Sandia researchers seek new nonpolluting ways to produce hydrogen fuel from water and sunlight

Hydrogen from solar-powered electrolysis could fuel hydrogen-powered cars of future

SUN POWER — Sandia researcher Doug Ruby is leading a team to use photovoltaics as a power source of an electrolysis process that can separate hydrogen atoms from water to produce pure hydrogen gas. The resulting hydrogen may be the fuel in hydrogen-powered cars of the future. (Photo by Randy Montoya)

By Chris Burroughs

A Sandia research team is avoiding the use of greenhouse gas-producing fossil fuels to create hydrogen by turning to the sun.

The team, led by Doug Ruby (6218), is working with Teledyne Energy Systems, Inc., of Hunt Valley, Md., to improve the electrolysis process that separates hydrogen atoms from water to produce pure hydrogen gas. In a nonpolluting approach, photovoltaics — a method that uses solid-state solar cells to convert sunshine to electricity — would be the power source.

Teledyne is a company that has manufactured commercial electrolyzers for more than 30 years.

The goal of the research is for the hydrogen produced from electrolysis to be the fuel in hydrogen-powered cars of the future without generating greenhouse gases in its production or use.

"There are a lot of problems to be solved before a hydrogen-fueled car can become a reality," Doug says. "One is development of a cost-effective, sustainable, and nonpolluting way to make hydrogen."

Electrolysis involves passing water between two electrodes, one positive and one negative.

(Continued on page 4)

GM joins with Sandia to advance hydrogen storage

Four-year, $10 million partnership focuses on solid-state storage

By Mike Janes

General Motors Corp. and Sandia have launched a partnership to design and test an advanced method for storing hydrogen based on metal hydrides.

Metal hydrides — formed when metal alloys are combined with hydrogen — can absorb and store hydrogen within their structures. When subjected to heat, the hydrides release their hydrogen. In a fuel cell system, the hydrogen can then be combined with oxygen to produce electricity.

GM, the world's largest vehicle manufacturer, and Sandia have embarked on a four-year, $10 million program to develop and test tanks that store hydrogen in a complex hydride, sodium aluminum hydride — or sodium alanate for short. The goal is to develop a pre-prototype solid-state hydrogen storage tank that would store more hydrogen onboard a fuel cell vehicle than current conventional hydrogen storage methods. Researchers also hope to create a tank design that could be adaptable to any type of solid-state hydrogen storage.

"Hydrides have shown significant early promise to one day increase the range of fuel cell vehicles," says Jim Spearot, director of GM's Advanced Hydrogen Storage Program. "We know a lot of research still needs to be done, both on the types of hydrides we use, as well as the tanks we store them in. We think our work on projects like this with Sandia will get us another step

(Continued on page 3)

Sandia LabNews

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Sandia National Laboratories

Sandia tests wing sensors that will be used on NASA's next shuttle mission

Team uses same analysis that helped determine cause of* Columbia *disaster

By Michael Padilla

Two members of a team that helped determine the cause of the space shuttle *Columbia* accident (*Lab News*, Sept. 5, 2003) are now helping NASA with its return-to-flight mission.

David Crawford (9116) and Ken Gwinn (9126) have been analyzing tests conducted on sensors that will be placed on the orbiter's wing-leading edges.

The project is to develop impact models for NASA's Impact Penetration Sensing system (IPSS) Wing Model. The model is being developed at Boeing to predict the accelerometer data to be collected during ascent and micrometeoroid/orbiting debris (MMOD) impacts on shuttle wing and spar leading-edge materials.

The project comes nearly two years after the shuttle fleet was grounded due to the space shuttle *Columbia* accident in February 2003. NASA has been working toward the final processing of hardware for the STS-114 Return to Flight mission. The space shuttle *Discovery* is scheduled to launch in early May.

The sensors developed by NASA are significant to the return-to-flight effort. The addition of the sensors to the leading edge meets one of the prime objectives identified by the Columbia Accident Investigation Board.

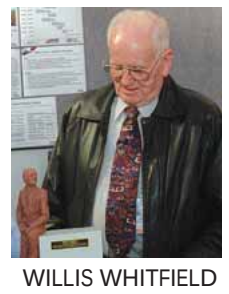
"If significant damage to the leading edge has occurred, the sensors will send a signal back to the command center and the request for an inspection can be made," says Ken.

David and Ken are evaluating test data and are comparing it with structural models of the shuttle and assessing what the signal levels mean.

Sandia's tasks include defining the forcing

(Continued on page 4)

Willis Whitfield visits cleanroom he invented



WILLIS WHITFIELD

Retired Sandian Willis Whitfield returned to Sandia recently for a tour of some of the Labs' clean rooms. In the early 1960s he invented the laminar flow cleanroom process that proved essential to the modern microelectronics industry. Read about his visit and invention in Neal Singer's story on **page 7**.

What's what

When a really good urban legend — or something akin — turns up, I secretly cheer for it because these yarns are almost always more fun than the corporate, bottom-line, hum-drum drumbeat most of us march to these days. And I got one of those lifts on a recent hum-drum day when Patrick O'Malley (2621) e-mailed that he had heard from a friend who had heard from his parents who had heard from two supposedly independent sources about a spectacularly exciting event.

"The story," he wrote, "is that back (sometime ago), some Sandians working with microwaves caused a payload of camera flashbulbs in a truck traveling nearby — the story says one of the highways — to go off and the truck thus catch fire. Have you heard anything like this or is it an urban (or rural, as the case may be) legend?"

I fired off an inquiry to some old-timers, none of whom knew anything about such a spectacular event. One of them asked the archives-history folks, and that line of inquiry came up equally empty.

And so, Patrick, unless someone reading this provides new evidence, I guess we have to dump it into the vast bin of urban (or maybe rural) legends. Too bad. I'd give a 12-pack of Twinkies to see a truckload of flashbulbs go off all at once. No fire; just the flash.

* * *

The subject of SMUs (that's Strategic Management Units, if you didn't know) came up in a staff meeting recently, and as the meeting droned on and my mind wandered, the acronym began to morph into Shmoos — those versatile little characters the inimitable Al Capp created for his *Li'l Abner* comic strip more than half a century ago. Soon after they first appeared in the strip, the country went ga-ga, merchandising them as dolls, watches, ashtrays, and even a Shmoo fishing lure.

Their cultural impact was reprised with the 2002 publication of *The Short Life and Happy Times of the Shmoo,* and a review noted that "the charming little critters can lay eggs, give milk, and be broiled into steaks — all Grade A — while their eyes make exquisite suspender buttons, their whiskers fine-grade toothpicks, and their hides the softest leather. The Shmoos provide for every need, and the frisky creatures reproduce at such a prodigious rate that no one even fights over them."

As I was mentally drawing parallels between what the Shmoos did for Lil' Abner and Daisy Mae and Mammy and Pappy Yokum and all the other residents of Dogpatch USA and what our SMUs do for Sandia, the subject changed and I was jolted back to semi-attentiveness. Lost the whole thread.

Maybe you can pick it up. If you do, let me know. There's got to be more of a connection between SMUs and Shmoos than a rhyme.

* * *

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

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Sandia National Laboratories

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Jim Allen elected an ASME Fellow

Jim Allen, of MEMS Device Technologies Dept. 1769, has been elected a Fellow of the American Society of Mechanical Engineers. This is the highest grade of ASME membership, recognizing "exceptional engineering achievements and contributions to the engineering profession."

JIM ALLEN

Jim has been a member of technical staff at Sandia for 19 years, where "he has made significant contributions to the design and analysis of weapons systems and to the microelectromechanical systems (MEMS) program." He has six patents and has published papers on a variety of subjects.

The ASME also noted his contributions to ASME during his 26-year membership. These include student section advisor, local section officer, and current MEMS subdivision vice chair.

Jim has a PhD in mechanical engineering from Purdue University. He received the award Nov. 14 at the 2004 International Mechanical Engineering Conference and Exposition in Anaheim, Calif.

Recent Patents

Armin Doerry (2342), Peter Dudley (2348), Dale Dubbert (2345), and Bertice Tise (2348): Waveform Synthesis for Imaging and Ranging Applications.

Douglas Adkins (1764), Edwin Heller (1763), and Randy Shul (1763): Microfabricated Teeter-Totter Resonator.

Douglas Adkins (1764), Edwin Heller (1763), and Randy Shul (1763): Method for Chemical Sensing Using a Microfabricated Teeter-Totter Resonator.

W. Kent Schubert (1763), Michael Butler, Douglas Adkins (1764), and Larry Anderson (1764): MicroAcoustic Spectrum Analyzer.

James Aubert (1811): Method of Making Thermally Removable Adhesives.

Dahv Kliner (8368) and Jeffrey Koplow (8368): Linearly Polarized Fiber Amplifier.

Patrick Brady (6118), Nadim Kahandaker, James Krumhansl (6118), and David Teter (9743): In Situ Remediation Process Using Divalent Metal Cations.

Brian Dwyer (6118), Stephen Dwyer (4154), Francine Vigil (6004), and Willis Stewart: Method and Apparatus for Injecting Particulate Media into the Ground.

David Haaland and David Melgaard (both 1812): Augmented Classical Least Squares Multivariate Spectral Analysis.

Tom Klitsner (9621), Thomas Zipperian (1740), Stanley Kravitz (1763), Alan Sylwester, Gail Ryba, and Andrew Hecht: Fuel Cell and Membrane.

Ronald Renzi (8755): Edge Compression Manifold Apparatus.

Dale Boehme and Michelle Hekmaty (both 8753): Polymeric Mold for Providing a Microscale Part.

Alfredo Morales (8762): Silicon Micro-Mold and Method for Fabrication.

Kenneth Peterson (14152) and William Conley (11500): Temporary Coatings for Protection of Microelectronic Devices During Packaging.

Dale Dubbert (2345), Peter Dudley (2348), Armin Doerry (2342), and Bertice Tise (2348): Waveform Synthesis for Imaging and Ranging Applications.

Congratulations

To Brian (9527) and Danielle Byers on the birth of their son, Emory Jonathon, on Jan. 27.

GM CRADA

(Continued from page 1

closer to our goal."

GM and Sandia say the program is part of a concerted effort to find a way to store enough hydrogen onboard a fuel cell vehicle to equal the driving range obtained from a tank of gas, which will be key to customer acceptance of fuel cell vehicles.

The current leading methods of storage are liquid and compressed gas. However, to date, neither of these technologies has been able to provide the needed range and running time for fuel cell vehicles.

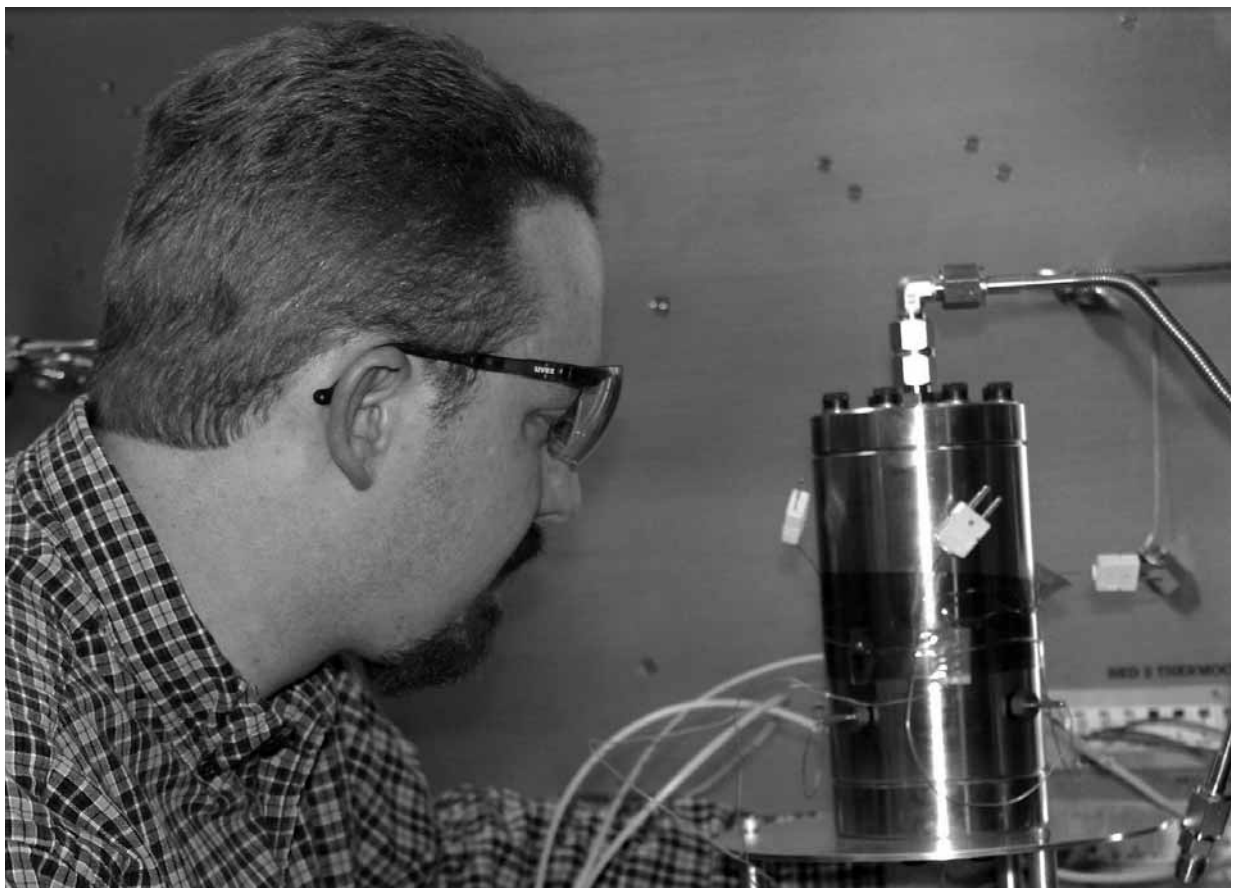
"We are designing a hydrogen storage system with challenging thermal management requirements and limits on volume and weight," says Chris Moen, manager of Sandia's Engineering and Science Technologies Dept. 8775. "Our staff researchers are excited to apply their unique, science-based design and analysis capabilities to engineer a viable solution."

"This is the kind of public-private research partnership that will help us realize the president's vision, communicated in his 2003 State of the Union Address, that 'the first car driven by a child born today can be powered by hydrogen, and pollution-free,'" said Spencer Abraham, DOE secretary at the time of the announcement. "Over the long term, because of the president's visionary leadership, clean, efficient hydrogen fuel technologies like this will help make our nation far less reliant on foreign sources of energy."

In 2003, President Bush announced the Hydrogen Fuel Initiative with $1.2 billion over five years (FY 2004-FY 2008) to accelerate hydrogen research. Sandia's research activities in hydrogen storage support the president's long-term vision for commercially viable hydrogen-powered vehicles to reverse America's growing dependence on foreign oil.

The GM/Sandia project, privately funded and separate from the president's initiative, will be conducted in two phases. In Phase One, the program will study engineering designs for a sodium alanate storage tank. Researchers will analyze these designs using thermal and mechanical modeling, develop control systems for hydrogen transfer and storage, and develop designs for external heat management. GM and Sandia scientists will also be testing various shapes — from cylindrical to semi-conformable — to see which are the most promising.

RECHARGING of the hydrides and release of the hydrogen from metal hydrides such as sodium alanate requires heat, which can reduce overall fuel economy. Sandia engineer Terry Johnson sets up a test apparatus that, when verified, will generate external heat that improves the overall energy density compared to traditional heat sources.



A CRITICAL ASPECT of hydride storage tank development is the act of recharging and discharging hydrogen. Here, Sandia engineer Mark Zimmerman integrates a hydride bed with temperature-monitoring sensors.

(Photos by Bud Pelletier)

In Phase Two, researchers will subject promising tank designs to rigorous safety testing and ultimately fabricate pre-prototype sodium alanate hydrogen storage tanks based on knowledge gained from the program's first phase.

Here's a possible scenario for filling up with a solid-state storage solution such as sodium alanate: The alanate would come preloaded in the tank, where it would remain, giving up its hydrogen and becoming a mixture of sodium hydride and aluminum. The customer would fill up using gaseous hydrogen. During filling, the mixture of aluminum and sodium hydride would absorb the hydrogen and turn it back into alanate, which would be ready to yield hydrogen when needed by the fuel cell. Once the tank is filled, the hydrogen would be stored at low pressure.

While it has shown good potential, hydride-based hydrogen storage also has some hurdles to clear. One current drawback is that most complex metal hydrides, such as sodium alanate, still operate at too high a temperature, which causes an inefficiency that forces some of the hydrogen to be used up in order to release the remaining hydrogen. Another challenge is reducing the time it takes to reabsorb hydrogen. It currently takes at least 30 minutes to recharge.

In separate, independent projects outside of this collaboration, both GM and Sandia are working to identify alloys that will store greater amounts of hydrogen that can be released at lower temperatures. Reducing filling and recharging times is another key area of research.

The research conducted through the GM/Sandia partnership is independent from that of Sandia's participation in the Metal Hydride Center of Excellence (see "Center of Excellence complements CRADA effort" below). The Center of Excellence, to be funded this year through a DOE "Grand Challenge," aims to develop a new class of materials capable of storing hydrogen safely and economically.

Sandia CaliforniaNews

Center of Excellence complements CRADA

Hydrogen storage has been identified by many academic and industrial groups as one of the roadblocks preventing the hydrogen economy from reaching maturity, especially in hydrogen vehicle applications.

In April 2004, Sandia was selected by DOE to lead the Metal Hydride Center of Excellence with partners from national laboratories, industry, and academia. Established in October, the five-year, $30 million program is directed by Jim Wang, manager of Analytical Materials Science Dept. 8773. No currently available onboard hydrogen storage technology can meet the DOE cost and performance targets calling for a minimum range of 300 miles.

The DOE Metal Hydride Center of Excellence complements the Sandia effort to work with General Motors to develop new solid storage materials that would go into an onboard tank as a safe alternative to storing high-pressure gas on a vehicle (see main story). But the Center of Excellence work is separated from the GM/Sandia team by a firewall to ensure that no proprietary information is exchanged between the two.

The Center of Excellence partners are Oak Ridge, Brookhaven, and Savannah River national laboratories, National Institute of Standards and Technology, Jet Propulsion Laboratory, General Electric, HRL, Intematix, Stanford University, California Institute of Technology, University of Hawaii, University of Illinois, University of Pittsburgh, Carnegie Mellon, University of Utah, and University of Nevada at Reno. — *Nancy Garcia*

Hydrogen

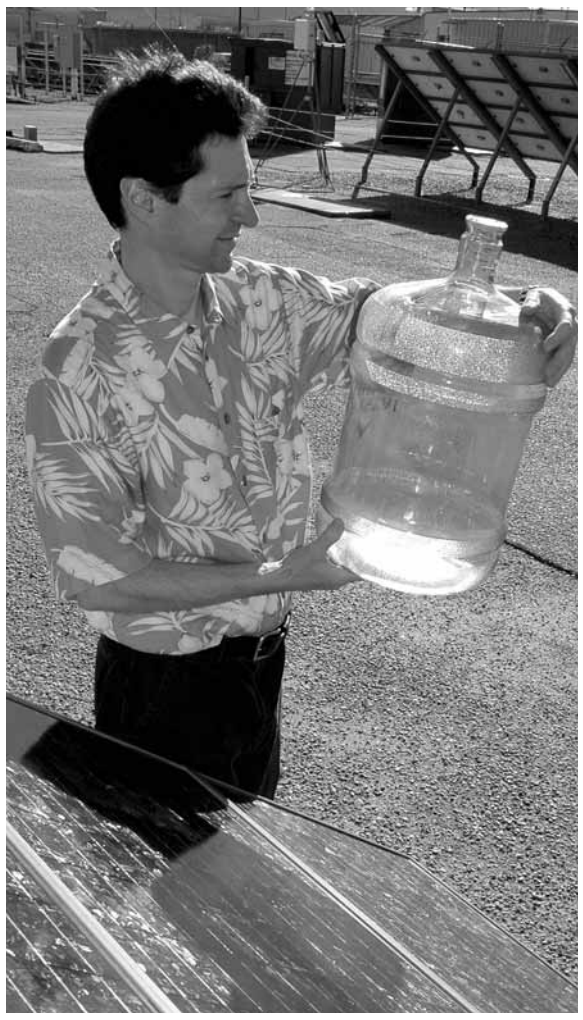
(Continued from page 1)

A DC voltage is applied across a cell separator (membrane). Hydrogen collects at the cathode and oxygen at the anode, which are kept separated by the membrane. The hydrogen is captured and then stored in a tank. The oxygen could be vented or sold for various uses.

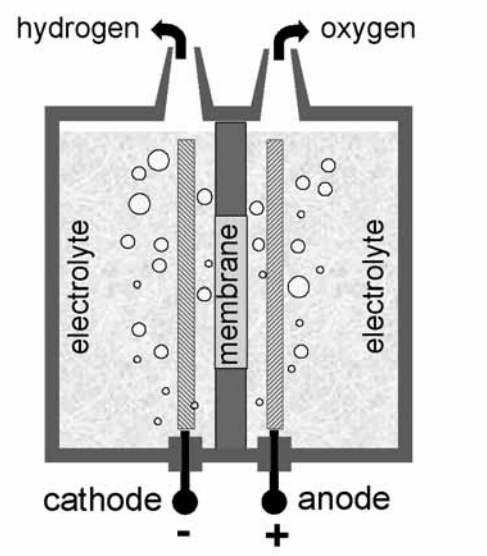
Today the most common way to make hydrogen is by using natural gas (methane). When it is heated and reacted with water (reformed), natural gas breaks down into hydrogen, which is stored, and carbon dioxide, a greenhouse gas that is released into the air.

"Electrolysis of water would be a far more preferable way to produce hydrogen than by reforming of methane," Doug says. "It avoids the use of the increasingly costly and limited supplies of natural gas. If the electricity for electrolysis is produced from renewable, hydropower, or nuclear sources, there are no greenhouse gases generated during production of hydrogen. This is a sustainable, nonpolluting cycle. Electrolysis produces hydrogen from water, and the hydrogen recombines with oxygen in air to create water and power in a fuel cell, which then powers our electric cars in the future."

The joint Sandia/Teledyne research will have three aspects: cell separator development, discovery of improved electrocatalysts and application methods, and design of optimized photovoltaics interface electronics. The improved electrolysis process will then be optimized using an economic/energy optimization model.



DOUG RUBY believes that the newly funded research will result in an inexpensive and clean way to make hydrogen from water. (Photo by Randy Montoya)



ALKALINE ELECTROLYSIS CELL — Simple construction, room-temperature operation, and low-cost materials make alkaline electrolysis, like the system being used in this research, the lowest-cost method of electrolysis for large-scale hydrogen production.

"The cell separator is a critical component in the electrolysis cell stack," says Donald Pile (2521), who is leading the cell separator development effort. "The objective here is to conduct research to design, develop, and fabricate an alternative cell separator material for electrolysis cells."

The separator is positioned between the two electrodes and prevents the remixing of hydrogen and oxygen products released after the DC voltage is applied to water. The problem with separators is that as the current increases, the efficiency of the separators decreases. A membrane made of a more ionically conductive material will minimize this issue.

Doug Wall and Bill Steen (both 1832) will be working on development of improved electrocatalysts. Teledyne has been using a proprietary catalyst for the cathode in its electrolysis process for many years.

"Although this catalyst is very effective in reducing cell voltage and improving efficiency, we believe the application of combinatorial electrochemical screening techniques will lead to identifying even better materials," Doug Wall says. "Furthermore, the same techniques can be used to evaluate anode materials, operating conditions, and duty cycles, generating an inclusive data set for identifying the optimum system conditions."

Over the next three years, he will work with Teledyne to build an electrochemistry toolset composed of automated, sequential evaluation techniques and truly parallel array-based screening methods. These will enable high-throughput evaluation of hundreds or thousands of material variations. These capabilities will be ideally suited for identifying catalysts but can also be used to pursue electrochemical-based sensor technologies.

In the meantime, Doug Ruby will take on the tasks of optimizing the photovoltaic interface electronics to maximize the overall system energy efficiency. And he will use extensive computer modeling to vary other parameters of the electrolysis process to reach the lowest overall hydrogen production cost.

It will be Teledyne's role to construct prototype electrolysis systems incorporating Sandia's research findings.

Electrolysis prototypes will then be evaluated at Sandia's photovoltaic test facilities.

Although the research is in its early stages, some people say it holds great promise for producing hydrogen for future hydrogen-fueled cars, which could reduce pollution and reduce our reliance on imported oil for making transportation fuel.

Hydrogen fueling stations

The vision, Doug Ruby says, is that there would be hydrogen fueling stations throughout the country, just as there are gas stations today. A hydrogen fueling station would consist of large electrolysis units, some powered by photovoltaics. Each unit could be sized to provide enough fuel for 100 cars.

"As the cost of natural gas keeps increasing, and if efficiency of electrolysis continues to improve, in the not-too-distant future, electrolysis-produced hydrogen could become available at the same cost as hydrogen produced from natural gas, which is the lowest cost source today," he says. "If we are successful, and similar problems in developing cost-effective hydrogen storage and fuel cells are solved, we anticipate that hydrogen can be produced at a cost equivalent to $1 per gallon of gasoline on a cost-per-mile-driven basis. We believe it's a realistic goal, and we are eager to get started."

Shuttle

(Continued from page 1)

functions for foam, pieces of ice (from take-off), ablator particles, and micrometeorites.

The tests evaluate different sizes of possible debris in the range of 20 cubic inches (the *Columbia* debris foam impactor was in the range of 2,000 cubic inches). All debris is studied by determining the velocity and angle of the impact.

"Lots of stuff can hit the shuttle," Ken says. "Liquid hydrogen and liquid oxygen develop frost prior to launch."

Ken says background noise from aero and acoustic loads also affects the sensors. "It is our job to discriminate significant impacts from the normal loadings of the shuttle," he says.

Full-scale tests of foam, ice, ablator, metal particle, and MMOD impacts are being performed at Southwest Research Institute (SwRI) in San Antonio, Texas. Tests on fiberglass and RCC (reinforced carbon composite) wing panels are being conducted at the White Sands Test Facility (WSTF).

The forcing functions will be individually and directly validated where possible against SWRI and WSTF test data. Integrated validation of the forcing function and IPSS Wing Model will be performed in collaboration with the effort of Boeing.

"We worked with the SWRI, WSTF, and NASA engineers to design tests to validate the impact models," Ken says. "This includes various velocity ranges, various impactors, and many locations on the panels to capture as many impact scenarios as possible. We also coordinated with the test engineers to place instruments where they'll be most effective for both analysis correlation and sensor demonstration."

Ken is analyzing the impact on the front of the wing, then providing impulse definitions to another team that determines how that impact affects the shuttle's structure and the response at the sensor box.

David analyzes the in-orbit data. He helps coordinate an experimental program at WSTF having to do with measuring and understanding the signals expected to be seen on the IPSS sensors from the impact of micrometeoroids or orbiting debris on the RCC leading-edge materials.

David primarily runs the shock physics code, CTH. He has been in daily contact with the experimenters at White Sands. His role is to develop a theoretical model of these signals to apply to the system model that Boeing is putting together.

He also provides a theoretical model for ice impacts and writes software that will distill all of the understanding of the various impactors —ice, foam, ablator, orbital debris— and provides it to the Boeing system model.

David says the general finding is that the signals expected to occur from damaging orbital impacts are large enough to be detectable with the sensor system.

"The IPSS project generally is very important as it is considered a crucial aspect of the space shuttle return to flight. Everything I've seen suggests that the IPSS should function as required."

Further analysis will extend forcing functions beyond the level that is accessible to tests being conducted at WSTF and SwRI. Every effort will be made to give Boeing the ability to construct new forcing functions as may be required for future missions.

Terry Michalske heads to California as new director of Biological and Energy Sciences Center 8300

As Sandia continues to intensify its focus on bioscience, several changes are being made to Center 8300.

The center — headquarted at Sandia/California — has a new name, Biological and Energy Sciences, and a new director, Terry Michalske. In addition, some bioscience operations in New Mexico will report to the center, but remain in Albuquerque.

Activities in Center 8300 will include reacting flow research, combustion chemistry, microfluidics, engine combustion, hydrogen and combustion technologies, remote sensing and energetic materials, computation modeling and systems biology, nano-bioscience, and biological imaging science.

One of six strategic goals established last year by California VP 8000 Mim John and other leaders at the California site is to "grow bio activities." One focus of Center 8300 is on bio and is the direct result of that strategic goal.

"I am pleased to be named director of Center 8300," says Terry, who will be moving to California. "This new organization has the opportunity to bring together our strong capabilities in energy science as we build a new bioscience capability at the laboratory."

He adds, "We anticipate that Sandia's bioscience capability will help develop and support programs throughout the Labs."

Until his appointment as Center 8300 director in January by Mim, Terry served as the director for the DOE Center for Integrated Nanotechnologies (CINT) in Albuquerque, operated by Sandia and Los Alamos National Laboratory. He also headed Sandia's Integrated Nanotechnologies Department.

Terry joined Sandia in 1981 and through the years has made numerous technical accomplishments in the areas of surface and interfacial phenomena, nanoscale properties of materials, and integrated microsystems. His work on the stress corrosion fracture of silica has been recognized with several international awards, including the Ross Coffin Purdy Award (1985) and the Weyl International Glass Science Award (1989).

Terry also developed several new programs using scanning probe microscopy to explore the nanometer-scale response of surfaces and interfaces. He is co-recipient of a 1994 R&D 100 Award for development of the Interfacial Force Microscope.

Terry has a PhD in ceramic science from Alfred University and received a National Research Council postdoctoral fellowship to work at the National Institute of Standards and Technology.

Mim, who announced Terry's appointment shortly after the holiday break, says he "comes to us with an excellent track record as both scientist and program leader, best exemplified in his leadership to establish the second Office of Science facility at Sandia, the Center for Nanotechnologies."

TERRY MICHALSKE is the new director of Biological and Energy Sciences Center 8300. Bioscience is a growing area of research of the center. (Photo by Bill Doty)

In parallel with the selection of the new director of 8300, Mim announced that the Sandia Mission Council has agreed to a consolidation of some of the bioscience activities in New Mexico under a new section to be headed by Grant Heffelfinger (8330). Grant will be headquarted in Albuquerque.

"We hope that this arrangement will allow the Labs to focus and grow its bio activities at a more aggressive pace," Mim said. — *Chris Burroughs*

Julia Phillips named CINT director; Tom Picraux becomes chief scientist

Julia Phillips (1100), director of Sandia's Physical, Chemical, and Biomolecular Sciences Center, has been named director of the Sandia/Los Alamos Center for Integrated Nanotechnologies (CINT), a DOE Office of Science-funded nonclassified research center. She will keep her present post in addition running CINT, which currently supports 65 approved research projects from 40 institutions in 22 states and three foreign countries.

"The work at CINT represents some of the most exciting scientific research pursued anywhere," says Julia. "It is breaking down barriers between traditional scientific disciplines and will play a critical role in integrating nanoscience into the technologies of the future. I look forward to helping make this vision a reality."

Julia is a past president of the Materials Research Society and past chair of the National Materials Advisory Board. She currently chairs the physics section of the American Association for the Advancement of Science and is vice chair-elect of the division of condensed matter physics of the American Physical Society

She holds a BS in physics from the College of William and Mary and a PhD in applied physics from Yale University. She has published more than 100 papers on various aspects of the growth, properties, and applications of electronic material thin films, in addition to more than 10 review articles. She has edited two books and holds two patents. She is a member of the National Academy of Engineering and a Fellow of the American Physical Society and of the American Association for the Advancement of Science.

The post of CINT chief scientist will be filled by former Sandian Tom Picraux, currently executive director of materials research at Arizona State University. Tom will join Los Alamos National Laboratory effective March 7 and will have lead responsibility for CINT science directions and programs.

Acting CINT user program manager Neal Shinn will become CINT user program manager. Currently manager of the Surface and Interface Sciences Department at Sandia, Neal will be responsible for CINT collaborative research programs and communications with the external science community.

— *Neal Singer*

JULIA PHILLIPS replaces Terry Michalske as director of the Center for Integrated Nanotechnologies (CINT). She remains director of Center 1100. (Photo by Randy Montoya)

Feedback

Q: *I think that someone has a total misconception of the value of the speed bump recently installed at 14th and Hardin, as you approach the entrance to the Bldg. 823 parking area. Besides being hard to see until you are right upon it, it poses a serious problem by diverting attention from incoming traffic on 14th while trying to minimize the blow to the front end of your vehicle. Because of the angle to the oncoming traffic and the height of the bump, at more than 1-mph the blow to the front end suspension is potentially damaging and will ultimately, after a few weeks of going over the bump, cause serious front end alignment problems for many vehicles. In my opinion, the speed bump is a wrong and dangerous solution to control speed in this area. There has got to be a better solution to speed control than that horrendous speed bump. I recommend that it be removed immediately, before the problems really start to happen.*

A: The Speed Bump at 14th and Hardin is temporary. The speed bump is there to make the entrance to the Weapons Integration Facility (WIF) construction site safe for entry and exit. This area historically has a large number of people speeding, and with the addition of construction traffic (i.e. concrete trucks, large semi trailers) there is an increased risk to vehicles and pedestrians. The speed bump is a standard design and is similar to those used by the City of Albuquerque and other municipalities; the bump is 2-1/2" high and 12" across. Any type vehicle, traveling at the posted speed limit, should have no problems negotiating the curve with the bump in place. To increase awareness, a 15-mph speed limit sign has been installed with a flashing light for nighttime driving and a "speed bump" warning attached to the sign. The speed bump will be removed at the end of construction.

— Ed Williams (10864)

New Radiography Control Building opens

When Senior VP Tom Hunter cut the ribbon for the new Radiography Control Building (Bldg. 6639) last week in Area 3, he was opening the door to a new generation of diagnostics and testing capabilities.

SENIOR VP TOM HUNTER, center, cuts the ribbon marking the opening of the new Radiography Control Building in Area 3. Looking on are Dept. 9134 Manager Steve Heffelfinger, right, and Center 9100 Director Carl Peterson, second from right. (Photo by Ed Bystrom)

SENIOR VP TOM HUNTER and Dept. 9122 Manager Mark Garrett examine X-ray images in the new Radiography Control Building. The new building is the front end for the Labs' radiography testing facility. (Photo by Ed Bystrom)

The new building is the front end for the Labs' radiography testing facility, a shielded, bunker-like compound where X-ray radiography and computed tomography (CT) imaging are carried out in a safe environment. The CT capability will soon include a device large enough to image a "system-sized" device. This means it will enable engineers to look at the innards of a full weapon in the same way that a full body scan shows the insides of a human body. Current CT capability is large enough to image only smaller components and subsystems. Department Manager Mark Garrett says the soon-to-come-on-line enhanced CT capability will provide testers with higher fidelity data than previously possible.

The radiography/CT scanning capability is one of the nondestructive testing tools used in Advanced Diagnostics and Product Testing Dept. 9122. The department also uses various other nondestructive testing methods, including ultrasonics, laser interferometery, eddy current, and fluorescent penetrant testing.

In addition to its nondestructive testing, the department uses shock testing and vibration testing on weapon components and other devices. It also designs custom test procedures and protocols and coordinates production testing activities tailored to specific customer requirements. The department is part of the Labs' Engineering Sciences Center, headed by Director Carl Peterson. *—Bill Murphy*

Woody Herman plays the C-Club; using clean room technology in joint study with NASA; coal gasification in Wyoming; sticky foam

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 . . . A Feb. 11, 1955, *Lab News* feature story about Sandia's motor pool pointed out that Sandia had its own taxi service and drivers then. Four dispatchers in the motor pool were responsible for coordinating the work of 26 drivers and heavy equipment operators. Sandia also had its own over-the-road hauling service, including a small "long distance moving van line." Big-name entertainers sometimes played at Sandia's Coronado Club in the '50s. The Feb. 25, 1955, issue announced that famed jazz musician Woody Herman and his band, The Third Herd, would perform for a March 25 dance; advance tickets cost two bucks.

40 years ago . . . A page-one article in the Feb. 26, 1965, *Lab News* featured a joint Sandia/Goddard Space Flight Center test using Sandia's laminar flow clean room to determine how such facilities might be used to minimize biological contamination of space-probe equipment during construction and assembly. The scientific community had agreed that planetary lander vehicles should be sterilized using the best available techniques. (Retired Sandian Willis Whitfield is credited with inventing the laminar flow clean room; see Neal Singer's feature in this issue, page 7; also the front-page photo in the Jan. 21 issue.) The same 1965 *Lab News* reminded employees they were obligated to turn in all trading stamps earned through company purchases to Sandia Finance. Still commonly awarded then by rental car companies and other businesses, trading stamps turned into Finance eventually went to Veterans Administration hospitals and were used to purchase recreational and occupational therapy equipment for patients.

GUESS WHOSE WIFE bought his gym shorts? Four members of the Sandia Employees Handball Association begin a doubles match in February 1955: from left, J. W. McKiernan, John Souza, Harold Cushman, and Les Dassoff.

SANDIA'S CLEAN ROOM was used by NASA in an experiment on biocontamination of space probes. On the left in this Feb. 26, 1965, photo is NASA engineer Ed Powers. On the right is Sandian Vernon Arnold.

30 years ago . . . A new Sandia energy research group led by Dave Northrop (now retired) was gearing up to develop control technology for an underground coal gasification experimental project in Wyoming scheduled to begin several months later. The experiment was designed to burn in place a 30-foot-thick coal seam some 300 feet underground by injecting air and oxygen. The burning coal was to produce a combustible gas mixture that could fuel an on-site power plant. Energy research in general was a growing business at Sandia then as the new US Energy Research and Development Administration began sponsoring many new projects responding to the mid-1970s "energy crisis."

20 years ago . . . Sandia's recently developed and patented "sticky foam" was featured in the Feb. 1, 1985, *Lab News*. Envisioned at the time for a variety of nuclear safeguards, security, and defense uses, the foam stuck to most any wet or dry surface and was difficult to remove with conventional solvents. Stored under pressure in a liquid state, the molasses-like mixture turned into a sticky substance and expanded in volume about 20 times when exposed to air. In the early 1990s, the Department of Justice funded Sandia to evaluate the foam for possible law-enforcement uses. It was actually used in limited applications by the Marines in 1995 during withdrawal of United Nations peacekeepers from Somalia. *— Larry Perrine*

Sandia engineer Willis Whitfield, whose invention made possible the modern electronic age, revisits Labs

Statue prototype approved by clean room inventor

By Neal Singer

The idea seemed so simple to Willis Whitfield that he didn't think it was an invention. He couldn't believe someone hadn't thought of it. To keep a room very clean, let air be the janitor — a "janitor" sweeping the premises every six seconds.

The modern electronic age as we know it began in the early 1960s when Willis, a Sandia engineer, envisioned using fans not only to send outside air through filters into a room but also to remove the air in equal measure through exhaust pipes in the far wall.

The air had to move slowly enough to be imperceptible, but fast enough to avoid aimless whorling.

Later he varied the design of the "clean room" to insert air from the ceiling and exhaust it through the floor. This meant that with an assist from gravity, particulates dropping from a device being cut or sanded or soldered would more readily "go with the flow" to be immediately cleansed from the room.

The omnipresence of the technique today in hospital surgery units, electronics fabrication plants, and laboratories makes it easy to take the invention for granted. At that time, things were different.

"I was amazed at the high level of interest [generated], chiefly from hospitals," said Willis during a visit back to Sandia last month (see photo, *Lab News*, Jan. 21). "They were very nervous about infections, and rightfully so."

So-called clean rooms of that era had no control over their own air, and depended solely on masks, gowns, and janitorial services.

Major corporations like General Motors — aware that dust was an increasing problem as circuit sizes decreased — built rooms with sloping walls in misguided, expensive attempts to minimize free-floating particulates. They also paid excessive attention to keeping doorknobs clean.

"They were looking at the wrong things," said Willis softly. "I said we could build a room out of drywall and latex paint. Some of these people almost passed out."

1,000 times cleaner

The difference in cleanliness between the old way and new was immediately apparent when Willis' group checked for dust contamination in their prototype clean room. "We turned on the particle counter and it just stopped counting. We thought there was something wrong with it," he recounted to a small group of Sandia management who gave him a tour of the Microelectronics Development Laboratory on Jan. 14.

The Sandia prototype facility was 1,000 times cleaner than any room ever measured.

THE LEGACY — Bill Jenkins (1920, left) shows Willis Whitfield a scale model of the life-sized statue of him that will be placed in a central courtyard of the MESA complex. The sculpture was crafted by former Sandian Neil McEwan, now a professional sculptor in Arizona.

THEN AND NOW — During a tour of the Microelectronics Development Laboratory to see how Sandia has put his clean room invention at the very heart of its most important work, Willis Whitfield pauses in front of a video screen showing him as a younger man stepping through the door of his first clean room. (Photos by Bill Doty)

In his recent visit, Willis described these events to Don Cook (1900), Marion Scott (1700), Regan Stinnett (1903), Bill Jenkins (1920), Tom Zipperian (1740), and a few others who wanted his permission to create a life-sized statue of him for the MESA project as it nears completion.

Don Cook said simply, "We want a statue of an engineer at our largest engineering complex."

Carol Sumpter (1702), who provided Willis an extensive description of current MEMS efforts, was more emphatic.

"My whole career in microsystems was enabled by what you did," she told him.

"You're very kind," he said.

His modesty never failed him. After listening for an hour to descriptions of microsensors, synthetic aperture radar, photonic lattices, MEMS devices, and self-assembling nanostructures, as well as a multidisciplinary approach aimed at summer students in the MESA Institute, he joked, "Now I know what Rip Van Winkle felt like when he woke up," referring to the literary character who awakened after a sleep of 20 years.

Accurate even in metaphor, he in fact retired 20 years ago in 1984 after a career at Sandia lasting 30 years.

Nevertheless, in his youthful leather jacket, pressed brown slacks, and polished brown shoes — if you ignored his white hair and the crosshatches of time on the back of his neck — he looked like a new recruit available for hiring, as at least one director mentioned privately. His attention never wavered. "What's intriguing to me, as an old electrical engineer, is the measurement of these things," he said of the tiny devices he was shown.

'I read the *Lab News*' to keep up

When Carol asked him, nearly an hour into a walking tour, if he wanted to sit down, he said, "No, please go right ahead." Later he said, "For a guy 86, it's quite a pleasure to be invited back. I thought everyone had forgotten about me."

The *Lab News* asked Willis how he kept up on technical matters, since he seemed familiar with many terms used in the private briefing.

"I mostly read the *Lab News*," he said.

Emboldened, *Lab News* then asked just what was "laminar" about the so-called "laminar flow clean room" — the usual term used to describe his group's invention.

"Nothing," said Willis, who described the word as a preexisting marketing term and a catchy name. "The air is just unidirectional."

Marion Scott wondered why Willis wasn't more of a worldwide name than he is. "If I was any more famous, I couldn't stand it," Willis quipped. More seriously, he said, "It's a specialized field. Clean rooms kind of slipped in the back door. It started as an ordinary room, like an office, with a HEPA filter and people in caps and gowns."

He was famous at the time of his invention, joining with luminaries like astronaut Neil Armstrong to give talks, but over time, worldwide interest in the originator of the background environment to all of today's electronic advances seems to have diminished.

Sandia's interest is in not seeing this contribution forgotten.

The Friday morning event, put together by Dan Fleming (1900), came about when retired director Dick Clausen reminded Sandia VP Pace VanDevender (1000) that the 40th anniversary of the invention of the clean room was coming up. Knowing of Don Cook's plans to have a statue of Willis installed at the MESA facility as an inspiration to its engineers, Marion Scott suggested that Dan invite Willis to visit. Regan Stinnett, who attends the same church as the inventor, seconded the invitation and participated in the tour. Dan picked up Willis from his Northeast Heights home and — ever the Sandian trying to eliminate any possible problem — left Willis' cell phone with MDL secretary Nancy Campanozzi, so that his wife could reach him, should she need him.

Bill Jenkins explained a model of the MESA facility and presented the foot-tall statue model, approved by Willis. The model was crafted by Neil McEwan, a former Sandian now a sculptor in Arizona. It shows a young man standing by a large, hip-high block, one leg draped casually over the block. Current plans are to inscribe it with two quotes.

One was suggested by John Stichman (2000), VP and chief engineer for Sandia's nuclear weapons program, from President Dwight D. Eisenhower: "Engineers build for the future, not merely for the needs of men, but for their dreams as well. Thus, inherently the engineer's work is a fearless optimism that life will go forward, and that the future is worth working for."

The second possibility are Willis' own words, simple and prophetic:

"I thought about dust particles. Where are these rascals generated? Where do they go?"

The idea of adding the statue of an engineer to the MESA complex also was suggested by John Stichman, says Don Cook: "It was John who laid out the challenge to me one day, saying, 'While there are many statues to inventors and scientists around the country, I can't think of one of an engineer.' When John said that, I said immediately that we'd put one in at Sandia as part of the MESA project."

The statue will serve as an emblem of MESA and Sandia as a premier engineering facility.

Ten teams win Gold President's Quality Awards

By Chris Burroughs

Ten teams were named Gold Award winners Jan. 27 during the 11th annual Sandia President's Quality Awards (PQA) program. Also given were three Silver Awards, and five Turquoise Awards.

"Each team represents Sandia's firm commitment to provide our customers with exceptional service by using best practices methods," says Mary Nation (10743), PQA project manager.

The PQA Award program originated in 1992 as a way to recognize, reward, and provide feedback to Sandia programs and projects. It's a hands-on approach to facilitate an in-depth understanding of how business and quality principles can be used to improve Sandia's work with government, industry, and academic partners. PQA award winners include Sandia employees, contract employees, stakeholders, and in some cases customers.

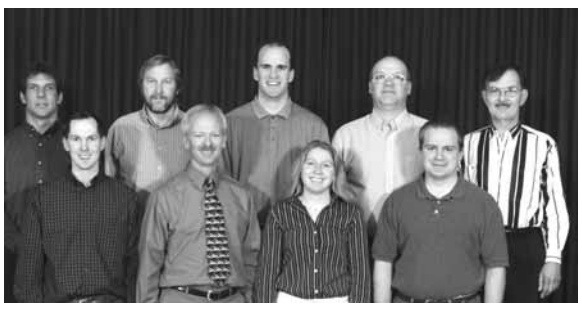
The program is intended to be compatible with all customer-required quality systems at Sandia, including ISO9000:2000, QC-1, and Malcolm Baldrige.

Independent PQA examiners evaluate all the teams' applications and recommend recipients of the Gold, Silver, and Turquoise awards.

Teams winning Gold Awards must have achieved and sustained excellent results relative to customer requirements. Silver winners had to achieve and sustain very good to excellent results, and Turquoise winners had to show very good results relative to key customers.

Gold President's Quality Awards

MC4655 Warhead Interface Module Team



MC4655 WARHEAD INTERFACE MODULE TEAM

This award recognizes a quality process used in delivering the first fully functional prototype of the warhead Interface Module for the W80-3 Life Extension Program. The new design has helped enhance the nuclear safety of the overall system while meeting the schedule and cost constraints of the program,

Team members: Ronald Diegle (2351), Perry Molley (2351), John Bellah (2990), Dale Brandt (2351), Marti Butt (2990), Lorraine Curtis (1734), Shawn Dumit, Susanne Gabaldon (2305), Jane Laflin (2332), Jason Millard (2351), Christopher Nail (2351), David Plummer (2330), Kenneth Reaves (29931), Bobby Robinson, David Schultz (2138), Ken Strasburg (12342), Brian Swafford (2351), Marc Taylor (2990), Steve Terwilliger (2351), Adam Umpleby (2351), and Jason Wingett (2990).

48th Annual Materials Management Workshop Planning Team

48TH ANNUAL MATERIALS MANAGEMENT WORKSHOP PLANNING TEAM

The Materials Management Workshop is an educational forum where association members gather to exchange ideas, address common problems, and improve the management of material throughout the DOE-NNSA complex. A proud achievement of the planning team was increasing member participation by 80 percent and partnering with Albuquerque's nonprofit groups, community businesses, and Laboratory support organizations.

Team members: Pauline Bruskas (10263), Larry Rogers (10263), and Laurie Bergemann (10267).

Learning Technologies Integration Challenge Team

LEARNING TECHNOLOGIES INTEGRATION CHALLENGE TEAM

The Learning Technologies Integration Challenge Team developed processes to integrate disparate learning technologies and capabilities. This provides on-demand delivery of professional development and training by streaming media to learners' desktops. A pilot using the new integrative processes was created to deliver the 2004 Leadership Series online.

Team members: Cheryl Herrera (35201), Carla Forrest (3521), Elsa Glassman (3521), Barbara Lucero (9527), Jared Pearce (3551), Dan Schell (35201), Cheryl Schuster (3522), Linda Stackpole (35201), Jim Stephens (3522), and Charline Wells (3520).

RTBF Implementation Plan Web Application Team

RTBF IMPLEMENTATION PLAN WEB APPLICATION TEAM

The Readiness in Technical Base and Facilities (RTBF) Implementation Plan Web Application tool was designed to meet the NNSA program requirements, while fostering continuous improvement of the overall quality, management, and accuracy of submitted data. The launch and continued use of the application has been successful due to forward-looking project planning that continually focused on the customers.

Team members: Todd Hunter (10751), Michael Procopio (6222), Duane Dimos (1803), Rick Fellerhoff (2610), Carolyne Hart (2800), Andrew Kazensky (6221), Derek Lane (6224), Kent Meeks (02820), Paul Raglin, and Elizabeth Roll (10751).

Advanced Sales Training Program (AST) Team

ADVANCED SALES TRAINING PROGRAM TEAM

The Advanced Sales Training Program seeks to assure Sandia's future by creating a pool of highly skilled and technically trained business developers. AST promotes teaming of R&D and systems solutions-focused staff to effectively identify opportunities, build customer relationships, discover customer needs, and close deals. Since 2001, AST participants have achieved $22.5 million in funds in, and a $161 million pipeline.

Team members: Kathleen Schulz (1314), Pat McCutcheon (3522), Carol Amedeo (15105), Tim Cohen (9725), Robert Cranwell (15243), John Cummings, Jr. (8000), Terry DeLaPorte (DeLaPorte & Associates), Pablo Garcia (15510), Wil Gauster (1010), Philip Heermann (15230), David Keese (15110), Berweida Learson (4121), Chuck Meyers (9720), Stephen Roehrig (15200), Daniel Rondeau (15301), George Sandy Sanzero (1316), Russell Skocypec (15240), Richard Steichen (15300), Jim Stephens (3522), Regan Stinnett (1903), and Charline Wells (3520).

Certified Earned Value Management System (EVMS) for Line Item Construction Projects Over $20 Million Team

EVMS FOR LINE ITEM CONSTRUCTION PROJECTS OVER $20 MILLION TEAM

The team developed a process that uses EVMS principles to effectively manage performance on large construction projects. The Defense Contract Management Agency formally certified the process in September 2004, making Sandia the first and only DOE laboratory to have a certified EVMS in place.

Team members: Lynne Schluter (10824), Steven Fattor (10825), Walter Berkey, Dianne Cannon (4131), Don Cook (1900), Jenny Dubbs (10516), Francisco Figueroa (10000), Jennifer Girand (10505), Walter Heimer (10824), Marlene Hyde (10825), Michael Kupay (6147), Donald Losi (10505), Jennifer Medina (10824), Bruce Mercer (10825), Roke Muna (10730), Sam Rogers (10825), Howard Royer (8512), Paul Schlavin (10824), Tim Sisley, and David Treacy.

Diabetes Pilot Project Team

DIABETES PILOT PROJECT TEAM

The Sandia Diabetes Pilot Program was designed to remove barriers to diagnosis and treatment, to provide convenient access to health care and education, and to work closely with physicians and health plan providers. A team of health care professionals, spe-

(Continued on next page)

PQA Awards

(Continued from preceding page)

cialists, case managers, and community providers were unified by a commitment to provide the best in evidence-based care. Outcome measures and data analysis were tracked throughout to show quantifiable return on investment.

Team members: Debra Menke (3331), Renee Holland, (3331), Deirdre Anderson (3331), Patricia Bowles (3332), Callie Butler (33312), Robyn Carr (3331), Edward Cazzola (3331), Larry Clevenger (3300), Linda Duffy (3330), Eileen Gonzales (3331), Catherine Anne Gray (3331), Neil Kaminsky (3331), Gerard Kerbleski (3331), Gigi McKenzie (3330), Marti Ann Peters (3331), Arlene Price (3331), William Talley (3331), Lisa Teves (3331), and Virginia Valentine (3331).

Corporate Education, Development, and Training Reporting System (CEDT) Reporting System Team

CEDT REPORTING SYSTEM TEAM

The CEDT Reporting System provides self-service web access to training reports. It provides users with tools to monitor training and compliance by individual, organizations, or to the entire laboratory. It also provides a mechanism so that compliance data can be reported to Lockheed Martin and DOE.

Team members: Lorraine West (3551), Linda Stackpole (3520), Ruth Aragon (3551), Alan Armentrout (3551), Lisa Barham (3551), Jessie Black (9521), Tara Camacho-Lopez (3551), James Finch (2913), Juanita Padilla (3522), Lynne Powell (3551), Constance Rush (3551), Edward Saucier (3551), Peggy Sisneros (3520), Dana Tidwell (3551), and Peggy Underwood (3520).

W80-3 Abnormal Environment ASC V&V Milestone Team

The W80-3 Advanced Scientific Computing Verification and Validation Milestone Team developed and applied computational models to predict the response of W80-3 components and subsystems under abnormal conditions. This project relied on a strong partnership between analysts, experimentalists, statisticians, and code-developers. Controlled experiments provided data to validate the models.

SOME OF THE W80-3 ABNORMAL ENVIRONMENT ACS V&V MILESTONE TEAM MEMBERS

Team members: Paul Spence (8754), Martin Pilch (9133), James Henry Aubert (1811), Jose Barela (14131), Amanda Barra (9116), Bennie Belone (9132), Thomas Bickel (1200), Ben Blackwell (9115), Barry Boughton (9116), Jo Bridge (14131) Johnny Casias Jr. (9112), Jaime Castaneda (9112), Raymond Cote (9112), Neil Davie (9134), Daniel Dawson (8754), Jay Dike (8774), Kevin Dowding (9133), Kevin Dowding (9133), Ken Erickson (9112), Victor Figueroa (9132). John Garcia (8512), Walter Gill (9132), Sylvia Gomez (9132), Louis Gritzo (9132), Arne Gullerud (9142), Kenneth Gwinn (9126), Charles Hanks (9132), Wahid Hermina (9110), Eugene Hertel Jr. (9116), Daniel Wayne Hester (9132), Michael Hobbs (9116), Roy Hogan, Jr. (9116), Polly Hopkins (9114), Patricia Hough (8962), Jill Hruby (8700), Tina Huber (1811), Michael Jew (8774), Justine Johannes (9112), Joseph Jung (9127), Bruce Kistler (8774), John Korellis (8754), James Richard Koteras (9142), Marvin Larsen (9117), Sangwook Lee (8754), Ken Lee (8754), Monica Martinez-Canales (8962), Sam McFadden (8754), Hal Morgan (9140), Jaime Moya (6310), Jim Nakos (9132), John Oelfke (9112), Jake Ostien (8774), Michael Prairie (2520), Daniel Ramirez (6784), Vicente Romero (9133), Edward Russick (1811), Armando Saenz (9132), Simon Scheffel (8754), Jean Sena (9122), Trè Shelton (2991), James Stewart (9143), Gerald Stoker (9122), Amy Sun (9114), Kyle Thompson (14131), Paul Thompson (14131), Steven Trujillo (9112), Michael Vahle (5500), Vernon Wallace Jr. (14131), Kenneth Wilson (8770), and Steven Younghouse (9122).

W87 Body Section Processing Team

W87 BODY SECTION PROCESSING TEAM

The W87 Life Extension Program involved assembly into an Mk21 body section. Due to past production issues, there was a shortage of War Reserve body sections. This team devised a process, and reworked previously rejected body sections, rendering them suitable for production. The team's efforts enabled the successful completion of the Life Extension Program.

Team members: Veronica Harwood (8231), Lee Rieger (12342), Christopher Binns (8762), Linda Domeier (8762), Marion Hunter (8762), Patrick Keifer (8762), Robert Oetken (8231), Don Osbourn (82363), Bud Pelletier (8528), Kit Schmitz (8236), Lynn Shackelfoot (8523), and Dale Walker (8231).

Silver, Turquoise award winners

Here are the Silver and Turquoise winners and their points of contact:

Silver Award winners: Finance Reporting System — Reportville, Mary Phillips (10762); Corporate Education Development and Training (CEDT) website, Tara Camacho-Lopez (3551); and Property Systems Management Assurance Plan (PSMAP) Team, Grace Miranda (85233).

Turquoise Award winners: Center 1700 Technologist Team, Charles Fuller (1743); Cross-Functional Contract Closeout Process Enhancement Team, Susan Schear (10250), Sandia Corporate New Employee Orientation Initiatives, Cheryl Schuster (3522); Project Management Working Group (PMWG) and the PM Portal Phase I, Justin Johnson (10517); and Tier Career Path Development Program, Rebecca Burt (3522).

Intel Science Talent Search Finalist Bob Cordwell is a Sandia intern (and son of a Sandian)

Robert Cordwell, one of 40 Finalists in the prestigious Intel Science Talent Search announced last week, has a double Sandia connection. He is a Sandia student intern working afternoons about 15 hours a week in Discrete Algorithms and Math Dept. 9215 in Area 4. And he is the son of Bill Cordwell, a physicist/mathematician who does cryptography in Computer Science Dept. I 5623.

BOB CORDWELL

Intel Corporation, sponsor of the awards, announced the 40 finalists in the nationwide competition Jan. 26.

The Science Talent Search is America's oldest science competition for high school seniors. It is sponsored by Intel and administered by Science Service, publisher of *Science News*. The finalists will vie for more than $530,000 in scholarships. Robert is the only finalist from New Mexico.

"These finalists reflect the best accomplishments of solid, project-based, curiosity-driven education," said Intel CEO Craig Barrett. Over the six decades of the competition's existence, STS Finalists have gone on to hold more than 100 of the world's most coveted science and math honors, including six Nobel Prizes, three National Medals of Science, 10 MacArthur Foundation Fellowships, and two Fields Medals.

Robert, 17, is a senior at Manzano High School, where he is first in his class. He also has perfect SAT scores, and he scored a 36 on the ACT. Like his father, he is an Eagle Scout.

He began working part-time at Sandia last September. "Bob is an exceptionally talented young mathematician, and we are lucky to have him working with us as an intern," says Bruce Hendrickson (9215). "We're all very excited about this major accomplishment of his."

The night after the STS awards were announced Bob also was awarded first place overall at a banquet giving out the GoFigure awards, a regional math contest sponsored by Sandia.

"These finalists reflect the best accomplishments of solid, project-based, curiosity-driven education."

Intel CEO Craig Barrett

For the STS competition, Bob submitted his mathematics project in graph theory and combinatorics. It considers ways to partition the complete graph K_n on n vertices into subgraphs. He plans to double major in mathematics and computer science at either the University of Chicago or Caltech.

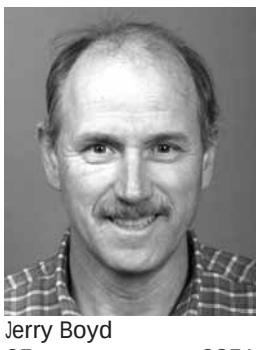
Intel STS Finalists will meet in Washington March 10-15 to attend the Science Talent Institute (where the guest speaker will be 2004 Nobel laureate physicist Frank Wilczek), interact with top scientists, and undergo rigorous judging. The top prize in the Intel STS is a $100,000 scholarship. Tenth- through second-place winners will receive scholarships of from $20,000 to $75,000 each. The remaining 30 finalists will receive $5,000 scholarships.

"Making the Intel top 40 has been a dream of Bob's since middle school, when he happened to visit the finalists' exhibits, in D.C.," says Bill.

— Ken Frazier

Mileposts

New Mexico photos by Michelle Fleming



Jerry Boyd
25 2351

Leonard Convissor
25 5724

Edward Garavaglia
25 9134

Jose Arguello
20 9126

Albert Baca
20 1742

Steve Rottler
20 2100

Bernard Gomez
15 2950

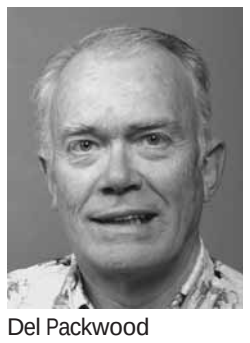
Glenn Jensen
15 5743

Larry Young
15 15422

Recent Retirees

Stan Kravitz
35 1763

Herbert Sutherland
34 6214



Del Packwood
20 9311

Feedback

Q: *Information overload has become a significant issue for most of us, and I find much of the problem stems from what I will call over-communication. If someone is not getting the response or attendance desired, the answer seems to be sending out more and more communications, rather than looking at the effectiveness of the content, timing, or format of the information they want to communicate. If everything is treated as a priority, people lose the ability to filter out what is truly important. Much of this over-communication seems to be coming out of Security. For example, just for the one Security Info-session on Jan. 19, there is a Teaser on the TechWeb page, SDN notices, e-mail notices, and finally a voice-mail notice sent to all employees. Enough!! How can we get people (particularly Security) not to blanket everyone with their communications for every event or issue?*

A: I want to assure you that your observation about information overload being a significant issue for many Sandians is validated by results of employee communications focus groups of Labs employees held in 1999 and last year and in Albuquerque and Livermore. In addition, all of us certainly become bothered by repeated messages, conflicting messages, and confusing messages. That happens at Sandia. At the same time, an interesting consensus that emerged from those focus groups was an appreciation for message repetition. Many people said, for instance, they appreciate the *Sandia Daily News* offering several reminders about things. Similarly, many of those who participated in the focus groups singled out and praised Sandia Techweb teasers, which appear at the top of that page. There was an important caveat, however, with what focus group participants found as messages acceptable for repetition. I'm paraphrasing here: "I really appreciate being reminded in several communication sources of things I must do, particularly things I must do to stay out of trouble and things I must do to get my job done." Obviously, one trick for Sandia organizations feeling they have something to communicate is to repeat what the majority wants to be repeated. Unfortunately, in this regard, not all Sandians are alike. So, can we get "people not to blanket everyone with their communication…" as you ask? We can strive for appropriate doses of meaningful communication and we can improve because of input like yours and like that from the focus group participants and those who complete periodic communication surveys. But not everyone will have the same definition of "enough is enough" or "I'm not getting enough information." It also is important to point out — particularly for those who want to communicate — that academic studies show that too much data — too many words, perhaps, or hard-to-understand words — reach a threshold when they cease to be "communication" but instead become "mental noise." Each day many people and groups at Sandia create words and disseminate them through a variety of forms and with an eye toward communication. Too often, the unintended result is mental noise. Over the past several years Sandians have pleaded for a more helpful and tailorable Intranet. It has arrived. The new Intranet or Techweb home page is https://techweb.sandia.gov/portal/site/techweb. If you haven't switched to it as your default browser home page, you should. It delivers on that long- and often-requested "customizable home page," which is a way to filter out some communications and messages that simply may not apply to you. There are directions right on that page about how to customize it to suit many — but not all — of your special work-related needs. The folks who designed it are the SWIFT Team (Strategic Web Infrastructure Framework & Technologies Team). Its leader is Carla Scott of the Desktop Technology Development Department 9617. If you wish, call her at her Sandia/California office, 294-2344.

—Rod Geer (12600)

Manager Promotions

California

Lori Kiefer from PMLS, California Site Human Resources Dept. 8522, to Manager, Recruiting Staff & University Partners Dept. 8524.

LORI KIEFER

Since joining the Labs in July 2003, Lori has been the Training Team Lead, mentored and coached the California site's education team members, and provided consulting services to management and staff for individual development and coaching.

Before joining Sandia, Lori was at Hewlett Packard, where she was Worldwide Learning Center Manager. She was a sales director in Support Services, where she led the top inside sales team in the US for three straight years.

Lori has a BA from the University of California-Irvine and an MBA (with a concentration in human resources and marketing) from the University of California-Davis.

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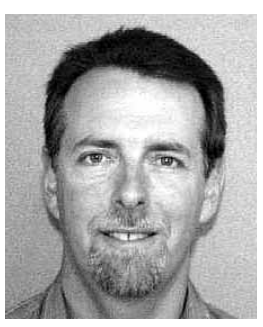
Howard Royer from DMTS, Facilities Planning & Engineering Dept. 8512, to Manager, Engineering Services Dept. 8236.



HOWARD ROYER

Since joining the Labs in June 1983, Howard has worked in Facilities Planning and Engineering at Sandia/California.

He was the electrical engineer for the power supply upgrade at Sandia/California, the Bldg. 910 construction, and other projects.

Howard was project manger for IMTL II, CRF II, and the Bldg. 913 deconstruction.

He has been involved in site planning for Facilities activities during the past four years.

He has a BS in electrical engineering from California Polytechnic State University and an MS in engineering management from Santa Clara University.

New Mexico

Jennifer Girand from Manager, MESA, Security & Infrastructure Business Office Dept. 10505, to Level II Manager, Executive Resources Dept. 12110.

JENNIFER GIRAND

Jennifer came to Sandia in November 1992. Her background is in accounting, budget, and project management. She has worked in the audit organization, the Controller's center, and the Nuclear Weapons program. Jennifer just completed a corporate initiative for project management and a DOE complex-wide initiative for capital equipment improvements.

She has a BA in accounting and an MBA from the University of New Mexico, and is a CPA and a certified project management professional.

Sandia features retired CIA agents as part of counterintelligence speaker series

Three talks in February; 'War on terror' topic of March 4 keynote address

By Michael Padilla

Counterintelligence is the topic of an upcoming Sandia speaker series that features several retired CIA agents.

The talks range from how national security institutions are not immune from intelligence penetration to dealing with burnout in high-stress occupations and how it can make people vulnerable.

Bruce Held (30), manager of the Office of Counterintelligence, said the goal of the series is to highlight issues of importance to Sandia. He says the series is part of the effort to highlight various security disciplines each month.

"We are fortunate to have four of the most knowledgeable counterintelligence experts in the country speak at Sandia," he says. "The speakers reflect the importance that Sandia places on the insider threat, the cyber threat, and the threat of terrorism involving WMD [weapons of mass destruction]."

The Feb. 16 presentation at Sandia/California will be videolinked to Sandia/New Mexico, and the presentation on March 4 at Sandia/New Mexico will be videolinked to Sandia/California. A videotape of each presentation will be available, and live and e-mail videostreaming will be available for the presentations on Feb. 21 and March 4.

Here's the whole lineup:

On Wednesday, Feb. 9, Paul Redmond, former CIA Chief of Counterintelligence, will discuss how national security institutions are not immune from penetration. The talk will take place from 9:30-11:30 a.m. in Bldg. 810, Center for National Security and Arms Control (CNSAC) Auditorium. A minimum of an L clearance is required to attend. All badges will be checked at the door.

On Wednesday, Feb. 16, Fred Turco, former CIA Chief of Information Operations, will talk about the importance of cyber in modern espionage and the special vulnerability that data-rich scientific institutions, like Sandia, have to cyber operations. The talk will take place in Sandia/California and will be video linked to the CNSAC Auditorium from 10:30 a.m.–12:30 p.m. (Mountain Time). A minimum of an L clearance is required to attend. All badges will be checked at the door.

On Monday, Feb. 21, Kevin Gilmartin, a private consultant, will talk on burnout in high-stress occupations and how it can make people vulnerable to recruitment attempts by foreign intelligence services. The talk will be held in the CNSAC Auditorium from 9 to 11 a.m.

Ambassador Cofer Black, former director of the DCI's (Director of Central Intelligence) Counterterrorism Center, is the keynote speaker for the series and will be featured on Friday, March 4. Cofer will talk on the "War on Terror." Black is the mastermind of the US government's immediate post-9/11 response and a star figure in Bob Woodward's book *Bush at War*. The talk will be held in the Steve Schiff Auditorium from 9:30-11:30 a.m. and will be videolinked to Sandia/California.

The series is sponsored by Sandia's Counterintelligence Awareness Program for Employees (CAPE). For more information concerning the speaker series call 284-5875.

Sandia wins 6 of top 7 STC awards

Randy Montoya's SnifferStar photo, the Sandia annual report, the Sandia Overview booklet (twice), the *Lab News*, and the "Welcome to Your Benefits" package were honored with Distinguished Technical Communication Awards from the Society for Technical Communication (STC).

These Sandia communications products won six of the seven "Distinguished" level awards — the highest in STC's 2004-2005 Southwest Regional Competitions. Los Alamos National Laboratory received the other one plus a special Best of Show award in Technical Art, both for its Laboratory-Directed Research and Development online annual report.

The awards were given at a Jan. 15 luncheon in Albuquerque sponsored by STC's New Mexico Kachina Chapter. "Distinguished"-level winning entries go on to compete in the STC's international competitions.

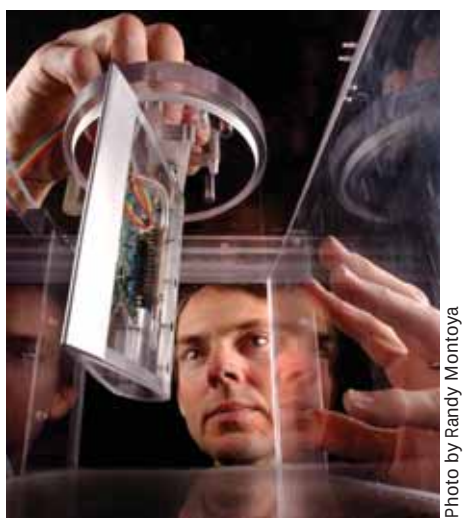


Photo by Randy Montoya

SANDIA'S SnifferStar — This photo was one of six Sandia winners of top Society for Technical Communication awards.

Michael Vittitow's name was on four of the top Sandia awards, Randy's three, and Larry Perrine's two.

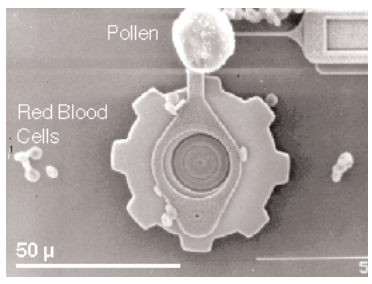
Michael also received two Excellence Awards (for the Thunderbird Express logo and the Sandia pocket folder), and Randy won one for his photo about the space shuttle *Columbia* computer model/ analysis. Bill Murphy received a Merit Award for the 2004 special Labs Accomplishments issue of the *Lab News*. Jan Gaunce received a Merit Award for Women's Wall of Fame 2004 poster. Jerry Gorman received a Merit Award for Experimental Visualization.

Sandia Women's Golf Association membership drive Feb. 16

The annual membership drive for the Sandia Women's Golf Association will be held on Wednesday, Feb. 16, at the Manzano Mesa Multigenerational Center (West Social Hall) located at 501 Elizabeth S.E. (corner of Southern & Elizabeth, east of Costco).

The group is open to any women or men who have an association with KAFB. For questions, contact Linda Daniels (844-5724), Christine Mitchell (845-3550), or Lynn Washburn (845-3520).

Sandia to host student MEMS design competition



A MEMS design competition sponsored by Sandia will provide eight university student teams the opportunity to have their microelectromechanical designs fabricated for free, using the world's most advanced silicon surface micromachining fabrication process, SUMMiT V™. In addition, the lead student on the winning project and his or her professor will be invited to visit Sandia to present the design to an audience of Sandia MEMS engineers.

Student designs will be judged based on the use of SUMMiT's specific strengths — which include integration of multiple layers and the flatness of those layers — as well as usefulness for educational demonstrations and uniqueness of design.

Institutions must be members of Sandia's MEMS University Alliance for their students to participate. Membership is available to any US institution of higher learning. Members receive course materials structured to help start or further develop their own MEMS program, licenses for Sandia's cutting-edge MEMS design software, and other benefits.

Designs are due April 1. For more information on the contest, contact Natasha Bridge at nabridg@sandia.gov. For more information on how a university can become a member of the University Alliance, contact Kathryn Hanselmann at kdhanse@sandia.gov. *—Neal Singer*

Base adds third traffic lane to Wyoming gate

OUT-OF-THE-BOX SOLUTION — Kirtland Air Force Base command has taken an innovative approach to reducing traffic backups at the Wyoming Gate. During peak traffic periods in the morning, it has "found" a third lane for security checks by diverting traffic to the right of the guard shack and through the visitor parking lot. To augment uniformed military personnel at the gates, the Air Force has hired and trained civilian security officers from Sec-Tek-DynCorp. (Photo by Randy Montoya)