Legacy Waste Program nearing completion

By Stephanie Holinka

In mid-December, the first shipments of remote-handled transuranic waste (RH-TRU) left Sandia, headed directly for disposition in DOE's Waste Isolation Pilot Plant (WIPP) near Carlsbad, N.M. These shipments began Sandia's final stage in DOE's Legacy Waste Program, which works to safely remove all legacy waste from sites throughout the nuclear weapons complex.

(Continued on page 5)

"NNSA has worked closely with Sandia since the decision was made in 2004 to reduce the nuclear footprint at this site and I am very pleased that, despite several obstacles, Sandia has successfully met its commitments and accomplished the effort without incident."

— NNSA/SSO Manager Patty Wagner

REMOTE CONTROL — Mike Torneby (1387) and Dave Siddoway (1387) use remote manipulators to maneuver materials inside the Auxiliary Hot Cell Facility in Tech Area 5.
(Photo by Randy Montoya)

BTU Busters

Sandia has an ambitious energy-reduction goal: Cut energy intensity, or BTUs per square foot, by 30 percent from 2006 through 2015 using a 2003 baseline, and reduce greenhouse gases 28 percent by 2020. To find out how the Labs is doing, see the story on **pages 6-7.**

Sandia LabNews

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Sandia National Laboratories

Sandia researchers, UK partners publish groundbreaking work on Criegee intermediates in *Science* magazine

"This is a breakthrough discovery, but really only the opening of the door on this work. The results from this study, and the doors this work opens for future studies of Criegee intermediates, will make models of the troposphere more accurate, providing a better understanding of how anthropogenic and biogenic chemistry together shape our planet's environment."

— David Osborn (8353)

In a paper published in this week's issue of *Science* magazine, researchers from Sandia's Combustion Research Facility and the University of Manchester and Bristol University report the potentially revolutionary effects of Criegee biradicals.

For more details, see the story on **page 3.**

NNSA Sandia Site Office manager Patty Wagner announces retirement

Patty Wagner, manager of NNSA's Sandia Site Office (SSO) for the past eight years, has announced her retirement, effective Friday, Feb. 3, after more than 30 years in government service.

PATTY WAGNER

As SSO manager, Patty has been responsible for overseeing DOE's largest management and operating contract.

She led development of the Sandia contract, whose language has served as a model for other contracts to improve the effectiveness and efficiency of the nuclear weapons enterprise.

Geoff Beausoleil will take over as manager of the Sandia Site Office. He has more than 30 years of experience in the nuclear industry, and for the past three years has served as deputy manager of the Pantex Site Office.

Patty's deputy, Rich Sena, will serve as acting SSO manager until the new manager arrives. Bob Scott, SSO assistant manager for programs, will replace Patty as chair of the Nuclear Production Contract competition and evaluation for Y-12, Pantex, and Savannah River tritium operations.

Inside . . .

50 years and counting

When Dick Spalding signed on at Sandia, John F. Kennedy was president, the Berlin Wall had just been erected, Nikita Khrushchev was premier of the Soviet Union, and Sandia was deeply involved in Cold War work. Dick recently marked 50 years at the Labs and shows no signs of slowing down. Story on **page 12.**

That's that

If, as time goes by, 2012 seems to drag on and on (and no, I'm not referring to the seemingly endless barrage of political debates we are likely to be subjected to over the next few months) perhaps it's because we're in a leap year. That pesky February 29, added once every four years, is intended to keep the calendar year synchronized with the seasonal year. This year, though, will be even longer. Not only will we have an additional day in 2012, but also, at the end of June, the powers-that-be that decide these things are adding an extra second, as well, a so-called "leap second," intended to keep UTC (Coordinated Universal Time) in sync with mean solar time.

The periodic implementation of a leap second (which can either be positive or negative to compensate for earth's rotational wobble) has become quite controversial for members of the body that decide when a new second is needed.

One camp — the conservatives? — argues for retention of the leap second option, while another — the progressives? — petitions for its demise as being unnecessary, irrelevant, and disruptive. Even as I write this, the warring parties are gathering in Geneva to have it out. One breathless headline announces that "Fate of the leap second hangs in the balance." Another headline reads, "Britain battles the US to keep leap second at conference . . ." Who are the good guys in this high-tech Gunfight at the OK Corral? Who are the Earp Brothers? Who are the Clantons? Time will tell.

* * *

Do you know about Groupon, the online site that offers two-for-one deals on all kinds of things, everything from gourmet meals to belly-dance lessons? My wife and I have actually had some nice meals we probably otherwise wouldn't have enjoyed had it not been for a Groupon offer. But it seems to me that a recent deal is just a bridge too far. The pitch: A two-for-one deal for Lasik surgery. Get one eye done at the regular price and get the second eye free. When you come across a deal like that, you almost expect to hear, "But wait! There's more!" Somehow that doesn't sound right to me.

* * *

Interestingly enough, that Groupon deal is oddly similar to a concept a reader, frequent correspondent, and friend floated past me recently. One of the pleasures of my job, as I've noted before, is that I'm able to maintain friendly correspondence with a number of retirees. One of my "regulars" is a longtime retiree who just can't help but be funny. Whenever I see a note in my inbox from Elmer, I just know I'm in for a treat. What's he got to say this time? Elmer has this sort of screwy outlook on things that always makes me laugh. For example, not long ago he wrote that he has a feud with the dental profession. Let's face it, none of us like going to the dentist, but Elmer puts a unique spin on his antipathy. "I realize I should have checkups, cleanings, X-rays, etc.," he writes, "but the dentists all say that I have to pay full price for an exam and cleaning even if I only have half my teeth. Makes no sense. The dentist's sign ought to say, 'Clean 32 teeth: $50; clean 16 teeth: $25; Tuesday special: $1 a tooth.' Until that comes about, I ain't going."

Makes sense to me, Elmer. I have a dentist's appointment next week. I'll bring it up with him then.

* * *

Everybody knows that bread always falls to the floor butter-side down. And we all understand that there's a fifth dimension for which the household washing machine is the portal. That's where all those missing socks end up, of course. But I've been wondering lately about another natural force at work for which I'm still looking for an explanation: Here I am, sitting at my desk, minding my own business. When I sit down, my shoes are tied. I go about my work and a half-hour later, when I get up to grab a cup of coffee, my shoes are untied. I haven't touched the shoes or laces, mind you. In fact, except for banging away at the keyboard I haven't even moved. But it never fails that my shoes somehow untie themselves. What's going on here? Any ideas? Probably has something to do with leap seconds. Or that fifth dimension.

See you next time.

— Bill Murphy (505-845-0845, MS 0165, wtmurph@sandia.gov)

Sandia LabNews

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LOCKHEED MARTIN

Retiree deaths

Isaias Gutierrez (age 88) . . . . . Nov. 18
Stephen L. Passman (69) . . . . . Nov. 20
Curtis P. McMurtrey (89). . . . . Nov. 24
Cecil M. Morrisett (86) . . . . . Nov. 28
William Lyon Wood (87) . . . . . Nov. 30
Vaun B. Atkins (85) . . . . . Dec. 2
Ronald Paul Haines (70) . . . . . Dec. 7
Norman L. Smith (86) . . . . . Dec. 8
Frank J. Cupps (82) . . . . . Dec. 8
Joseph Paruta (96) . . . . . Dec. 14
Kenneth A. Peters (86) . . . . . Dec. 15
Robert Dwight Nasby (72) . . . . . Dec. 16
Calixto Sifre Soto (78) . . . . . Jan. 1

Lab News Reader Service

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

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

Employee death

Rob Bugos: It seemed he could do anything

Rob Bugos, who died in December at age 48, left a mark on Sandia that will not soon be forgotten.

Rob hired on at the Labs in 1984 as an entry-level technologist; at the time of his death, he was a principal member of the technical staff and lead mechanical engineer in Flight Structures and Mechanisms Dept. 5343. He was responsible for the mechanical design of the synthetic aperture radar systems produced at Sandia.

ROB BUGOS

His longtime friend and colleague, Phil Kahle (5343), who worked side by side with Rob for 27 years, says Rob's contribution to SAR technology cannot be overstated.

"His work and that of the teams he led over his career contributed directly to Sandia being the world leader in this business area," Phil says, adding that Rob's seemingly limitless knowledge of SAR systems, "along with the honesty and integrity he brought to the job, made him someone who truly embodied 'Exceptional Service in the National Interest' every day."

One of Rob's former managers, Stew Kohler (5359), vividly conveys the essence of how Rob approached his work. In a retrospective piece, "Rob Bugos: The Early Years," Stew wrote that, "Rob began work [in 1984] as a mechanical technician. I, as a senior engineer, worked with him on gimbal assembly mechanical design. Right away, I realized that Rob was special. He quickly picked up the nuances of gimbal mechanical design and began making technically important design contributions. . . . One day Rob said, 'Now that I know how to design gimbal assemblies, what are you going to do?' At first I was somewhat taken back, but I soon understood the importance of that moment. Rob had emerged as the incredibly capable 'owner' of gimbal assembly mechanical design. It turns out that gimbal assembly design has non-mechanical aspects (control system design, electronics) so Phil Kahle, I, and others were able to stay gainfully employed. . . ."

"In recent times," Stew concluded, "Rob and his team developed SAR gimbal assemblies that have seen duty all over the world including in Asia, the Middle East, and even in Antarctica. Without a doubt, Rob's legacy of accomplishments will prove to be of long-lasting importance to Sandia's national security mission."

For all of his contributions to Sandia and the nation, Rob's friends and colleagues recognize that, ultimately Rob was first and foremost a family man. He was called "Dance Mom" and "Sound Man," so devoted was he to helping his daughters with their professional dance productions at a local dance studio. He enjoyed coaching his son's soccer teams and always had projects going on at home, maintaining vehicles, remodeling the kitchen, reroofing the house.

"It seemed he could fix anything," Phil marvels. "You name it — he would take it on and do it well."

Though described as a man who didn't often show his emotion, Rob was moved to tears by the birth of his first grandchild.

"Rob was always involved with any activity his kids were interested in," colleague Curtis Gibson (2627) says, noting that even at the very last lunch the team shared, Rob was talking about what his kids and his grandson were up to.

Immersed in his work as he was, Rob always had time for his co-workers. Says Lucille Ortiz (5343): "He was my friend, the one I could go to his office and talk to. We talked about many things, *American Idol*, politics was a big one, and just work environment things. . . . There was nothing he couldn't do just thinking about it for a while."

Tammie Neill (5343) called Rob her "go-to guy" on anything to do with her home computer. "Rob knew so much about so many things," Tammie says. "I could talk to Rob about anything and will miss him every day."

Fellow worker Jen London (5343) was always impressed with Rob's incredible work ethic; he came in early and more often than not worked on his Fridays off, she says. Being a dancer herself, Jen says she enjoyed talking with Rob about his daughters' latest dance productions.

"The things I will remember most about Rob are his laugh in the hallway and his obvious pride for his family," she says.

Add it up: Devoted family man, husband, father, grandfather, friend, community servant, and defender of his nation — that is the legacy of Rob Bugos.

"We will all miss him greatly," says Curtis. "Our lives are richer for having Rob in them." *— Bill Murphy*

Groundbreaking research could illuminate chemical processes that help shape planet's environment

By Vanitha Sankaran

SANDIA COMBUSTION RESEARCHERS Craig Taatjes (8353), left, and David Osborn (8353) discuss data found from the detection and measurement of Criegee intermediate reactions. The apparatus was used to make the measurements, which researchers believe will substantially impact existing atmospheric chemistry. (Photo by Dino Vournas)

In a breakthrough paper published in this week's issue of *Science* magazine, researchers from Sandia's Combustion Research Facility and the University of Manchester and Bristol University report the potentially revolutionary effects of Criegee biradicals.

These chemical intermediates are powerful oxidizers of pollutants produced by combustion such as nitrogen dioxide and sulfur dioxide. Although Criegee intermediates — carbonyl oxides — were hypothesized in the 1950s, it is only recently that they have been detected. Previously, scientists only had indirect knowledge of their reaction kinetics.

"This is a breakthrough discovery, but really only the opening of the door on this work. The results from this study, and the doors this work opens for future studies of Criegee intermediates, will make models of the troposphere more accurate, providing a better understanding of how anthropogenic and biogenic chemistry together shape our planet's environment," says David Osborn (8353).

The article, titled Direct Kinetic Measurements of Criegee Intermediate (CH_2OO) Formed by Reaction of CH_2I with O_2, reports the first direct kinetics measurements made of reactions of any Criegee species, in this case formaldehyde oxide (CH_2OO). These measurements determine rate coefficients with key species, such as sulfur dioxide (SO_2) and nitrogen dioxide (NO_2), and provide new insight into the reactivity of these transient molecules.

The detection and measurement of the Criegee intermediate reactions were made possible by a unique apparatus, designed by Sandia researchers, that uses light from a third-generation synchrotron user facility, Lawrence Berkeley National Laboratory's Advanced Light Source, to investigate chemical reactions that are critical in hydrocarbon oxidation. The intense tunable light from the synchrotron allows researchers to discern the formation and removal of different isomeric species — molecules that contain the same atoms but are arranged in different combinations.

In the *Science* publication, the researchers reported a new means of producing gas-phase Criegee intermediates and used this method to prepare enough CH_2OO to measure its reactions with water, SO_2, nitric oxide (NO), and NO_2. The ability to reliably produce Criegee intermediates will facilitate studies of their role in ignition and other oxidation systems.

The researchers found that the Criegee biradicals react more rapidly than first thought. Moreover, the British and Manchester investigators demonstrated these kinetics results imply a much greater role of carbonyl oxides in tropospheric sulfate and nitrate chemistry than models had assumed, a conclusion that will substantially impact existing atmospheric chemistry mechanisms.

For example, SO_2 oxidation is the source of sulfate species that nucleate atmospheric aerosols. Because the oxidation of SO_2 by the Criegee intermediate is much faster than previously assumed, Criegee reactions may be a major tropospheric sulfate source, changing our picture of tropospheric aerosol formation.

This capability breakthrough was funded by the Office of Basic Energy Sciences (BES) in DOE's Office of Science, and conducted using the Advanced Light Source at Lawrence Berkeley National Laboratory, a scientific user facility supported by BES.

Blake Simmons elected to AIMBE College of Fellows

Blake Simmons (8630) has been elected to the College of Fellows for the American Institute for Medical and Biological Engineering (AIMBE). The 107 inductees were nominated by their peers and screened by committees of Fellows within their specialty, and were finally elected by the full college as the official class of 2012.

BLAKE SIMMONS

Blake was selected for his work on the "development of sustainable technologies that provide low energy routes for the biological production of fuels and chemicals." The College of Fellows is composed of the top two percent of medical and biological engineers in the country. Engineering and medical school chairs, research directors, innovators, and successful entrepreneurs comprise the College of Fellows to fulfill AIMBE's mission of providing leadership and advocacy in medical and biological engineering for the advancement of society.

"The 107 inductees consist of some of the most talented and influential members of our field," says Kenneth Lutchen, AIMBE president and dean of Engineering at Boston University. "It is both a pleasure and an honor to welcome the class of 2012 to our College of Fellows."

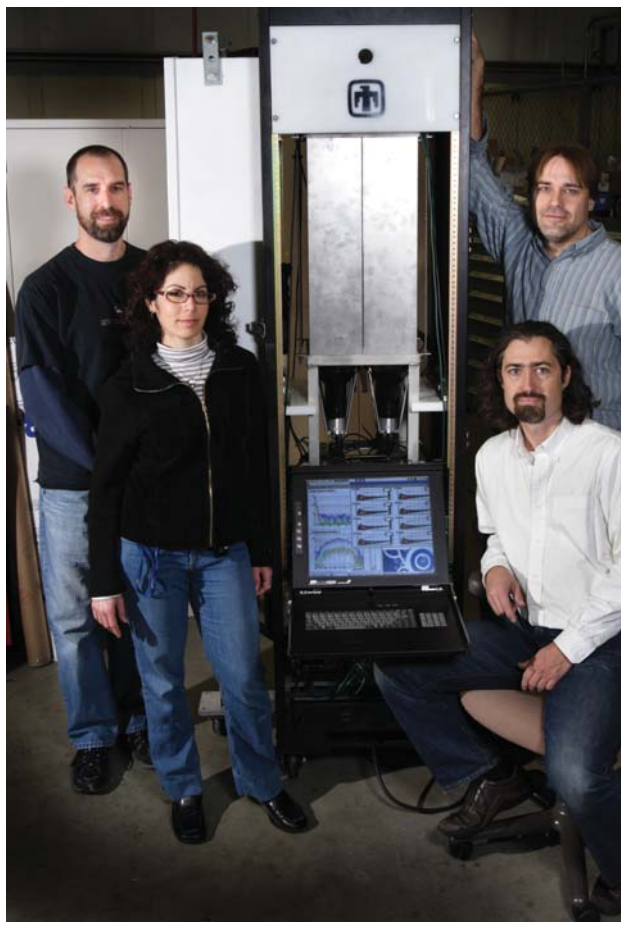
Blake is the senior manager of Biofuels and Biomaterials Science and Technology and serves as the Biomass Program leader for Sandia. He is also the vice president of the Deconstruction Division at the DOE Joint BioEnergy Institute (JBEI). His JBEI team is working on novel hydrolytic enzymes and biomass pretreatments to liberate fermentable sugars from lignocellulosic biomass.

He received his PhD in chemical engineering from Tulane University and his bachelor's degree in chemical engineering from the University of Washington. He served six years in the US Navy as a nuclear propulsion operator.

A formal induction ceremony will be held during AIMBE's 21st annual event at the Grand Hyatt in Washington, D.C., on Feb. 20. For more information about the event, visit www.aimbe.org.

Sandia CaliforniaNews

Sandia team deploys antineutrino detector at San Onofre plant



Sandia's antineutrino detection team (left) prepares an antineutrino detector for deployment. This is the 5th deployment of Sandia's antineutrino detector at the San Onofre Nuclear Generating Station and the smallest, most compact system yet. The detector, computer, electronics, and readout systems all fit within a single electronics rack, and the detector uses a novel combination of scintillator components to provide unambiguous particle identification (PID). The PID allows researchers to maintain a high efficiency for detecting antineutrinos while rejecting environmental backgrounds at the level of 4 or 5 orders of magnitude. Team members, from left to right in photo at left, are Dan Throckmorton (8125), Belkis Cabrera-Palmer (8132), Dave Reyna (seated, 8132), and Jim Brennan (8125). (Photos by Dino Vournas)

What would *Bruce* do?

A cast of characters leads to more people-centric software

PRODUCTION TOOLS DEPT. 9342 developers, from left, Andrew Steele, Ramona Gallegos, Kyle Hayden, manager Andy Ambabo, and Russ Clark in their paired programming environment. (Photo by Randy Montoya)

Story by Stephanie Holinka • Photo by Randy Montoya

Production Tools Dept. 9342 is changing the way Sandia's software is developed and implemented by integrating the human factor into every step of its research and development.

"For nearly 40 years, software development at Sandia was done the same way it was done in the rest of the business world," says computer systems engineer Andrew Steele (9342). "Now, groups like Production Tools, which manage Sandia's cyber infrastructure, are using newer approaches to ensure that their products are really meeting the needs of their customers.

"In the past, using what's called the 'waterfall method,' a developer group would develop a requirements list, create a project plan to address each item on the list, and work on the software," Andrew says. "Once the software met the requirements, the program got passed onto another group that measured quality assurance, and it was finished. It sounds logical, but it doesn't account for the most important variable in whether a program is effective: the human factor."

Now, Andrew's group turns to more human-centric processes. Rather than a list of requirements driving work, they develop profiles of end-users who must work with the software. The computer systems engineers choose among several profiles, developing software more in keeping with the goals and style of the designated user. They don't get to meet everyone who uses their tools, but they do work to ensure that people are kept in the forefront of developers' minds as tools are being created and modified.

Another change is the use of agile development, which creates programs in an iterative way, using incremental development and collaboration. The method promotes research of technologies, adaptive planning, evolutionary development and delivery, a time-boxed iterative approach, and encourages rapid and flexible response to change. This approach enables a rapid response to changes in Sandia's cyber security environment, thus providing solutions that strengthen the Labs' cyber posture.

The computer system engineers are also thinking about the people who will use their software, allowing their motivations and concerns to inform how the software evolves, and making the users' story an important part of the development environment. For example, while developing DiGS, software currently in use internally at Sandia, the developers used the "Bruce Hamilton" persona (see box at left). DiGS is an individual's cyber footprint.

'Paired programming', test-driven development

"If something interfered with Bruce's experience using the software, we wouldn't do it," Andrew says. Building for a specific profile meant that the user was a static profile, and didn't morph over time to become something more convenient for developers to create at the expense of a user's experience.

Using this method, customers' priorities are documented by the team for a period of time. A user story is generated out of that documentation. The story includes a short description of a feature to be implemented and associated acceptance criteria that define what the system must do for the user story to be considered complete. The developers and customers agree on which features the team will implement in the upcoming quarter.

During the subsequent quarter, the team works in iterations that last three weeks. The team first identifies which user stories will be completed during the iteration, and each item to be completed is given a point value based on the level of effort required to complete the story.

During development, while the research phase is a bit more independent, the team strives to code in pairs, using a methodology called "paired programming." Doing this ensures that code is automatically peer-reviewed. It also allows developers to bounce ideas off each other, potentially discussing different implementations, and it means that multiple developers understand the code, to allow for flexibility.

In addition to paired programming, the team practices test-driven development. Under this methodology, all requirements are expressed as one or more tests. When a user story is completed, it has an automated suite of tests that demonstrate that the system performs the desired functionality.

The team tracks its source code, user stories, and links between the two. Each time a developer checks in code, it is associated with a user story. This ensures that code and related tests can be traced back to customer requirements.

A story is complete when the customer has approved the working application, or portion of an application, and the code is ready for deployment.

Recent products such as DiGS have used these methodologies, and the group hopes to continue to employ them as software is updated and redeployed. Andrew says an important program coming up for revision is the software acquisition management system (SAMS), which will allow them to further refine their methodologies.

Meet Bruce: Cranky everyman disdains unnecessary complexity

BRUCE HAMILTON (electrical engineer)
Age: 51
Education: Computer literate/educated
Web usage: Bruce uses the web for personal banking, home shopping, and email.
Gear: Bruce not only has a desktop and laptop to do his "office" type of work, but he also has several additional machines to do lab/test work. But his office desktop and laptop are Windows machines.
Characteristics:
• Prone to complaint
• Intolerant of unnecessary complexity

BACKGROUND

Context:
• Service time with Sandia: 27 years
• Bruce is annoyed that his "real work" is being interrupted by nonsense administrivia.
Working Environment:
Bruce splits his time between his office and his lab. He will attend minimal meetings each week, but is able to get large chunks of time to do his "real" work in the lab.

GOALS

Essence of the goal: *Take care of any non-compliance issues and be on his way.*
If Bruce has to be aware of some responsibility on his part, he wants to get in, get out, and get on his way. And he only wants to see what he should care about — what's mine and if I need to take any action to get people off my back and stop the nagging emails from coming.

Cold War-era wastes moved to WIPP

(Continued from page 1)

NNSA Sandia Site Office Manager Patty Wagner says the shipments mark a significant milestone on the journey to remove nuclear materials from Sandia.

"NNSA has worked closely with Sandia since the decision was made in 2004 to reduce the nuclear footprint at this site," says Wagner, "and I am very pleased that, despite several obstacles, Sandia has successfully met its commitments and accomplished the effort without incident."

The waste being removed is the byproduct of nuclear defense program research and weapons production. Much of the waste removed from Sandia came from programs completed in the 1980s.

Depending on the level of radioactivity, the waste was packaged for disposition in lower-level contact-handled waste containers (CH-TRU) or higher-level remote-handled waste containers (RH-TRU).

TIARA KISSAM (4128) uses a frisker to confirm that a sealed barrel is free of contamination.

Both the RH-TRU and CH-TRU disposed of at WIPP consist of tools, rags, protective clothing, and other materials contaminated with radioactive elements that have atomic numbers greater than uranium (transuranic).

RH-TRU waste produces a higher dose rate than CH-TRU waste at the surface of the disposal container, but when transported RH- and CH-TRU waste have the same dose rate limit on the outside of the shipping casks due to lead shielding.

Before any of the waste left for WIPP, the Environmental Protection Agency (EPA) and New Mexico Environment Department (NMED) reviewed Sandia's documentation for determining the physical and chemical characteristics of the waste, to ensure its safe disposal at WIPP.

Remote-handled (RH-TRU) removal

Beginning in the summer of 2011, employees in Non-Reactor Nuclear Facilities Dept. 1387 and WIPP Central Characterization Project (CCP) personnel worked for more than a year in the Tech Area 5 Auxiliary Hot Cell Facility (AHCF) to analyze and repackage the remotely handled RH-TRU waste for shipment. CCP personnel on site were able to certify as safe the RH-TRU waste, so it could be sent directly to the WIPP facility for disposition.

WASTE NOT — Mike Spoerner (1387) and Dave Rast from NNSA's Sandia Site Office inspect a contact-handled waste container (CH-TRU) that travelled to Idaho in late 2010, and then later to WIPP. (Photo by Randy Montoya)

The AHCF, a small, heavily shielded concrete box, was established specifically to process and disposition legacy nuclear material and waste. A crane brings waste materials into the cell through a roof door. Crew members examine the waste material through thick, leaded windows, and use glovebox-style manipulator arms to examine the material and take samples. During the RH-TRU project, workers confirm that the waste materials have been correctly described and documented, and then repackage the waste, which is then removed through the cell's roof door.

On Dec 16, 2011, WIPP received the first of eight planned RH-TRU shipments from Sandia. WIPP is designed to safely isolate defense-related TRU waste from people and the environment. Operating since 1999, WIPP receives waste temporarily stored at sites around the country, and permanently disposes of it in rooms mined out of an ancient salt formation 2,150 feet below the surface.

RH-TRU waste will make up only about 4 percent — or 7,080 cubic meters — of the total volume of waste received at WIPP.

Contact-handled (CH-TRU) removal

Prior to the removal of remote-handled transuranic waste, employees in Radioactive Waste/Nuclear Material Disposition Dept. 4139 removed all of Sandia's lower-level CH-TRU waste.

Beginning in December 2010, Sandia packaged and sent its CH-TRU waste to Idaho's Advanced Mixed Waste Treatment Project, where it was certified to ensure that the waste was of a level appropriate for CH-TRU disposal.

The first of three CH-TRU shipments left Sandia in December 2010, with the second one leaving in March 2011, and the final CH-TRU shipment in October 2011. The CH-TRU sent as part of the first two shipments was then certified in Idaho and shipped to WIPP for disposal. Drums from the final shipment were recently certified in Idaho and shipped to WIPP.

CH-TRU waste must emit less than 200 millirem per hour on contact, on the side of the drum. This relatively low level of gamma radiation means that, when properly packaged, the drums can be handled directly by workers in appropriate gear.

SHIELDED BY THE THICK WALLS of the Auxiliary Hot Cell Facility, David Siddoway (1387) uses the manipulators to hold a ratchet, which he will use to open the material drums. (Photo by Randy Montoya)

Removing legacy wastes a priority

DOE National TRU Program Director J.R. Stroble says the shipment is significant to WIPP.

"Our goal is to reduce the nation's nuclear waste footprint and we routinely receive shipments from around the country," says Stroble. "This first shipment of RH-TRU waste from Sandia begins the final stages of eliminating legacy TRU waste from a DOE site in New Mexico."

Nationally, DOE has prioritized removing legacy waste from small-quantity sites, such as Sandia. Removal of the TRU waste was also a contract incentive (PBI3) for Sandia, so completing the removal met a contractual requirement that was given high priority by NNSA.

For Sandia, proper disposition of legacy waste reduces programmatic and regulatory risk associated with the continued storage of such waste forms. Another benefit is that it demonstrates the opening of a pathway for TRU waste so future projects that may generate similar materials have a viable path out the door.

Additionally, DOE also assured New Mexico legislators that removal of legacy waste in New Mexico would be a priority. In addition to waste removal at Sandia, DOE has overseen the removal of 913 shipments from Los Alamos National Laboratory in northern New Mexico for final disposition to WIPP.

The last four shipments RH-TRU shipments are expected to leave Sandia in March, and will conclude the cleanup of all legacy TRU wastes at Sandia.

BTU Busters

Sandia on track to meet bold energy goal

Stories by Nancy Salem • Photo by Randy Montoya

Sandia has an ambitious energy-reduction goal: Cut energy intensity, or BTUs per square foot, by 30 percent from 2006 through 2015 using a 2003 baseline, and reduce greenhouse gases 28 percent by 2020.

What it means is that the Labs must lower energy consumption in its buildings by about 30 billion BTUs a year, or the amount of energy used in approximately 300 households.

"Sandia is more than halfway there and right on track to meet the goal," says Chris Evans of Sandia's Facilities Management and Operations Center (FMOC), Partnership and Planning Dept. 4853, and Resource Conservation lead for the Labs' Energy Management program, which includes all Sandia sites. Chris and the Dept. 4853 staff work with project managers, operations engineers, and maintenance personnel in FMOC to implement new conservation programs and install energy-saving equipment.

During the past six years, the FMOC team, working with mission customers, has helped Sandia cut energy usage by more than 250 billion BTUs and reduce greenhouse gas emissions.

'Some pretty innovative projects'

"That's a huge amount of energy," Chris says. "What we've done so far has been a big success. We've come up with some pretty innovative projects."

When many of the Labs' buildings were constructed decades ago, energy was cheap and conservation a foreign word. "Now, years later, we're retrofitting the buildings," says Jack Mizner, 4853 manager. "We're doing things in a smarter way."

Jack says Sandia has been upgrading the energy efficiency of buildings for about 10 years but, in the past, didn't quantify the results. Now when a project is planned, baseline data are taken and the energy savings are measured and tracked. "We have monthly data to show the reductions," he says.

FOR MORE INFORMATION about Sandia's energy savings initiatives see the Sandia Energy & Sustainability website at: https://info.sandia.gov/energy_mgmt.

Four strategies guide the effort

Jack says the energy projects are driven by a desire to reduce costs to Sandia's customers and to be a good corporate citizen. "I think it is incumbent on us as a national lab to do the most we can and be a leader in energy management."

He says four strategies guide the effort. "Use less, use what we have efficiently, use renewable energy, and tell people about it. That's a thumbnail sketch of our Energy Management program."

"Free cooling" has saved the most BTUs for Sandia. Free cooling is the use of cold, dry, outside air in late fall, winter, and early spring to chill water for air conditioning systems in data centers, which need year-round refrigeration.

In traditional air conditioning, water runs through an evaporative cooler, then through a chiller to further cool it before it goes into the building. In free cooling, when the air temperature drops to a set point, a valve allows the cooled water to bypass the chiller. Water runs from the cooling tower through a heat exchanger and straight into the building. The chiller remains operational as a backup, but electricity is not used to run it.

"We determined that chilled water generation consumption is one of Sandia's largest electricity consumers," Chris says. "So free cooling has been a big success."

Other savings have been achieved through sophisticated controls on lighting, air flow, heating, and cooling of buildings. "We've really been pushing the envelope on converting our buildings from old-style, analog controls to new, digital controls," says Chris, who stays abreast of new technologies by reading and tracking what's going on in the industry. "It is demand-based, only using the power we need."

Systematically retrofitting buildings

He says the old thinking was to maintain building systems at a high level to meet standards. "That takes a lot of energy," he says. "Our approach now is to only push enough air in the ducts to meet health and safety requirements, only cool enough to take care of the actual problem. We used to have systems take care of everything. Now, we go out and measure the worst-case problems and just take care of that."

FMOC engineering and operations staff are systematically retrofitting buildings with a combination of smart controls and sensors that communicate with each other. One successful pilot project integrated lighting control sensors with heating and cooling. Instead of turning off only lights with sensors when an office is unoccupied, ventilation shuts down as well. "It's a very innovative thing," Chris says. "When you leave a room, why does it have to be heated or cooled?"

All offices in Bldg. 753 were retrofitted with the system. Lighting, heating, and cooling turn off when a person has been out of an office 15 minutes. The result was a 30 percent reduction in the building's energy use. The system is now being installed in buildings 969 and 6587, and there are plans for others.

"It costs us a couple hundred dollars per office," Chris says. "When we look at the building, overall, we anticipate at worst a four- to five-year payback. It's a cool success story for Sandia."

A project in Bldg. 701 optimized air flow in lab spaces where exhaust systems were being overused. "We fixed leaks, fixed broken components, fixed air-flow sensors," Chris says. "Fixing and optimizing significantly reduced exhaust flow in that building and energy consumption."

The team is also looking at fume hoods across the Labs. A single fume hood uses as much energy as three households. Of the Labs' 2,000 ventilation devices, 85 percent are fume hoods. The team first looked at Bldg. 1090, a five-year-old structure that didn't have variable air volume systems in its fume hoods.

Aggressive in shutting down buildings

"They were exhausting air at 100 percent all the time, no matter how the hood was being used," Jack says. "So, we put in a more sophisticated system and saved a lot of ventilation exhaust."

The team has been aggressive in shutting down buildings when not in use and promoting conservation awareness activities. "It's a combination of many things," Chris says. "We have to be on top of things 100 percent of the time. We use whatever avenues we can to meet our goal. We're always on the edge and pushing the envelope."

There is no shortage of projects. Each year, Sandia is required to perform energy and water audits in 25 percent of the top energy-using facilities. "We're developing a never-ending list of opportunities," Chris says. "If you go into a large building like 701, there are hundreds of variable air boxes above the ceiling with linkages and mechanisms. What are the odds of one mechanism out of 400 or 500 being broken? We're always finding something. There's a lot of detective work."

Money for the projects comes from Sandia internal operating funds and from Integrated Management Systems investment funds. Energy program funding totaled about $1.5 million last year and is budgeted for $2 million this year. "We want to save the most energy with the least investment," Jack says.

He says Sandia is viewed favorably within the federal government for its energy management and sustainability. When asked at a symposium in Washington, D.C., how Sandia had accomplished so much, Jack responded, "Part of it is that we're an engineering community. If you can sell engineers on efficiency, they'll buy into it."

Innovative energy-saving projects save beaucoup BTUs

Representative Energy-Saving Projects

Project Description	Location	Start Date	Completion Date	Estimated Construction Cost ($)	Estimated Energy Savings
High-bay fan modifications	Bldg 986	1 October 2010	31 May 2011	50,000	1,200 million Btu
Install high-efficiency T5 lighting	Bldg 905 (CA)	1 October 2010	1 August 2011	180,000	30 million Btu
Install "free cooling" system on chilled water loop	Bldgs 880/890/891/894	1 October 2010	31 July 2011	725,000	3,400 million Btu
Install occupancy sensors for lighting & HVAC control	Bldg 753	1 March 2011	9 June 2011	10,000	180 million Btu
Install occupancy sensors for lighting & HVAC control	Bldg 969	1 July 2011	Sept 2011	14,000	440 million Btu
Install occupancy sensors for lighting & HVAC control	Bldg 6587	1 July 2011	31 August 2011	7,000	285 million Btu
Install occupancy sensors for lighting control	Bldg 895	1 July 2011	31 December 2011	18,000	1,300 million Btu
Install occupancy sensors for lighting control	Bldg 701	1 July 2011	31 December 2011	35,000	1,900 million Btu
Install magnetic bearings on new chillers Install Green Machine water-treatment system	Bldg 962	10 October 2011	1 August 2011	65,000	272 million Btu

Sandia's Chris Evans singled out as DOE Energy Pioneer

DOE has named Chris Evans (4853) its 2011 Energy Pioneer for his work in identifying and implementing energy-saving practices at Sandia.

The award recognizes one person each year who goes above and beyond in energy management for the federal government. "This came from the federal side, not Sandia," says Chris, Resource Conservation lead for Sandia's Energy Management program. "We were really active at Sandia looking for innovative ways to reduce energy and water use."

Chris has been involved in DOE's Energy Management program since 2003, when he was tapped to head the Sandia effort, which includes all the Labs' sites. "I've gotten to know the people on the federal side and have been very active," he says.

Career revolves around energy

It's fitting that Chris's career revolves around energy. His own energy is off the charts. He has competed in more than 100 triathlons. He ran the Boston Marathon. His personal best marathon time is 2 hours 51 minutes, a 6:30-mile pace.

Chris is also internationally competitive in racquetball. He has won several state championships and recently competed in the state doubles tournament. "I'm 51, and the 19- and 20-year-olds don't stand a chance," Chris laughs.

He runs 40 miles a week, bikes about 100, and swims. His day starts at 3:30 a.m. He runs before work and at lunch, and in the evening either swims, lifts weights, or plays racquetball.

"I stay pretty active," he says as an understatement.

Chris is married and has a 23-year-old son, a 21-year-old stepdaughter, and a toddler grandson, all in Albuquerque. His son is a mechanical engineering student at the University of New Mexico (UNM), following in his father's footsteps.

Chris was born and raised in Albuquerque. He graduated from Highland High School and UNM, where he earned a bachelor's degree in mechanical engineering.

His first job was with a small Albuquerque company that designed and manufactured heating systems for asphalt plants. "I had to learn much of the actual engineering in the field on my own," Chris says. "When I walked in the door they said, 'You're the engineer. Start engineering.' I had to do it all — structural, electrical, mechanical. I designed all the systems. It was scary — sink or swim. I was fresh out of school, so I pulled out the books and figured it out. It was a great learning experience."

"I had to do it all — structural, electrical, mechanical. I designed all the systems. It was scary — sink or swim."

'Your plane leaves in one hour'

One day his boss came to him and said, "Your plane leaves in two hours for Devil's Lake, North Dakota. Don't come back until the asphalt plant is running." The company's one service person was unavailable, so Chris had to fix the equipment at a plant being used to build a North Dakota road. Chris had not been trained in troubleshooting, but figured it out. "I'm sure I got it done in a day," he says. "That's where I learned to handle stress."

Chris left that job after five years and went to Intel, where he worked in engineering. He joined Sandia as a contractor in operations engineering in 1988 and became a Sandia employee in 1994. Chris held a variety of jobs within Facilities, including system engineer at the steam plant and for natural gas.

He was asked to take over energy management in 2003. He juggled the energy, steam plant, and natural gas roles for a few years. Then, as energy became a bigger concern of the federal government, he focused solely on that.

He says receiving the DOE award, which he claimed in Washington, D.C., in November, was a great honor. "It's really cool to know that your work is being recognized," he says.

The award is icing on the cake for Chris. "My job is a mechanical engineer's dream," he says.

National Nuclear Science Week a glowing success

Story by Sue Major Holmes • Photos by Randy Montoya

Each day during National Nuclear Science Week, Jan. 23-27, Albuquerque's National Museum of Nuclear Science & History slated hands-on activities to introduce 250 middle school and high school students to the breadth of the nuclear world.

The schedule called for everything from atomic modeling and chain reactions to workshops on radiation and basic energy programming, says museum Director Jim Walther. Local chapters of the American Nuclear Society (ANS) and North American Young Generation in Nuclear (NA-YGN) helped museum staff and volunteers with the presentations.

This year's 3rd annual National Nuclear Science Week continues the theme of "Get to Know Nuclear," aimed at promoting careers in nuclear and other sciences, technology, engineering, and math.

The National Museum of Nuclear Science & History, a Smithsonian affiliate, sponsors the week and is largely responsible for creating it.

The designated week, the fourth week in January, came about because museum staff and corporate partners wanted a way for educational institutions and the industry to be able to talk broadly about nuclear energy, Jim says.

"So it became a little bit of our advocacy role," he says.

The museum, chartered by Congress, is one of only a few national museums outside of Washington, D.C. Due to its location, Jim says, "we have to have a national footprint, and this is part of a way to do it."

The week quickly became a national effort as many partners in the nuclear industry embraced it as filling a need and promoted it, he says.

Each year the celebration centers around a different location, and the location that was host the previous year marks the week with events the next year. In that way, Jim says, the celebration has grown remarkably in its short lifetime.

"It's kind of viral on a personal level because people get excited about doing something," he says.

This year the museum's partners included the National Science Teachers Association and Chicago's Illinois Institute of Technology, which was hosting four webinars for live broadcast on Nuclear Science Day, Jan. 25, says Jeanette Miller, museum marketing director. Students and teachers nationwide were invited to log on to listen to the webinars and ask questions. Other Nuclear Science Day sponsors are the ANS, the Nuclear Energy Institute (NEI), the Society of Nuclear Medicine (SNM), Exelon Corporation and Entergy.

Teachers and others were invited to download free curriculum and information at www.NuclearScienceWeek.org. The site includes suggested lesson plans and classroom presentations.

"If an eighth-grade classroom is talking about radiation, there's an activity for them," Jim says.

Nuclear world is everywhere

Elsewhere, the agenda for the week included presentations at schools and colleges, some channeled through ANS chapters; a briefing for congressional staffers in Washington on nuclear science, nuclear power, and jobs; and events scheduled at such DOE sites as Savannah River in South Carolina, Idaho National Laboratory, and Argonne National Laboratory near Chicago, Ill.

National Nuclear Science Week is meant for the general public, but Jim says the way to reach adults is to reach children.

"That's how you do it. You hook the family, you hook the kids, you get the moms and dads that way, and you begin the broader conversation about nuclear power or nuclear medicine or whatever," he says.

The nuclear world is everywhere, from nuclear medicine in local hospitals to nuclear industry manufacturing plants to towns that have nuclear power or, in the case of communities like Albuquerque, that have national laboratories and many people working in the industry.

The museum's national steering committee set five subject areas before the first celebration in 2010, and this year they broke down this way: Monday, education about all things nuclear; Tuesday, careers; Wednesday, nuclear energy generation; Thursday, nuclear safety; and Friday, nuclear medicine.

Focusing on careers is important in an era of increasing emphasis on creating jobs, Jim and Jeanette say. But Jim says it's also important to the museum because "we're interested in preparing young people to be technically capable of being employees someday. We don't care if they work for the labs or wherever, but we want them to be better prepared for the world they'll face when they get there." Jeanette adds: "And scientifically literate and proficient just in order to be better prepared all around."

Supporters of National Nuclear Science Week wanted to talk about safety because "that ends up being one of the things the adult population cares about when it comes to nuclear: 'Is it safe? How safe is it?'" Jim says.

Nuclear medicine was a natural topic because it's a huge part of modern health care. In the United States alone, nuclear medicine is used to diagnose or treat 55,000 people every day, he says.

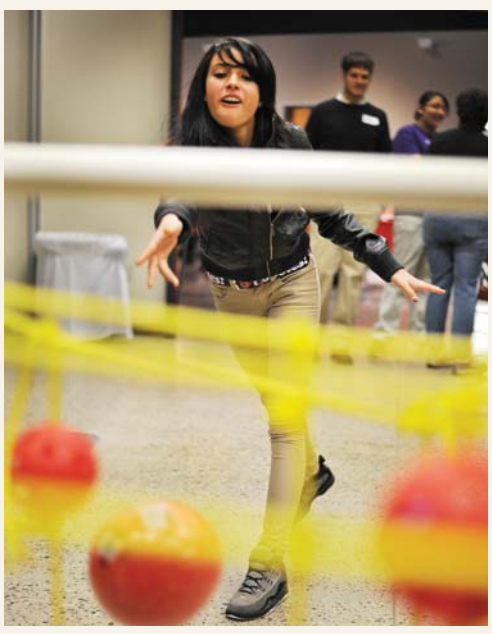
Many partners promoting events also advocate for nuclear energy to contribute a larger part of the nation's electricity, so more discussion of those issues is needed, Jim says.

Jeanette says the designated week also provides a platform "for breaking down a little bit of the fear factor that goes with 'nuclear.'"

"If people don't have a strong science background, this is a way to sort of say OK, let's take this step by step. There are ways to learn about nuclear; it doesn't have to be an overwhelming, scary topic," she says.

National founding partners included in the recognition week are ANS, the American Society of Radiologic Technologists, Arizona Public Service, Areva, Entergy, Exelon, and LES. National presenting partner organizations, which sponsor activities in their regions, are Sandia, Los Alamos National Laboratory, DOE, NEI, SNM, NA-YGN, and US Women in Nuclear. National corporate sponsors are the Albert I. Pierce Foundation, Energy Solutions Foundation, and Idaho National Laboratory.

EVERYTHING NUCLEAR — Students from Albuquerque High School enjoy hands-on activities at the National Museum of Nuclear Science & History during National Nuclear Science Week.



Sandia's Postdoc poster session showcases top work

Story by Sue Major Holmes

Chief Technology Officer (CTO) Steve Rottler stood in the packed lobby of Bldg. 858EL surrounded by metal easels displaying research by 34 Sandia postdocs, listening to one of them explain his project amid a rising buzz of conversations around the work of other postdocs.

It was more than a chance to showcase what postdocs do; it was an opportunity for them to demonstrate their abilities to managers looking to fill positions, Steve, VP of Div. 1000, later told the crowd in brief welcoming remarks to the 5th annual postdoc poster session Dec. 15.

"There are a lot of gifted people here talking about their work," he said.

In the case of two postdocs he'd chatted with before stepping up to the podium, "I'm impressed by their work and their ability to explain it to someone who does not have a technical background [in that field]."

Steve also had a message for managers: "Take a hard look at the people here in this room today and give them an opportunity" to remain at Sandia if they choose. Sandia took steps to help make them more visible by setting up a page on the Resume Central website where they could post their resumes.

The scene was repeated simultaneously in the Bldg. 915 lobby at Sandia/California, where 21 postdocs also highlighted their research projects.

Div. 8000 VP Rick Stulen, who heads Sandia's Energy, Climate and Infrastructure Security Strategic Management Unit, attended the California session and also praised the postdocs. He noted one research topic was in an area he had pushed to be funded while he was in New Mexico, and said he hadn't been aware until the poster session that "a fine job" was being done in an area in which he was personally vested.

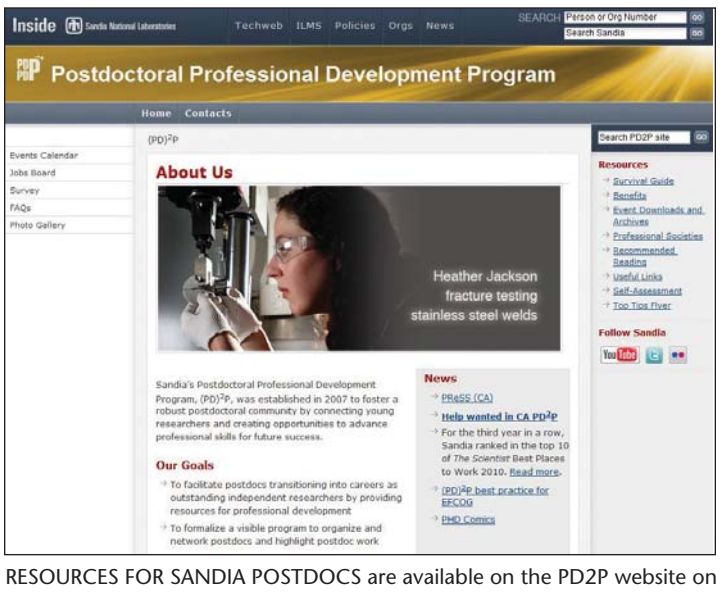
Sandia's Postdoctoral Professional Development Program, known as PD2P, sponsors both sessions each December to highlight postdocs' work, create opportunities for them to advance their professional skills, and help them move into research careers.

The idea is to introduce the Sandia community to the scientific breadth of postdoc research, says Laura Biedermann (1748), New Mexico staff lead of PD2P. Postdocs are "very talented, have a great breadth of experience, have great recent connections to academia, and would be a valuable addition to the staff," she says.

That breadth of research mirrors Sandia at large, running the gamut from chemistry, physics, and materials science to aerospace, engineering, analysis, and biological sciences, Laura says. For example, the 2011 posters covered such areas as nanoscience, carbon sequestration, biofuels production, DNA sequencing, photovoltaics, and quantum computation.

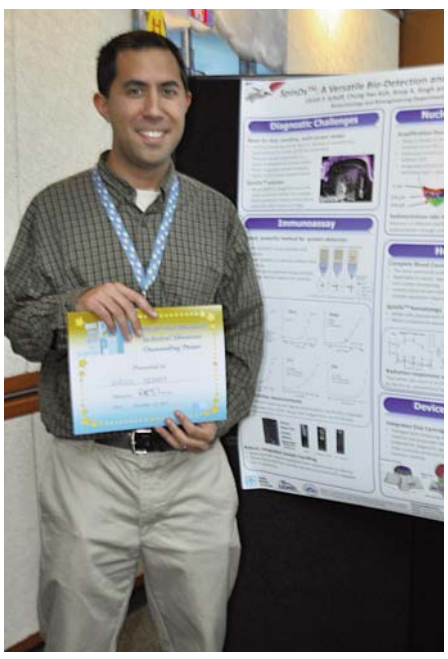
California's staff lead for PD2P, Isaac Ekoto (8367), says comments from those talking to the postdocs on the West Coast ranged from suggestions the participants start their own business based on their ideas to praise for a presenter for being able to explain the topic to a general audience.

Postdocs receive one-year, renewable contracts, and most remain at Sandia two to three years as postdocs, Laura says. Sandia currently has 214 postdocs. The number hired as regular staffers at the Labs has been increasing, she says, averaging about 20 a year over the past decade.



RESOURCES FOR SANDIA POSTDOCS are available on the PD2P website on Sandia's internal web at https://prod.sandia.gov/pd2p.

NEW MEXICO TOP POSTERS — Toby Jacobson (1425, left) and Greg White (1821, center) won the postdoc poster session on Dec. 15 for their work on, respectively, *Simulating double quantum dot charge qubits for adiabatic quantum computation*; and *Leveraging Isotopic Labels to Elucidate the Origins of CO_2 and NH_3 in Nylon 6.6.* Shreyas Rajasekhara (1111, right) was the runner-up with his poster, *Understanding Nanostructure Evolution with Advanced Microscopy Techniques.*



CALIFORNIA POSTDOC — Ulrich Schaff (8621) presented the top poster in Sandia/California's postdoc poster session on Dec. 15 with his work on *SpinDx: A versatile bio-detection and diagnostics platform.*

CALIFORNIA RUNNERUP — David Donovan (8252) shows the certificate he received as runnerup in Sandia/California's postdoc session last month. His poster was titled *Comparison of collected currents from the Divertor Material Evaluation System on the DIII-D tokamak and its effect on the Sheath Power Transmission Factor.*

Before Gayle Thayer (5732) started PD2P in 2007, "there was no place for postdocs to gain recognition or to network," says Laura, who received her doctorate in physics from Purdue University.

After a graduate fellowship at Sandia in 2009 under the Sandia-Purdue Excellence in Science and Engineering Fellowship, she joined Sandia's staff in November 2010 and became PD2P's New Mexico staff lead at that time.

Isaac, who has been the staff lead in California since May 2010, joined Sandia as a postdoc in May 2007. He became a member of the staff in February 2010.

A survey PD2P sent to all postdocs last spring found the majority "very highly satisfied" with the quality of training and mentorship at the Labs and felt the experience advanced their career goals. More than half planned to pursue a career at Sandia; 25 percent more would consider a career at Sandia. Fifty-eight percent of the then-185 postdocs responded to the survey.

In 2010, for the third year in a row, Sandia ranked in the top 10 of *The Scientist* magazine's Best Places to Work for postdocs survey. Laura says unique facilities such as the ion beam lab and the Z machine attract postdocs for training and the chance to use the Labs' resources.

Steve says Sandia benefits as well.

"I see outstanding examples of work at the Labs, examples of individuals trying to connect their work with problems in a wider context," he told the Albuquerque poster session.

Twenty-three judges in New Mexico and 13 in California evaluated the posters.

The winners:

- Toby Jacobson (1425), *Simulating double quantum dot charge qubits for adiabatic quantum computation*;
- Greg White (1821), *Leveraging Isotopic Labels to Elucidate the Origins of CO_2 and NH_3 in Nylon 6.6*;

and

- Ulrich Schaff (8621), *SpinDx: A versatile bio-detection and diagnostics platform*.

The runners-up:

- Shreyas Rajasekhara (1111), *Understanding Nanostructure Evolution with Advanced Microscopy Techniques*;

and

- David Donovan (8252), *Comparison of collected currents from the Divertor Material Evaluation System on the DIII-D tokamak and its effect on the Sheath Power Transmission Factor*.

50 years and counting

Dick Spalding shows no signs of slowing down

Story by Bill Murphy • Photos by Randy Montoya

FOR MORE THAN HALF of his 50 years at Sandia, Dick Spalding has ridden his bicycle to work almost every day. When Dick signed on at the Labs, President Kennedy had just taken office and the Soviet Union had just erected the Berlin Wall.

Keyword search "1961": John Kennedy. Nikita Khrushchev. Yuri Gagarin. Bay of Pigs. Berlin Wall. *Runaway*. *Catch 22*. Tsar Bomba. *West Side Story*. Dick Spalding. Roger Maris. *Breakfast at Tiff* . . . wait a minute. *Dick Spalding*?

Sure. 1961 was the year Dick Spalding signed on at Sandia.

Last month, Dick marked 50 years at the Labs and as 2012 begins, he is still going strong, the most senior of Sandia's senior engineers. Maybe you've seen him from time to time, a man of a certain age (10 years older than he looks, by the way) riding his bicycle to work, making the 16-mile round trip almost every day for more than 25 years.

Though Dick's formal start-date was December 1961, he had actually interned at the Labs in the summer of 1960 and 1961. Dick found that he really liked New Mexico, but that first internship experience at Sandia? Not so much.

Working in manufacturing development as an intern in the summer of 1960 was "a very dull job, even for a student," Dick recalls. The next summer he worked in Field Test, which was much more to his liking. So much so that when he graduated from Purdue with a master's degree in electrical engineering, he happily accepted an offer to come to Sandia full-time.

"I hired on to be in Field Test but the following thing happened: When I came out in 1962 with my family, both our children were in diapers," Dick recalls. "We had found a place to live but the furniture hadn't arrived yet. The Field Test organization I was assigned to wanted to send me right off to Nevada because they had a big test coming up and were looking for all the people they could get. I refused to go. I said I can't leave my wife here with no furniture and with two kids in diapers. So they said, 'Okay, well, why don't you go over here and work with this group for a little bit.' This was Bill Myre's Vela satellite group. And once I got there, I stuck. I was immediately immersed in interesting work and they [Field Test] never came and tried to pry me back out."

Transient atmospheric phenomena

When Dick says "he stuck," he means that quite literally. For most of his 50 years at the Labs he has been closely associated with satellite programs, specifically programs designed to detect nuclear detonations from space. As a result of his work, Dick has become an expert on transient atmospheric phenomena. In recent years, he has been perhaps the go-to Sandia source for information when interesting, unusual, and spectacular things happen in the Southwestern sky.

Vela was a three-pronged program designed to detect nuclear explosions as part of a treaty compliance protocol. There was Vela Uniform, a seismic component to detect underground explosions; Vela Sierra, a component that detected atmospheric detonations; and Vela Hotel, a satellite component that detected nuclear explosions in space (and later also in atmosphere). Dick landed in the Vela Hotel program, which, he said, "was right up my alley."

Vela used digital instrumentation, which was novel at the time. As it happened, Dick was among the first generation of electrical engineers trained in this new field of digital electronics. He immediately became a key contributor in the program.

Sandia worked closely with Los Alamos National Laboratory (LANL) on the Vela program, which was overseen by the US Air Force with primary development by DoD's Advanced Research Project Agency.

Initially, LANL developed the Vela sensors and Sandia handled the data processing tasks. As the successful program matured, decisions were made to add to the satellite's capabilities and Sandia took on a larger role in some of the sensor design. For example, Dick was one of the design engineers for an electromagnetic pulse (EMP) sensor, deployed on second-generation Vela satellites, and was also involved in the implementation of an optical sensor.

Gamma ray bursts

It was during the early Vela days that Dick was involved in a discovery that he still views as a high point of his career.

As Dick explains it, "I felt like I had a part in Los Alamos' discovery of gamma ray bursts. Gamma ray sensors were already on the Vela satellites but it was additional processing that was added that allowed the bursts to be recognized for what they were — immensely powerful sources coming from deep space — and that processing was designed here at Sandia. This is a peek at what's happening in the cosmos."

Dick stayed with the Vela program throughout its lifespan and then moved into other satellite programs with a similar nuclear detonation detection mission. After a stint in management, Dick found he missed the hands-on satisfaction of working directly with the technology, and returned to the life of a working engineer. During the 1990s, he embarked on a series of independent mission-related projects that tapped into his fertile imagination and propensity for out-of-the-box thinking.

In recent years, Dick's work has brought him full circle back to the satellite group, where he continues to watch, analyze, and try to understand the phenomena of the skies. Dick is the father of the all-sky camera network, a program now operated by New Mexico State University's Klipsch School of Engineering. The system, a network of up-looking, wide-angle view cameras at a number of sites throughout the continental US, is intended to monitor, track, and analyze atmospheric meteor events. The all-sky data assists satellite operators in separating natural and man-made events and also aids in instrument calibration tasks.

Tried to breath life into things

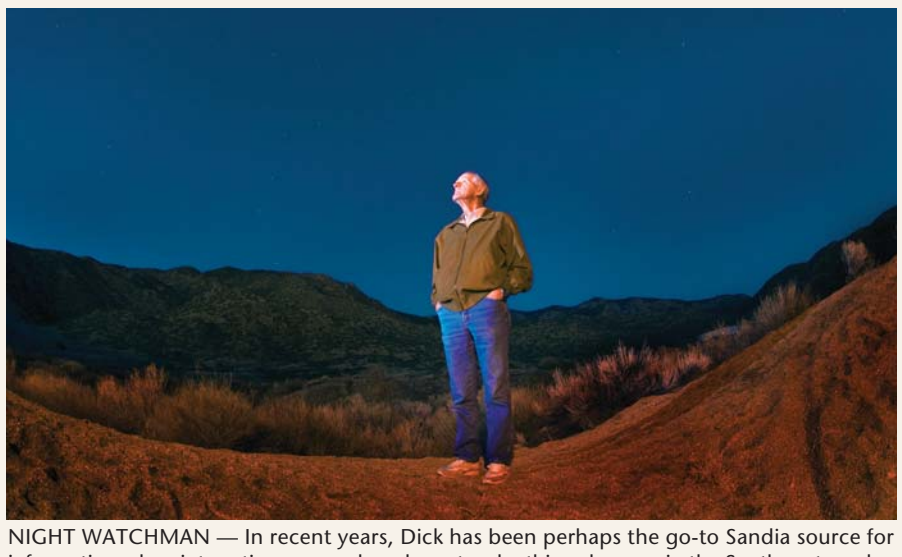
After 50 years, Dick reflects on a career that has been overwhelmingly satisfying. He doesn't look back at this point wishing he had pursued another course.

"I like to dabble in lots of different things and so far I've managed to keep the freedom to do so one way or another," he says. "If I felt I was stuck in a rut, I wouldn't be here very long at all. . . . By and large, being a person of action, I tried to breathe life into things and not let the opportunities go by. I don't have any major turning point where I look back and say I wish I'd done it differently."

Dick's wife, herself now retired, has talked about Dick's potential retirement for at least the past 20 years, he says. But he isn't ready to leave just yet.

"I still get involved in things that are interesting; a lot of it has to do with satellite data analysis and interpretation," he says. "I like what I'm doing better than anything I can see out there."

DURING A 1962 VISIT TO SANDIA, President John F. Kennedy, left, looks on as Sandia President Siegmund Schwartz, right, explains capabilities of the Vela satellite, designed for detection of nuclear detonations. Looking over Schwartz's shoulder is Atomic Energy Commission Chairman Glenn Seaborg. Dick Spalding, who had joined Sandia a year before and was a member of the Vela satellite team almost from its inception, remembers well the excitement around the Labs about Kennedy's visit.



NIGHT WATCHMAN — In recent years, Dick has been perhaps the go-to Sandia source for information when interesting, unusual, and spectacular things happen in the Southwestern sky.