

Sandia researchers seek ways to make lithium-ion batteries work longer, safer

Batteries could soon replace standard nickel-metal hydride batteries in hybrid vehicles

By Chris Burroughs

As part of the DOE-funded FreedomCAR program, Sandia's Power Sources Technology Group is researching ways to make lithium-ion batteries longer-lived and safer. The research will lead to these batteries being used in new hybrid electric vehicles (HEVs) in the next five to 10 years.

"Batteries are a necessary part of hybrid electric-gasoline powered vehicles and someday, when the technology matures, will be part of hybrid electric-hydrogen fuel cell powered vehicles," says Dan Doughty, manager of Advanced Power

Sources Research and Development Dept. 2521. "Current hybrid vehicles use nickel-metal hydride batteries, but a safe lithium-ion battery will be a much better option for the hybrids."

He notes the lithium-ion battery has four times the energy density of lead-acid batteries and two to three times the energy density of nickel-cadmium and nickel-metal hydride batteries. It also has the potential to be one of the lowest-cost battery systems.

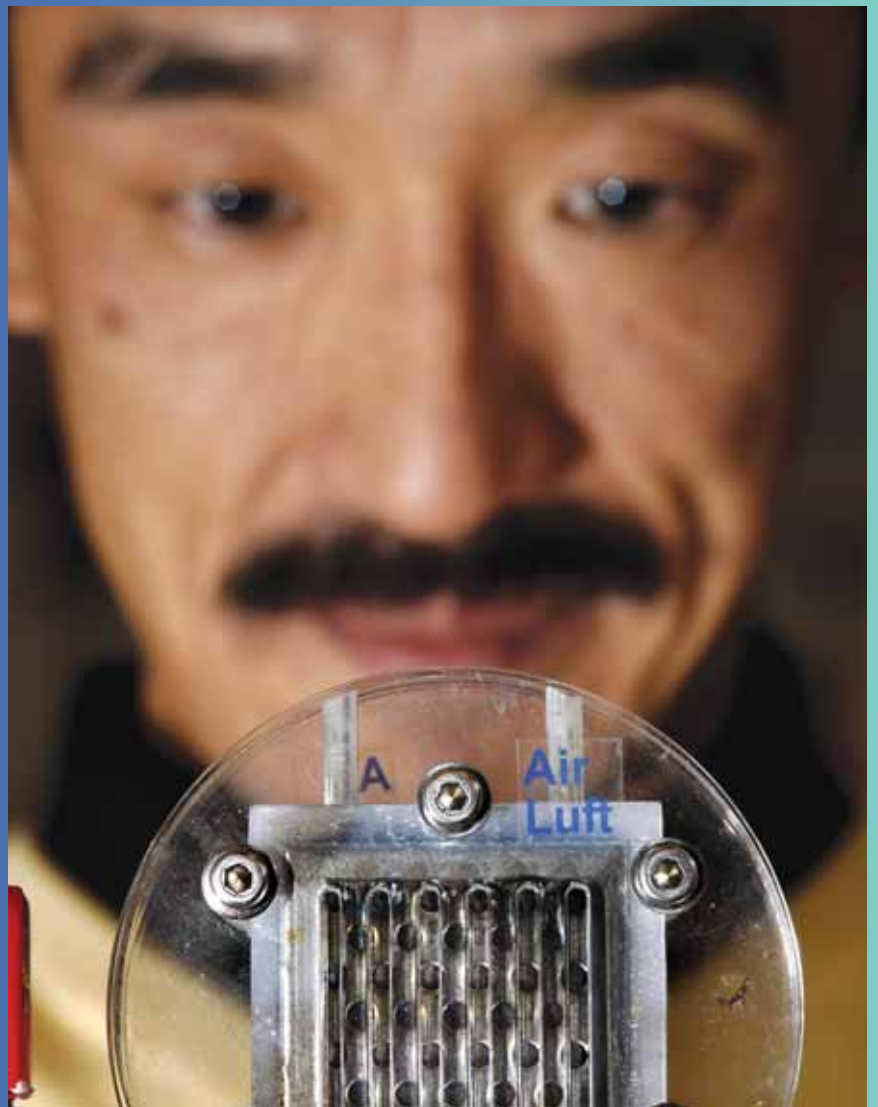
Dan's department receives about \$1.5 million a year from the FreedomCAR program to improve the safety, lengthen the lifetime, and reduce costs of lithium-ion batteries.

The FreedomCAR program, initiated by President Bush in 2002, focuses on developing hydrogen-powered electric vehicles to free the US from dependence on foreign oil supplies. Five national laboratories — Sandia, Argonne, Lawrence Berkeley, Idaho, and Brookhaven — are involved in the program, each researching different aspects of making hybrid electric-hydrogen
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"Fixing the problem will come from informed choices on improved cell materials, additives, and cell design, as well as good engineering practices."

Dan Doughty

Sandia, Sharp team on energy R&D



ENERGY FOCUS — Sharp Corp. researcher Akimasa Umemoto studies a prototype miniature fuel cell stack. Sandia and Sharp are teaming on alternative, renewable energy. Read about the work on page 4. (Photo by Randy Montoya)

Special appointments

It is, perhaps, the highest honor that the Labs can bestow upon an employee: the special designator that identifies him or her as a senior scientist or engineer, a senior administrator, or a "distinguished" member of the workforce. Photos of the 55 recipients of the 2005 special appointments are shown in a double-page spread on pages 6-7.

It's UC/Bechtel DOE announces new LANL contract

DOE Secretary Samuel Bodman on Dec. 21 made the long-awaited announcement: The team headed by the University of California and Bechtel won the contract to manage and operate Los Alamos National Laboratory. UC has managed the lab since the beginning of the Manhattan Project in 1943, but Bodman stressed that the new contract is not an extension, but represents a new management team.

"This is a new contract with a new team, marking a new approach to the management of Los Alamos. It is not a continuation of the previous contract," Bodman said.

The contract competition had pitted the UC/Bechtel team against a team headed by Lockheed Martin and the University of Texas.

Following the announcement, Labs Director Tom Hunter said, "We congratulate the Los Alamos National Security LLC . . . on their successful partnership bid to manage Los Alamos National Laboratory, and Sandia looks forward to maintaining and enhancing our already strong working relationship with our LANL colleagues.

"DOE's National Nuclear Security Administration and its national laboratories face many technical challenges in our core mission to ensure the continuing viability and safety of our nation's nuclear weapons deterrent. Close and full cooperation among the labs is vital to the success of this mission, and we will do our utmost to ensure such cooperation with the new LANL managing partnership."

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'Good' report card from NNSA cites outstanding mission work, room for improvement in ops

By Bill Murphy

NNSA, in its annual report card on Sandia, has awarded the Labs an overall "good" rating, based on the Labs' composite score of 88.5 percent.

The score, assigned in NNSA's Performance Evaluation Report for FY05, is calculated from Sandia's combined scores in its mission performance and operations performance. The Labs earned an "outstanding" rating for its mission-related work and a "good" in operations.

The "good" and "outstanding" ratings are two of the four possible scores; the others are "satisfactory" and "unsatisfactory." To achieve an overall outstanding rating, the Labs would have needed to earn a composite score of 90 percent or better.

In the mission area, Sandia met 119 of 121 Level II Nuclear Weapons Program milestones, with an overall mission score of 92 percent. Historically, going back to 1995, Sandia has always earned a 90 percent or better rating in its mission performance. The mission area includes assess-

ments in nuclear weapons work, science and technology, and defense nuclear nonproliferation programs. Those areas all earned outstanding ratings, as did the Labs' counterintelligence program, which falls in the operations area.



"We must take up the challenge."

Labs Director Tom Hunter offers his insights on the NNSA report card. See his letter to Sandians on page 5.

"Sandia has continued its record of scoring 'outstanding' in terms of meeting its mission obligations," notes Sandia Executive VP John Stichman. "We're extremely proud that we consistently perform at an outstanding level in carrying out the vitally important mission the nation has assigned to us."

Sandia's operations score in FY05 lagged

(Continued on page 5)



Truman lecture speaker and Nobel laureate Steven Chu discusses interface between biology and physics. Story on page 3.



BP chief scientist and former Caltech provost Steve Koonin says oil won't run out anytime soon. Story on page 9.

What's what

Maybe for a start on the new year, it would be interesting to have a look at some of the highlights of the old year.

For one, it was a good year for the rock group U2. Lead singer Bono shared the cover of *TIME* magazine with Melinda and Bill Gates as the "Persons of the Year" for 2005, and the group was nominated for a Grammy for its album "How to Dismantle an Atomic Bomb." Probably a best-seller around Pantex.

Sandia got a new executive management team and Los Alamos got a new management contract headed by the University of California and Bechtel, the latter announced by DOE Secretary Samuel Bodman Dec. 21.

We all got a lot of warnings about bird flu – and some medications that might protect us from it – but so far, no one in the US actually got bird flu, as far as we know. That's good, because we also got a lot of warnings that those medications might not protect us from it.

The stock market continued its comeback from a long downturn, which was good news for those of us who are counting on investments to buy and enjoy those retirement homes, RVs, boats, travel, and whatever else retired folks look forward to. There was no Santa Claus rally, but no Santa Claus fizzle, either.

Sandians – those retiring and those working on – learned that our pension funds are in pretty good shape, especially compared to those of some other fellow Americans whose funds aren't. That was the sugar coating for the less-tasty news that benefits costs for all of us – working and retired – are going up this year.

Global warming concerns continued, with predictions that ocean levels will rise. Bad news for those of us who want to retire to beachfront homes, but maybe a good reason to keep working: Albuquerque is 5,314 feet above sea level (current sea level, that is) and Livermore is high and dry at 397 feet. You might want to reconsider that request for a move to Kauai, though.

If you commute to Albuquerque from Belen or Los Lunas or Bernalillo or Placitas, you may sometime this year be able to avoid the morning/afternoon NASCAR training ground formally known as I-25. The RailRunner was expected to begin running along its first leg – Belen to/from Bernalillo – by sometime in the spring, but at year's end that timeframe seemed to slip some. Feeder lines to get you closer to Kirtland AFB won't be in place for a while yet, but there'll be some way to shuttle you to the base and at least you'll be able to avoid the I-25 mayhem.

* * *

With all the new building going on at the New Mexico site, Irene Dubicka (5925) asked recently about the old buildings – specifically which are the 10 oldest. She said she was told Bldg. 868 is the second oldest and wondered if 892 is the oldest. "If not, what is?" she asked.

How about the oldest 10 buildings and their rank in seniority? Anybody know?

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



Mark Lee named fellow of American Physical Society

Citation notes experiments in materials physics

Mark Lee, who came to Sandia from Bell Labs in 2003, has been named a fellow of the American Physical Society (APS). Mark was nominated by the Division of Condensed Matter Physics. Election to fellowship in APS is limited to no more than one half of one percent of the membership.

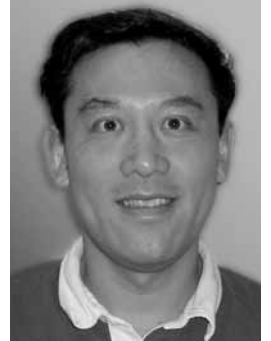
The citation on Mark's fellowship certificate, to be presented at the annual meeting of the Condensed Matter Physics Division, will read: "For experiments advancing the understanding of electron correlation and electrodynamic response in oxide superconductors, ferromagnets, Coulomb glasses, and nonlinear optical polymers."

Mark, a member of Semiconductor Material and Device Sciences Dept. 1123, is currently leading a research program focused on measuring and understanding the electromagnetic properties of novel materials, devices, and nanostructures from microwave through terahertz frequencies.

Mark earned an AB in physics from Harvard, an MS in applied physics from Harvard, and a PhD in applied physics from Stanford.

In addition to his work at Bell Labs, he served on the physics faculty at the University of Virginia.

For his research on high-frequency properties of superconductors and quantum properties of semiconductors, Mark has received a National Science Foundation Career Award and a Cottrell Scholars Award from the Research Corporation. He is vice-chair of APS's Forum on Industrial and Applied Physics.



MARK LEE

Recent Patents

Darryl Sasaki (8331): Self-Assembled Lipid Bilayer Materials.

Frank Horine (2552) and Forrest James (2431): Measuring in situ MDF Velocity of Detonation.

Dwight Jennison (1114): Method of Making Maximally Dispersed Heterogeneous Catalysts.

Ann Bouchard (1128) and Gordon Osbourn (1001): Method for Self-Organizing Software.

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Employee death

Blase Gaudé (5622), who had been at Sandia nearly 19 years and worked in technical programs and project management and planning in the Embedded Systems Engineering group, died Jan. 1. He was 44.



BLASE GAUDE

Retiree deaths

Charles N. Allen (age 81) August 2
Fermin Vallejos (94) August 2
Davis S. Tarbox (84) August 3
Robert W. Gray (78) August 3
Melvin M. Newsom (73) August 6
Lloyd A. Kelton (78) October 6
M. Hugh Martin (90) October 23
Onella R. Allen (80) November 6
Walter J. Dickenman (62) November 7
Thomas S. Oglesby (70) November 8
Hubert G. Fifer (76) November 11
Allie B. Whitmore (95) November 12
George W. Buddrius (87) November 13
Olden L. Burchett (71) November 16
Thomas D. Dragoo (74) November 19
Adela Bowen (89) November 27
Harold E. Houts (85) November 28
Robert E. Treharn (84) November 29
Frances V. Stohl (60) November 30

Nobel laureate Steven Chu explores the interface of biology and physics in Truman lecture

By Nancy Garcia

Lawrence Berkeley National Laboratory Director Steven Chu chose three disparate subjects to discuss the connections between biology and physics in his Truman Distinguished Lecture at Sandia/California in December. Trained in physics, he joined LBNL last year after serving on the faculty at Stanford University, and holds a joint appointment as professor of physics and molecular and cellular biology at the University of California, Berkeley.

9th-grade biology?

"The last time I took a biology course was in ninth grade," Chu quipped.

He first discussed research he began at Bell Labs in the 1980s to hold and move atoms at will with a laser beam — which led to the 1997 Nobel Prize in physics he shared with William Phillips and Claude Cohen-Tannoudji. By 1989, researchers in his Stanford laboratory were attaching polystyrene spheres to the ends of DNA strands to make "handles" for manipulating it. "The types of experiments you can do are brain-dead stupid," he said, showing slides of the polymer stretching and relaxing like a rubber band. "It turned out to be a new approach in studying polymer dynamics."

From *Science* to *Nature*

The work was significant enough that from 1993-99 the group averaged a paper a year in the prestigious journal *Science*, and when the referees complained, the researchers submitted results instead to its competitor, *Nature*. To develop a more accurate picture of molecular dynamics, the group began working with individual molecules. "It's incredible the mindset you get [when you believe] that the average is the truth," Chu said.

One focus has been to understand the enzy-

matic behavior of RNA, which has functions in building proteins as well as encoding and transferring genetic information.

Hairpin ribozymes are of interest because variants might be created to disarm harmful retroviruses like HIV or polio. Through a combination of thermal fluctuations and friction, the enzyme snips the strong covalent backbone of



LAWRENCE BERKELEY National Laboratory Director Steven Chu speaks at Sandia's Truman Distinguished Lecture in Livermore. (Photo by Bud Pelletier)

RNA without consuming energy.

Meanwhile, when constructing polypeptide strings of amino acids, RNA-rich ribosomes (which act as a sort of vise for cellular protein manufacturing) and amino-acid shuttles (called transfer RNA, or tRNA) are so accurate they insert the wrong amino acid only once in 10,000 times.

Looking for the physics behind this marvel, Chu said that again friction and thermal motion seem key rather than a force such as the binding energy between nucleotide base pairs. (As the code-bearing messenger RNA enters the ribosome to be translated into protein, three of its bases match up momentarily via hydrogen bonding to a corresponding sequence at the foot of the tRNA.

The tRNA is shaped like an upside down capital L and fits momentarily inside a channel in the ribosome, which looks roughly like two donuts stacked on top of each other.)

The dynamics appear to involve a squeeze by the ribosome that induces a fit, leading to an energy-dependent bond formation between the new amino acid and the end of the polypeptide chain, then a shift back in the position of the tRNA that is conjectured to be a proofreading stage.

"Nature seems to be much more clever than ever expected," Chu said.

Let's hear it for physics and biology

Another example of the interface between biology and physics is the physiology of hearing, subject of a 1961 Nobel Prize that Georg von Békésy received for showing that the inner ear senses different frequencies in different locations within the spiraled cochlea. "You're essentially doing a Fourier transform," Chu remarked.

Better than any artificial instrument, our ears' sensitivity spans 12 orders of magnitude partially because they have an "automatic gain control." The vibration-sensitive motion of clumps of bristles that coat the interior can be modulated via exquisitely tuned control of cellular calcium uptake. "The biology of molecular systems is beginning to be reduced to chemistry and physics," Chu noted.

Chu ended with a well-received discussion of energy issues. He had recently given a talk in Beijing on "Optimizing Clean and Efficient Energy Technologies Through Tax and Fiscal Policy," followed by former President George H. W. Bush and Gov. Arnold Schwarzenegger.

In his view, the downside of a free-market economy is that it does not take into account externalities, such as pollution and climate change, or policies concerning such issues as international fishing.

Against this backdrop, the US has been operating under an outlook that he said the State Department has termed the Carter doctrine, the conviction that "we have to guarantee access to oil."

National security = energy security

Usage is increasing while reserves are finite. An approach to ensuring access could involve using the military, he noted, saying that China has spent billions to modernize its army. "National security is now intimately tied to energy security, which is tied to economic prosperity," Chu said. That is also linked to effects upon the environment, such as the importance of minimizing the release of carbon.

The answer is two-fold, to conserve on the one hand while developing new sources of clean energy on the other. Chu said the head of one of the country's largest energy companies in the Midwest wanted to invest in wind power, which would boost the cost to consumers by 1 cent per kilowatt hour, and was turned down by regulators who believed they were advocating for consumers. "There's got to be a sea change on the part of the American public," he observed.

One answer might be to grow cellulose-rich plants, perhaps modified to be self-fertilizing and weed-resistant. This envisioned "super weed" might be used to produce methanol either from processing biomass or directly from sunlight itself, Chu said.

At the Berkeley lab, researcher Jay Keasling has been growing an antimalarial drug produced by a rare plant through bacterial fermentation, thus providing through synthetic biology an alternative to quinine (for which most malarial forms have developed resistance) at just 20 cents a treatment.

"I'm hopeful we and other labs can play a role in making a targeted contribution to sustainable energy," Chu concluded. "In the last 10 years I've become very interested in energy."

Sandia California News

Check out the new California Site webpage

Sandia/California's new website offers a fresh, clean look and easy access to key programs and services. One cool feature is a real-time ticker of the number of days since the last security infraction and the number of hours since the last days-away case. The url for the page is: <http://www.ran.sandia.gov>

Sandia signs energy CRADA with Sharp Corporation

Agreement focuses on renewable and alternative energy technologies

By Michael Padilla

Sandia and Sharp Corporation have signed a Cooperative Research and Development Agreement (CRADA) to work together in research and development of renewable and alternative energy technologies.

Jeff Nelson (6218), manager of the CRADA, says the agreement is one of Sharp's first interactions with a US laboratory.

Jeff says Sandia brings novel membrane and catalyst capabilities to the fuel cell project while Sharp brings extensive system and application-level experience.

"Our hope is that we're successful and that success could expand our collaboration into solar photovoltaics and other areas," he says.

The broader partnership between Sandia and Sharp will focus on energy technologies, specifically photovoltaics and fuel cells. It will involve research and development of Sharp's solar photovoltaic technologies, including tests and improvements on reliability, durability, calibration of solar modules, inverters, and other advanced applications.

Sharp is the largest producer of solar photovoltaic modules in the world.

Chris Cornelius (6245), principal investigator for the CRADA, says Sandia will work with Sharp on the development of technologies for direct methanol fuel cells.

"Our research team and Sharp Corporation will bring together our materials and engineering skills to develop technologies that will impact methanol-based fuel cells," Chris says.

"Sandia can apply its extensive materials capabilities to help Sharp bring

new products to the market, and Sharp with its extensive electronics and manufacturing expertise will assure the development of commercial mobile power technology that is important for many applications, including portable power and distributed sensor networks," Jeff says.

Sandia's immediate focus is on portable power applications, such as the use of direct methanol fuel cells to power consumer electronics like laptops, cell phones, and PDAs.

Sharp has asked Sandia to fabricate fuel cells using Sandia's proprietary membranes and catalysts. Members of Depts. 6245, 1823, and 1815, along with researcher Akimasa Umemoto from Sharp, have begun designing the materials and membrane electrode assemblies for Sharp's specific application target. They will fabricate and test the fuel cells during the 12- to 18-month project under conditions relevant for Sharp's applications.

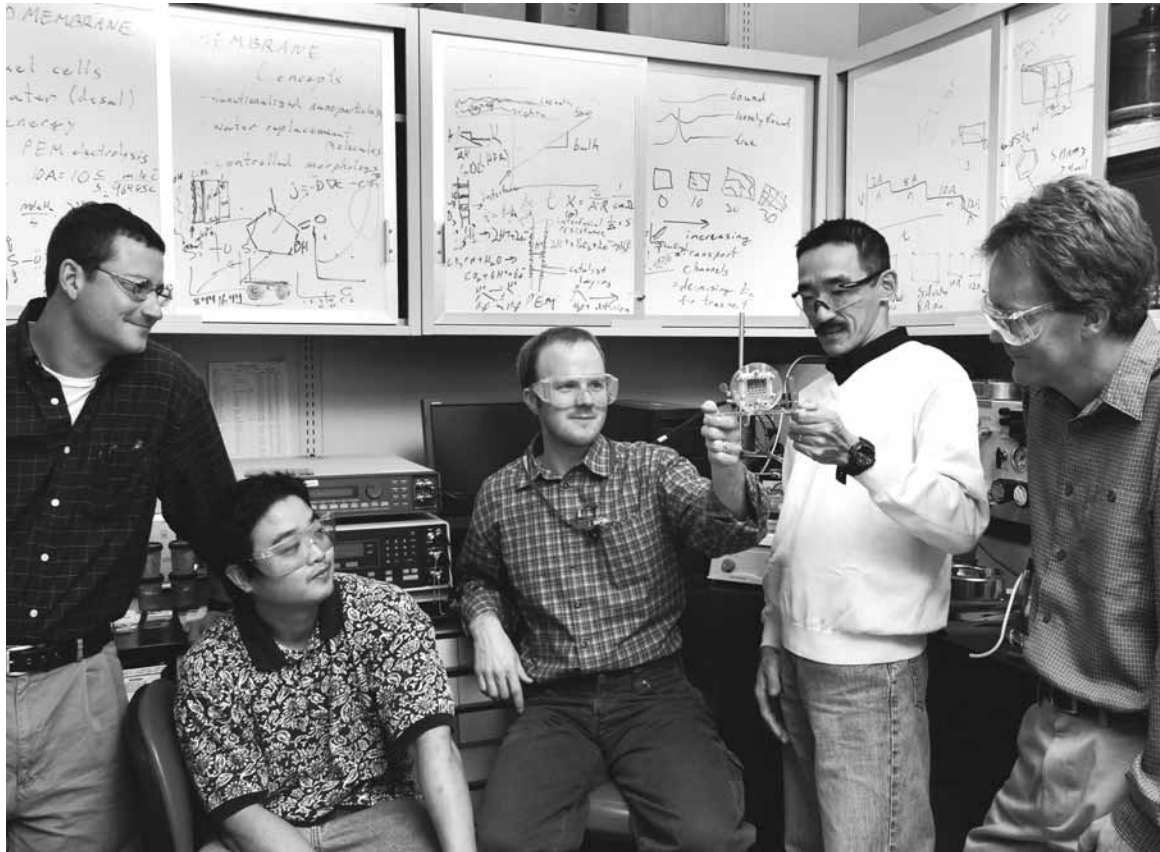
The Sandia research team members for this project are Cy Fujimoto, Mike Hickner (both 6245), Bill Steen (1823), Eric Coker (1815), and Chris Apbeltt (1723).

Jeff acknowledged the assistance of Sandia's technology transfer group in

developing the CRADA, including Gary Jones, Vic Weiss, and Sherry Anderson.

"Gary and his team were instrumental in helping us navigate through many of the challenging issues associated with putting together a CRADA with a non-US company," Jeff says.

The arrangement was brokered by the New Mexico Economic Development Department following Gov. Bill Richardson's meeting with Sharp's executives in Tokyo.



SHARP MINDS — Sandia/Sharp CRADA fuel cell team members, from left, include Bill Steen (1823), Cy Fujimoto, Mike Hickner (both 6245), Sharp researcher Akimasa Umemoto, and Eric Coker (1815). (Photo by Randy Montoya)

Lithium-ion

(Continued from page 1)

vehicles a reality.

Dept. 2521's FreedomCAR work centers on the areas of battery abuse tolerance and accelerated lifetime prediction, with abuse tolerance receiving most of the focus.

"We want to develop a battery that has a

"Fixing the problem will come from informed choices on improved cell materials, additives, and cell design, as well as good engineering practices."

graceful failure — meaning that if it's damaged, it won't cause other problems," Dan says. "We have to understand how batteries fail and why they fail."

Understanding abuse

The technical goal is to comprehend mechanisms that lead to poor abuse tolerance, including heat- and gas-generating reactions. Understanding the chemical response to abuse can point the way to better battery materials. But, Dan says, there is no "magic bullet" for completely stable lithium-ion cells.

"Fixing the problem will come from informed choices on improved cell materials, additives, and cell design, as well as good engi-



POWER TO THE PEOPLE — Brad Hance (2521) examines a lithium-ion battery that may someday be put in a hybrid car. (Photo by Randy Montoya)

neering practices."

Work in abuse tolerance is beginning to shed light on mechanisms that control cell response, including effects of the anode and cathode, elec-

trolyte breakdown, and battery additives.

The other area of work, accelerated life test, involves developing a method to predict lithium-ion battery life.

Empirical and mechanistic

"We have two approaches in our research — the empirical model and the mechanistic model," Dan says. "The empirical model generates life prediction from accelerated degradation test data, while the mechanistic model relates life prediction to changes in battery materials. Our approach provides an independent measure of battery life so we don't have to rely on what battery manufacturers tell us."

Improved abuse test procedures developed at Sandia have led to lithium-ion test standards that the battery team has developed and recently published in a Sandia research report (SAND2005-3123). Dan anticipates that the Society of Automotive Engineers will soon adopt these test procedures as national standards, just as they adopted in 1999 (SAE J2464) the abuse test procedures that Sandia developed for Electric Vehicle batteries (SAND99-0497).

"There has been substantial progress in making batteries more tolerant to abusive conditions," Dan says. "It won't be long before these batteries will be used in gasoline-electric hybrid vehicles. And the great thing is this technology will be able to transfer over to the electric-hydrogen fuel cell powered hybrid vehicles of the future."

Battery team members

Dan Doughty, J. Anthony (Tony) Romero, Brad Hance, Pete Roth, Dave Johnson, Lori Davis, Jill Langendorf, and Herb Case (all 2521)

NNSA report card

(Continued from page 1)

behind its mission score. That is also consistent with the historical record: the FY05 rating was 83 percent, which, as John notes, was not quite high enough to boost the overall grade from B+ to A.

John notes that, while NNSA's report cited some areas where Sandia's management systems need improvement, it also noted that the Labs, late in the fiscal year, began to make notable strides in many of those areas. In particular, we have increased our emphasis on operational safety and security, and we will continue this thrust.

John cited the NNSA report's executive summary:

"In many ways, FY05 was a transition period for Sandia. Conduct of mission-related technical activities, defense programs, and science and technology programs is outstanding. Performance in operational areas, however, was mixed.

"Near the beginning of the fourth quarter of FY05, Sandia executed an organizational structure change, shifting responsibilities for most of [the Labs'] senior executives. Improvements have been noted in the following areas: increased management involvement in operation issues; increased management expectations for excellence in both mission and operational performance; and an increase in management-initiated actions to improve operations."

Clearly, John says, NNSA took note of the efforts that Sandia has initiated over the past few months to address operational issues.

As the NNSA executive summary noted, however, "The change [in management responsibilities and responses] came too late in the year to accomplish all the commitments made at the beginning of the FY05."

"These words from NNSA are, I think, a message of hope," says John. "Our people — at all levels, from members of the workforce, managers, directors, and vice presidents — really did a lot of work and it has been noted and is appreciated. Their efforts, which NNSA recognized, put us on a good path for FY06."

The fact that Sandia did not attain the 90-percent overall outstanding rating means that

To all Sandians:

Improving our results for FY06 and beyond

A little over two years ago, Sandia signed a new management and operating contract intended to serve as a model for the nuclear weapons complex. This contract and its annual evaluation of performance are central to our relationship with our customers at NNSA and DOE. In my view, the contract is consistent with our goal of becoming a world-class science and engineering laboratory and an institution managed with excellence. For fiscal year 2005, Sandia received a "good" report card that cited "outstanding" mission work, but noted room for improvement in operations. We have every reason to be proud of our work last year. We have even more reason to take the results of our evaluation, learn from them, and renew our quest for excellence.

As Sandia seeks to transform itself for the future, there will be many challenges. Meeting our customer's requirements for an "outstanding" rating in operations is only one of them, but it is an important challenge and we are up to the task. This fiscal year, it became apparent we had to significantly improve our operational performance, so we immediately launched aggressive efforts in both operations and mission. The DOE acknowledged that we made significant progress, but we simply ran out of time. In the mission area, while we were rated outstanding, our evaluation of ourselves was actually higher than that

of the DOE, so we are now exploring these differences of view to better understand them.

I want to acknowledge all those who worked so hard to meet the conditions of the contract. I also want to personally recognize the efforts and accomplishments of the management and staff who, in my view, achieved some truly remarkable results. For all the men and women who worked so hard, I applaud you and all that you achieved. We asked a lot of everyone this year, and I was genuinely impressed with the commitment and progress made by those who dedicated themselves to making tangible and significant improvements in so many areas of both mission and operations.

We will now move forward, and as we do, it is important that each of us engage our customers and examine the report card to extract all the learning and understanding we can, with the goal of strengthening our performance and improving our results for fiscal year 2006 and beyond.

My own confidence is, as always, derived from the potential shown by the excellent men and women who work at Sandia. I want to thank each of you for your splendid efforts this year and for demonstrating again and again that my confidence is well placed.

Tom Hunter
Labs President and Director

Lockheed Martin did not qualify this year for consideration of a one-year contract extension.

Last year, in the first year under the new contract, Sandia earned an outstanding rating and Lockheed Martin received a one-year contract extension. Under the terms of the M&O contract, in each of the five years of the contract term, Lockheed Martin can qualify for a contract extension if Sandia scores an outstanding rating and if it receives "pass" marks on certain award-term incentives.

However, John adds, the scores earned on the annual report card are not about contract extensions or contractor incentives.

"The emphasis isn't that we're trying to get a score; we expect that good performance will be rewarded, of course, but we're here to carry out our mission for the nation.

"This is about how well we perform our mission and how well we assure the performance of that mission through how well we operate.

"And this is important to understand: Our job isn't to just happen to achieve mission success; it's to assure mission success. One of the ways we assure mission success is through the quality of the operations that underpin all the activities necessary to attain it."

DOJ and US attorneys' reps tour Sandia Center for SCADA Security



JASON HILLS (5612) demonstrates a cyber attack against a SCADA system during a tour of Sandia's Center for SCADA Security by participants of the Computer Hacking and Intellectual Property Coordinators' conference last month in Albuquerque. Assisting Jason in the demo (back to camera) is Jonathan Margulies (5616). (Photo by Randy Montoya)

Representatives from the US Department of Justice and US Attorneys' offices from around the country got a tour of Sandia's Center for SCADA (Supervisory Control and Data Acquisition) Security last month when they were in Albuquerque for the annual Computer Hacking and Intellectual Property Coordinators' conference, hosted by Sandia.

The conference, held Dec. 5-9, was sponsored by the Justice Department's Office of Legal Education and Computer Crime and Intellectual Property Section (CCIPS). (More info at <http://www.cybercrime.gov>.)

Some 180 conference-goers obtained tools and tips about how to better prosecute computer hackers, people who steal intellectual property, and those involved in terrorism.

Dec. 8 was "Sandia day" at the conference. Labs experts provided information to attendees based on Sandia's work in cyber security. Sandia also teamed with local representatives of the FBI and the US Attorney's Office to

demonstrate how the three agencies can work together to solve cyber crime.

Some of the conference was classified, and all of it required prior authorization to attend. The Dec. 8 afternoon session featured a tour of Sandia's Center for SCADA Security (see <http://www.sandia.gov/scada>). SCADA systems control computerized operations of the nation's critical infrastructures, including the electric power grid, oil and gas pipelines, and water treatment and distribution systems.

"We were pleased to have this conference at Sandia," says Michael Skroch (5612), manager of a Sandia department that runs red teams that probe US systems in order to understand their vulnerabilities and improve their defenses. "Sandia has a vast amount of knowledge and experience in the area of cyber security. We want to leverage this capability to assist other government agencies, such as DOJ's CCIPS, in protecting our national security and the integrity of our critical infrastructures." — *Chris Burroughs*

55 Sandians move into Distinguished, Senior ranks

Divisions announce DMTS, DMLS, DTNG, DASA, Sr. Scientist/Engineer appointments

Sandia's special appointments represent employees from all areas of the Labs' operations: Senior Scientist/Engineers, Distinguished Members of Technical Staff, Distinguished Members of Laboratory Staff, Distinguished Technologists, and Distinguished Administrative Staff Associates. Fifty-five sandians were honored with special appointments in 2005.

According to Corporate Process requirement documents, "Placement in the Distinguished Level signifies a promotion to the highest level of the Technical Staff, Laboratory Staff, Technologist, or Administrative Staff Associate Ladder. This level is different from the other levels in that it is subject to a 10 percent population limitation to preserve the distinction of the level."

Traditionally, one of the Labs' key "total rewards" incentives has been the quality of the folks who work here. Being able to offer prospective employees the opportunity to work with the most highly regarded people in their fields is a powerful recruiting tool. The individuals pictured

here represent the world-class quality of the Labs workforce at its best.

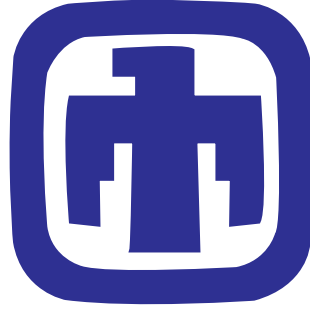
Appointments offer alternative career paths

Employees selected for the new levels have been recognized with a special plaque and a nonbase salary award, in addition to this special mention in the *Lab News*.

The Distinguished and Senior levels are part and parcel of the Integrated Job Structure (IJS) goal of providing multiple career paths for employees. The IJS's dual-track structure — management and staff — makes it possible for employees to advance in salary, prestige, and recognition without following a management track.

As has been its tradition for many years, the *Lab News* presents photographs of Sandians who have received special appointments this year.

Not pictured: David Clifford (5524) DMTS; Gary Denison (5133) DTNG



	Nature of Work and Technical Expertise	Exercise Discretion/ Direction Received	Creativity	Responsibility for External Contacts	Sphere of Influence/Potential Impact on Organizations
Distinguished Member of Technical Staff (DMTS)	Utilizes advanced concepts spanning several specialized disciplines or comprehensive knowledge of one field. Conducts innovative engineering studies or scientific research. Advice is sought throughout the company; is recognized as an expert in professional field.	Work is conducted under consultative direction rather than by formal review.	Expected to develop new methods/ processes as a result of identifying new perspectives and approaches in solving complex problems.	Is the program, project, or subject Principal Investigator with the sponsor/customer? As appropriate, expected to serve on committees of technical societies.	Leads or changes a knowledge area through developing new concepts, redirecting an approach, or redefining customer requirements that impact organizational operations or directions.



DMTS — Distinguished Member of Technical Staff
DMLS — Distinguished Member of Laboratory Staff
DASA — Distinguished Administrative Staff Associate

DTNG — Distinguished Technologist
Sr. Sci/Eng — Senior Scientist/Engineer



Photos by Bill Doty



Gilbert Aldaz (10827)
DMTS



James Allen (1769)
DMTS



David Bailey (10821)
DMTS



Suzette Beck (2029)
DMLS



Betty Biringner (0301)
DMTS



Dianna Blair (6926)
DMTS



Craig Boney (5712)
DTNG



Pat Brady (6118)
Sr. Sci/Eng



Brian Bray (5433)
DMTS



Walter Caldwell (5923)
DMTS



Milton Clauser (4326)
DMTS



Evangeline Clemena (1056)
DASA



Mary Crawford (1123)
DMTS



Michael Cuneo (1673)
DMTS



David Cunningham (5050)
DMLS



James Dotson (10864)
DTNG



Ireena Erteza (5937)
DMTS



Elaine Evans (2913)
DMTS

55 Sandians move into Distinguished, Senior ranks

Divisions announce DMTS, DMLS, DTNG, DASA, Sr. Scientist/Engineer appointments



Jeffrey Everett (12300)
Sr. Sci/Eng



Dave Foral (5415)
DMTS



Chris Forsythe (6641)
DMTS



Regina Gerchow (10501)
DMLS



Anthony Gomez (1525)
DTNG



Rick Heintzleman (5353)
DMTS



Dennis Helmich (2123)
DMTS



Roy Hogan Jr. (1516)
DMTS



Patrick Knight (6422)
DTNG



William Kolb (10854)
DMTS



Kevin Linker (6418)
Sr. Sci/Eng.



Tim Madden (3552)
DMLS



Sean McKenna (6115)
DMTS



Linda McNeil (10104)
DASA



Fred Mendenhall (5932)
DMTS



Diane Nakos (3011)
DMLS



Stephanie Oborny (10312)
DASA



William Peters (10241)
DMLS



DMTS — Distinguished Member of Technical Staff
DMLS — Distinguished Member of Laboratory Staff
DASA — Distinguished Administrative Staff Associate

DTNG — Distinguished Technologist
Sr. Sci/Eng — Senior Scientist/Engineer



Kenneth Peterson (2452)
DMTS



Gary Pressly (2722)
DMTS



Mark Rule (2712)
DMLS



Patti Sanchez (1905)
DMLS



Brian Schwaner (5923)
DTNG



Katherine Simonson (5531)
DMTS



Michael Sinclair (1824)
DMTS



Mike Skaggs (2554)
DMTS



George Sloan (5345)
DMTS



David Stokebrand (5416)
DMTS



Danny Thomas (2132)
DMTS



James Tomkins (1420)
Sr. Sci/Eng



Timothy Trucano (1411)
Sr. Sci/Eng



G. Bruce Varnado (6441)
DMTS



Mial Warren (5624)
DMTS



Steve Webb (6141)
DMTS



Larry Zamora (6451)
DTNG

Labs increases investment in safety of Sandians by \$22 million

By Iris Aboytes

How important is the safety of Sandians? Very: \$22 million dollars has been added to this year's Environment, Safety, & Health budget.

"We prioritized ES&H over other activities," says Joe Polito (10700). "It shows a tremendous commitment by management to workforce safety. This funding commitment will bring Sandia in line with other sites in the DOE complex and provides resources to close gaps in our current program. We want Sandians and their families to be confident that their loved ones return home safe."

A recent DuPont Survey described Sandia's safety culture as "immature." On a scale of 1-5, Sandia scored 2.5. "Sandians are clearly trying," says Jaime Moya (10330). "Of the recent survey sent to Sandians, 70 percent participated. Clearly Sandians are trying to do the right thing. I believe Sandians realize they are part of the solution."

Some of the \$22 million will go into emergency management, where Sandia has had out-of-compliance issues throughout the last decade. Internal and external audits have shown more staffing is needed. Critical jobs are one person deep, and many jobs are staffed by part-time contractors. This area is being reorganized, and more Sandians will staff critical positions.

Additional funding for Sandia's Industrial Hygiene (IH) and Safety Engineering (SE) pro-

grams is being used to significantly enhance IH support to the line organizations, particularly in job-hazards analysis. The money will also be used to revise IH and SE program documentation and IH/SE tools used by both safety professionals and line customers. The funding will also be part of the Labs-wide effort to prepare for the DOE implementation of a new worker health and safety law. The law, very similar to the requirements already in place for DOE nuclear facilities, requires OSHA-like compliance activities and allows for potential fines for noncompliance throughout DOE.

"Sandia's dedication to service in the national interest cannot happen without a strong ES&H program," says Phil Newman, Director of ES&H and Emergency Management Center 10300. "Everyone needs to foster a conscious awareness of safety." According to Phil, the increase in the ES&H budget will enable Sandians to have the necessary tools and training to ensure both employee safety and mission success.

"Sandia management is determined to do what it takes for Sandia to be the safest place for employees to work — 'Best-in-Class' in the DOE laboratory complex," says VP Frank Figueroa. "Sandia is consistently the laboratory the nation comes to for help. We already know Sandians are the best and brightest. We are working to make sure they are also the safest."

Meet ES&H Director Phil Newman

Phil Newman is Sandia's new Director of ES&H and Emergency Management Center 10300. Phil's previous job was Global Manager of Industrial Hygiene at GE Advanced Materials.



PHIL NEWMAN

The challenge of enabling Sandia to become a safer place to work keeps him energized.

Phil hopes to roll out this month what he calls a "path forward," which will supplement and add rigor to the already established Best-in-Class plan.

"It is hard to work to be world-class from a programmatic perspective when you don't have world-class safety programs led by the line," says Phil. "Fluke accidents may be an ever-present issue, but with knowledge and conscious awareness we hope to minimize them."

Retirees . . .

Your story is Sandia's story; tell it to the History Program

The history of Sandia is the history of the thousands of individuals, who, over the course of the past almost 60 years, have called themselves Sandians. The knowledge they hold, the stories they could tell, would add flesh and blood to the "official" histories of the Labs, which have focused largely on corporate and programmatic issues.

Sandia as an institution has long realized the benefits of documenting its history. The first organizational history dates from 1960 and was written by Kimball Prince, Sandia's general attorney at the time. His first-generation recounting of the Sandia story did not incorporate much of the "personal history" of individual Sandians who had worked at the labs up to that time and put a stamp on Sandia culture that prevails to this day.

Personalizing Sandia history

To address that historical oversight, the Sandia Corporate Archives and History Program, led by corporate historian Rebecca Ullrich (4532), is initiating a new effort to look at the specific contributions and recollections of individual Sandians. Retirees (and near-retirees) are invited to participate.

Called the Personal History Project, this endeavor will gather individual memoirs from anyone who wants to share a memorable Sandia experience. The initial focus will be on retirees and near-retirees.

"If you have a memoir that you would be willing to share with the program or if you would like to have the History Program help you to generate one, give me a call," Rebecca says.

Rebecca's phone number is 844-1483 and her e-mail address is raulri@sandia.gov. Or you can contact corporate archivist Myra O'Conna at 844-6315; e-mail mlocann@sandia.gov.

"This might also serve as the perfect opportunity for you to clean out the garage or closet and donate Sandia materials of historical interest to our corporate archives for safekeeping and preservation — Myra and her staff *do* make house calls," says Rebecca.

"Please help us preserve this unique part of Sandia's heritage by becoming a participant in the Personal History Project."

EVMS team wins Lockheed Martin NOVA award



THE CERTIFIED EARNED VALUE MANAGEMENT SYSTEM TEAM, a recipient of a 2005 Employee Recognition Award, was also selected as a 2005 Lockheed Martin NOVA Award winner. The NOVA awards honor excellence across the Lockheed Martin corporation in several categories. A second Sandia team, involved in the W80-3 program, was previously announced as a NOVA winner. Members of the EVMS team include: Dianne Cannon, Don Losi, Michael Kupay, Jenny Dubbs, Marlene Hyde, Jennifer Medina, Walter Heimer, Sam Rogers, Lynne Schluter, Paul Schlavin, Steven Fattor, Bruce Mercer, Walter Berkey, Donald Cook, Frank Figueroa, Jennifer King Girand, Roke Muna, Howard Royer, Tim Sisley, and David Treacy (not all in photo). The NOVA citation states: "For developing a Certified Earned Value Management System — the very first in the DOE complex — for line item construction projects that cost more than \$20 million."

Essays in science and engineering net five high school students \$2,000 US Savings Bonds

Five high school students have been awarded \$2,000 US Savings Bonds in the third annual "The Write Thing to Do" Scholastic essay competition. The competition, open to all students in Albuquerque and surrounding area high schools, was sponsored by Sandia and Lockheed Martin.

The competition was created to encourage students in grades 10 through 12 to pursue careers in science, engineering, and mathematics and to foster excellence in those fields.

Students were required to write 500-word essays in one of these areas: hydroponics, optical fibers, photoelectrical effect, Brownian motion, special relativity, or the search for extraterrestrial intelligence (SETI) project.

Twenty essays were received from students in seven different high schools. Each school was permitted to submit five. Bonds were awarded to: Rosendo DeHaven, West Mesa High School; Joel

Hartenberger, and Jim Murphy, both Sandia High School; Kaycee Schleich and Arthur Weagel, both Cibola High School

"The students had a difficult task," says Len Duda (5733), one of the contest judges.

"They were required to compose an essay answering a science-related question in less than 500 words. That's harder than it sounds, but the winners were up to the assignment. Their remarkably well-written essays exhibited a clear understanding of the scientific topic in their selected questions. This competition emphasized that it is important to write well in science and engineering, and these students succeeded in that goal."

In addition to Len, the judges were: Donald Pile (2521), Leslie Simmons (1525), Norb Tencza (3652), and R. A. Williams (5724).

— Iris Aboytes

BP Chief Scientist: The end (of oil) is not near ...but global warming is a serious concern, says Steve Koonin

By Will Keener

The Stone Age didn't end for lack of stones and the Petroleum Age isn't likely to end for lack of petroleum. That was the message of Steve Koonin, chief scientist for BP, plc, speaking to a nearly full house at Sandia's Steve Schiff Auditorium in December.

"We are not running out of oil any time soon," he said.

His talk, the final one in a series of distinguished lecturers for 2005 presented by the Geosciences and Environment Center, was carried live on streaming video to another 1,100 Sandians.

Koonin, who earned his doctorate at MIT and served as provost at Caltech until moving to BP in 2004, alluded jokingly to an earlier talk at Sandia/California's Combustion Research Facility (*Lab News*, Dec. 9, page 3.) At that talk, Paul Roberts, author of *The End of Oil*, gave his perspective on the future. Although Roberts' message that a new revolution in energy is beginning seems opposite of Koonin's, in fact the two speakers agreed on much of what lies ahead.

Signing on with one of the largest multinational

energy companies in the world, Koonin was assigned the job of mapping a long-range technology strategy for BP (formerly British Petroleum). He took about a year to look at mounds of data, establish limiting factors that impact technology development, and predict the energy mix of the future. He identified population growth, supply security and challenges, and environmental constraints as the key factors affecting technology.

A physicist by training, Koonin cites a number of reasons for expecting petroleum's continued dominance of the energy market, including substantial petroleum reserves and the "energy density" of petroleum.

Hydrocarbon dominance

Added to 41 years of known oil reserves and 67 years of gas reserves are other petroleum fuel forms extending the reach of the oil era. An additional 200 years of coal reserves allow for even more far-reaching possibilities. Incremental price increases will allow industry to convert heavy oils, biofuels, and gas-to-liquid products to extend the hydrocarbon dominance.

"If we choose to do it, we can double vehicle efficiency with technologies like homogeneous charged compression ignition and diesel. Fifty percent of new cars in Europe are diesel," he said. "If you include enhanced oil recovery, super deep reserves, tar sands, and oil shale you can extend the petroleum use curve....It depends on what you call oil."

On the subject of petroleum's high energy density, Koonin told the audience, "An amazing number for me is that with your average fill-up of gasoline, you're wielding about 15 megawatts of power. That's a tremendous number, carrying that kind of power in a small space."

Koonin focused much of his talk on the environmental consequences of his predictions for the future energy mix. While local pollution "is a solvable problem," his view of global warming was less positive. There's a growing body of anecdotal and scientific evidence that "it's getting warmer," he said. "There's a plausible connection of increases of CO₂ with these temperature



STEVE KOONIN

"We are not running out of oil anytime soon."

increases." Although there are complicating factors, there is a strengthening scientific case, he said. "It's over 50 percent but not 90 percent right now."

Tough problem to fix

"My own bottom line, and BP's as well, is that it is extraordinarily unwise to be putting this much CO₂ into the atmosphere and that the world should do something about it." Limited absorption rates for CO₂ in the environment, the fact that global warming is less visible than other hazards, and the mismatch of CO₂ scales between human activity and life-cycle times in the environment all make it a tough problem to fix, Koonin said.

Growing energy demands also mean that, "We would need to halve the current value of emissions to stabilize the CO₂ levels because we are doubling energy use over the same time. He suggested a CO₂ rate of 550 per million (twice the pre-industrial level) is workable. It would take about 45 years to stabilize the concentration. "CO₂ emissions and concentrations are going to rise unless the world does something dramatically different."

Koonin noted several transport technologies, including hybridization of vehicles, and light-weighting of vehicles, hydrogen, and biofuels as options for the future. But transport is only about 20 percent of emissions, he noted. For stationary energy sources, he suggested that solar, hydrogen, nuclear, and wind offer potential.

For fighting global warming, Koonin said his personal choices would be carbon sequestration efforts and nuclear power. "BP is practicing carbon sequestration at the Salah gas field in southern Algeria," he said. Engineers are re-injecting CO₂ into the ground and monitoring to see what happens to it, where it will migrate, and "will it stay down there?" He estimates costs may be 30-40 percent higher than venting CO₂ to the atmosphere.

Nuclear energy growth will be fixed and probably growing fractionally, he said. "Nuclear and carbon sequestration are necessary to stabilize the climate. For CO₂ there are two technologies necessary to have a meaningful impact on emissions: Nuclear and carbon sequestration. Without those two I don't think the world has a prayer."

Why are we doing hydrogen?

Steve Koonin, BP chief scientist, AAAS and APS Fellow, and holder of the DOE's E.O. Lawrence Award, praised a number of Sandia's energy efforts during his Dec. 15 talk at Sandia/New Mexico.

He gave shorter shrift to the concept of a hydrogen economy. "Hydrogen in vehicles is much discussed in the US and at DOE but it is a long way off, if it is there at all," he said. Currently there are no production methods that satisfy economy, security, and low CO₂ emissions requirements. Also, well-known barriers exist to distribution infrastructure and onboard fuel.

"At the same time, there are plausible evolutions of existing technologies to achieve the same ends. I keep asking why we are doing hydrogen? And I haven't heard a really good answer yet," he said.

Fast facts for our energy future

Here are some selected observations from Steve Koonin's lecture:

Automobiles increased in energy efficiency by 23 percent from 1990 to 2000. This was overshadowed by weight and performance increases that shaved 18 percent off efficiency during the same period, resulting in only a 4.6 percent net improvement. "For the US, significantly reducing transportation energy efficiency is a question of political will, not technology."

Currently, half the world's population lives in urban areas. In the next 25 years, that will reach 80 percent. Along with urbanization comes higher Gross Domestic Product and energy demands, both in terms of stationary power plants and transportation fuels. "Right now there are 2.5 billion people at the bottom of the energy curve who want to move up to levels of the industrialized world. Energy use is inextricably linked to economic growth."

The three largest markets — North America, Europe, and Asia — consume 80 percent of the world's oil and hold 15 percent of the reserves. The co-location of coal reserves with demand centers in these markets is likely to lead to a near-term resurgence in coal use.

There will be nine billion people on the planet by 2050, with the most growth in Africa and Asia. As people shift from walking and public transit to privately owned vehicles, transportation energy and other power demands will drive overall demand up by 60 percent over the next 25 years.

Battling global warming will be difficult because there will be inevitable distractions, such as economic disruptions, high costs, and short-term cooling. The developing world is growing at the rate of 2.8 percent in terms of CO₂ production, while the industrial nations are growing about 1.2 percent. Reduction in the industrial world won't counteract developing world increases. "We have to cut emissions by a factor of two while energy demand doubles and this has to be done over the next 25 years," he said.

Since the first US discoveries of oil in 1850, a trillion barrels have been produced. Another trillion will be needed between now and 2030. With other sources of oil, such as deep reserves in the Gulf of Mexico, "the curve extends out for four trillion barrels."

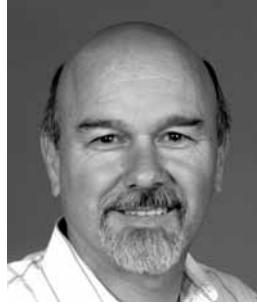
UNM chemist to talk on intelligent design Jan. 9

The Christians in the Workplace Networking Group is sponsoring a colloquium by UNM associate professor of chemistry David Keller Jan. 9 on "Is Intelligent Design Science?" Keller will discuss two of his research projects into intelligent-design-related questions. The colloquium is in the Steve Schiff Auditorium at 11:30 a.m.-12:30 p.m. and will be videolinked to Sandia/California. It is the first of a monthly series the group is sponsoring on origins research. For further information, contact Mark Nielipinski at mnielip@sandia.gov.

In related news, on Dec. 20 U.S. District Judge John E. Jones ruled that intelligent design is not science but a "religious idea" and that teaching it in science classes violates the Establishment clause of the Constitution. The ruling came in the long-awaited case involving the Dover, Pa., school district.

Mileposts

*New Mexico photos by Michelle Fleming
California photos by Bud Pellitier*



Art Hayes
35 8948



W. Jeanne Bando
30 1527

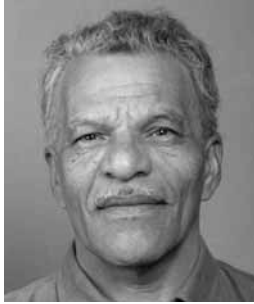
Recent Retirees



Preston Herrington
40 5736



Chuck Draper
30 2541



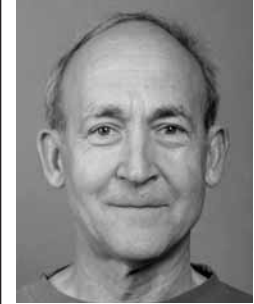
Lance Gordon
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Wilfred Jaramillo
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Michael Young
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Phillip Walkington
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Art Sena
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Jon Bryan
25 17121



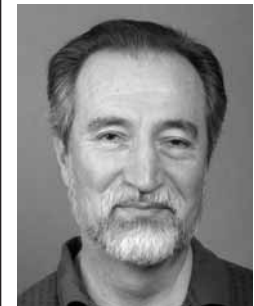
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Philip Dreike
25 5526



Brenda Langkopf
25 6146



Bill Mantelli
38 2452



Rod Shear
31 5122



John Mareda
25 4537



Steve Orth
25 8247



Eric Russell
25 6226



Martina Baldonado
20 4211



Ronald Hartenberger
30 2434



Fred Luetters
30 6924



Dean Buchenauer
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Barbara Cochran
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Lynn Fitzpatrick
20 6036



Robert Habbit
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Guy Dahms
25 12342



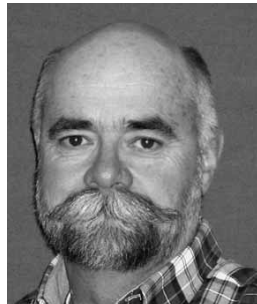
Milrene Goodloe
25 4532



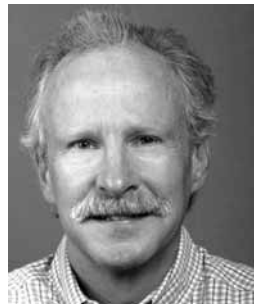
Jeff Hollowell
20 5342



Brenda Jensen
20 4234



Ed Schaub
20 6822



John Scott
20 10862



James Strickland
20 1433



Grace Thompson
20 233



Anthony Wagner
20 5525



Robert Weir
20 5417



Thomas Corbet
15 6222



Virginia Edmund
15 5925



Valerie Mascarenas
15 3332



Jennifer Robles
15 8205

In her book *Tap Dancing in the Shed Row* Sandian Ronda Hutchinson makes horses talk

By Iris Aboytes

The sound of horse hoofs tapping in the shed row gave Ronda Hutchinson (5919) the title to her self-published autobiographical book, *Tap Dancing in the Shed Row*.

The book is about a young girl who works against all obstacles and becomes a jockey, the person that in her dreams she would have become.

Ronda was born in North Carolina, where her parents owned quarter horses. Her love of horses was evident even as a child. She not only rode ponies, but also taught them tricks. As her confidence grew, she became a trick rider. She would do trick riding in rodeos. She loved everything that had to do with horses. They were at the center of her world.

As she got older, Ronda began riding quarter horses on "bush" tracks in the Carolinas and Georgia. She won 16 races in a row riding her parents' quarter horse, Miss Top Etta, at country weekend races. She stopped racing when she was 18, when her height and body frame caught up with her.

Ronda began exercising and galloping thoroughbred horses on farms and racetracks. She



RONDA HUTCHINSON

could get horses to do what other people could not get them to do. "Every horse has its own personality," says Ronda. "In my book horses talk and help the girl."

Extremely disappointed in not achieving her dream of becoming a thoroughbred jockey, Ronda started breaking thoroughbred "babies" in Ocala, Fla., a horse mecca. Winters were spent in Florida; summers, she would go to Charles Town, W. Va., or Philadelphia Park, Pa.

"I owned and raced my horses at Charles Town after buying them from a local trainer," says Ronda. "These horses were considered 'cheap claimers.' I bought one of them for a dollar. These horses came around and won a nice sum of money. When I sold them, they went to a good home where they became personal riding horses. The fillies became broodmares on farms."

Ronda also raced her own horses at Philadelphia Park after buying them in Ocala and hauling them to Philadelphia. Both horses became successful. Ronda proved that her horses could not only be pets, but successful racehorses as well.

Ronda worked for eight years for many dif-

ferent farms. "I broke two young 'babies' that other trainers or riders couldn't break," says Ronda. "They gave me six weeks but they were both broken within two weeks. I was completely committed to them. Horses have character and their own level of emotion. I could communicate with them."

It took Ronda about two years to write her book.

According to one reviewer, "Here's a book for anyone who loves horses, who loves people. Suitable for adults and kids, for this is a book about life. 'Tap Dancing' is a great read; would make a great movie! I highly recommend this debut from a promising new author!"

"He told me he had cried twice," says Ronda of the reviewer.

"In some ways my book is inspirational,"

says Ronda. "Never stop believing in yourself. Things will come your way, if you work hard enough. I believe that."

Ronda loved the horses, but had a hard time with many of the people on the farms and tracks. She cannot stand cruelty to animals, and she saw more than a little of that in the racing world. "If I could I would save every horse," says Ronda.



Ronda Hutchinson rides million dollar mount. The quarter horse sold at auction for more than one million dollars.



This monthly column highlights Sandia Lab News items from 50, 40, 30, 20, and 10 years ago, but each column does not necessarily include items from each decade.

50 years ago . . . Pity the poor proofreader: With Sandia just getting started with its service anniversary award recognition program, the Jan. 13 and Jan. 27, 1956, *Lab News* issues combined to list the names and organization numbers of the more than 4,250 employees who had two or more years of service at the time. The 24 employees who had accumulated 10 years or more also got their pictures published in the Jan. 27 issue. Sandia wasn't exactly "Diversity Central" in those days; only one of the 24 was a woman, the other 23 all appeared to be white men. The Sandia Corporation was not officially 10 years old at the time, but for purposes of the awards, all service from Sandians' original hire dates was counted for employees originally hired at what was then Los Alamos Scientific Laboratory (LASL) or hired at the Sandia site when it was operated by the University of California as the Z Division of LASL.

40 years ago . . . The total Sandia payroll for 1965 was announced as \$78.6 million in the Jan. 14, 1966, *Lab News*. About 8,090 employees were on roll in 1965, making the average annual salary a little more than \$9,700. While that doesn't sound great today, you could fill your car's gasoline tank for six or seven bucks and get a pretty fair cheeseburger and fries for 60 cents or so — probably less at the golden arches. The Jan. 28 issue announced that Sandia had been selected to provide technical direction for the Atomic Energy Commission's (AEC) rapidly expanding space isotope power program that was developing radioisotope-fueled power systems for space missions. Sandia was also to conduct investigations to provide direction for future space power systems.

30 years ago . . . A Sandia project to design a new 17-meter-tall vertical axis wind turbine (VAWT) was featured in the Jan. 9, 1974, issue.

Funded by \$1 million from the Energy Research and Development Administration (successor agency to the AEC), the new machine was a follow-on to the smaller egg-beater-shape wind turbine that had been installed and evaluated atop Sandia's Bldg.

802. After years of research, development, and testing — culminating with testing of a 34-meter-tall unit at Bushland, Texas (near Amarillo), VAWT technology never proved cost effective and lost out to horizontal axis wind turbines, commonly generating electricity at many "wind farms" in the US today, including eastern New Mexico and California.

10 years ago . . . The Jan. 19, 1996, issue reported that more than 500 Sandians had applied for benefits under the Labs' Voluntary Separation Incentive Program (VSIP), announced the previous year to reduce the size of the workforce without using forced layoffs. The then-30-year-old story of the most severe US nuclear weapons accident ever was retold in the same issue. An Air Force tanker and a B-52 carrying four B28 nuclear bombs collided on Jan. 17, 1966, 30,500 feet over the coast of Spain. Both airplanes crashed, and seven of the 11 crew members were killed. Three bombs were quickly located on land near the small coastal town of Palomares. But the fourth was missing, and several Sandians helped calculate where it might be and in subsequent recovery efforts. The bomb was found on March 15, damaged but intact, nearly 2,250 feet under the sea and was recovered April 7, 1966. (If you'd



SANDIA ENGINEERS DISCUSS SYSTEM DESIGN of Sandia's 17-meter vertical axis wind turbine. The new turbine was expected to be taller than a six-story building.

like to read more about this fascinating story, the National Atomic Museum has two related publications for sale — a \$3 booklet and a \$14.95 book, both written by now-deceased Sandia retiree Randy Maydew, who was heavily involved in the events; call 505-242-6083 for details.)

— Larry Perrine

Nominations sought for Labs' Employee Recognition Awards

Nominations accepted through Jan. 30

The Employee Recognition Awards program is a way for Sandians to recognize individuals and teams whose work or contributions in support of Sandia's mission and values have been exceptional.

Take this opportunity to acknowledge a deserving individual or team. Nominations are being accepted Jan. 10-30.

The ERA program recognizes excellence in four categories, three for individuals — technical excellence, exceptional service, and leadership — and one for teams.

Nomination forms with detailed instructions are available from Sandia's internal Web home page or at <http://www-irn.sandia.gov/era/06era.htm>. Each division has an ERA coordinator who is listed via the link above.

Any current, regular Sandia employee may nominate individuals or teams. A separate nomination form must be submitted for each individual and team nomination.

A combined total of 122 individuals and teams will receive corporate Employee Recognition Awards.

ERA individual winners and designated representatives from winning teams will be recognized at the Corporate Employee Recognition Night Banquet, Saturday, May 20.