Labs technology launched in first test flight of Army's conventional Advanced Hypersonic Weapon

By Heather Clark

Seven seconds remained in the countdown to launch a conventional hypersonic glide vehicle from the Kauai Test Facility (KTF) in Hawaii, when a technical issue stopped the count. The Sandia launch team scrambled to find the offending software script error and craft a solution to keep the first test flight of the US Army's Advanced Hypersonic Weapon (AHW) on track.

"It was very nerve-wracking," says David Keese, director of Integrated Military Systems Development Center 5400, who was at KTF's Launch Operations Building to view the flight in the early morning hours of Nov. 17. "We had to hold the countdown, examine what the problem was, define a solution to the problem, coordinate the solution with the flight test director, and implement that solution, which we did in about 30 minutes."

Problem solved, the countdown resumed, and the US Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT) AHW flew a non-ballistic glide trajectory at hypersonic speed in its successful first test flight.

The three-stage booster system and glide vehicle were developed by Sandia under the direction of the

(Continued on page 9)

THE US ARMY'S Advanced Hypersonic Weapon on a non-ballistic flight path after launch from Sandia's Kauai Test Facility. (Illustration courtesy of Sandia National Laboratories)

California Friends and Family Day

More than 1,100 members of the workforce, spouses, parents, siblings, children, and friends turned out for Sandia/California's Friends and Family Day on Saturday, April 28. Story and photos on **pages 6-7.**

Sandia LabNews

Vol. 64, No. 9 May 18, 2012

Managed by Sandia Corporation for the National Nuclear Security Administration

Sandia National Laboratories

Bonnie Apodaca named Business Ops Div. 10000 VP and Chief Financial Officer

Bonnie Apodaca has been selected as VP of Business Operations Div. 10000 and Chief Financial Officer. Her appointment was effective May 11.

In announcing the appointment last week to members of the workforce, Sandia Deputy Director and Executive VP for Mission Support Kim Sawyer said of Bonnie, "I am confident that her contributions will move Sandia forward, improve our business efficiencies, and ensure continued excellence in mission support."

BONNIE APODACA

Bonnie brings a range of experience in multiple business areas. For the past four years, she has been director of Business Management Operations Center 10600. Previously, she was director of Supply Chain Management Center 10200. Bonnie's first position as a director came with her service from 1998 to 2005 as controller and director of Pension Management Center 10500. Bonnie started at Sandia as a contract auditor in 1988, and was promoted to manager of the business office for the Satellite Center and Non-proliferation program in 1991.

Before she came to Sandia, Bonnie was the controller for private companies in Albuquerque and Colorado Springs, Colo. She earned a Bachelor of Science in accounting from the University of Colorado and an Master of Business Administration from the University of New Mexico. She became a Certified Public Accountant in 1985.

Bonnie is a member of the Central New Mexico Community College Accounting Advisory Board, an alumna of Leadership New Mexico, a member of the Rio Grande Chapter of Blue Star Mothers, serves as an adviser to the Hispano Chamber of Commerce, and has participated in the Manos education outreach program for 16 years.

Kim thanked Jeffrey Kallio for his service as CFO and acting VP of Div. 10000. "His steady hand," Kim said, "has kept Sandia in great shape through the many challenges we've faced during that period."

Sandia's assurance

It's our way of doing business

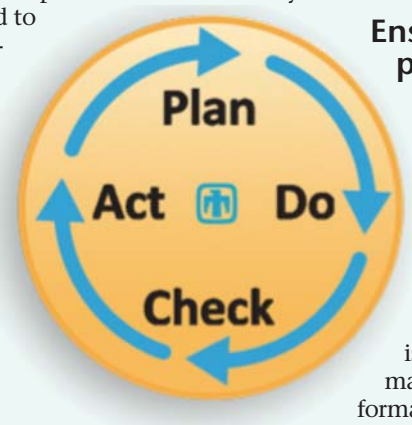
By Chris Miller

Last month, two Sandia materials handlers inspected a shipment of 15,000-pound load-hugger tie downs — destined to secure high-risk hazardous materials during shipment — and found them to be counterfeit and of questionable quality.

In 2011, Division 6000 determined during a management assurance review that growing issues with procurement and reapplication in the Supply Chain Policy Area were impacting mission work and creating safety hazards.

In 2009, a self-assessment in Sandia's Explosives Technologies Group discovered that the material specification provided to a vendor and used to fabricate a component was imprecisely worded and could lead to confusion. This assessment grew out of an issue discovered by the quality inspector during the acceptance process.

Each of these issues was discovered and corrected in the course of performing day-to-day job responsibilities. They are just three examples of how members of Sandia's workforce routinely take steps to verify that work is meeting mission requirements. In today's vernacular, this process is called "assurance."



Ensuring optimal Labs performance

During his all-hands meeting with Sandia's management in October 2011, President and Laboratories Director Paul Hommert described assurance as "the way we do business; it is what we do for ourselves to ensure optimal performance by the Labs." He further explained that "our performance assurance system is just one piece of Sandia's overall management system, and central to performance assurance is plan, do, check, act, which provide a rhythm and a framework for assurance implementation."

Manager Susan Gardner (5342), who assisted Paul during his presentation, used the plan-do-check-act framework to describe how her department delivers and helps maintain 10 radars for a military customer. Those activities, she said, include extensive conversa-

(Continued on page 4)

Inside . . .

Tales of courage

Students from public and private schools in the Albuquerque area were honored recently as 2012 Thunderbird Award winners for overcoming significant personal challenges on the path to high school graduation. See **page 12.**

That's that

Taos used to have a hum.* Now it has a buzz. A good buzz. Last month, *Smithsonian* magazine ranked Taos No. 2 in its list of the 20 best small towns to live in in the US. And this month, *Smart Money* magazine cited Taos as one of the top places to retire, a great alternative to Arizona. In fact, *Smart Money* says New Mexico may very well be "the next Arizona." (I think that's supposed to be a good thing.)

After seeing that *Smart Money* item, it struck me that I'd been hearing an awful lot about Taos in the national media lately, so to confirm that impression, I called Cathy Connelly, director of Public Affairs and Tourism for the town of Taos. I was right. Cathy, who was just as pleasant as she could be, sent me a list as long as my arm of publications where Taos has shown up on one "best of" list or another in just the past few months: *Vogue* (Best mountain towns with culture). *National Geographic* (World's 25 best ski towns). *USA Today* (10 happiest towns in the West *and* 10 great places to see animals in the wild). And the lists go on: Best honeymoon destination. Best historical towns you've never heard of. America's prettiest towns.

If you've been to Taos, probably none of this surprises you. For a lot of us, a trip up to northern New Mexico — including, of course, Taos — is a must-do activity when we have out-of-town visitors. It's a special place for sure, but I feel an extra-special affection for the town because my son was born there. As he's grown up and set out on his own, he's found that everywhere he goes, even out of the country, people have heard of Taos. And whenever he mentions he was born there, people always say, "Oh, so your parents were hippies, right?" Well, no. (Or at least not by the time he was born.) "Actually," he explains, "my father worked for the chamber of commerce."

For the record, I was director of the Red River Chamber of Commerce in the late 1980s; Taos was the nearest hospital. I remember well making the trip down there at about 4 in the morning, driving the monster car we called the Green Dragon, a 1976 Buick with a hood about 15 feet long. My wife was in the backseat and her midwife, Tanya, was driving right behind us. At one point, Tanya flashed her lights and waved for me to stop. When I rolled down the window, she said, "Quit stopping at the stop signs!" Anyway, since then I've kept my own list: Best place to have a daughter: Albuquerque. Best place to have a son: Taos. Best place to raise them: New Mexico.

* * *

*You've never heard of the Taos hum? It turns out that a certain percentage of the local population in Taos periodically hears a very district hum, which has been described as the sound of an idling diesel engine heard from afar. It got to be so pronounced that in 1993 Congress got involved and mandated a team of experts from several national labs and universities, including Sandia and UNM, to investigate. As far as I can tell from a quick bit of web research, the phenomenon seems to be real, but the investigation was never able to definitively identify a cause.

* * *

How about some language fun? I guess I ought to put "fun" in quotes; when you're in the word business, it's no fun to get zinged for glaringly bad usage. In the case immediately at hand, former *Lab News* editor Bruce Hawkinson nailed me fair and square. In a page one story last time, the word "miniscule" was used in a sentence talking about how a tiny sample of the botulinum toxin can be deadly. Bruce, or "the Hawk" as he was often called, jumped all over that one. The "correct" spelling, of course, is minuscule. I put "correct" in quotes because the Associated Press says that's the way to spell it. A lot of dictionaries out there are now accepting miniscule as a legitimate variant of minuscule. But I made my bed with AP and I have to sleep in it. So it was a mistake, but just a little one. A minuscule one, even.

* * *

Speaking of mistakes, the daily quotation on our Techweb homepage the other day really resonated with me. It was by the great Irish playwright George Bernard Shaw. "A life spent making mistakes is not only more honorable but more useful than a life spent doing nothing." By that standard, I have lived a very honorable life, indeed.

See you next time.

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

Sandia LabNews

Sandia National Laboratories

Sandia National Laboratories

http://www.sandia.gov/LabNews

Albuquerque, New Mexico 87185-0165
Livermore, California 94550-0969
Tonopah, Nevada • Nevada National Security Site
Amarillo, Texas • Carlsbad, New Mexico • Washington, D.C.

Sandia National Laboratories is a multiprogram laboratory operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corp., for the US Department of Energy's National Nuclear Security Administration.

Bill Murphy, Editor **505/845-0845**
Randy Montoya, Photographer **505/844-5605**
Mike Janes, California site contact **925/294-2447**
Michael Lanigan, Production **505/844-2297**

Contributors: Michelle Fleming (Ads, Milepost photos, 844-4902), Neal Singer (845-7078), Patti Koning (925-294-4911), Stephanie Holinka (284-9227), Darrick Hurst (844-8009), Stephanie Hobby (844-0948), Heather Clark (844-3511), Sue Holmes (844-6362), Nancy Salem (844-2739), Jennifer Awe (284-8997), Tara Camacho-Lopez (284-8894), Jane Zingelman (845-0433), Jim Danneskiold, manager (844-0587)

Lab News fax **505/844-0645**
Classified ads **505/844-4902**

Published on alternate Fridays by Media Relations and Communications Dept. 3601, MS 0165

LOCKHEED MARTIN

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.

Retirees (only):

To notify of changes in address, contact Benefits Dept. 3332, Customer Service, at 505-844-4237, or Mail Stop 1021, Sandia National Laboratories, Albuquerque, NM 87185-1021.

Others:

To receive the *Lab News* or to change the address (except retirees), contact Michelle Fleming, Media Relations and Communications Dept. 3651, 505-844-4902, email meflemi@sandia.gov, or Mail Stop 0165, Sandia National Laboratories, Albuquerque, NM 87185-0165.

Employees:

To address concerns regarding delivery of the *Lab News* to your facility, call Mail Services Team 10268-4, at 844-3796. At Sandia/California contact the Mail Room at 925-294-2427.

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.

Partnership program seeks small-business groups needing technical help

By Nancy Salem

Ranchers in eastern New Mexico faced a vexing problem. Their cattle were living shorter lives, reproduction rates were down, and some calves weren't surviving. One rancher lost 20 head.

They suspected poor water quality from deep underground wells, the area's primary water supply, was harming livestock.

The ranchers formed a group and applied to the New Mexico Small Business Assistance (NMSBA) Program for technical help. The program — a partnership of Sandia and Los Alamos national laboratories and the state of New Mexico — connects scientists, engineers, and others with New Mexico small businesses to solve critical challenges and promote economic development.

KENNETH MCKENZIE of McKenzie Land and Livestock was among a group of eastern New Mexico ranchers who asked for New Mexico Small Business Assistance Program help to improve water quality that was harming livestock.

While individual businesses can apply for help throughout the year, group projects are considered once a year. The NMSBA is currently soliciting proposals for 2013 leveraged projects, in which two or more small businesses facing common challenges apply as a group for technical help from Sandia and Los Alamos researchers. The deadline for submission is June 8.

Sandians familiar with businesses that might be interested in applying for assistance through a group project can direct them to the NMSBA website, www.NMSBAprogram.org, where there are application instructions. For more information contact Jenni DeGreeff at 505-844-9623, jldegre@sandia.gov, or Becky Coel-Roback at 505-667-1710, beckycr@lanl.gov.

Applicants must explain the problem they face, the expertise NMSBA offers that can't be found in the private sector for a reasonable cost, and the economic benefit they expect as an outcome. NMSBA funds researchers' time and incidental materials. The group projects must be completed in one year and can receive $20,000-$100,000, depending on the number of companies involved and their locations.

The livestock project in Guadalupe and Hidalgo counties was among 10 honored by NMSBA at its annual Innovation Celebration on May 1.

It turned out the ranchers — McKenzie Land and Livestock, Singleton Ranches, and Don Thompson Ranch — were right. Tests by Sandia's Michael Schuhen and Brian Dwyer found an endemic bacterium that was releasing sulfur into the water.

The researchers found partners with expertise in water quality and improvement. Al Bierle of Western Environmental Management Group studied the feasibility of installing low-pressure reverse osmosis (RO) to treat the water and provided cost data from his experience with dairy cows. Jay Glasscott of Arrakis weighed in with expertise on membrane selection for an RO system. And Joe Ortiz of Sustainable Resources Inc. evaluated solar pumping systems to power RO in remote locations.

The new RO system is at work purifying ranch water. Ranchers expect to see results with this year's calf crop that will produce greater cattle life expectancy and profits.

Since its inception, NMSBA has provided 1,876 small businesses with $29.8 million worth of research hours and materials. The program has helped create and retain nearly 2,317 New Mexico jobs at an average salary of about $38,000, increase small companies' revenues by $107.6 million, and decrease their operating costs by $63.6 million. These companies have invested $34.9 million in other New Mexico goods and services and received $40.9 million in new funding and financing.

Get connected with Sandia Plug

By Patti Koning

Nearly 10,000 people work at Sandia, and, like most large corporations, we are scattered geographically with people in Albuquerque; Livermore; Carlsbad, N.M.; Nevada; Washington, D.C.; and even a lucky few in Kauai, Hawaii. So outside of the people we see day to day and at formal meetings, how does this massive, diverse workforce share ideas, inspire one other, and ask and answer questions? The same way people across the globe connect — through social media.

Sandia Plug (http://plug.sandia.gov) is a pilot application to discover, rate, and chat about web content within Sandia. Modeled after popular sharing sites like Digg and Reddit, Plug lives on the Sandia Restricted Network (SRN) so users can share content without the risk of inadvertently exposing information to the outside world.

"We originally conceived of Plug as a tool to show current trends of what is important to the laboratory and a place to have informal conversations around topics of interest," says Tracy Walker (8949). "For example, at an all-hands meeting, only a few voices are heard. Plug allows that discussion to continue online."

The goal, says Joe Lewis (8944), Sandia's chief web architect, was to create an internal bookmarking, link-sharing, commenting, and ranking tool. "Users post links — internal or external — that are of interest to them," he explains. "Other users can comment on and vote if the link is useful or not, known as 'Plugging.' This gives you a nice, clear picture of what people find compelling. As more people begin to use Plug, the results will become more interesting."

Info doesn't get buried

One of Plug's newer features is Questions. Users can submit questions on any topic to the entire Plug community. Users also have the ability to "Plug" both questions and answers, driving the most useful content to the top of the page and keeping it there for as long as users rate it positively.

"We want people to know about Plug so they can start using and start enjoying it. It's a fun way to share information and a fun way to work."

— Joe Lewis

"The Q&A utility enables Sandians to submit questions and answer other queries, enriching the collaborative experience," says Wendy Shaneyfelt (9537). "The expertise and interest areas that emerge from this Q&A content provide a rich data source where skill sets and competencies across the Labs can be discovered." The Enterprise Analytics Competency project is using this Q&A data to supplement SAND report abstracts and MySite pages to characterize Sandia's capabilities and knowledge areas.

People are using Plug in ways that the developers didn't envision. "Some departments are using Plug specifically for their department. They want to share information, but they don't want everyone swimming in email and they want to be able to retrieve the information in a central location," says Joe.

Jill Micheau (8539) uses Plug to share notifications of federal funding opportunities. "I find when I send this information by email, it gets buried," she says. "With Plug, this information is always easy to access."

Using Plug eliminates the need to write an email — Jill just plugs what she finds and adds relevant tags. She asked all of the managers and business with whom she regularly interacts to subscribe to her on Plug or to tags relevant to their programs. "I think it's working," she says. "The next step is for this community to add comments if they intend to respond to an opportunity so that others can join."

Joe says he uses Plug to post links to articles, papers, and websites he thinks are of interest to the general Sandia populace. Craig Hokanson (8944) subscribes to the RSS feeds to get an overall view of what's going on at Sandia via Plug.

Andrew Scholand (5741) believes collaborative knowledge repositories like Plug are both social and informative. While the informative value, as a repository of work-relevant resources, is fairly self-evident, he sees plenty of social value as well.

"Plug allows a 'presentation of self'— a curated collection of resources and responses that advertise 'here's who I am and what I'm interested in,'" he says. "The reciprocal of that self-presentation is that users can build up a mental model of clusters of expertise across the organization. In addition, Plug allows individuals to see the collective responses to those socio-technical identities. That acts both as reinforcement for some behaviors and also allows users to self-associate into virtual communities of practice, despite organizational or geographic boundaries."

The developers are working on several improvements to make Plug more user-friendly and mobile-friendly. Another major goal, says Joe, is to build the user base. "We want people to know about Plug so they can start using and enjoying it. It's a fun way to share information and a fun way to work," he says.

THE PLUG DEVELOPER TEAM, from left to right: Janine Scott; Hope Niblick, project manager (8947); Carly Tanaka-Lubensky, web interface designer (8947); Joe Lewis; and Craig Hokanson, software engineer (8944). (Photo by Dino Vournas)

Sandia CaliforniaNews

Sandia Plug
discover • share • chat

Start Plugging Away

To get started, users can first visit the Plug home page and see what their coworkers are discussing. See an article or link you like? Just click on the Plug button to the left. To get more involved, add a comment. The same holds true for both questions and answers on the Questions page.

"There are two keys to using Plug effectively," says user experience designer Janine Scott (8947). "The bookmarklet, which allows users to post new content to Plug with just one click, and the subscriptions feature, which allows users to follow Plug activity by subscribing to people or tags and (optionally) sign up for a daily summary of that activity."

Joe subscribes to the tags HTML5 and CSS3, both work-related, and music, a personal interest. Everything on Plug is available through an RSS feed.

Plug should only be used for information you are comfortable broadcasting to the entire enterprise — information you want everyone in your peer group to know, information that will make everyone more knowledgeable and more capable for having known it. If access controls are needed, use a different resource such as Sharepoint or Sandiapedia. All rules governing use of the SRN apply.

Need more help? The Tools and Help page includes both screencasts about specific features and tools of Plug and FAQs.

Joe and the other developers welcome feedback on Plug (email WebCo@sandia.gov). "If people have ideas, they should definitely submit them to us because we want to continue to improve this tool," he says.

Assurance

(Continued from page 1)

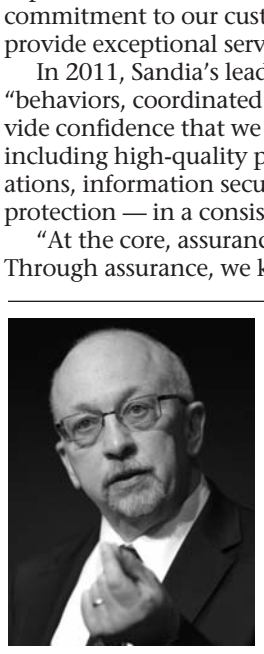
tions about expectations and specifications, providing solid cost and schedule estimates, analyzing risks at each step, constantly assessing against requirements, and seeking customer feedback.

Assurance is about mission success

Assurance performance improvements have always been integrated into Sandia's work. During Sandia's early days, the Laboratories focused primarily on ensuring the safety, security, and reliability of weapons in the growing nuclear stockpile, safeguarding sensitive information, and ensuring the safety of the workforce. All of these tasks required a painstaking attention to detail and quality seldom before attained. As Sandia expanded its work into other programmatic areas, our commitment to our customers remained the same: to provide exceptional service in the national interest.

In 2011, Sandia's leadership defined assurance as "behaviors, coordinated activities, and evidence to provide confidence that we meet mission commitments — including high-quality products and services, safe operations, information security, and environmental protection — in a consistent and predictable manner."

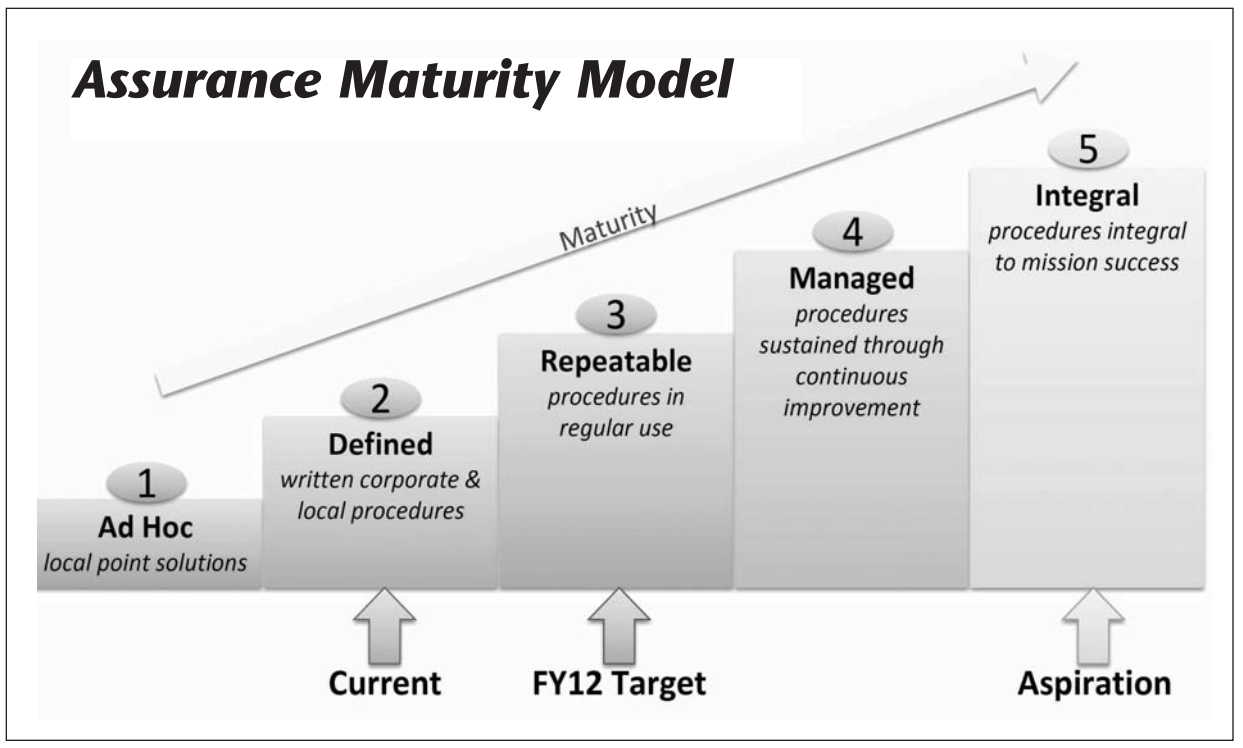
"At the core, assurance is about mission success. Through assurance, we know we are meeting our objectives, handling our risks, managing our business, and delivering high-quality results time after time," says Pat Smith, director of Mission Support and Corporate Governance (700). "Our customers also know that they can rely on us to meet their requirements. And there's an added bonus: If we do this well, we should be able to achieve the governance model that we want and need to ensure continuous performance improvements vital to mission success."



Assurance is "the way we do business; it is what we do for ourselves to ensure optimal performance by the Labs. . . our performance assurance system is just one piece of Sandia's overall management system, and central to performance assurance is plan, do, check, act, which provide a rhythm and a framework for assurance implementation."

— Labs Director Paul Hommert

In today's dynamic external environment, our customers and stakeholders have high expectations. Government and taxpayers are demanding more transparency; they want to know that we are meeting today's national security challenges within the context of multiple regulatory and business requirements. A strong culture and habit of assurance doesn't come overnight; it's built over time because "we are motivated by values and principles to deliver, assure, and sustain mission success," Pat says. "The challenge is to not fall into a compliance-based mindset. Instead, we need to deliberately decide how we want to govern and manage ourselves, and then use the right systems and processes to help us get there. We can naturally use plan, do, check, act as part of our normal business cycle, without a sense of added complexity or a compliance mentality, to maintain and improve our mission performance. "



Achieving robust management assurance

Sandia's Strategic Objective 3 ("Lead the complex as a model 21st-century government-owned contractor-operated national laboratory") has set the bar to achieve "robust management assurance." Last year, Pat's organization conducted a self-assessment as a way to understand where we are from a maturity perspective relative to assurance and to establish a baseline to measure improvement. Sandia rated itself as "partially meets." An independent review conducted by an NNSA team in November 2011 confirmed these results.

Sandia's self-assessment was performed using a five-stage Assurance Maturity Model to evaluate Sandia's overall assurance system. The five stages in the maturity model are described from lowest to highest levels as:

1) Ad hoc
2) Defined
3) Repeatable
4) Managed
5) Optimized

Sandia continues to make steady progress on its assurance journey, says Pat. The Laboratory Leadership Team is actively engaged in reaching a minimum of Stage 3 maturity, or "repeatable" level, across the Labs this fiscal year. As part of the journey, last year the Assurance Information System (AIS) was deployed for risk purposes and this year, as part of AIS, new tools for assessments and corrective actions purposes will become available.

Quarterly management reviews are evolving as one way to routinely assess program and operations performance, and to identify areas for improvement. Through these reviews, issues can be raised from one management level up to the next, potentially reaching the Executive Management Review meetings chaired by Paul. The management review process — within the "check" portion of the plan-do-check-act cycle — is one way that Sandia manages mission performance through assessments "to ensure risks and issues from throughout the Laboratories are being brought forth in a systematic way so that they can be addressed at the right level," Paul said.

Making assurance real

Ultimately, assurance comes from behaviors, not stand-alone systems, processes, and procedures. Going back to the situations cited at the beginning of this article, members of the workforce took personal ownership to identify and correct issues. Here's how:

Senior Manager Roy Fitzgerald (10220) says the questionable tie-down straps were discovered because staff understand that things can fail and used methods to validate that requirements were being met. The division, center, and department had spent time developing its management assurance system based on quality principles, and with assistance from Sandia's Six Sigma Office and the application of ISO 9001 principles.

"The straps were discovered during an inspection that was part of our own work procedures, which are just a part of our assurance system," Roy says. "Should those straps have failed, we could have had a significant event."

Senior manager Dave Kessel (6010) says the procurement and supply chain issues bubbled to the surface through Div. 6000's rigorous management assurance review process. In an atmosphere that supports candid dialog and transparency, departments review issues and risks monthly, and bring them to quarterly center management review meetings. Significant issues are brought to the quarterly division management review meeting, where they are addressed by policy area.

The division rated the Supply Chain Management policy area red in the first quarter of FY11 when systemic issues, broken communications, and negative impacts to mission work were identified. The cause of the problem turned out to be poor communications between the division and the Sandia Supply Chain organization, including a lack of information regarding requirements and specifications. By providing feedback, issues were addressed and resolved before they became significant problems.

"There now are more proactive and regular communications between Supply Chain and our division management team," Dave says. "We were able to turn the issue from red to yellow, and then to green in two quarters and it continues to be green."

Corky Corcoran (2550), assigned to managing and assisting with the assurance assessment for the Explosives Technologies Group, says the group values internal reviews and assessments, and the ability to learn and improve. They conduct between four and six risk-based assessments each year with an eye on identifying and correcting issues before they become problems. He says the assessment that found an issue with the material specification used to fabricate a component was performed to evaluate processes and to identify improvement opportunities.

"Managers now compete to have their program or activity assessed since they know it will make things better for everyone in the long run," Corky says.

Corky says a knee-jerk reaction would have been to blame the vendor for the issue with the material specification. But closer inspection showed that the processes of both the vendor and Sandia were in need of improvement. "We could have done things to help the vendor, like provide more specific requirements," he says.

A never-ending journey

A common theme stressed by Paul, Pat, Roy, Dave, and Corky is that assurance is a never-ending journey, not an end-state. And, as with many journeys, there is a systematic approach to getting where you want to go. "The environment has changed, the bar has been raised, and it's up to us to provide credible assurance to our employees, customers, suppliers, and stakeholders that we deliver quality products and services for the nation," Pat says. "It's just the right way of doing business."

For more information

Several training opportunities are available on assurance topics:

The PAS200, "Performance Assurance," course covers aspects of assurance such as:

- Essentials of planning work, including identifying and managing associated risks;
- Appropriate risk responses and monitoring, including conducting assessments or using performance measures;
- Management reviews focused on demonstrating performance and solving issues and concerns; and
- Taking actions to improve performance based on Management Review outcomes.

The RM200, "Risk Management," course explores the aspects of identifying and managing risk more fully.

The AT200, AT101, and AT102 courses provide varied levels of information and instruction about Sandia's risk-based approach for selecting and conducting quality, risk-based assessments, and analyzing assessment data. These courses cover the three primary types of assessments that span the entire spectrum of policy and mission delivery performance.

Information can be accessed from the Performance Assurance System home page of ILMS (on Sandia's internal TechWeb): https://my.sandia.gov/authsec/portal/ilms/default/corp_pas.

The Assurance Information System (AIS) tool is also available to help manage risk. Contact Ed Weinbrecht, Management Systems Processes and Tools (Dept. 754), for more information.

Sandia research comes up with unique materials approach to provide temperature-stable circuits

MATERIALS SCIENCE RESEARCHER Steve Dai (1832) has come up with a unique approach to creating materials whose properties won't degenerate when temperatures swing. (Photo by Randy Montoya)

By Sue Major Holmes

Steve Dai (1832) jokes that his approach to creating materials whose properties won't degenerate when temperatures swing is a lot like cooking — mixing ingredients and fusing them together in an oven.

Sandia filed a patent last September for a unique materials approach in multilayered, ceramic-based, 3-D microelectronics circuits, such as those used in cell phones. The approach compensates for the effects of how something called the temperature coefficient of resonant frequency, which is one critical property of materials aimed at radio and microwave frequency applications, changes due to temperature fluctuations. The work was the subject of a two-year Early Career Laboratory Directed Research and Development (LDRD) project that wrapped up in March.

The LDRD team focused on developing fundamental understanding of why certain materials behave as they do. That knowledge could help manufacturers design and build better products.

Steve, who spent 14 years with Motorola before joining the Labs in 2009, says Sandia was interested in the research for its own programs, but the work also has potential commercial applications. He says, however, no exact projects have been pinpointed.

"At this point we're just demonstrating the technology," he says. "We have to demonstrate that it's practical, that we can design a device with it, that we can design it over and over again, and can design it reliably."

The familiar cell phone illustrates how the development might be used.

Wasting potential bandwidth

The Federal Communications Commission allocates bandwidth to various uses — aviation, the military, cell phones, and so on. Each must operate within an assigned bandwidth which, like a pipeline, has finite capacity. But temperature variations in operating a cell phone cause the properties of the materials inside to change, and that causes a shift in resonant frequency at which a signal is sent or received.

Because of that shift, cell phones tend to operate in the middle of the bandwidth, avoiding the edges so as not to break the law by drifting outside the assigned frequency range. That necessary caution wastes potential bandwidth and sacrifices the rate at which data can move.

Under the LDRD, Steve worked on low temperature co-fired ceramic (LTCC), a multilayer 3-D packaging and interconnection technology that can integrate passive components. Most mainstream LTCC dielectrics now on the market have a temperature coefficient of resonant frequency in a range as wide as that between northern Alaska in the winter and southern Arizona in the summer. A dielectric is a material, such as glass, that does not conduct electricity but can sustain an electric field.

Steve's research achieved a near-zero temperature coefficient by incorporating compensating materials into the multilayer LTCC structure.

A graph shows the differences. Resonant frequencies used in various LTCC base dielectrics today appear as slanted lines on the graph as temperatures change. Steve's approach to an LTCC leaves the line essentially flat — indicating radio and microwave resonator frequency functions that remain stable as temperatures change.

"The critical kind of understanding about the science here is required to design the material right to achieve properties that complement each other," Steve says.

He presented the results of the approach in a paper published in January in the *Journal of Microelectronics and Electronic Packaging*.

"We can actually make adjustments in the materials property to make sure the resonance frequency doesn't drift," Steve says.

And, he says, "if your materials property doesn't drift with the temperature, you can fully utilize whatever the bandwidth is."

Another advantage: Manufacturers could eliminate additional mechanical and electrical circuits now built into a device to compensate for temperature variations, he says. That would reduce costs.

One basic challenge of the project was choosing different materials that don't fall apart when co-fired together, Steve says. Glass ceramic materials used are both fragile and rigid, but they're also very solid with minimal porosity. Researchers experimented with different materials, changing a parameter, adjusting the composition, and seeing what worked compatibly.

"It's in a sense like cooking, you mix all these things together — it's cooking. You have these ingredients, certain things you do in certain ways, just making sure it works together. Even the equipment is very similar; we have furnaces, ovens, mixers. . . . Each step is very much like making bread or something," he says.

Steve had to consider both physical and chemical compatibility. Physical compatibility means that as materials shrink when they're fired, they shrink in the same way so they don't warp or buckle. Chemical compatibility means each material retains its unique properties rather than diffusing into the whole.

Looked at variables to boost performance

The LDRD created a new set of materials to solve the problem of resonant frequency drift but also developed "more of an understanding of why this works this way," Steve says. "Why select material A and not B, what's the rationale? Once you have A in place, what's the behavior when you make a formulation change, a composition change, do little things?"

Researchers looked at variables to boost performance. For example, the functional material within the composite carries the electrical signal, and researchers experimented with placing that material in different areas within the composite until they came up with what worked best and understood why.

"That's really important, the why," Steve says.

The team also constructed a computational model to analyze what happens when materials with different properties are placed together, and what happens if you change their order in the stacked layers or the dimensions of one material versus another.

"We study all these different facets, the placement of materials, the thickness, to try to hit the sweet spot of the commercial process," he says.

That's where computer modeling helps.

"Modeling can calculate all these things," Steve says. "Modeling's important. You cannot do exhaustive experiments. Modeling can change whatever you want, once you have the basic experiment."

Manufacturing can be done as a simple screen printing process, a low-cost, standard commercial process much like printing an image on a T-shirt. Steve says the idea was to avoid special requirements that would make the process more expensive or difficult.

"That's kind of the approach you try to take, make it simple to use with solid understanding of the fundamentals of materials science," he says.

Transit of aircraft . . .

Getting ready for the annular eclipse

In anticipation of the May 20 annular solar eclipse, for which Albuquerque is ground zero, Mike Pendley (5632) is laying down a challenge to his fellow Sandians. Mike, an accomplished amateur astronomer, was doing a practice session with his camera to get exposure numbers for the eclipse when he happened to catch a picture of an airplane (at lower left in photo) going across the Sun's disk.

Says Mike, "Assuming the plane is a large passenger jet, I figure it was several hundred miles away and the contrail behind it was a mile or so long. It might be fun to have folks estimate how far away it *really* was and compare their values to mine." (The *Lab News* has posted Mike's photo on the internal *Lab News Interactive* site and invited comments.)

Here are some technical details to help in the calculation: The picture was taken April 24 at 7:27 p.m. (sunset was at 7:47 p.m.) from the Lomas and Tramway area. The camera setting was ISO 400 at 1/125 sec. The telescope was an 8-inch f/4 Schmidt-Newtonian with a full-aperture Thousand Oaks glass solar filter, which is advertised as a neutral density filter with optical density of 5 (1/1000th of 1 percent).

Mike notes that the image is a bit "soft" because, since it was just a test, he didn't use a remote-controlled shutter release.

Friends and family get an inside view of Sandia

By Patti Koning ***Photos by Dino Vournas and Randy Wong***

More than 1,100 people turned out for Sandia/California's Friends and Family Day on Saturday, April 28. Only about one-quarter of that total were members of the workforce; the rest were spouses, children (even one two-day-old infant), siblings, parents, and friends.

"I want to thank all of the guests who attended Family Day," says Div. 8000 VP Rick Stulen. "The sacrifices they make allow staff the creativity and flexibility to solve some of our nation's toughest problems. We know we can be difficult when we're close to a breakthrough but we really couldn't serve our country and achieve our national security mission without their support."

Family Day was an opportunity for many friends and family members to see their loved ones' workspaces and gain some insight into how they spend their workdays. "I enjoyed seeing the young children watching in amazement as their moms and dads described what they did in their labs and offices across the site," says Robert Mariano (8005), deputy to Rick and executive champion of Family Day.

"One image burned into my heart is of all the families walking from the parking lot to join the Family Day celebration. I saw many moms and dads walking with young children in their arms and their older children walking hand in hand," he adds. "I'm especially proud that we were able to include foreign nationals in this very special day." Both Robert and Rick volunteered as escorts for non-US citizens and their guests.

The site was filled with engaging activities, including family science exploration, a martial arts demonstration by Aaron Cummings, cyclone fitness classes, the FBI Crime Scene Truck and a fingerprinting demonstration, and a workshop on Scratch, a programming language aimed at children.

Attendees toured the optical engine lab, scanned probe microscopy lab, and hydrogen effects on materials lab and discovered "a million computers in a box" — lightweight and low-memory virtual machines as well as scalable management software to emulate large-scale networks and computers.

On display was a new discovery made recently at Sandia — survival supplies for nuclear fallout preparedness. Recent core drilling for new networks uncovered the supplies, which had been sealed for 50 years in a fallout shelter below Bldg. 912. The display was accompanied by radio and music spots of the time.

"Judging by the smiles on everyone's faces throughout the day, the event was a huge success. That is due, in part, to the efforts of many people who helped organize the event, led lab tours, and gave demonstrations," says Stephanie Beasly (8521), Sandia/California community relations officer and Family Day project manager. "Family Day demonstrated the caliber of Sandia's capabilities and our diverse mission."

A runaway balloon captures the attention of Izzy Barter, the 2-year-old son of Garrett Barter (8114).

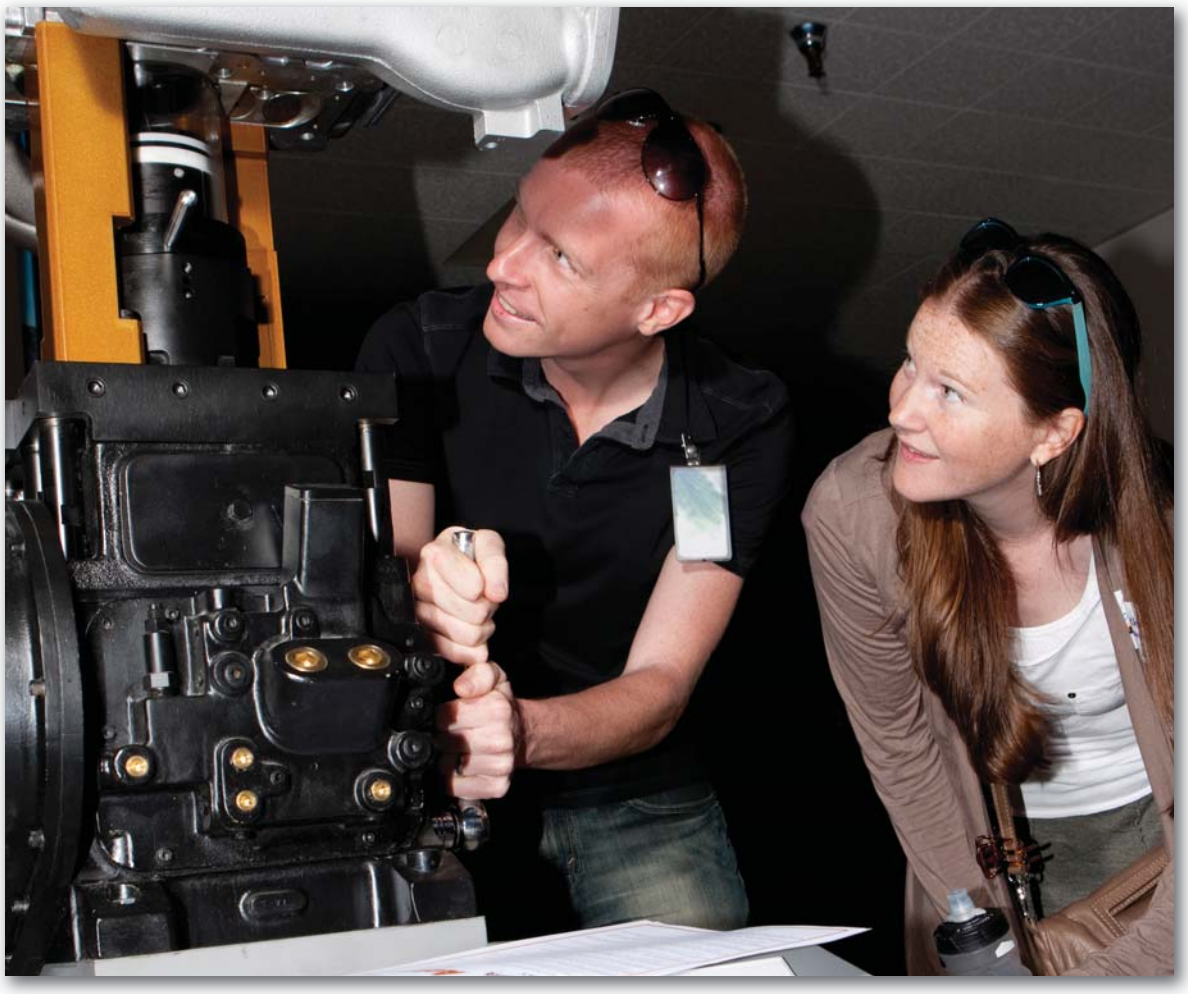
Special thanks to the Family Day Committee and everyone who helped make the event a resounding success: Herman Armijo (8516), Dennis Baker (8511), Stephanie Beasly (8521), Nick Charnichko (8511), Jamie Mcleod (8511), Morgan Edwinson (6527), Laurie Farren (85151-1), Carol James (8511), Pam James (8511), Barbara Larsen (8516), Jessica Matto (8522), Dorrance McLean (8537), John Paulson (21), Lisa Corcoran (8533), and Robert Mariano (8005).

Rion Paradise, Steve Paradise's (8226) 2-year-old son, watches with trepidation as an FBI representative reveals his handprint.

Jim Hanley and his son, Seamus, examine atomic force microscopy tips. (Guests of Alf Morales, 8131)

Jim Costa (8950) and his wife, Dorothy, check out the nuclear fallout survival supplies recently discovered in a fallout shelter under Bldg 912.

Neal Fornaciari (8530) with Anthony Pirounakis, his first cousin's son, examine a machine for testing the strength of material exposed to hydrogen.



Kevin Young (8961) and his wife, Michelle, check out the engine demo in the lobby of the Combustion Research Facility.

Justin Fritz, guest of Joseph Sloss (8353), tries on an FBI bulletproof vest.

Aron Cummings (8836) and Nate Gleason (8101), on ground, give a thrilling martial arts demonstration.

In the hydrogen effects on materials lab, Heather Jackson (8252) explains how scientists measure the fracture toughness of metals (resistance to cracking) when they are exposed to hydrogen gas, such as for containing or transporting high-pressure gas.

Rick Stulen (8000) and his grandchildren, Grace and Lucas, enjoy the day.

Ray Friddle (8252), holding his two-year-old daughter, Lily, explains microscopic cantilevers used for Atomic Force Microscopy.

Nes Pinar, wife of Ali Pinar (8954), shows their son Eren how to skewer a balloon without popping it, one of the family science exploration activities.

Ken Lee (8252) gives a demonstration on hydrogen effects on materials.

Tom Felter (8252) strolls with guests as they enjoy the spring weather while attending Friends and Family Day.

Sandia CaliforniaNews

Alf Morales (8131) and his family peruse the activities offered on Friends and Family Day.

New understanding of geological strata may aid resource recovery and Earth history studies

'Largest known chemical wave' caused previously unrecognized effects, says researcher

By Neal Singer

A Sandia modeling study contradicts a long-standing belief among geologists that pore sizes and chemical compositions are uniform throughout a given strata.

Better understanding of the variety of pore sizes and their spatial patterns in horizontal slices of sedimentary rock is essential to fully utilize underground oil reservoirs and water aquifers. It would also aid in evaluating potential carbon storage sites, and in assessing isolation of nuclear waste depositories.

"I think our paper for the first time provides a reasonable explanation for the origin of disparate patterns," says Yifeng Wang (6222). "We also found we could predict the variations in pores as well as the heterogeneity of a reservoir."

The analysis, published Feb. 21 in *Nature Communications*, was able to match the field observations published in 2006 by second author David Budd, professor of geological sciences at the University of Colorado at Boulder.

"At the 2010 annual meeting of the Geochemical Society, at a session chaired and assembled by Yifeng," says Budd, "he recognized that the data I showed could be explained by stress-induced chemical waves. He subsequently developed the numerical model to test his idea. Then we used the 2006 data set to demonstrate the correspondence between his model's outcomes and the field data."

A chemical wave in this context relies upon mineral dissolution and precipitation, powered by geologic stress, to penetrate material, just as an ocean wave powered by the moon's gravitational pull rides up on a beach. Ocean waves shift sand; chemical waves act to modify the spatial distribution of rock porosity.

As Yifeng puts it, a chemical wave is "like water rippling. The concentration of a chemical species varies periodically in space (a standing wave) or sometimes such variations propagate through space (a travelling wave).

"The one we revealed in dolomite may be the largest chemical wave ever known because no one had thought to look for chemical waves in strata. This one occurred on the scale of meters to tens of meters and propagated between a hundred to a thousand years." Chemical waves are usually observed on much smaller scales in laboratories.

Using the chemical wave concept and well-known equations for material stresses, Yifeng formulated a mathematical model.

YIFENG WANG EXAMINES a sedimentary outcrop in Tijeras Canyon. Yifeng is lead author of a paper published recently in *Nature Communications* that offers new insights into pore size and distribution in horizontal slices of sedimentary rock. (Photo by Randy Montoya)

"The remarkable thing is that the model predictions match very well with many seemingly uncorrelated observations. The model predictions not only match the observed porosity patterns, but also match very well with chemical and isotopic signatures. This is the power of mathematical analysis," Yifeng says.

Could overturn long-held models

The work may help trounce an earlier belief held by geologists that each layer of sedimentary rock, deposited over eons, is more or less homogenous in porosity and composition. Thus a single core sample obtained from a given depth was thought to chemically represent its layer. But Budd's findings showed that horizontal variations within a sedimentary rock layer could be quite significant — in some cases, as large as vertical variations. This would affect not only the amount of fluid stored or percolating through a rock but the amount of pressure needed to shoot liquids to Earth's surface. But no one knew why these variations occurred and at what magnitude.

The problem has always been, says Budd, how to extend horizontally the knowledge gained from vertical bore holes that may be 1,300 feet apart.

To date, the model developed by Yifeng is not large enough in scope to derive equations meaningful to an entire reservoir — a process called upscaling. Still, he says, "Part of the predicted heterogeneity can be captured by a high-performance computer model, for example, using very fine spatial grids. Another way to capture this variability is to use mathematical analysis to derive upscaled flow-transport equations. This work is on the way."

In addition to benefitting oil and water recovery, better understanding of the size and pattern of pores would enable more efficient use of subsurface reservoirs for potentially storing excess carbon, help evaluate radionuclide transport for performance assessments of nuclear waste disposal, and reveal important information about Earth's geological changes.

"Even the shape of a variation may reveal important facts about past times," says Yifeng. "Our work may have geologists rethinking their method of field sampling and their interpretation of data about Earth's evolution."

What I found at Reutilization: RF amplifier

By Sue Major Holmes

Note: This is one of an occasional series of articles about machines, instruments, and equipment now at Reutilization and Disposition that have been part of Sandia's history. If you see something intriguing you'd like to know about at Reutilization — and it has an asset number that might be traceable — contact Sue Holmes at Media Relations & Communications, 505-844-6362.

* * *

Leonard Martinez (1653) peers through a missing plate on the front of a bulky rectangular green RF amplifier, looking at rows of turquoise capacitors inside. He's come to Sandia's Reutilization and Disposition to explain how the 6-foot-tall machine was once used.

The amplifier, labeled pulse modulator model PM1001, now rests on a wooden pallet inside Reutilization's Quonset-hut-shaped white plastic Tent 5. Such machines have been used at Sandia since the 1970s in electromagnetic environment tests — this particular one at the Labs' Electromagnetic Environments Simulator (EMES).

"The tests were conducted by applying an RF signal source to the input of the amplifier where the signal was amplified to desired output power levels," Leonard explains.

Technology that harnesses electromagnetic (EM) energy is used in communications and radar, navigation, and complex electronic and radiofrequency systems. Sandia's experimental facilities and its expertise in analysis and computer modeling help users understand and predict systems' vulnerability to EM energy.

LEONARD MARTINEZ (1653) looks at the large twist-lock connector on an RF amplifier now at Reutilization and Disposition. Such machines have been used at Sandia since the 1970s in electromagnetic environment tests — this particular one at the Electromagnetic Environments Simulator (EMES). (Photo by Randy Montoya)

EMES, built in the 1970s to support nuclear weapons development and qualification, is a transverse electromagnetic (TEM) cell, which means it's structured like a coaxial cable, but large enough to fit a city bus inside. It's DOE's only facility capable of reproducing the full-threat-level electromagnetic pulse resulting from a nuclear weapon burst.

The EMES unit now at Reutilization amplified a radio frequency signal to send into the TEM cell where the test items were located. That bathed the test items in RF energy, allowing researchers to evaluate how much got into the test item and whether it caused electronics inside to malfunction.

Inside the pulse modulator are two sets of 15 capacitors, each labeled in red — as is the outside of the machine — "High Voltage."

The boxy machine also has a large blue commercial twist-lock connector so it can't be unplugged by accident. The plug is more than oversize. It's as large as a fist and heavy enough to make holding it up for a photograph a chore. The black AC power cord it's connected to, now coiled around a galvanized metal vent at the top of the machine that was used to exhaust heat generated by the amplifier, is slightly thicker than a garden hose.

"This just plugs into the wall; this is AC power," Leonard explains to an audience who can clearly see that the plug would never fit into regular a household wall plug.

When Sandia's Electromagnetic Effects Department upgraded its amplifier suite several years ago, EMES received a more modern amplifier with a higher power level, and the model PM1001 became obsolete.

"So this system here generated or amplified the RF input signal to a power level of 2,000 watts, compared to the newer amplifier's power level of up to 5,000 watts," Leonard says.

The machine was sent to Reutilization last July. At that time, Leonard verified the capacitors had bleeder resistors installed across their leads — standard practice to prevent any voltage from building up on them and possibly posing a personnel safety hazard.

Leonard pats the machine on its pallet at Reutilization. "We kept this for a while as a spare until we felt comfortable with the new system."

CONVOY! — The last scheduled shipments of remote-handled transuranic (TRU) waste leave Sandia, headed directly for permanent disposal in DOE's Waste Isolation Pilot Plant near Carlsbad, N.M. These shipments end Sandia's final stage in DOE's Legacy TRU Waste Program, which works to safely remove such waste from sites throughout the DOE complex. The waste 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. (Photo by Randy Montoya)

Hypersonic

(Continued from page 1)

USASMDC/ARSTRAT. Thermal protection system development for the glide body was the responsibility of the US Army Aviation and Missile Research Development and Engineering Center in Huntsville, Ala. The test flight was launched from Sandia's Kauai Test Facility.

The AHW program is part of DoD's Conventional Prompt Global Strike effort to develop conventional weapon systems that can deliver a precision strike anywhere in the world within an hour. Success would mean the US would have an alternative to nuclear weapons to prevent a crisis and it would decrease the conventional military response time significantly, David says.

The test flight represented about four years of work for up to 200 Sandia employees across the Labs. It came from a foundation of work on projects from as long as 25 years ago, David says, including the Sandia Winged Energetic Reentry Vehicle Experiment (SWERVE), the Strategic Target System (STARS), and the Tactical Missile System-Penetrator (TACMS-P).

A flight of many firsts

About 50 Sandia employees, including Defense Systems & Assessments Div. 5000 VP Jeff Isaacson, viewed the test in Kauai. Eric Schindwolf, deputy director of Strike and Aerospace Systems 5420, says large screens projected digital animation driven by the actual data coming from the AHW in real-time along with displays of the vehicle's condition as it reached certain milestones.

The historic flight had many firsts, David says. It was the first time a Sandia-developed booster had flown a low-altitude, long-range horizontal flight path at the edge of the Earth's atmosphere; the first time eight grid fins (designed by Sandia and Huntsville, Ala.-based Dynetics Corp.) were used to stabilize a US missile system; and the first time a glide vehicle flew at hypersonic speeds at such altitude and range. This flight test incorporated lessons and data from previous DARPA flight tests conducted as part of the Defense Department's Prompt Global Strike Program.

"You could almost feel the tension change to jubilation as the launch occurred and the booster performed well and the grid fins deployed," David says. "At each milestone along the way, Sandia employees were becoming more excited about the success because you could see how the missile was flying. . . . Cheers would go up every time we would meet one more mission milestone."

The flight path took the vehicle up hundreds of thousands of feet and then it flew toward the Earth's surface before pulling up slightly to fly horizontally within the atmosphere to the target, Eric says.

"We always knew the pull-up would be the most difficult part of this. We knew that success was going to be historic," Eric says. "So as we watched this actually happen, the anticipation was really high. Once we saw the vehicle was climbing and leveled out at its glide altitude, we knew we had gotten through the hardest part. You could feel the relief as the team immediately sensed that the rest of the way would be comparatively easier."

NIGHT LAUNCH — The US Army's Advanced Hypersonic Weapon is launched from Sandia's Kauai Test Facility in Hawaii. (Photo courtesy of US Army)

The success was praised by Sandia's leaders, who flooded employee inboxes with congratulatory emails the next day.

Jeff called the flight a "stunning success" and a "real engineering achievement."

At a team celebration after the mission, Jeff told the attendees, "This success could not have been achieved without exceptional teamwork, which was evident to anyone in the Launch Operations Building that night."

Sandia President and Labs Director Paul Hommert, who says he couldn't have been more proud to be a Sandian as he listened to the test from Washington, D.C., wrote: "Once again today our Laboratory rendered exceptional service in the national interest. For your dedication, excellence, and professionalism thank you and congratulations!"

Eric shared the general scope of Sandia's work on the AHW. The technical challenges that faced Sandia were aerodynamic stability, aerodynamic heating, and control of the missile and glide vehicle, he says.

Typically, boosters fly missiles to heights of millions of feet above Earth, but the AHW flew only to a peak of hundreds of thousands of feet above the Earth's surface, before descending to a lower altitude for the remainder of the flight. The modified STARS booster, which was about 40 feet long and 54 inches in diameter, powered maneuvers that had never been done before, Eric says.

The lower a missile flies in the atmosphere, the more it tends to tumble end over end, he says, so Sandia helped develop the eight grid fins to improve stability, which had never been used before on a US missile.

Eric says Sandia's researchers did not want to risk having the fins interact with the missile exhaust near the ground, so four opened right after clearing the launch tower and four more deployed when the first stage burned out nearly 60 seconds later.

"They provided the margins of aerostability and control needed to prevent the missile from tumbling," Eric says.

'String of pearls'

Because the 2,485-mile (4,000-kilometer) flight from Kauai to the Army's Reagan Test Site on the Kwajalein Atoll was so low, the curvature of the Earth prevented continuous monitoring from the takeoff and landing sites alone, he says.

Space, air, sea, and ground platforms collected vehicle performance data during all phases of the flight, according to a Pentagon news release. The Sandia booster and glide vehicle transmitted data to this network, called the "string of pearls," Eric says.

Sandia also led the design and development of the glide vehicle, including improved navigation, guidance, and control technologies and teaming with AMRDEC to use advanced thermal protection materials to protect it on the long flight in the atmosphere.

Sandia researchers also successfully designed and tested the Flight Termination System for the AHW. This system protects public safety by destroying the vehicle if it should fly off-course during a test flight, he says.

The test's objective was to collect data on the technologies and test range performance for long-range atmospheric flight. The mission emphasized aerodynamics; navigation, guidance, and control; and thermal-protection technologies, according to the Pentagon news release.

Eric says Sandia employees are analyzing the data from the test flight, which will be used by DoD to model and develop future hypersonic boost-glide capabilities.

"This was only a very first demonstration," Eric says. "This is not a weapon by any stretch of the imagination. There's quite a bit of work that needs to be done."

David says the information gathered also will be used to validate Sandia's computational models so they can be used with more confidence in the future.

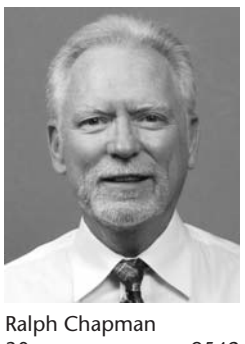
David had nothing but praise for the people who spent nights, weekends, and many long hours working at KTF and the Labs.

"All the credit for the success of this effort goes to the team and its tremendous commitment and dedication that produced these extraordinary accomplishments that enhance our country's national security," he says.

Mileposts

New Mexico *photos by Michelle Fleming*

George Wagner
35 6612



Ralph Chapman
30 9542

Donald Funkhouser
30 5764

Wahid Hermina
30 1710

Liz Huffman
30 1822

Terry MacDonald
30 6212

Matthew Sena
30 5345

Thomas Brown
25 411

Paul Claassen
25 5358

Jake Deuel
25 6532

Micheal Glass
25 1545

Jeffrey Kallio
25 10000

John Schroeder
25 1821

Thomas Wubbels
25 3654

Deborah Belasich
20 6921

Caroline Byrd
20 4142

Russ Clark
20 9342

Debbie Chavez
20 10662

Shari Garcia
20 10694

Barbara Lucero
20 9531

Frank Lujan
20 10694

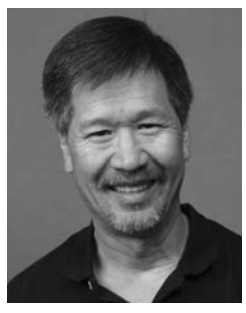
Ricardo Ortiz
20 4822

Camille Reyes
20 4856

Sonoya Shanks
20 4121

Paiboon Tangyunyong
20 1726

Larry Varoz
20 412



Mark Wong
20 4126

Evaristo Bonano
15 6220

Lora Bonano
15 9545

Lillian Ingham-Hill
15 5742

Darryl Melander
15 9515

Ana Barraza Sandoval
15 10248

Daryl Stephens
15 9543

Doug White
15 424

Demonstration highlights technologies for secure cross-border shipping

Researcher John Dillinger explains the Sandia-developed hexagonal actuator controller, which automates the repetitive process of opening and closing doors on cargo containers during tests of security systems. The system was one of several related technologies on display during the recent Cargo Security Demonstrations at the Defense Threat Reduction Agency's Technical Evaluation Assessment Monitor Site at Sandia. The technologies are intended for securing shipments bound for the US that originate in Canada or Mexico.

The demonstration was part of the Department of Homeland Security's Secure Transit Corridors (STC) program, developed in partnership with US Customs and Border Protection (CBP) and private industry.

The STC system uses an electronic chain of custody (ECoC) device to secure the doors of trucks and rail cars, instead of the bolt seals currently in use. The reusable ECoC records its route using GPS as well as monitoring and recording door openings. Data will be securely transmitted through an integrated system for analysis during the year-long demonstration, tracking methods on how cross-border shipping may be expedited through new technology.

(Photo by Randy Montoya)

Welcome to the Logistics Communications Network

ON THE JOB INFO — While Pat Abeita (10265-2), left, and Brad Boultinghouse (10265-1), work on a vehicle in Fleet Services' garage, a digital signage monitor in the background brings news, messages from management, safety notes, and other information directly to their workplace. (Photo by Randy Montoya)

Digital signage brings info straight to the workplace

By Jeff Young (10265)

It's June 2011, and my senior manager, Roy Fitzgerald asks me if I am interested in working on a new project. Of course, when your senior asks you to do something, the word "no" should never be in your vocabulary. So as expected, I was happy to work on it. The next thing I know, I'm on a flight to Los Angeles to attend a training session on the cutting edge technology of digital signage.

If you are still drawing a blank, digital signage (also known as the fifth screen) is a form of electronic display that can show television programming, menus, information, advertising, and other forms of communication. Embraced by marketers and retailers, it can found in a wide variety of public and private environments.

Although we have all types of technology to communicate, digital signage goes where no other technology has gone. It can be seen in airports showing arrival and departure times, fast food restaurants as menus, billboards along freeways, and inside retail stores promoting products.

The idea behind digital signage in the corporate realm is to fit a need for communications in areas where employees can't be reached. In Logistics, a large number of our employees work in shops, warehouses, and receiving docks. Digital signage allows communication in the area where they work. We expect digital signage will become a part of their work through integration.

The idea behind digital signage in the corporate realm is to fit a need for communications in areas where employees can't be reached.

Logistics has 11 devices strategically placed throughout its operations, all controlled from a central location. The technology streams content to monitors at each of the locations. Monitors are located in breakrooms, warehouses, and other places where they are likely to be viewed by Logistics employees. The devices are loaded with "projects" that consist of a variety of videos, news and weather feeds, metrics presentations, safety information, motivational material, and urgent messages. Each project is created using a radio-type format and the program schedule for the project is displayed at the beginning of each day.

One unique characteristic of the Logistics digital signage is the use of a safety status indicator. We review the latest data showing recordable injuries for our center. Based on that review, our status indicates RED or GREEN, informing Logistics employees of any recordable injuries in the last 30 days.

Recently, digital signage went Labs-wide as the Logistics Communications Network. With the help of Steve Wenrich (8947) of Corporate Web Design and Wendy Shelton (10691) of Communications, we are now able to stream one of the devices to the entire Laboratories. Although content development for the customers is still in its infancy, customers will likely find instructions for how to do business with Logistics, live news and weather feeds, and be able to watch various safety and motivational videos. It's also possible that customers will be able to view images of items available in Reapplication, vehicles and carts available from the loan pool, and have access to metrics data in Logistics. Other applications of the Logistics Communication Network are likely.

Although the Logistics Communications Network is in the early stages of development, we expect that applications for the fifth screen to be limited only by imagination.

If you have questions or comments about the Logistics Communications Network, feel free to contact me at jtyoung@sandia.gov.

To view the Logistics Communications Network stream on your desktop, see the Logistics Operations Homepage. Click on the "Logistics Communications Network" link at the lower right of the screen and follow instructions.

Tales of courage

Sandia award helps students who conquered adversity

By Nancy Salem

Katy Flaming and Nick Hines are typical high school seniors. They have good friends. They love sports. They're active and engaged in the community. They dream about the future.

But Katy and Nick are different, too. They've had more than their fair share of dark days. Katy has been homeless on and off since age 13. Nick and his twin brother were born two months prematurely, and a lack of oxygen for Nick resulted in cerebral palsy.

But they persevered and are graduating this month, Katy from Belen High School and Nick from Sandia High School. Katy is headed to the University of New Mexico and Nick to the University of Northwestern Ohio with smiles on their faces and help from Sandia and Lockheed Martin.

They are among the 2012 Thunderbird Award winners who received $1,500 in recognition of their exceptional ability to overcome significant personal challenges on the path to high school graduation.

"Each of you is a hero," Jerry McDowell, deputy Labs director and executive VP for National Security Programs, told the 21 honorees at the 18th annual awards ceremony earlier this month. "As a Thunderbird winner, you exemplify the triumph of the human spirit over adversity. Each of you has something special that enabled you to overcome the obstacles in your lives. For others who find themselves in tough situations, each of you is a role model."

SANDIA VP JERRY MCDOWELL, center, stands with the winners of the 2012 Thunderbird Award recognizing students who overcame hardship on the road to a high school diploma. "Each of you is a hero," Jerry told the young honorees.

KATY FLAMING has been on her own since the age of 13. She says the Thunderbird Award will help make ends meet while she studies pharmacy.

Family, friends, school principals, advisers, and mentors of the winners attended the ceremony at the Embassy Suites. Also on hand were representatives of the New Mexico congressional delegation, members of the Albuquerque Public Schools board, and APS Superintendent Winston Brooks.

'An inspiration to every person here'

No one in the audience was untouched by the stories of courage. There was Michael, abandoned by his parents shortly after birth and raised by his grandmother. Yalda fled Afghanistan with her mother and siblings when her father was taken prisoner by the Taliban. He remains missing. Celina overcame heart surgery and severe bullying. Michael is a cancer survivor. Jamie excelled while battling cystic fibrosis. Adela was a target of violence. Luis has been in and out of foster care and attended six different high schools.

"You are an inspiration to every person here," Jerry told the honorees.

Each of the students is headed to college with a career goal. Majors range from music to engineering to medicine.

Katy plans to pursue a degree in pharmacy. She says a positive attitude helped her overcome serious family dysfunction that left her either homeless or living on her own since eighth grade. "I have had a desire to be something better than what I was raised around," she says. "My experiences have shown me what not to be and left me with a direction. I've always had a desire to do something better. I've never been one to quit or give up."

She says she doesn't use her difficulties as a crutch. "I expect things from myself and try my hardest," she says. "I try and hope for the best."

Nick plans to study automotive high performance and eventually crew for a National Hot Rod Association dragster team. He has been a drag racer since childhood. Nick also plays and coaches basketball and is the Sandia High team manager. His grandfather is legendary Albuquerque Academy basketball coach Vince Cordova.

> ***"Every penny of the money is so helpful. When an opportunity like this comes along the benefit is immeasurable. I can't thank Sandia and Lockheed Martin enough."***
>
> **— Katy Flaming**

Nick hasn't let cerebral palsy, or 13 surgeries, keep him from doing the things he loves. "I don't look at myself as limited," he says. "I have to work harder at everything. But if anyone else can do it, so can I."

He says his condition sometimes gets him down. "But I never use it as an excuse not to be able to accomplish something," he says. "There are people much worse off than I am. I have an excellent family support system, and great people have come into my life."

'Proud to invest' in exceptional students

Katy, Nick, and the other recipients all said they are excited about college and grateful to Sandia and Lockheed Martin for the Thunderbird Award.

"I visited my school a couple of weeks ago and was like a kid in a candy store," Nick says. "I'll live on campus, and the award will help immensely."

Katy says she will be responsible for making ends meet while at UNM. "Every penny of the money is so helpful," she says. "When an opportunity like this comes along the benefit is immeasurable. I can't thank Sandia and Lockheed Martin enough."

Jerry says Sandia is proud to invest in the educational future of these "exceptional young men and women."

"We wish you the greatest success in your lives," he said.

THUNDERBIRD AWARD WINNER Nick Hines, who has cerebral palsy, has loved drag racing since childhood and hopes to crew for a National Hot Rod Association dragster team after college.