Setting the standards for hydrogen
Sandia playing a role in developing codes and standards for hydrogen fueling stations of the future

By Will Keener

Filling up the family car with gasoline, we take something for granted. The official labels that reveal the octane rating of the gas, inspection stickers, the location of the pumps relative to streets, buildings, tanks. Unseen codes and standards ensure that filling stations provide customers with an administrative layer of safety most of us rarely consider.

For the hydrogen station of the future, similar codes and standards are being developed today, and Sandia is playing a key role.

Within DOE, these standards are one of several elements of the hydrogen economy being addressed by the national laboratories system, says Chris Moen, manager of Sandia/California’s Thermal/Fluid Science and Engineering Dept. 8757.

"In the safety, codes, and standards program element there is a harmonization element and R&D part. We are responsible for the R&D part, which I think is the fun stuff," says Chris.

"We are trying to work with the people who are writing the codes and standards so they have good information," says Chris. Some industrial standards already exist for hydrogen. "If you want to build a refinery, there are codes and standards that tell you how far to situate a tank from other buildings and things like that," says Chris. But there are no agreed-upon standards and codes for general public interaction with hydrogen on a daily basis, as will be likely in the envisioned hydrogen economy of the future.

Multiple stakeholders
Stakeholders for Sandia’s research are code and standards development organizations, which are working to write technically sound code. Other stakeholders are original equipment manufacturers (OEMs) and the energy companies, which tend to look at the standards as enabling product commercialization. Within DOE’s FreedomCAR and Fuels initiative — to develop pollution- and energy-efficient vehicles — DOE promotes the development of standards that go into understanding unintended releases of hydrogen. The Labs also have an eye on the development of sensors for leak detection and other mitigation strategies. This year, Sandia will pursue codes and standards research with a budget of about $1.5 million.

Sandia researchers work to understand hydrogen risks. Story on page 4.

Within the complex, the National Renewable Energy Lab is addressing domestic safety standards, and Los Alamos is working on international standards. "These areas require a lot of consensus building," says Chris. "At Sandia, we are trying to provide technical information to support the codes and standards organizations."

Ultimately, the goal is to have a set of acceptable domestic standards that are harmonized with international standards as much as possible.

Sandia is addressing the science and technology that goes into understanding unintended releases of hydrogen in the cases of large high-pressure (momentum-driven) or small (buoyancy-dominated) releases. The Labs also have an eye on the development of sensors for leak detection and other mitigation strategies. This year, Sandia will pursue codes and standards research with a budget of about $1.5 million.

Sandia-LANL ice capades
Sandia, Los Alamos face off in first-ever invitational hockey match. Find out who won — and see photos by Randy Montoya on page 12.
What's what

With apologies to Andy Rooney, do you ever wonder who dreams up packaging?

I recently downloaded the Internet free international phone service software Skype. Took a couple of minutes. Then I struggled for five minutes trying to get it the thick, clear, weedy-seaweed, plastic package holding the headset/ microphone you have to have to use the service. I thought I was going to have to find a pair of tin shears, but finally chanced a small pair of scissors and managed to get it open without cutting myself.

Not long before that, I did get a little cut — peeling off the foil seal on a little plastic tub of crumbled bleu cheese. The disclaimer told me all the ingredients, origin, weight, and nutrition value of the contents — and a lot of other stuff you never look at — but it didn’t warn me about the possibility of injury.

And those little stickers with the price of things? They’re OK on the part of the package you’re going to throw away anyway, but they’re sometimes devilishly hard to get off the actual product. My method is to scrape the sticker off with a small knife, then put a spot of charcoal lighter fluid on a paper towel and rub the adhesive residue off with that, then wipe the lighter fluid residue off with a water-dampened paper towel.

This all seems unnecessary. And it certainly adds a lot to the cost of the product. I don’t know what you think, but I think earning enough money to buy all this stuff is struggle enough. I don’t think we should have to struggle with the packaging after getting it home.

It was noted in this space in the last issue of Lab News that the Corporate Computing Help Desk is a good example of mnemonics in phone numbers — use of a combination of numbers whose corresponding letters spell something meant to make it easy for people to remember the numbers — 844, 845, or 284 — are not required. If you need computer help, just punch in CCHD and you’ll get the desk. The number also works with all three prefixes, so no matter what you punch in, you’ll get through.

Meanwhile, retiree Jack Budon e-mailed that he also dislikes alpha phone numbers, but sent the URL for a website that translates them both ways — numbers to words and vice versa. The URL is http://www.csnetwork.com/phonenumcvtrev.html.

Oh, yes. That’s the Integrated Enabling Services Help Desk.

That’s not a mnemonic, but the mnemonic for its services is YES. Get it? ... Say I-E-S quickly. Get it now?

Lab News editor Ken Frazier and staff members Bill Murphy and Chris Burroughs sat down with Labs Director Tom Hunter for the annual State of the Labs interview last week. Watch for a story in an April issue.

— Howard Kercheval (844-7842, MS 0165, hckerch@sandia.gov)

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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, non-profit organizations, media, and private life who request it.

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New DOE worker protection rule issued

DOE has issued a new rule, 10 CFR 851, “Worker Safety and Health Program,” to regulate worker safety and health at contractor sites. The rule contains provisions for DOE enforcement of a uniform set of safety and health regulations and national consensus standards from groups such as the American Conference of Governmental Industrial Hygienists, National Fire Protection Association, American National Standards Institute, and American Society for Mechanical Engineers. The rule establishes national DOE investigative procedures and fines (up to $70,000 per violation, per day) for failing to meet safety and health requirements.

Implementation plan being developed

The development of a Sandia 10 CFR 851 implementation project plan and schedule is in progress. They will address how to close gaps identified during a requirements mapping and gap analysis between the existing Sandia worker safety and health protection program and the 10 CFR 851 requirements for such a program.

The plan and schedule include development and implementation of a written Sandia Worker Safety and Health Protection Program (WSHPP) that describes how Sandia will implement all 10 CFR 851 requirements. Included are mechanisms Sandia will use to track and document the review, identification, correction, and reporting of non-conformance issues. The WSHPP document is required by the new rule.

The Sandia WSHPP must be submitted for DOE review and approval by Feb. 26, 2007. The rule requires all DOE contractors to be in full compliance with the rule and their DOE approved Worker Safety and Health Protection Program by May 25, 2007.

For more information on the new rule and for future updates go to the Safety Engineering Dept. 10322 website.

— Iris Aboytes

Manager promotion

California

Dan Hardin from PNTS, W80 System Engineering Dept. 8241, to Manager, Telemetry Systems Engineering Dept. 8233.

He joined Sandia in 1977 and has since spent most of his career in the telemetry development areas dealing with instrument, design and development, field testing, and data reduction. Dan was responsible for the first Enhanced Fidelity Instrumentation system, originally deployed on the W87 program. He was also involved in the Joint Test Assembly activities for a number of active weapon programs (B83, W78, W80, W87, and W88).

In 2000, Dan moved to the W80 System Engineering Department to work on the Life Extension Program (LEP) for the W80 warhead. He was responsible for the Warhead Interface Module, firing and warhead Electrical Subsystem. He accepted responsibility as the project lead for the W80 LEP in 2005 and remained there until he moved to manager of Telemetry Systems Engineering in February.

Dan has an Ada Software Engineering Education and Training Degree from DeVry Institute of Technology, Phoenix, Ariz.

Sympathy

To Sylvia Cardoza (10561) on the death of her mother who passed away two weeks ago. Sylvia’s daughter (the granddaughter), Jessica Cardoza (16416), is also an employee at Sandia.

To Ron Allen (12872) in San Diego on the loss of their son Gavin Thomas Allen who passed away Feb. 25.

To Emanuel Paul Roth (25211), on the death of his son, Emanuel Paul Roth, 32, in an automobile accident near San Ysidro, N.M., March 22.
Physicist Ilke Arslan will work in Micro- and Interfacial Sciences Department

Ilke Arslan joined Micro- and Interfacial Sciences Dept. 8756 in January as this site’s second recipient of the President Harry S. Truman Research Fellowship in National Security Science and Engineering. After obtaining a PhD in physics from the University of California, Davis, in 2004, she carried out research from 2004-2005 at the University of Cambridge, funded by a National Science Foundation International Fellowship and a Royal Society USA Fellowship. She received her bachelor’s and master’s degrees in physics from the University of Illinois at Chicago.

In between interviewing at Sandia and arriving for work, she published her postdoctoral research on materials, structures, and properties in the Sept. 30, 2005, Science. The article, “Embedded Nanostructures Revealed in Three Dimensions,” discusses directly imaging the size, shape, and formation of tin quantum dots embedded in silicon — an approach applicable to any system as a unique and versatile visualization tool with nanometer-scale resolution.

At Sandia she will continue developing this pioneering work in scanning transmission electron microscopy (STEM) with Z-Contrast tomography for three-dimensional imaging, along with electron energy loss spectroscopy to research structural and electronic properties of nanostructures.

As a graduate student at UC-Davis, Ilke used STEM to study gallium nitride defects that are critical in developing the semiconductor material for solid-state lighting.

Projects she is working on at Sandia with her mentor Doug Medlin (8756) include characterizing nanowires and nanotubes that have sensing and energy applications. Initiated two years ago, Truman fellowships are highly selective awards that give recipients the opportunity to pursue independent research of their own choosing for three years that supports Sandia’s national security mission. Fellowship candidates are expected to have solved a major scientific or engineering problem in their thesis work or to have provided a new approach or insight to a major problem, as evidenced by a recognized impact in their field. There are currently five fellows at Sandia, three in New Mexico and two in California.

Announcing Ilke’s arrival in remarks at her recent Town Hall meeting, Mimi John, VP for Division 8000 and Homeland Security, said the excitement and innovation of Sandia’s research is “the very best of the best to come work with us.”

Society of Automotive Engineers elects CRF’s Paul Miles a fellow; cites leadership, accomplishments

Paul Miles (8362) is the latest Sandia researcher to receive the rare distinction of election to the fellow grade of membership in the Society of Automotive Engineers (SAE), an international organization of 80,000 members with about 320 active fellows. Paul will be honored at SAE World Congress April 3-6 in Detroit, where a special dinner for newly elected fellows is held every year.

Paul was nominated for leadership in organizing fuels and lubricants activities and for technical accomplishments in developing advanced techniques to study combustion processes within the cylinder of internal combustion engines. Coupled with subsequent studies, these techniques have generated new understanding of processes influencing pollutant formation in both spark- and compression-ignition engines. The common thread unifying these contributions is an emphasis on fluid mixing processes and how these can be influenced by the engine designer.

He is the fourth engine researcher at the Combustion Research Facility to gain this honor, after Dennis Stebers, John Dec, and recently retired Pete Witze, all of Engine Combustion Dept. 8302. SAE fellow status is the highest grade of membership bestowed by the society. It recognizes outstanding engineering and scientific accomplishments by an individual that have resulted in meaningful advances in automotive, aerospace, and commercial vehicle technology. Established in 1975, the program recognizes an average of 20 worldwide recipients for this honor each year.

Paul is freshly returned from a three-month sabbatical visit to Lund University in Sweden, where — in conjunction with Lund researchers — the first planar flow measurements in a firing diesel engine were obtained. These measurements clearly reveal the in-cylinder bulk flow structures and the late-cycle mixing in these engines. Enhanced mixing rates are a critical requirement for implementation of new, high-efficiency, clean diesel combustion strategies.

‘End of oil’ is next topic for distinguished lecture series

Prof. David Goodstein of the California Institute of Technology will give a provocative talk on “Out of Gas: The End of the Age of Oil” at the Spring 2006 Truman Distinguished Lecture on Wednesday, April 5, from 10:11-10 a.m. in the Combustion Research Facility auditorium (Bldg. 904). Goodstein is vice provost and professor of physics and applied physics at Caltech, where he has won awards for his teaching. He is also a prolific researcher in experimental condensed matter physics, a textbook author, and a co-author of the best-selling book, “The Man’s Last Lecture, as well as the author of Out of Gas: The End of the Age of Oil,” published in 2004.

Having turned his attention to the world’s energy situation, he will discuss in his lecture how the world will soon start to run out of cheap, easily produced oil. He will then carefully consider how turning to the other fossil fuels might do incalculable damage to our climate and how we are likely to start running out of all fossil fuels, coal included, by the end of this century.

The Distinguished Lecture Series is intended to help stimulate our thinking about the most vital issues confronting our nation and the world by bringing in highly respected speakers to discuss their ideas with us. These special site-events are part of Sandia’s Truman Distinguished Lectures, dedicated to fostering the exchange of knowledge on the intersection of national security, science, technology, and public policy. — Nancy Garcia

50th anniversary talks available online via video streaming

Videos of presentations made at the 50th anniversary of the California site (Lab News, March 17), including “Careers Through the Decades,” are available through the following videostreaming link: http://www.ran.sandia.gov/anniversary50/video_feed/index.html

Also, as promised in the March 17 Lab News, the poster featuring highlights from 1996-2006 is reproduced as a full page on page 9.
Sandia researchers work to understand hydrogen risks, improve safety codes and standards

By Will Keener

Sandia doesn’t write codes and standards for the coming hydrogen economy, but if Carmen Mendez has anything to say about it, the Labs will help make those codes better. She and her colleagues will do it using a systematic risk assessment process to address the challenges posed by the new fuel.

“We hypothesize what can cause an accident at the scale of a hydrogen refueling station, but we need to identify the risk drivers,” says Chris Moen (8775), co-manager of the hydrogen codes and standards project at Sandia. “We can identify, quantify, and prioritize the risk drivers using the risk assessment approach. Then we can also address the mitigation strategies for those most likely events.”

“When people go to a gas station, they normally don’t think about the risks,” says Carmen. “However, others have thought of those risks and have put safety measures in effect to protect product users. We want hydrogen to be as safe as fueling products that are available now. We want to get to that level with hydrogen refueling. But, instead of doing it as we go along learning from experience, we are trying to understand how to reduce risks before they occur.”

Carmen, who joined Sandia last fall, receives input from an industrial working group, formed by representatives from energy companies and auto manufacturers that provide guidance to DOE on matters of technical interest. Additional industry experts have been brought together to help think through the assumptions being made in creating a risk approach, provide data, and ultimately put the assessment into practice.

The first steps involve studying failure modes (with information provided by industry), understanding the behavior of the users, and gathering data on the materials and components involved. Data can be gathered in a variety of ways, including comparisons with other available products, such as compressed natural gas, liquefied natural gas, propane, and butane. Because there are always some uncertainties in risk assessment, we use expert judgment and other quantification alternatives, says Carmen.

Another source is data from Sandia’s experimental element of the codes and standards project (see “Setting the standards for hydrogen” on page one). “It’s helping us to know everything that’s available,” says Carmen.

Sandia researchers work to understand hydrogen risks, improve safety codes and standards

Hydrogen

(Continued from page 1)

petroleum-free vehicles — technical teams have been established with industry advisors. “Everything we do gets scrutinized by the OEMs and energy companies, so that we get good feedback about what’s important to them,” says Chris.

Sandia started in 2003 with studies of unintended releases of momentum-driven gas, or jet-type releases. Experiments at 2,500 and 6,000 psi at the SRI burn site east of Livermore, Calif., were conducted under contract to measure the jet characteristics. “One of high-priority items for us is what separation distances are needed for sitting equipment at refueling stations,” says Chris. “There was a lack of information for hydrogen in jets, where there may be a fire hazard.”

Small is the enemy

Sandia worked with the International Code Council as experiments were conducted. Labs researchers also talked to the National Fire Protection Association and presented the data to the council.

The next effort involves a transition to small-scale releases, like hairline cracks, O-rings, fittings, and fixtures. These leaks create gases that are not momentum-dominated but buoyant, says Chris. Sandia will do these experiments at the Combustion Research Facility (CRF), with Bob Sefker (8367) as principal investigator. Bill Houf (8772) will generate engineering models based on the data. The engineering models are used to rapidly quantify the consequences of unintended releases.

Sandia is also contributing to future standards by analyzing how metallic materials interact with hydrogen. Generally, molecular hydrogen decomposes on a metallic surface and diffuses into the material, affecting the properties. Often, these effects include making metal more brittle and reducing its strength.

Sandia has created a technical reference on these compatibility issues based on the Labs’ 40 years of experience in storing hydrogen in metal containers. The reference also uses other peer-reviewed published literature. Staff metalurgists Brian Somerday and Chris San Marchi (both 8772) are writing the reference guide. They are describing compatibility issues for various grades of steel and other materials in a web document, http://www.ca.sandia.gov/matlsTechRef, available to groups writing the codes involving structural design for hydrogen use.

“We learned about hydrogen compatibility in Defense Programs can apply to this project,” says Chris.

Sandia has worked with the American Society of Mechanical Engineers to develop codes for pressure vessels for different material classes and effects, as well as with CSA. “We want to understand how hydrogen works with other materials,” says Chris.

Unique equipment

Sandia can do even more, given the opportunity. One area where the Labs can contribute is in materials testing where no information currently exists. Pressures of 10,000 to 15,000 psi are expected in hydrogen refueling; this means pressures super-saturated atomic hydrogen will be reacting with the container metals.

“We have some unique equipment here we are using in Defense Programs that we also use to develop data for the codes and standards project,” says Chris. “We can test static crack growth at pressures up to 30,000 psi to understand some of these interactions.” Testing at pressure and with cyclic loads is another option Sandia researchers could explore.

Hydrogen had no significant role in Hindenburg disaster

By Will Keener

We all know that hydrogen gas is dangerous as all get out, right? We’ve seen the footage of the Hindenburg and heard the famous emotional radio broadcast. But sometimes, says scientists who study the properties of hydrogen, we learn the wrong lessons.

“I would say that hydrogen is no more dangerous than gasoline, taking everything into account — it is just different,” says Jay Keller (8367), co-manager of Sandia’s codes and standards effort for hydrogen. “With gasoline, we’re used to it. We’ve learned to live with it.” Any substance that stores energy deserves our respect, Keller adds, but the public perception of hydrogen — based largely on newsreel footage of the 1937 Hindenburg airship fire — represents an undeservedly difficult obstacle for hydrogen proponents.

Consider the scenario of a leaking automobile gas tank, Jay suggests. A slow drip can lead to gasoline on the garage floor that would, if ignited, engulf the vehicle and the garage in a bright orange flame with very high heat radiating off scattering heat. “The orange color indicates that carbon compounds are involved in the fire,” Jay notes.

Now consider a slow hydrogen leak in the same garage. Hydrogen, because it is 14 times lighter than air, would go up in the garage. Its diffusive nature suggests it would then dissipate rapidly through the porous walls of the garage. “Preliminary calculations suggest that hydrogen in a condition where it is flammable, Jay says. “Hydrogen burns with a faint blue color because no carbon compounds are involved, Jay adds. “Everything goes up and away.”

Although there was speculation early on that hydrogen was the key culprit in the Hindenburg fire, it was research by retired NASA scientist Addison Bain that showed definitively that hydrogen had no significant role. Among his findings, published in 1997:

• The airship did not explode, but burned in an expanding pattern;
• The ship sank slowly to the ground with the aft section burning and sinking faster than the nose, which likely still contained hydrogen;
• The bright flame color seen by witnesses indicates another likely source of the fire, which Bain suggested was the bright paint and fabric used on the aircraft; and
• The powdered aluminum used in a varnish applied to the fabric formed compounds with burning very high heat radiating off that are comparable to those used in modern solid rocket fuels.

Was the ship burning? Yes,” says Jay. “Was it overwhelmed by a hydrogen explosion? No!”

For more information on this research, go to this National Hydrogen Association site: http://www.hydrogenus.com/advocates/ad2002.htm.
Stockpile evaluation

(Continued from page 1)

The new program is an important Nuclear Weapon Strategic Management Unit (NWSMU) transformational initiative for the Weapon System Life Cycle (WSLC). It is designed to recognize the need for evaluation to evolve over the weapon system life cycle. Early on, the focus is on detecting unanticipated design or production defects. However, once enough data is accumulated to provide reasonable confidence that any remaining defects are very small in number, the focus of the program will shift to look for trends, aging, and degradation.

In the first step, we will develop a computer program to fill knowledge gaps, quantify margins, and monitor for aging. CHERYL HOMER, manager of Integrated Stockpile Evaluation, says that revising Sandia's sampling rationale is the most significant initial change.

High confidence in previous results

"We have high confidence that we have found most of the prominent defects in the existing weapons systems through the previous years of testing," Sheryl says. "The new approach will be driven by a strong technical requirements basis, where the data needs drive the sample requirements. We call this a "bottoms-up" approach. And, we will be developing science-based tools, such as modern computational models and simulation, and new diagnostics for fundamental characterization of aging, to improve our understanding of the state of health of the stockpile."

Sheryl anticipates that ISE will allow Sandia to expand from nine endurance stockpile systems to an entire class of stockpile systems, allowing a decrease in the overall quantity of field return samples required. It will also improve cost-effectiveness and be a result of integrated policies and processes, unambiguous roles and responsibilities, strong technical requirements for the evaluation programs, improved data analysis and information systems, efficient communications, and targeted research and development.

There's one more plus of ISE, says Dave. Staff working in Sandia's nuclear weapons program will be challenged by many aspects of the new ISE program.

"It will create new technically challenging opportunities for our staff, particularly in areas of component evaluation and in developing new tools and capabilities to foretell trends and the effects of aging," Dave says. "We are already creating new and expanded capabilities, including the addition of new test equipment at WETL."

He adds, "The transformation of stockpile evaluation extends beyond Sandia and involves partnerships with our sister labs and the plants. We will continue to be challenged over the next several years in our desire to find ways to improve the process with support needed from across the complex. Expanded efforts to change current processes, requirements, and supporting infrastructure will be needed to achieve transformation."

ISE all-hands meeting for April 13 in Bldg. 810

Members of all divisions devoted to nuclear weapons are invited to attend an all-hands meeting April 13 from 2:30-3:30 MT to learn more about the new Integrated Stockpile Evaluation (ISE) program. The meeting will be in the Bldg. 810 auditorium in New Mexico and will be broadcast to Bldg. 915, Room N237, in California. The agenda will include remarks by Steve Rottler, VP of Weapons Engineering and Product Realization Division 2000, and an overview by Dave Corbett, director of Stockpile Resource Center 2900; and a question and answer panel discussion.

Take a class

(Continued from page 1)

jobs better, or maybe even take us in new directions with our careers."

The first step for anyone considering the program is to have a career development discussion with your manager. Next, visit the SEI "wizard" on the CEDT website (http://www.irn.sandia.gov/learning/wiz). The wizard's questions are designed to help you determine whether the class qualifies for SEI time charging. Senior Manager Charlaine Wilts says that people can use the SEI wizard to help you determine whether the class qualifies for SEI time charging.

The next question asks whether the class is relevant to your current work. If it does, it should be paid for through your regular project funds. If your company doesn't have a career development discussion with your manager, it is also excluded from the SEI program. Only regular work hours — not flex time, overtime, or extended workweek — can be charged for education and training.

Dr. Elaine Grant, an OMA at the Sandia Science and Technology Park, took a two-day "fundamentals of benefits" class through the program in January. She's interested in learning more about human resources, and an HR consultant she knew recommended she try the class.

"I'm glad I did it so I could see what it was like and whether I might be interested in the field," she says.

At Sandia, California, some impacted employees have used the program to gain new skills. Jimmy Ross (8245), a mechanical technologist whose job went away after the Explosive Destruction System project with the Army ended, took a wet chemistry class with a number of other impacted employees. Sandia brought in the instructor. While he hasn't yet found another job, he thinks SEI is a good way for Sandia to try to stay agile as the needs of the business change.

"I spend 15 years working on a laser and combustion, then they said they aren't the hot thing any more," he says. "If you've been working in one area for a number of years, it's difficult to retool yourself as new opportunities come up. But if you can take classes outside your field you can be more marketable."

Since the program began a year-and-a-half ago, nearly 2,200 employees have logged more than 48,000 hours in classes. During that same time, participants in the program have changed an average of 22 hours of class time each. For more information on the program, and frequently asked questions, click on the Strategic Education Initiative link on CEDT's home page.

Feedback

Wanted: Some way to disappear inactive DropZone folders

Q: I understand the files uploaded to the "Dropzone" remain available for about a week, and then are deleted to save space. However, the folders seem to live forever. Right now, there are 1,780 folders in the Dropzone, and most of them are empty. This makes it burdensome to scroll through, and causes people to start a new list every time. Could we make the following changes? First, let's make sure all folders are accessible from the default folder list. Also, if we could have a "jump" to the folders that you're interested in. If you know the name of the folder that you are looking for, you can type the first one or two letters of the folder name after clicking the file window. Second, folders that are deleted after 30 days begin with that or those letters.

— William Swartz (4329)
These black belts and green belts aren’t a fashion statement

**Lean/Six Sigma is the real thing**

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**Note:** As Sandia has placed increased emphasis in recent years on “operational excellence,” we’re heartened by a quality process called Lean/Six Sigma (LSS), which rapidly has helped many large organizations improve their operations. We weren’t sure what LSS is, so we talked to Sandia’s LSS group to explain it to us. This is their story.

Sandia has more Black Belts and Green Belts than a skip-n-meat door to a dace card center for rich kids in downtown Manhattan. The Labs’ 30 certified black belts and 170 certified green belts constitute a pretty formidable and focused force. But these “belts” aren’t practicing martial arts.

They’re huddled in the art of Lean/Six Sigma (LSS), a methodology used by some of the world’s most successful companies (Lockheed Martin, Toyota, GE, Dow, Exxon, Citibank, Raytheon, and Honeywell), among many others, to eliminate wasteful practices, improve processes, increase productivity, and enhance employee morale through team-based solutions in order to meet customer demands.

Lean/Six Sigma combines Lean, a methodology used to eliminate non-value-added activities in a process, and Six Sigma, a statistical methodology that reduces variations and defects in a process. LSS is redefining the way we do business — and not just in manufacturing where it originated. It is being embraced by healthcare, banking, government, and other industries because the results it achieves are quantifiable and unlike any seen in industry — increases in productivity of 50 percent or more and decreases of 75 percent in product delivery lead times and development lifecycle times are not uncommon. And these aren’t small wins, say Sandia’s LSS champions, adding that LSS isn’t the corporate world’s “fla-

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**Articles by Jennifer Stonebaugh  Illustrations by Michael Vittitow**

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**Ready, get set, go! — Some LSS definitions**

So how does an organization begin its “Lean Six Sigma journey?” First and foremost, there should be a strategic driver behind the need to get better. Management needs to understand and support the effort and be willing to knock down barriers to implement changes that result in drastic improvement. The next step is to contact the corporate LSS office to determine what LSS tools are appropriate.

- **Value Stream Mapping** — a three- to four-day improvement event where the process is analyzed, waste is minimized, and actions items are put into place to implement an improved process within a six-month period. This approach is usually preferred when looking more strategically at how to improve over time.
- **Kaizen** — a two-to-four-day rapid improvement event where changes happen during the course of the event and business is conducted differently the following week.
- **5 — a three-to-four-day improvement event where an area is sorted, straightened, shined, standardized, made safe, and sustained. 65 events closely examined and optimized work flow to eliminate waste, waiting, excess movement of materials, and wasted time looking for tools required for the job.

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**Engineering Work Cell**

- **5 percent Cycle Time Reduction**
- **5 percent scrap reduction**
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**In the MC-4300 neutron tube. The customer now has a product whose performance can be more tightly predicted for better reliability and longevity.**

- **In the technical office environment — Center 2700 worked with Center 900 to reduce engineering drawing change time by 92 percent by implementing a “less” office layout and improved workflow design.**
- **Increased capacity in a research environment — Throughout the Advanced Materials Processing Laboratory, LSS techniques are used to optimize work flow and physical work spaces, increasing bench space by up to 85 percent, drawer space by 25 percent, and floor space by 30 percent.**
- **Reduced MC4277 neutron tube final assembly cycle time by 74 percent.**
- **Decreases of 75 percent in product delivery lead times and unneeded equipment and books were recycled or appropriated.**
- **Increased capacity in a research environment — Generator Design and Production Group applies LSS tools to improve the property accountability process by implementing on-line tracking and an individual asset list for each Sandia employee, resulting in 99 percent inventory accountability and up to 85 percent space by 75 percent.**
- **Improved 5 percent cycle time and KEP.**

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**For more information contact Cindy Longenbaugh (0225) at 844-8788 or visit https://www-im/sandia.gov/65/lean_six_sigmaresearch.htm**

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**SANDIA LAB NEWS • March 31, 2006 • Page 7**
Twenty-two Sandia women were honored March 13 in the 2006 Women’s Wall of Fame. 

The wall, a series of six posters highlighting achievements of some of Sandia’s outstanding women, was unveiled to the Labs Leadership Team (LLT) with Labs Director Tom Hunter and Becky Krause, Vice President, General Counsel, Corporate Secretary, providing comments. It now resides on the first floor of Bldg. 802 and later will be moved to different buildings for months at a time.

This is the fourth year the Sandia Women’s Action Network (SWAN) is recognizing the accomplishments of Sandia with the wall. The honorees will be recognized at a California celebration April 12.

“There are over 2,800 women at the Labs working in all areas bringing special talents and skills to the workplace,” says Judy Moore (5634), who together with Georganne Smith (3000), co-chairs SWAN. “We are proud to present some of the women who have been brought to our attention by co-workers, bosses, peers, and in some cases themselves.”

Because of the overwhelming response to SWAN’s request for women who received an award or special recognition in 2005, the original focus was expanded to include many more women at Sandia who give freely of their time and energy to mentor, volunteer, and balance their professional and family lives.

One of the posters is an organizational chart showing Sandia’s female directors and vice presidents. The titles of the other posters are Community, Earning Recognition, Expanding Our Influence, In The News, and Making Key Contributions.

The 2005 poster series honorees are:

- Community: Ruth Bitui (3815), Kathleen Holt (6874), Marie Steele (10761), and Judy Sturtevant (4328)
- Earning Recognition: Kathleen Gee (5932), Jennifer Gilbride (2138), Shekita Robinson (5351), and Megan Slinkard (2661)
- Expanding Our Influence: Lori Parrott (7000), Catherine Pasterczyk (5923), Karen Prinke (10874), Lynn Yang (8114), and Nancy Yang (8758)
- In The News: Iris Aboytes (3651), Chris Burroughs (3851), Veronica Chavez-Soto (5735), Shanaylon Kemme (1713), and Deborah Tewa (6218)
- Making Key Contributions: Mary Crawford (1123), Renee Holland (3331), Adriane Littlefield (6924), and Margaret Scheffer (5419)

by Chris Burroughs

Women at work

Women at work at Sandia

- Women compose nearly one-third of the regular work force at Sandia today.
- Thirty years ago women were represented in one of 23 management positions. Today women serve in one of five management positions.
- Women are in one of four positions within the professional (technical and laboratory staff) ranks.

Women at work should participate in PNM’s wind energy program

Q: It has been estimated that wind energy could supply nearly 20 percent of our nation’s energy needs. New Mexico’s geography makes it particularly well-suited to take advantage of wind power. Meanwhile, increases in wind turbine efficiency, combined with the rising cost of natural gas, have made wind energy increasingly viable. Has Sandia considered participating in PNM’s Sky Blue Wind Energy Program? As a DOE lab, this would set an excellent example of our commitment to the environment and to renewable, pollution-free energy.

A: Sandia purchases electricity from the Western Area Power Administration (WAPA) through a contract negotiated by the U. S. Department of Energy’s National Nuclear Security Administration (DOE/NNSA) for KAFB and Sandia National Laboratories. DOE/NNSA currently purchases 3.5 megawatts of hydroelectric power through the KAFB/Sandia contract, with Sandia receiving approximately 60 percent of the 3.5 megawatt allocation.

Sandia has also purchased 6,700 megawatt hours of renewable energy certificates from WAPA for FY06. This represents 3 percent of Sandia’s total annual energy use.

Sandia, per the contract with DOE, cannot negotiate directly for electrical power. As such, we work closely with the DOE Service Center and Sandia Site Office on energy management and utility purchases.

I will ensure that our counterparts are aware of PNM’s Sky Blue Wind Energy Program so that it is properly considered during negotiations.

— Lynnwood Dukes (10860)

Feedback
As the Cold War ended, Sandia’s weapons role shifted from new designs to ensuring the viability of the existing stockpile through the use of advanced computational tools at the newly opened Distributed Information Systems Laboratory. Our capability in designing highly reliable systems was used to create the Explosive Destruction System for the U.S. Army to safely destroy legacy chemical ordnance. The largest laboratory-industry partnership was begun with a consortium led by Intel Corp. The program was to apply expertise developed during the Strategic Defense Initiative to enable patterning of smaller and more powerful microchips. Sandia also contributed to the Partnership for a New Generation of Vehicles announced by the White House. The Combustion Research Facility opened its Phase II in 1999, doubling its number of offices and labs. Modifications to the W7x workload under the Life Extension Program were first incorporated into Minuteman III missiles in 1999. The site’s portfolio diversified into biodefense and counterterrorism work prior to the 2001 terrorism attacks on the Pentagon and World Trade Center, and continued under the new cabinet level Department of Homeland Security.

In 1996, distributed information systems laboratory was dedicated when building 913 was formalized.

In 1998, the Sandia National Laboratories were set on fire.

In 1999, the Sandia National Laboratories turned 50 years old.

In 2004, the site Distributed Thermochromic Materials Laboratory was dedicated when building 913 was finished.


Bush Administration (2)

Clinton Administration (2)

On Sept. 11, 2001, terrorists ultimately hit the U.S. national laboratories in New York City, and the Pentagon.

On September 11, 2001, the space shuttle Columbia broke up in re-entry.

On November 20, 2001, the U.S. engaged in missile strikes with major advantage and made other missile attacks before ground control orders.
Feedback
Will ‘Sandia Marketplace’ be restored anytime soon to anything like its former self? In short: No

A note from Sandia Feedback administrator Mike Clough (3651):
The number one issue for Feedback questions throughout 2005 and for the first months of this year has been “Will the Sandia Marketplace be Restored?” Benefits Director Dr. Larry Clevenger’s latest response on this subject is quite detailed and should inform employees of why the site was moved to the internal web.

Q: This question(s) (and venting) is a follow-up to the previous Feedback question on the removal of most discounts on Sandia’s Marketplace website (which is now practically useless).

Why does Sandia remove a good deal just because of some complaints by a few people? Instead of providing visible, clear, and precise warnings that clearly state that Sandia only provides this information and does not endorse, solicit or otherwise contract with any of the vendors on this site, “Sandia chooses to remove the majority of the benefits. This was done without any attempt to find out if the majority (or even a minority) of employees valued the benefit (apparently that isn’t an input to our HR group).

Additionally, the removal of some of these companies from our website removes the ability of some of us to take advantage of contracts we have already committed to (can’t reach Verizon’s corporate discount page even though Lockheed is part of their program).

Can we expect Sandia to expand this site in the future (or totally eliminate it)? Or is it another case of we (Sandia management) don’t care and it’s not worth our effort. I personally was excited when I saw the potential discounts we Sandians could take advantage of, especially when Sandia’s trend seems to be making a determined effort to reduce, shift the cost to employees, and/or eliminate as many employee benefits as possible. It seems maintenance of a good employee discount page (including the occasional complaint) would pay a lot more dividends than it costs to maintain.

At: The Health, Benefits, and Employee Services Marketplace discount site was moved to Sandia’s internal web to display only the corporate discounts negotiated by Lockheed Martin. There were many reasons for this decision including difficulties with vendors, employee dissatisfaction, and ethical and procurement issues. For some time, the HBE Services Center had been experiencing an increasing rate of employee dissatisfaction with many of the vendors offering discounts on the site.

Discounts that had previously posted to the site had not been negotiated with Sandia. Despite the fact that the site clearly stated that Sandia did not endorse, solicit, or otherwise contract with any of the vendors, employees experiencing difficulties had an expectation that Sandia could somehow intervene. Vendors and their discounts had not been negotiated through Sandia’s procurement process, which resulted in an increasing number of questionable vendors aggressively soliciting the Employee Services department to advertise their services and to link up to vendors websites.

Many vendors began to demand free web advertising labor and services of the HBE Services Center. Moreover, many of the vendors already posted to the Sandia site, migrated their websites, discontinued discounts, or went out of business without notification to the Employee Services site.

This became a site maintenance issue and raised concerns about applying Sandia labor and funding to advertise outside vendors. An effort was made to establish a link from Sandia’s internal web to a site maintained by Lockheed Martin, but because Lockheed’s internal web is available only to its employees and requires a Lockheed employee authentication, this was not possible.

Anyone can, at any time, ask a retailer or vendor if they offer corporate discounts, and most large vendors do offer discounts to corporate and government employees. However, Sandia employees cannot use government resources to procure personal benefits. The discount site was bordering on this ethical issue. Being a Sandia site, the discount site unintentionally encouraged employees to shop and compare personal consumer goods from their Sandia computers. As a Sandia Open Network site, this also gave a questionable impression of Sandia Corporation to other web users. Most large vendors routinely offer discounts to government employees, government contractors, and corporations. Employees interested in vendor discounts may contact vendors directly.

— Larry Clevenger (3300)

Thunderbirds to hear talk on Mars Rover and Cassini Saturn flyby discoveries April 10

Sandia’s retirees group, the Thunderbirds, is hosting a presentation on “Astronomical Discoveries from the Mars Rover and the Cassini Flyby of Saturn” on April 10, at the Mountain View Club on KAFB. The speaker is Michael Sepulveda, Observatory Director at the Lodestar Astronomy Center, who also presents many of the programs at the New Mexico Museum of Natural History and Science Planetarium.

Call Rod Boenig at 836-6977 for information.
Sandia skaters take on LANL’s best in exhibition match

ICE HOCKEY TEAMS from Sandia and Los Alamos faced off on March 19 at Outpost Ice Arena. The newly formed Sandia team struggled against a visiting team with more experience playing together. Matthew Stockham scored six times and Bill Scherzinger scored once for Sandia, but Los Alamos hung on to win 9-7. The Sandia team and the rivalry match against Los Alamos were inspired by the FBI vs. Secret Service ice hockey games held periodically in Washington, D.C. Sandia’s team plans to make the LANL match an annual event, with home games in Albuquerque and away games at Los Alamos. The team is arranging local games against Kirtland Air Force Base, Albuquerque police and fire departments, and other regional organizations. Other plans include ordering Sandia ice hockey jerseys. If interested in playing or purchasing a Sandia hockey jersey, contact Bankim Tejani (5631) at 284-9877 or bjtejan@sandia.gov.

IES Mercado’s annual big tent to-do showcases panoply of services

THE ANNUAL IES MERCADO, held in a big tent near the Thunderbird Cafeteria on a snowy March day, attracted a steady stream of Sandians interested in learning more about the host of services provided by the Labs’ various Integrated Enabling Services organizations. (They also came for the free ice cream bars, which were a popular take-away, even on a cold day.) Above, Dominique Kilman (4317, left), Deborah Schutt (4312), and Paula McAlester (4311) talk with customers about cyber security issues. At top right, T.J. Allard (4210, left) and Jeff Kallio (10530) welcome a visitor to the Mercado tent. At right, Creative Arts Dept. 3654 Manager Linda Lovato-Montoya explains her team’s services to a potential customer.

Playing for Sandia:
Jason Cook, Derick De Smet, James Freymiller, David Hostetler, Blake Jakaboski (goalie), Juan-Carlos Jakaboski, Gordon Keeler, Joseph Martin (assistant), Ron Oldfield (goalie), Jason Podgorski, Michael Rightley, Gary Rivera, Patti Sawyer, Bill Scherzinger, Jerry Smith, Dwight Stockham, Matthew Stockham, Bankim Tejani (captain), KC Wagner, and Jean-Paul Watson