordinator. “The nominations we received this year range from administrative assistants who are passionate about recycling and inspire their departments to participate to teams of people committed to finding ways to reduce emissions of sulfur hexafluoride at their operations.”

The nominated projects, she adds, save Sandia money and resources. In total, the nine nominations resulted in 2,000 pounds of solid waste being recycled and about $25,000 costs savings annually.

The 2013 Excellence Award recipients are:

- **Energy-efficient lighting systems in the Bldgs. 810 and 825 auditoriums**
  
  Creative Services, Dept. 3653 used Integrated Enabling Services funding and recovery monies from its service center to update the lighting in the Bldg. 810 and Bldg. 825 auditoriums. Both auditoriums are now equipped with modern energy-efficient lighting systems. The new lighting in the Bldg. 810 auditorium equates to 79.2 percent energy savings and, in the Bldg. 825 auditorium, a 35.2 percent energy savings. The return on investment is significant and provides cost savings to Sandia.

- **Bldg. 753 — Taking occupancy sensing to a new level**
  
  Occupancy sensor lighting control projects have been implemented in buildings around Sandia to save energy. These projects have significantly reduced building energy consumption because lights automatically switch off after occupants leave their offices. Lights remain off until occupants return to their offices and turn the lights on. The Bldg. 753 occupancy sensor project was a first of its kind at Sandia and takes occupancy sensor control to a new level by shutting off lights as well as closing air-flow dampers in unoccupied offices. Results have shown the building’s overall electrical consumption has been reduced up to 36 percent during summer months.

- **Center 2700 pilots glass bottle recycling**
  
  Sandia’s Site Sustainability Plan.

High-achieving Sandia physicist leaves technical yet personal memoir

By Neal Singer

The swan song of retiring Sandia physicist Tom Sanford is contained in SAND document 2013-2481, “History of HERMES III Diode to Z-Pinch Breakthrough and Beyond.”

The achievement-oriented physicist was mentor by two Nobel laureates and went on to share the 2005 Hannes Alfvén Prize of the European Physical Society “for the remarkable achievements of the multi-filament Z-pinch development of recent years.” In his memoir, he discusses the process by which he helped fashion improvements at the Z and HERMES III accelerators. He credits his successes to relentless attempts to coordinate theory and experiment in attacking the problems of science.

At HERMES, for example, his effort to use a diode to create the required radiation field gave him migraine headaches when the generated beam — theoretically perfect — kept pinching.

“Subsequently,” he writes, “I found out that the crate containing the large heavy graphite target being used had been left out in the rain before being installed. The crate had leaked and the graphite likely contained moisture. This could easily explain why the beam pinched. The incident beam would have heated any moisture, creating ions.”

A Sherlock Holmes-like solution, but unfortunately heating the graphite to drive out moisture failed to solve the problem. So the HERMES team (all credited by Tom) tried other changes, like replacing the surface of the target with a new foil, to no effect. Finally, a technician found electrical burn marks on an obscure tantalum shield that had not been secured. “The shield was removed and the beam immediately snapped into the calculated position and my migraine disappeared,” Tom writes.

Changing the course of fusion research at Sandia

At Z, the breakthrough generally credited to him (and implemented by many Sandians, all credited) is that a z-pinch could be stabilized through use of an orderly forest of tiny wires through which huge currents are passed. In the space of a year, the innovation — which created a huge magnetic field that smashed ionized metal particles together, releasing X-rays — tripled the power output of first the Saturn accelerator, where the innovation was first employed, and then Z, which was already the world’s largest producer of laboratory X-rays.

The huge increase changed the course of fusion research at Sandia from the use of ion beams to that of z-pinch, making Z a candidate to achieve peacetime fusion power — an outcome still considered possible by researchers working on the machine now. The increased power output also made Z a more effective materials tester.

Not reluctant to reveal that even successful people sometimes fail, Tom writes that to his chagrin, he had to buy pulsed-power director Keith Matzen a double-decker ice cream cone when Keith won a bet on the output that would result from increasing the mass of Z’s wire target. Tom’s history of moving without restriction from project to project at the Laboratories, he says, “illustrates how Sandia provides opportunities.”