

Sandia-developed MiniSAR flies for first time on Lockheed Martin unmanned aerial system



MINISAR SYSTEM developed at Sandia undergoes flight-testing on a Lockheed Martin SkySpirit unmanned aerial system during tests last fall in Minnesota. (Photo courtesy of Lockheed Martin)

By Chris Burroughs

The Sandia-developed miniaturized synthetic aperture radar (MiniSAR) flew for the first time on a Lockheed Martin unmanned aerial system (UAS) recently, taking images in flight.

“This has been our goal all along — to have the MiniSAR fly on a UAS,” says Sandia researcher Dale Dubbert (5345). He, together with George Sloan (5345) and Armin Doerry (5342), created the approach for a miniaturized synthetic aperture radar. Working with them

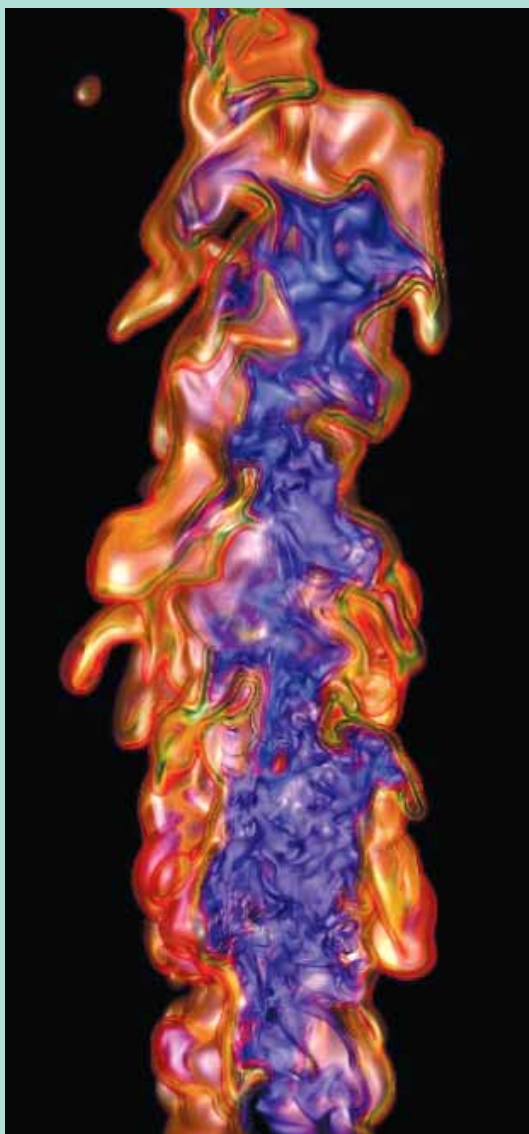
were other engineers from multiple departments, playing key roles in the development and innovation activities. Eventually the intent is to have the MiniSAR be used for reconnaissance missions.

MiniSAR flew on Lockheed Martin’s small SkySpirit UAS at the Minnesota National Guard test facility. On Oct. 19, through the closely coordinated efforts of Sandia and Lockheed Martin, the SkySpirit soared to nearly 3,000 feet, becoming the first UAS to successfully transmit real-time, four-inch resolution SAR imagery from a Class III unmanned aerial vehicle. During four different mission demonstrations, the SkySpirit

(Continued on page 4)

“This has been our goal all along — to have the MiniSAR fly on a UAS.”

Dale Dubbert



A CALIFORNIA TEAM HEADED by Jackie Chen has been awarded six million hours of super-computing time by DOE to study flame structure, form, ignition, soot formation, and related issues. The image above, produced by Jackie during a previous round of experiments, shows instantaneous volume rendering of heat release rate (red) and progress variable (blue) in the preheat zone from direct numerical simulation of a lean methane-air slot Bunsen flame. The progress variable is indicative of the strong turbulence stirring ahead of the reactive layer, a challenge to capture for current combustion models. Read about Jackie’s work in a Mike Janes story on page 3.

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Sandia goes tobacco free March 1

Dr. Ed Cazzola discusses the difficulties of quitting and ways Sandia can help

Sandia announced Jan. 9 that beginning March 1, Sandia will be a tobacco-free workplace (Lab News, Jan. 19).

The goal of the policy change is to improve the overall health of Sandia’s workforce, says Sandia Medical Director Dr. Larry Clevenger (3300). To help employees quit, Health, Benefits, & Employee Services (HBE) offers a number of cessation services (See “Ways to start quitting now” on page 4).

The Lab News sat down with Dr. Ed Cazzola (3331), who manages Sandia’s tobacco-cessation programs, to discuss his experiences. John German conducted the interview.

Lab News: Were you a smoker?

Dr. Cazzola: I had an ordeal getting off cigars and a pipe. It wasn’t an easy thing. I enjoyed it. It was relaxing. I just quit one day, but that’s not the experience of many folks. Some people are very addicted to it.

LN: What makes tobacco so difficult to give up?

Dr. Cazzola: We think there are two parts to the addiction. One has something to do with the hand-to-mouth gratification. People get relaxation, some stress relief, from doing that. We also know there is a biochemical component to nicotine addiction. There are receptors in the brain that are nicotine sensitive. They get used to having it and the brain keeps calling for more.

LN: And there is no question tobacco is a health threat?

Dr. Cazzola: There is no question that using tobacco products is detrimental to one’s health. We know you have a one in 10 chance of devel-



oping lung or other cancers as well as heart disease or having a stroke if you are a smoker, and 90 percent of oral cancer cases are caused by tobacco. There are many medical studies out there. All are very clear about the health problems associated with tobacco use — lung disease and bladder, kidney, pancreas, cervical, breast, and colorectal cancers.

LN: What can you tell us about Sandia’s cessation programs?

Dr. Cazzola: Our programs have evolved over the last two years as we have tried to find

(Continued on page 4)



Royalty awards

In 2006, 321 Sandia inventors, authors, contributors, and technical organizations received \$680,000 in royalties.

This brings the total to more than \$6.5 million in royalty incentives that have been distributed to qualifying employees since the program’s inception in 1992. Read the story on page 6.



Speaker launches Black History Month by asking — and answering — the question: “Is Black History Month still needed?” Story on page 2.



Attendees at fifth annual CINT workshop see big opportunities for nano research; facilities now available for non-CINT Sandians. Story on page 5.



A wind turbine blade with a gently curved tip promises to be more efficient than existing designs, especially at low-wind sites. Story on page 7.

What's what

In a bit of a different twist on nostalgia, retiree Jack Tischhauser emailed recently, "I read with interest the article about the new lab-wide smoke-free policy to be implemented March 1.

"At the time I joined Sandia in 1952, if one went to a meeting, about three-fourths of the people attending would light up without a second thought. A non smoker like me had no choice but to "suck it up," When I went on airplane trips, not only did I have no recourse if my seat mate lit up, but the stewardess handed out little packets of cigarettes to the passengers (along with the gum).

"If someone had told me then that in 50 years Sandia would be smoke free, I would have said they were crazy - smokers were a huge majority. It just goes to show what's possible with persistence and dedication."

* * *

Some expressions are hard to lose, even when they're no longer relevant. Such as ads or commercials that tell you to "dial 123-4567" or engine strength expressed in "horsepower." Both were perfectly understandable when they came into use, but if the concepts they describe were new today, we'd never hear about "dialing" or "horsepower."

Our cars and trucks all have glove compartments, but when was the last time you put gloves in one of them? Did anybody ever put gloves in them? Since that's what they're called, somebody must have.

Although most of those 12-volt electrical outlets in newer vehicles are labeled "Power" or something similar, most of us still call them cigarette lighters, and some manuals call them "cigar lighters."

Song lyrics, too, sometimes include references that the younger among us must wonder about. They probably wouldn't even have had the chance to wonder about those lyrics if what's called "The Great American Song Book" wasn't so popular - even among many younger singers. And so, those younger folks can wonder about "telegraph cables, how they sing down the highway. . ." when they hear "Moonlight in Vermont."

And in "Standing On The Corner," Dean Martin croons about "standing on a corner, watching all the girls go by; standing on a corner, giving all the girls the eye. . . . Brother you can't go to jail for what you're thinking. . . ." Maybe not, but you might get accused of stalking, or sued for ignoring diversity and not also "watching all the guys" go by.

Who stands on corners these days? . . . unless you're waiting for a bus? More likely, one of those girls you're standing on a corner watching go by would demonstrate her tae kwon do skills and leave you lying on a gurney watching the IV drip.

Language can be pretty entertaining, even if it doesn't always make a lot of sense.

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



HOWARD KERCHEVAL

Is Black History Month still necessary?

Speaker helps launch annual observance

George C. Wright, president of Prairie View A&M University and professor of Afro-American history, opens Sandia Black History activities with a talk at the Steve Schiff Auditorium on Feb. 5, 9:30-10:30 a.m. His talk will focus on the connection and importance of African American history to all Americans.

Sandia's Black Leadership & Outreach Committee (BLOC) is the sponsor of this event as well as a scholastic competition titled "Roots that Make a Difference." The contest encourages middle and high school students to honor Black History Month through intellectual discussion of African American contributions to the fields of science, engineering, and technology.

Competition participants will be awarded a luncheon, tour, and savings bond following Wright's presentation.

"Black History Month is not only to honor our past, but also to challenge those of us living today to make contributions that will have a lasting effect," says Wright.

Sandia's BLOC designed "Roots that Make a Difference" to promote student awareness of past scientific achievement and to encourage the realization of their own personal goals in these areas, a message Wright will reinforce during his presentation.

Wright is the author of three books: *A History of Blacks in Kentucky: In Pursuit of Equality, 1890-1980, Volume II; Racial Violence in Kentucky, 1865-1940: Lynchings, Mob Rule, and "Legal Lynchings;"* and *Life Behind a Veil: Blacks in Louisville, Kentucky, 1865-1930*. He was presented the Governor's Award by the Kentucky Historical Society for his last two books. He is currently working on another, *Robert Charles O'Hara Benjamin: A "Forgotten" Afro-American Leader*.

Wright codirected two documentaries for television, "Don't Let the Sun Go Down" and "Upon this Rock: The Black Church in Kentucky."



GEORGE C. WRIGHT



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LOCKHEED MARTIN

Sympathy

Sympathy to Steve Roehrig (6300), Mary Roehrig (212), Nate Roehrig (6463) on the death of father, father-in-law, grandfather Charles Roehrig (1981 Sandia retiree).

Recent Patents

Note: Patents listed here include the names of active Sandians only; non-Sandia inventors are not included. Following the listing for each patent is a patent number, which is searchable at the US Patent and Trademark Office website (www.uspto.gov).

David Teter (243), Patrick Brady, and James Krumhansl (both 6316): Inorganic Ion Sorbents (Patent No. 7,122,502)

David Teter (243), Patrick Brady, and James Krumhansl (both 6316): Method of Removing Arsenic and Other Anionic Contaminants from Contaminated Drinking Water Using Enhanced Coagulation (7,138,063)

Tom Kulp, Dahv Kliner, and Ricky Sommers (all 8368): Backscatter Absorption Gas Imaging Systems and Light Sources Therefore. (7,151,787)

James Stamps (8235) and Daniel Yee (8125): Modular High Voltage Power Supply for Chemical Analysis (7,161,334)

John Dec and Carl-Magnus Sjoberg (both 8362): Fuel Mixture Stratification as a Method for Improving Homogenous Charge Compression Ignition Engine Operation (7,128,046)

Black History Month activities

Is Black History Month Still Necessary?

Special presentation by George C. Wright
Feb. 5, 9:30-10:30 a.m.
Steve Schiff Auditorium
8:30-9:30 a.m. Bldg. 905, Room 210
Video-linked to Sandia/California

African American Heritage Luncheon

"From Slavery to Freedom:
The Story of Africans in the Americas"
Presented by the 377 ABW
Meet and hear Alan Gropman tell the compelling story of the Tuskegee Airman and African American military history.
Feb. 8, 11:30 a.m.-1 p.m.,
Mountain View Club
Contact Lt. Stephanie Tillman at 846-2083 for ticket information.

5th African American Day at the New Mexico State Legislature

Feb. 9, 9 a.m.-4 p.m.,
State Capitol Roundhouse,
Santa Fe, N.M.
Contact Sheryl Williams-Stapleton, D-N.M. (19), at 830-8088 for additional information.

CRF team awarded more than six million hours of supercomputing processor time to better understand flame phenomena

Award is part of DOE's 2007 INCITE program to fund cutting-edge research

By Mike Janes

Jackie Chen (8351) and a team of collaborators have been awarded more than six million hours of computing time on the Cray X1E and XT3 supercomputers at Oak Ridge National Laboratory to study flame phenomena. The award comes from DOE's Office of Science and is part of the department's 2007 Innovative and Novel Computational Impact on Theory and Experiment (INCITE) program, which will allow cutting-edge research and design of virtual prototypes to be carried out in considerably less time than it would take using conventional computing systems.

Jackie's team, Chun Sang Yoo (8351), David Lignell (8351), Ramanan Sankaran (Oak Ridge, 8351), Evatt Hawkes (8351), and Phil Smith (University of Utah), is working on an array of direct numerical simulations that will provide a fundamental understanding of key processes such as flame stabilization, flame structure, extinction, ignition, and soot formation. The high-quality simulated benchmark data will also be used by combustion modelers to develop predictive engineering models used to design future combustion devices. These processes underlie fuel-efficient low-temperature combustion engine designs for transportation and lean premixed combustion for stationary power generators. An increase in automobile fuel efficiency from 30 to 45 percent, experts say, would result in a savings of three million barrels of oil per day of the 20 million consumed for transportation with a corresponding decrease in CO₂ emissions.



JACKIE CHEN is leading a team that has won a major DOE computational grant to study flame phenomena. The team's studies could ultimately lead to more efficient combustion in automobile engines. (Photo by Bud Pelletier)

"Our project has strong applications and science impact, which given the importance of energy conservation and efficiency, very likely makes it all the more attractive to the Office of Science," says Jackie, who works in Sandia's Combustion Research Facility. Simulations developed by her and her team provide data to validate mixing and combustion models in engineering-level simulations of combustion devices. The award-winning project is titled "High-Fidelity Numerical Simulations of Turbulent Combustion

— Fundamental Science Toward Predictive Models."

The DOE Office of Science awarded 45 projects and a total of 95 million hours of computing time on some of the world's most powerful supercomputers as part of the INCITE program. DOE Under Secretary for Science Raymond Orbach presented the awards at the Council on Competitiveness in Washington, D.C.

CPU hours valuable

Supercomputers are playing an increasingly important role in scientific research by allowing scientists to create more accurate models of complex processes, simulate problems once thought to be impossible, and to analyze the increasing amount of data generated by experiments. For example, a project receiving one million hours could run on 2,000 processors for 500 hours, or about 21 days. Running a one-million-hour project on a single-processor desktop computer would take more than 114 years.

"The Department of Energy's Office of Science has one of the top 10 most powerful supercomputers in the world and four of the top 100 and we're proud to provide these resources to help researchers advance scientific knowledge and understanding," Energy Secretary Samuel Bodman said.

"I look forward to witnessing the promise of these efforts as some of the world's greatest thinking minds use some of the world's greatest thinking computers."

Launched in 2003, the INCITE mission is to advance American science and industrial com-

Sandia California News

Sandia's OVIS now available

The initial version of OVIS — a Sandia-developed software tool that provides intelligent, real-time monitoring of computational computer clusters — is now available for free download at <http://ovis.ca.sandia.gov>.

OVIS, say its developers, offers a statistical approach to the problem of computational platform monitoring and analysis, which can be inefficient and ineffective due to the traditional emphasis on manufacturer-specified, "absolute" thresholds. Instead, OVIS observes the overall statistical properties and environmental effects of a cluster, characterizing individual device behaviors and comparing them to a large number of statistically similar devices.

Thus, individual node values that appear to deviate from the norm (given the current applicable model, as established by real-time analysis) are flagged as aberrant. This technique, say the developers, can accurately expose problems much earlier than the current practice of simply waiting for a predetermined threshold — necessarily set high to preclude too many false alarms — to be crossed.

OVIS not only addresses the issue of aberrant node detection but also allows the system builder to visualize the spatial distribu-

tion of a particular characteristic over the entire system.

The baseline capabilities of OVIS currently available for download include:

- Visualization and correlation tools that display information about state variables, such as temperature CPU utilization and fan speed, and their aggregate statistics.
- Statistical tools that present the cluster as a comparative ensemble (rather than as individual nodes), a convenient and useful method for tuning cluster setup and determining the effects of real-time changes in the cluster configuration and its environment.
- An XML-based cluster configuration information template.

Though not part of the current download distribution, OVIS also incorporates a novel Bayesian inference scheme to dynamically infer models for the normal behavior of a system and to determine bounds on the probability of values manifested in the system. (Bayesian analysis, according to the International Society for Bayesian Analysis, is a well-known approach to data analysis that casts statistical problems in the framework of decision making). This and other advanced features will be available in future releases.

— Mike Janes

"I look forward to witnessing the promise of these efforts as some of the world's greatest thinking minds use some of the world's greatest thinking computers."

DOE Secretary Samuel Bodman

petitiveness. These awards will assist in that mission by supporting computationally intensive, large-scale research projects and awarding them large amounts of dedicated time on DOE supercomputers.

The projects, with applications from aeronautics to astrophysics, consumer products to combustion research, were competitively chosen based on the potential impact of the science and engineering research and the suitability of the project for use of supercomputers.

"One of the most important aspects of the INCITE program is that the resulting knowledge will largely be available, so that the information and technologies can be used by other researchers, further broadening the impact of this work," Orbach said.

"Our scientific leadership underpins nearly every aspect of our economy and by making these resources available to a broad range of science and engineering disciplines; we believe the resulting work will make us more competitive in the years and decades to come."

For 2007, the projects were awarded time at DOE's Leadership Computing Facilities at Oak Ridge National Laboratory in Tennessee and Argonne National Laboratory in Illinois, the National Energy Research Scientific Computing Center at Lawrence Berkeley National Laboratory in California, and the Molecular Science Computing Facility at Pacific Northwest National Laboratory in Washington.

Tobacco free

(Continued from page 1)

better ways to help employees. We typically start people with an orientation meeting to help people understand what options they have. After that, we have one-on-one counseling. We have two educators who help people through the process.

Our programs include the option to use medications. Medications we offer include Zyban, which is most frequently used for depression but can help with the anxiety of quitting. For nicotine replacement we mostly use patches. And the newest one we have is the nicotine blocker called Chantix, which has a good success rate.

Combination of approaches works best

LN: So a combination of counseling and medication?

Dr. Cazzola: Yes, studies have shown that with the combination, there is a better success rate than either one alone.

LN: And these services and medications are free to employees?

Dr. Cazzola: They are, for employees. Contractors may use the benefits offered by their companies. These usually are similar to Sandia's, but contractors are welcome in Sandia's classes and support groups as well.

LN: Who comes to you for help?

Dr. Cazzola: We see three different types of people. We have someone who has wanted to quit and has decided on his or her own that now is the right time. We have someone who has had a health crisis — a heart attack, pneumonia, emphysema, shortness of breath — so they've become aware that their addiction is harming their health and that has caused them to seek help. And lately we have had someone who has heard Sandia is going to go tobacco free and wants to be ready for that.

LN: So has the tobacco free announcement

Ways to start quitting now

- Contact Health, Benefits, & Employee Services (HBE) at 505-844-HBES (4237) or see hbe.sandia.gov (in California, call 925-294-2700).

- New Mexico: Attend cessation orientation class, third & fourth Tuesday of every month, next class Feb. 20 and 27, 11 a.m.-noon, MO 307, Rm. 131. No reservation necessary.

- New Mexico: Join the Stay Quit support group, second Wednesday of every month, noon-1 p.m., next meeting Feb. 14, Bldg. 832, Rm. 31, Benefits Conference Room.

- New Mexico: Join Smokers Anonymous, first date to be announced; stay tuned to HBE updates at hbe.sandia.gov.

- Tobacco-cessation benefits are available through Sandia's three health plan providers as well; get more information at www.sandia.gov/resources/emp-ret/spd

An online Sandia tobacco-free website summarizing tobacco-cessation assistance options is available at www-irn.sandia.gov/tobaccoFree.

increased participation?

Dr. Cazzola: It has. We used to hear from one person a day on average. Now we're up to four or five a day.

LN: Are there statistics on the success rate of Sandia's programs, and who tends to succeed and who doesn't?

Dr. Cazzola: We've had 175 people through the program since it began less than two years ago. The success rate is about 25 percent for participation of greater than six months. I don't think any of us can predict who succeeds and who doesn't. We've had people go on the patch,

and then go on Zyban, and then go on Chantix. Some people succeed the first time. Others fail on all three. We try never to give up. This is not easy. But we are here to help.

We also are working with HBE to expand to some of the alternative treatments, such as hypnosis, acupuncture, and so on, so those can be covered in our health plans.

You can do it

LN: What do you tell people who want to quit?

Dr. Cazzola: That they can do it. All they've got to do is make the choice. We'll help them get there any way we can. If it means meeting with them once a week, if it means a phone call every day, that's what we'll do.

LN: Anything else?

Dr. Cazzola: Yes. If people will really stand back and look and see how tobacco can affect their lives, their health, their productivity, their future enjoyment of retirement, that smoking is a cumulative event, that the sooner they get off the more healthy they will be and the more they will enjoy their lives, they will want to get off tobacco. If you don't believe me, ask a smoker who has quit.

"Nicotine-free Living" program offered at Sandia/California

Sandia/California is offering a free seven-week class to help smokers adopt a tobacco-free lifestyle. "Nicotine-free Living" begins Feb. 15 and is available to employees and contractors at Sandia/California.

The class includes a one-on-one meeting with the site physician, Stephanie Ball, as well as a workbook, CD, and access to a "Quit Coach" (health educator Morgan Edwinson and Sandia/California employee assistance counselor Tamara Cagney).

Sign up by Feb. 12 by contacting Morgan Edwinson at 294-3501 or email saludca@sandia.gov.

MiniSAR

(Continued from page 1)

transmitted MiniSAR images, capturing actionable data in two operational modes, including focused area circle-mapping and broad area strip-mapping. Multiple imaging passes were post-

processed to demonstrate coherent change detection used to identify changes over time.

First autonomous flight

This demonstration marked the first time an autonomous flight of a small tactical UAS has captured SAR data of this type and resolution. The use of a MiniSAR, which is being produced by Rockwell Collins, Inc., could greatly enhance a ground unit's surveillance capabilities with a UAS. It can capture high-resolution images

through weather, at night, and in dust storms.

Dale, George, and Armin started developing the 30-pound MiniSAR about three years ago, incorporating a number of key technologies, including mechanical design, digital miniaturization, RF miniaturization, and navigation expertise. MiniSAR was made possible after the gimbal and electronic teams got the unit down to its diminutive size. It consists of two major subsystems: the antenna gimbal assembly (AGA) — the pointing system that consists of the antenna, gimbal, and transmitter — and the radar electronics assembly (REA) — the signal generator, receiver, and processors. The AGA beams the radio frequency and receives it back. The REA is the electronics package that generates the radar signals, controls the system, processes the data, and transforms it into an image.

"In the past small classes of UASs could carry payloads of 50 pounds, which limits them to video or infrared cameras," Dale says. "The smaller MiniSARs will let them carry additional sensors that together will provide a very detailed reconnaissance picture."

MiniSAR was initially tested on a Twin Otter aircraft owned by NNSA. The October test flight on the Lockheed Martin SkySpirit UAS demonstrates that the MiniSAR could be deployed by tactical unit commanders for real-time reconnaissance, regardless of smoke, dust, heavy rain, or nighttime conditions.

Rick Udicious, vice president and general manager of Lockheed Martin's Tactical Systems business, says his company understands the military's need to provide tactical support for the warfighter.

"The need for small unmanned systems that meet emerging mission requirements for agility, affordability, and the next generation of resolution accuracy is a key element in extending the tactical capabilities of US forces," he says.


Flying MiniSAR on Lockheed Martin's small SkySpirit UAS will help meet that need.

Benefits trends: UnitedHealthcare unveils paperwork improvements

UnitedHealthcare (UHC), one of Sandia's health plan providers, recently adopted a monthly health statement that consolidates all recent family health care activity and describes, in clear terms, the status of each claim.

The new statement includes a column that specifies what you owe the health care professional or facility for each active claim, replacing the often confusing Explanation of Benefits.

The consolidated monthly statement also summarizes remaining deductible amounts and other plan indicators for each family member. It even includes tips for saving money. For more information, see www.myuhc.com or call 1-877-835-9855.



Here's what your new UHC health statement page will look like:

Member Number Policy Statement Period
800450011 0010752 1/1/2006 - 01/31/2006

Understanding Your Health Statement

Network Deductible: Total dollar amount of eligible expenses you need to incur before your co-insurance begins to apply.

Network Out of Pocket: The maximum dollar amount you would still have to pay before your plan covers 100% of eligible expenses.

Remaining Account Balances	Network Deductible	Network Out of Pocket
Family	\$1400.00	\$2307.10
Phil	\$792.50	\$1714.52
Nancy	\$874.96	\$1669.22

Discount: Reduction from Amount Billed due to savings from a network or other agreement.

Cost of Care: Cost after all discounts have been applied.

Health Plan Paid: Amount paid by your plan's Health Coverage for qualified expenses.

You Owe: Amount you owe the physician, health care professional or facility. May include amounts already paid to your provider/ pharmacy at the time of service.

Remark Code: Refer to Remark Code Definitions section of this statement to find the description that is associated with this code.

Amount Billed: Amount billed for service before any discounts.

Claim Details *	Amount Billed	Discount	Cost of Care	Health Plan Paid	You Owe**	Remark Code ***
Phil on 4/08/05 #1234567890001 Acme Clinic Medical	116.00	20.00	96.00	76.00	19.20	D1

Macro growth for Sandia/Los Alamos nanotechnology center evident in presentations at January meeting

With research facilities now available to non-CINT Sandians, it's a level playing field

By Neal Singer

The big news at the fifth annual workshop of the Sandia/Los Alamos Center for Integrated Nanotechnologies — held in Albuquerque Jan. 16-17 — was:

- CINT buildings at both labs are in place and populated. That capability already has made possible the review and approval of a significantly increased number of research applications and acceptances. Said CINT Director Julia Phillips (1100), "Until this year, we've been future-focused, as in: 'Some day, we're going to do great stuff.' But there were no real users working in real CINT buildings with real CINT staff. That's all changed." CINT Chief Scientist Tom Picraux (LANL) seconded this remark.

- The CINT Discovery Platform™ chips have been fabricated at Sandia's MESA center. These chips are now undergoing shakedown tests. They allow convenient, repeatable, and (because mass produced) inexpensive interrogation of materials at the nanoscale, and are expected eventually to be widely distributed to university, government, and industrial researchers.

- CINT facilities are now potentially available to any Sandian with a nanotechnology idea to propose. The new openness allows Sandians to compete with non-Sandians on an equal footing for access to the CINT equipment and staff scientists' expertise. "Until now, we have discriminated against internal users," said Neal Shinn (1131), CINT User Program manager, "but now, with regular operations, it's a level playing field."

While much of the work still seemed in the condition of the universe after the Big Bang — accreting, but not yet with enough matter collected to produce many suns — the accretion was evident and some of the work blazed.

As for accretion, numbers tell the tale. In the recently completed Jump Start Program — the energetic effort from 2003 through 2005 by DOE's Office of Science to fund nano research before the CINT buildings and staff were in place — 257 research proposals were received and 89 approved.

In the 2006 call for user proposals alone, 176 additional proposals were received, with 129 accepted.

Papers coming out of CINT even in its formative stages are increasingly cited by other researchers. One workshop poster listed 80 institutes from 22 countries citing CINT research prior to Nov. 30, 2006.

Proposal acceptances in the current year were from 32 states and 10 foreign countries, a testament not only to the wide interest in nanotechnology but to the efficiency of CINT staff in spreading word of the program around the world.

Sandia researchers helped as well. Igal Brener (1727) was there, among other reasons,

"The next step is to poke and prod and see how well these platforms work."

Julia Phillips

to make sure he would be able to tell his collaborators at several universities the proper application steps to follow, he told the *Lab News*.

Neal Shinn repeated CINT's straightforward application rules: Proposals must be approved through CINT's normal review mechanisms, which involve both an internal feasibility screening and external board of reviewers. "Identify CINT scientists working in your area," Neal advised the audience of 175 attendees.

"Discuss the possibilities of the research. Put together a team. Submit a two-page proposal." Also, as is customary for CINT work, research and travel funds are expected to be obtained by principal investigators from other sources. CINT managers will write letters of support that may be useful in securing funding.

Stars forming

Nanotechnology involves understanding the properties of tiny composite systems whose behavior can be predicted neither in terms of individual constituents nor by their behavior in the macrosphere. The idea is to exploit the integration of these tiny composites to design systems with desired performance.

The three Discovery Platform chips are expected to be a step in achieving these goals by expediting reproducible research across wide swaths of nanotechnology. The initial three Discovery Platforms presently under development include microfluidics, led by Nelson Bell (1816); electronic transport, led by Mike Lilly (1132); and a cantilever array testing physical properties of nanomaterials, led by John Sullivan (1132). Also in the late design stage is a chip cradle with preset microfluidic and electrical inputs that will aid in standardizing experimental conditions anywhere in the world it is used. The chip and cradle will also allow instant examination by electronic microscopes and instant data readout by computers, so that information gleaned from nano experiments will reach the so-called macro, or human, scale rapidly and easily.

Said Julia, "The next step is to poke and prod and see how well these platforms work. And to finish up the interface over the next several months so we don't need little nanopersons for input and readout," she joked.

Another platform, proposed at the meeting by Jim Kushmerick from NIST (working with Bruce Bunker, 1816), involves an array of microelectrodes that face each other like fork tines in solution. Electromagnetism



SANDIA'S BRUCE BUNKER (right) and NIST'S JIM KUSHMERICK discuss prospects for an ingenious method to test the electrical conductivity of a wide variety of nanomaterials.

(Photos by Neal Singer)

herds two-micron-thick metal particles, also in solution, so that each lands between two tines. The particles, by filling these gaps, complete circuits between electrodes. Even cleverer, the particles can be coated with many different nanomaterials. Since the electrical transport capabilities of the metal are already known, sending current through particles trapped at junctions allows researchers to rapidly test the electrical transport properties of a wide variety of nanomaterials down

to even molecular dimensions, aiding in the development of nanocomposites for energy harvesting and sensors. Turning off the magnetic field releases the particles, allowing a new crop of nanomaterials to be inserted for testing.

Sandians mentioned by external speakers for their expertise, in addition to Bruce, included John Reno (1132) for his crystal-growing work in developing quantum wells and quantum cascade lasers, Brian Swartzentruber (1132) for his experiments in measuring silicon surface structure; and George Bachand (8331) (also working with Bruce) for work in kinesin motors and shuttling microtubules. By implication, Sandia Fellow Gordon Osbourn (1001) was remembered when one plenary speaker — Max Lagally from the University of Wisconsin — recalled that strained layer superlattices were invented at Sandia.

Delivering locally

Questioned by the *Lab News*, workshop attendee Piotr Grodzinski — NIH program director of National Cancer Institute Alliance for Nanotechnology — defined another difference between nanotechnology and straight chemistry, the currently less glamorous brother science working with the same atoms, like this: "Nanoparticles can deliver locally," he said. "You can design to the spot to which you want them to go. So you can use lower doses of drugs and get equal or better effects."

From CINT, he says, he hopes for more new sensors to recognize disease at an earlier stage.

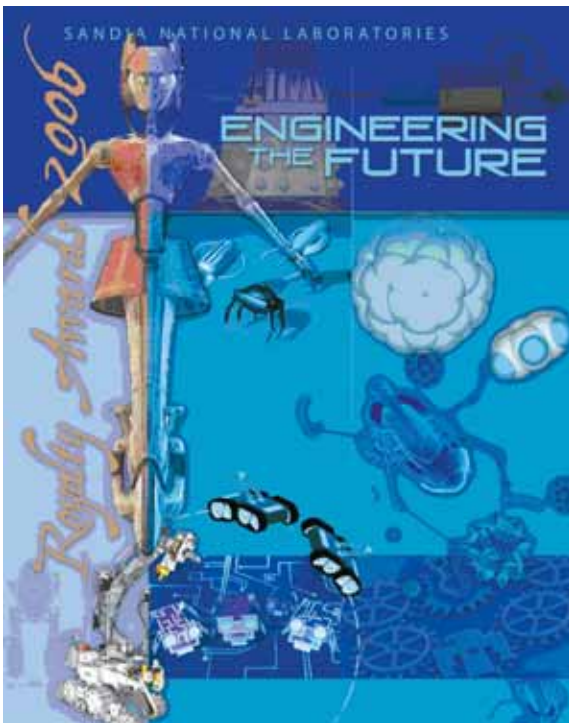
Naomi Halas, Stanley C. Moore Professor in Electrical and Computer Engineering and chemistry professor at Rice University, delivered a plenary talk in which she described using nanoshells to influence energy transfer. In one application, currently being tested by a Texas company, she described the possibility of these ultrasmall metal structures being deposited in human cancers. The structures, heated, could be used to destroy cancers with less damage than radioactive "seeds" currently implanted for the same purpose. The composite nanoparticles, consisting of a layered dielectric core with a metal shell, have tunable optical resonances that span a large portion of the visible and infrared regions of the spectrum. The particles receive energy at particular wavelengths and do not immediately reradiate but store the energy to increase their temperature. Halas, a newly named APS Fellow, recently received the "Cancer Innovator" award from the congressionally directed medical research programs of DoD.

The workshop drew 52 attendees from universities, in addition to 44 from LANL, 39 from Sandia, one from Brookhaven, another from Lawrence Berkeley National Lab, eight from industry, and 13 from other government agencies, according to figures provided by Goldie Piatt, CINT user administrator.



ELBA SERRANO (left) from New Mexico State's biology department discusses optically active quantum materials with Jennifer Hollingsworth, head of the Synthetic Chemistry Lab at Los Alamos National Laboratory's CINT Gateway.

Sandia royalty awards hit \$6.5 million mark since program's inception in 1992



By Michael Padilla

During 2006, 321 Sandia inventors, authors, contributors, and technical organizations earned \$680,000 in royalties.

This brings the total to more than \$6.5 million in royalty incentives that have been distributed to qualifying employees since the program's inception in 1992.

The recipients were honored at the 14th annual Sandia Royalty Awards ceremony held recently at the Albuquerque Sheraton Uptown Hotel. Recipients include current and former employees, retirees, heirs of deceased employees, contractors, and Entrepreneurial Separation to Transfer Technology individuals.

Sandia established the Royalty Sharing Program to encourage Sandians to identify, protect, and deploy the Labs' intellectual property assets, which include patents, copyrighted software, and trademarks.

Through the program, individuals can receive royalty awards from technology licensing. Royalty income is generated through commercial licenses negotiated by the Sandia/New Mexico Intellectual Property Management Team and the Sandia/California Site Business Office.

Twenty percent of the royalty funds generated are distributed to inventors and authors of the licensed intellectual property and 10 percent are distributed to employees who qualify for awards as classified inventors or significant contributors, and to employees identified as inventors on patent filing applications. Sixty-five percent are distributed to technical organizations within Sandia for discretionary research and development and technology maturation. Five percent of total royalties received are distributed for intellectual property management purposes, including technology assessments and market research that support the Sandia's licensing program. Sandians can receive up to \$150,000 in royalty incentives per year in addition to base salary.

"Imagination, perseverance, and hard work isn't the exception, it's the rule, at Sandia," said David Goldheim, director of Strategic Relationships, in opening remarks at the event. "The celebration honors the imagination of the inventors and authors who are recipients of the royalty awards and their families whose support structure enables such creativity. The products of the recipients' imagination and perseverance are the foundation of Sandia's intellectual property management and licensing program."

Lenny Martinez, VP for Enterprise Transformation, discussed technology transformation.

"I'm convinced that we can initiate a transformation that will ensure we retain our position at the top of the technology curve," he said. "If we are to move beyond just sustaining our work, we'll

need to refocus our thinking, and integrate sociological and other aspects into our decisions."

Al Romig, deputy director for Integrated Technologies and Systems, provided three Sandia "laws" that guide life-changing technology.

"The first is to use our creativity, innovation, and perseverance to provide state-of-the-art technology, at an affordable cost, for critical national needs," he said. "Our second law is partnering as an essential strategy, and third is to invest in an environment where bold imagination can thrive and create even greater advances."

Al and Rick Stulen, VP and Chief Technology Officer, presented the awards and Craig Tyner and Kevin McMahon served as emcees at the ceremony.

Year-end highlights

- 323 patent disclosures were recorded, bringing Sandia's total since 1992 to 5,413.

- 162 patent applications were filed, bringing the total to 2,291.

- 86 patents were issued, bringing the total to 1,228.

- 72 commercial licenses resulted from Sandia's intellectual property, with the total income from active licenses up by nearly \$1 million to \$3.4 million this year.

- The divisions responsible for the future application of the technologies for the benefit of DOE missions will receive more than \$2.2 million of the royalty payments, also up from last year's figure of \$1.7 million.

- Another ten percent of royalty revenues — this year \$340,000 compared to last year's \$272,000 — is set aside to acknowledge significant contributors in generating and transferring the Labs' intellectual property, and to recognize individuals responsible for classified inventions.

Robotic ants inventor uses Mother Nature as a model



ROYALTY AWARDS GUEST SPEAKER James McLurkin explains how his latest robotic swarm uses unique algorithms to work collaboratively. (Photo by Bill Doty)

James McLurkin says he explores ideas about robot communities using one of the best examples around — Mother Nature.

McLurkin, a graduate student at the Massachusetts Institute of Technology Computer Science and Artificial Intelligence Laboratory, spoke at the 14th annual Sandia Royalty Awards ceremony held recently at the Albuquerque Sheraton Uptown Hotel.

McLurkin built his first robot in 1988 and for his thesis project as an MIT undergraduate he developed a group of smaller robots that could work together. He got the idea after watching the ants in an ant farm he kept on his desk. He designed and built 12 robots mimicking the ants in the farm. Measuring about an inch per side, each "ant" is powered by a tiny internal computer that runs three motors. Each ant has feelers and other sensors that allow it to detect and avoid obstacles and move toward light. These mechanisms cause the robots to interact in ways that mimic the behavior of real ants.

Using nature as a model, McLurkin's core research is developing algorithms and techniques for constructing and programming large swarms of autonomous robots. Inspired by the behavior of ants and bees, the Swarm-Bots perform individual tasks that collectively contribute to the goals of the group. They were originally created during his five-year post as lead research scientist at iRobot, one

of the world's leading robotics companies.

Potential applications for swarms include military-style applications, space exploration, and earthquake rescue.

McLurkin, considered by many as a leader in the field of distributed robotic systems, was the manager of the iRobot Swarm project, which was successfully completed in 2004. Previous projects include developing two other robotic communities and crafting some of the world's smallest robots.

As an independent consultant, McLurkin has advised on many mechanical and engineering projects for clients such as Walt Disney Imagineering, SensAble Technologies, and MicroDisplay Corp.

In 2003, he was recognized by *Time* magazine as one of five leading robotics engineers in its "Rise of the Machines" feature, and by *Black Enterprise* magazine as one of the Best and Brightest Under 40. He says his goal is to understand where intelligence comes from, how it works, and how to incorporate artificial intelligence into real robots.

McLurkin received a bachelor's degree in electrical engineering with a minor in mechanical engineering from MIT, a master's in electrical engineering from the University of California, Berkeley, and a master's in computer science from MIT. He is currently a PhD candidate in computer science at MIT.

— Michael Padilla

Wind turbine blade designed by Sandia and partner is first of its kind *Blade's most distinctive characteristic is gently curved tip*

By Chris Burroughs

A new wind turbine blade design that Sandia developed in partnership with Knight & Carver (K&C) of San Diego promises to be more efficient than current designs. It should significantly reduce the cost-of-energy (COE) of wind turbines at low-wind-speed sites.

Named "STAR" for Sweep Twist Adaptive Rotor, the blade is the first of its kind produced at a utility-grade size. Its most distinctive characteristic is a gently curved tip, termed "sweep," which unlike the vast majority of blades in current use, is specially designed for low-wind-speed regions like the Midwest. The sites targeted by this effort have annual average wind speeds of 5.8 meters per second, measured at 10-meter height. Such sites are abundant in the US and would increase by 20-fold the available land area which can be economically developed for wind energy.

Sized at 27.1 meters — almost three meters longer than the baseline it will replace — the blade improves energy capture at lower wind speeds. Instead of the traditional linear shape, the blade features a curvature toward the trailing edge, which allows the blade to respond to turbulent gusts in a manner that lowers fatigue loads on the blade. It is made of fiberglass and epoxy resin.

"This design allows the blade to twist more than traditional designs, thus relieving some of the effects of gusty turbulent wind on blade life,"

Knight & Carver

Knight & Carver started out in 1971 as a custom yacht builder and repairer of large-scale vessels. The company expanded into the wind-turbine blade business in 1997, using the same methods used in composite boat building.



PROOF LOAD TESTING on new Sweep Twist Adaptive Rotor blade using 55-gallon-drums to test blade strength.

says Tom Ashwill (6333), who leads Sandia's blade research efforts. "This then allows us to grow the blade length for the same rotor, providing for increased energy capture of 5-10 percent and yet retaining the same expected fatigue life.

Low Wind Speed Technology project

The Knight & Carver contract is part of the Low Wind Speed Technology (LWST) project that targets wind sites that are not the strongest but plentiful. In late 2005 DOE and Sandia awarded Knight & Carver the \$2 million contract that includes \$800,000 in K&C cost share. Because of budget reallocations, this project was the only one of several LWST projects to receive 2007 funding.

Sandia's role in the project has been in directing design and test planning. The Knight & Carver team provided the detailed design and blade fabrication.

The first STAR blade was tested last week at Knight & Carver's fabrication facility in San Diego to determine its bending and twist behavior due to static loads. Natural frequencies were also measured. This data will be compared to design simulations to determine how well the design concept performs. Four additional blades will be fabri-

cated in the first quarter of 2007 — three of which will be flight-tested on a turbine in Iowa.

Other members of the design team are Dynamic Design of Davis, Calif.; MDZ Consulting of Clear Lake Shores, Texas; University of California, Davis; and NSE Composites of Seattle, Wash.

"The DOE interest and funding are a big step for us," Tom says. "We've been pushing for the incorporation of innovative concepts into utility-scale blades for some time now as a way of reaching program goals of lowered cost of energy."

He adds that the continued increase in the average size of utility-grade wind turbines may come to an end before all efficiencies are wrung out unless blade weight growth (which is nonlinear) can be reined in. The challenge is to develop new concepts that reduce the rate of weight growth, such as the swept STAR blade.

Other weight-reducing concepts such as carbon spar caps, off-axis carbon fibers that facilitate bend-twist coupling, and new "structural" airfoils have been incorporated at a smaller scale in 9-meter-long prototype blade being flight-tested at Sandia's test site in Bushland, Texas, at the US Department of Agriculture's Agricultural Research Service facility.

Feedback Program Report

January - December 2006

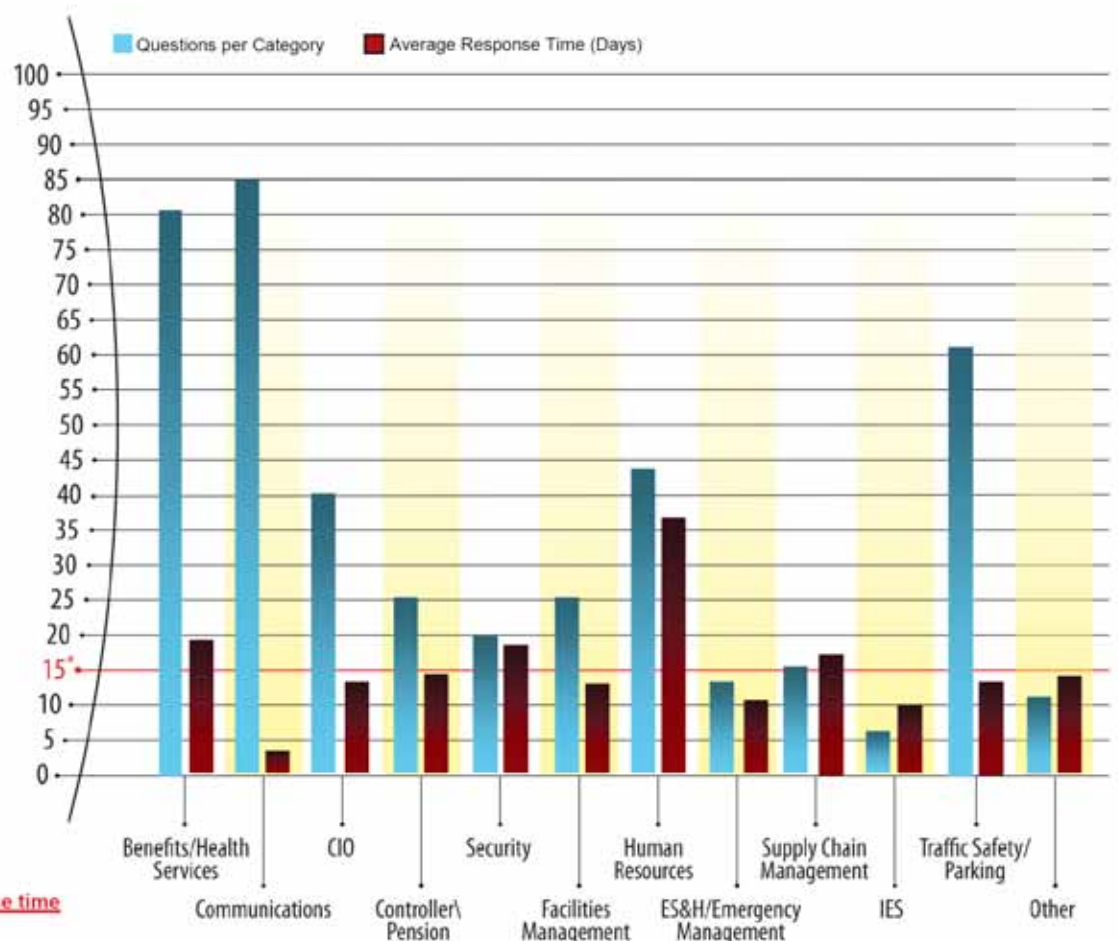
Key recurring questions of 460 submitted:

- Limited enforcement of parking violations (10)
- Disappointment with United Health Care (10)
- Will the Sandia Marketplace Website be restored? (8)
- Will Sandia provide shuttle bus service for Rail Runner riders? (7)
- Why is corporate allowing the intelligent design (creationist) colloquiums? (6)
- Will Sandia have *Take Your Sons to Work Day* this year? (6)
- Booking through Travelocity is difficult and more expensive (6)

The following actions were initiated as a result of employee feedback:

- Redesign of corporate form
- Tech area facility improvements
- Customer service training for service provider
- Supplier Website inaccuracies corrected
- SSN removed from a corporate form
- South Valley gate users notification process

* Expected response time



SANDIA'S FEEDBACK PROGRAM offers Sandians a chance to raise questions about any area of Labs management, work environment, policies, or procedures. The award-winning program is designed to assure confidentiality and a prompt

response from a responsible authority. Feedback Program administrator Mike Clough (3651) keeps track of the trends in Feedback questions and publishes a report on those trends each year.

Nanomaterials researchers should balance problem-solving potential with possible risks

By Will Keener

Vicki Colvin, director of the Center for Biological and Environmental Nanotechnology at Rice University, thinks that small is beautiful and nanotechnology offers powerful possibilities for improving the human condition. But speaking at Sandia's January Environmental Management System awards ceremony, she offered a caveat.

Be prepared for "the flip side," the chemistry professor and researcher from Houston, Texas, warned.



VICKI COLVIN
(Photo by Bill Doty)

There have been a number of materials developed through research that were first seen as advances to solve important social problems, but had a flip side in environmental or human health costs that society didn't want to pay, she said. "When societies adopted these technologies (including DDT, pesticides, refrigerants, asbestos materials), they didn't have equivalent information about the benefits and the risks. So as the risk information unfolded, a backlash occurred that basically shut down the technology."

Given the numbers of diverse materials and applications, some nanotechnology projects are destined to follow this "wow-to-yuck trajectory," she said. "Ultimately it's a social decision; scientists and engineers can't make it. But our job is to provide the benefit analysis. If you are a researcher you need to be thinking about it and finding the science to uncover it as soon as you can."

The combination of relatively large surface areas on nanostructures and the unique chemical, optical, and other properties of the materials are providing a wealth of applications opportunities for nanoscientists, Colvin told her audience of about 150 at the Steve Schiff Auditorium. (Others watched the talk on streaming video, available

throughout the Labs.) A photomicrograph of a single cadmium selenide nanocrystal illustrated the crystal shape, while Colvin estimated that the actual surface area of a gram of the material would amount to several acres.

The billion-dollar-plus annual US government expenditure in nanotechnology research is being matched by industry across a number of scientific disciplines, Colvin said. Scientific literature on the subject is also expanding rapidly.

"Nanotechnology is here. Maybe not in the exciting ways you may have heard about in science fiction, but odds are in your everyday life you use a number of products with nanotechnol-

ogy in them and you use them happily," she said. She cited small-scale pigment engineering in cosmetics, antiperspirants, and sunscreen, tennis ball core materials, and stain-resistant fabrics as examples.

Colvin also outlined research at her center involving nanosized magnetite for arsenic removal. The approach could be used to reduce elevated levels of bladder cancer found in the US and other health problems associated with arsenic in drinking water elsewhere in the world. Studies have shown 20 percent by weight of arsenic can be bonded irreversibly to the nanosystem, which can then be removed from the water magnetically.

EMS award winners

Fourth-quarter Environmental Management System Environmental Excellence Award entries ranged from informal grassroots efforts and a loose network of several hundred bicycle commuters to formal design teams for new Sandia facilities. Awards were presented for:

- Conducting a building-by-building energy-savings contest, and
- Conserving water at the new Microsystems and Engineering Sciences Applications (MESA) complex.

Team recipients in the energy reduction category were Mark Boslough (1433), Dave Castillo (10339), Lorraine Cordova (2027), Boyd Hamilton (12870), Reeve Harriman (5742), Constance Koch (42332), Janette Kohler (6433), Norma Lauben (4528), Bruce Levin (6312), Ronald Martinez (2553), Jeffrey Miller (10248), Adriana Canavan (2122), Gwen Lunsford (4514), Ron Rhea (5925), Kathryn Sedlacek (10761), Alice Starcher (2994), Jason Strauch (1723), and Jake Christopher Trujillo (42341). The team organized and conducted

the 2006 Energy Contest to reduce electrical use. During the first nine months of the voluntary contest, participating buildings showed a 443,000 kilowatt-hour reduction in energy, when compared to the previous year's energy rates. That's an equivalent of 400 tons of carbon emissions.

Team award recipients for the water conservation category were Mike Cieslak (12900), Bill Jenkins (12920), Bill Kitsos (10823), David Bailey (10862), Jim Beals (10822), Mike Strosinski (10322), Darrel Rogers (10863), Ron Jones (1741), and Jeanette Norte and Roke Muna (both NNSA/SSO). Team members reviewed a study of water purification systems and determined that a high-efficiency reverse-osmosis system would best fit demands of the new MESA complex. The system's lifecycle costs were 24 percent less than a conventional system, while calculations show it will save a million kilowatt-hours per year and 43 million gallons of water. The system will also reduce wastewater flow by 36 million gallons annually.

Favorite Old Photo

So long, Bill

Bigger than life Lab News photographer Bill Laskar helped nation visualize technology



BILL LASKAR, who brought a unique — and astonishingly gifted — eye to his work as *Lab News* photographer for almost three decades, passed away last month at age 85. His family was at his side at his death. Bill's work, which graced the pages of the *Lab News* issue after issue, was always something to look forward to. His photographs, which showed engineering in a new light, were reprinted in many national publications. Using his own creativity and art, Bill captured through his lens the creativity and dedication of Sandia's technical staff. Bill was more than a photographer, though. He was, in fact, a husband, a father, a grandfather, a great-grandfather, a friend. He enjoyed a lifelong passion for aircraft, trains, automobiles, and music. Current *Lab News* photographer Randy Montoya says Bill set the bar very high for visuals at Sandia and "still leaves big shoes to fill."

Feedback

Reader questions religious displays in the workplace

Q: Recently, I was in a Sandia building that I don't visit often. I was surprised to see religious pictures hanging on the outside of an office door, and a radio broadcast of a religious program coming from the same office (loud enough to hear in the hallway). In my building, we are prohibited from displaying anything personal on the outside of our doors and we are encouraged to use headphones when listening to music to prevent disruption to other staff. Is there a Sandia policy that addresses these issues?

A: Your question provides us an opportunity to revisit applicable guidance regarding appropriate uses of Sandia property. The issue is "relevance to the business," and the guidance described below applies whether content is religious, as you have referenced above, or otherwise unrelated to the business at hand.

Based on the prime contract governing the management of Sandia, all Sandia property is owned by the government and is to be used for official business, i.e., "... for the performance of this contract." Further, the Property/Assets User's Manual (CPR 500.2.3) also emphasizes that "All Sandia property, whether leased or owned, shall be used only in the performance of official corporate work as stated in the Prime Contract." At the same time, there is corporate acknowledgement that occasional personal/incidental use by employees may occur without adversely affecting the interests of the company. Specifically, *Setting the Standard — Code of Ethics and Business Conduct* advises that we obtain and use company and customer assets wisely: "While these assets are intended to be used for the conduct of Lockheed Martin's [Sandia's] business, it is recognized that

occasional personal use by employees may occur without adversely affecting the interests of the company." *You & Sandia* (our employee handbook) reinforces this with the following guidance under Personal Appearance and Work Area: "To promote efficiency and safety, all work areas are to be maintained in a neat and orderly manner. Materials that offend visitors or fellow workers or that detract from the businesslike appearance of the work area are not allowed." Additionally, relative to information resources, you can review requirements with regard to incidental personal use in CPR400.2.10 — Using Information Technology Resources.

In the situation you described with your question, it appears that your management has provided you and the individuals in your work area with explicit guidance to mitigate the likelihood that you will inadvertently detract from the conduct of business or from the businesslike appearance of your work area. It may be that the occupant(s) of the office you noticed when visiting a different location are unaware of the impact of the non-work-related pictures and the loud broadcast — the implication of your observation is that both detracted from the businesslike appearance of the work area.

That said, as employees, any one of us has the prerogative to bring work-related concerns to management's attention. If you would not feel comfortable sharing your observations with the occupant of the referenced office, you might consider sharing the observation with management responsible for that particular work area.

— BJ Jones, Director (3500)

New NNSA eStore method of buying commodities may mean cost savings for nuclear weapons complex

By Chris Burroughs

Eight organizations that make up the NNSA nuclear weapons complex are joining forces to leverage spending on commodities, possibly resulting in cost savings for all.

The Supply Chain Management Center (SCMC) enterprise-wide collaborative sourcing system went into effect at the start of FY07 and encourages one site negotiating a price on a commodity that would be available to all eight organizations.

"Each site could buy the same commodity from small businesses in their community, but they could all pay the same low price," says Bonnie Apodaca, director of Supply Chain Management Center 10200. "The goal is to have the complex use commodity strategies and corporate

agreements to do business the same way big corporations do."

She gave the example of purchasing computers. One of the organizations in the nuclear weapons complex would negotiate a good price with a main computer manufacturer. The manufacturer's distributor would, in turn, offer the same low price for computers to local resellers at each NNSA site, and the savings would be passed on to the entire complex.

Participating in the new cost-saving program are Sandia, Los Alamos National Laboratory, Y12, Pantex, Lawrence Livermore National Laboratory, Kansas City Plant, Nevada Test Site, and NNSA Service Center. The idea for the collaboration came out of NNSA's 2030 plan that calls for transformations in the way the nuclear weapons complex does business by the year 2030, among other things.

The target for this first fiscal year is to start with two commodities that could be negotiated. Bonnie is part of a team consisting of representatives from all eight organizations in the nuclear weapons complex — the Work Integrated Contractor Product Team — that will make the decision about what commodities to target first. They also will address processes and methods of getting to the end goal of working together.

Another committee made up of representatives from NNSA site offices and service centers is involved in approval processes — like they did early in the fiscal year when it approved the official incentive.

The project started with the establishment of an NNSA SCMC. A signing of a SCMC Business Process Overview Memorandum of Understanding (MOU) followed.

Enterprise-wide collaborative sourcing system

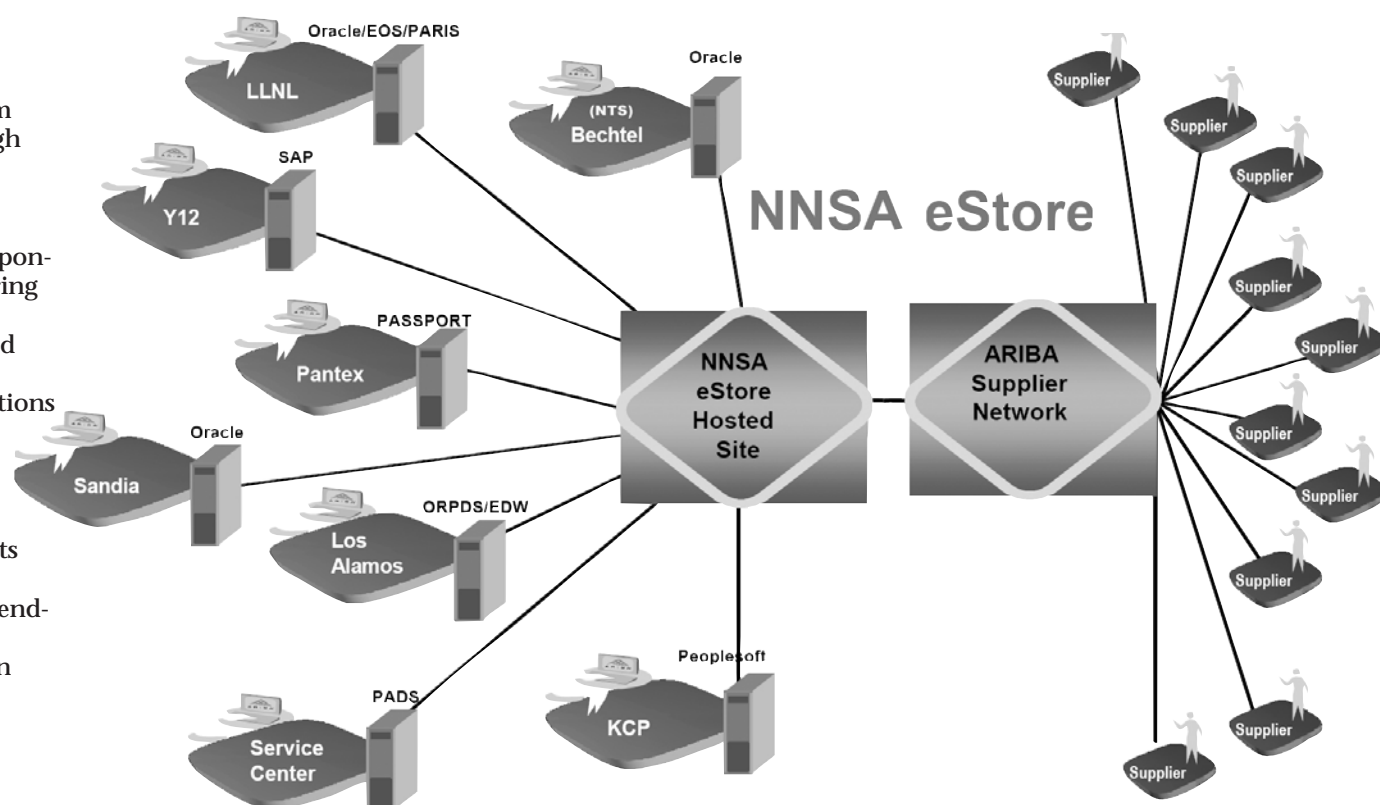
What it is:

- An enterprise-wide sourcing system
- Leverages NNSA's spending through nuclear weapons complex contracts
- A collaborative effort among all nuclear weapons complex participants
- Commodity owners and teams responsible for commodity strategy and delivering savings
- Cost savings shared with NNSA and sites through system utilization
- modeled after the way big corporations do business.

What it is not:

- Does not shift procurement budgets from individual sites
- Does not removed execution of spending from individual sites
- Does not replace systems already in place
- For procurement of everything

The eStore: How it works



Linton Brooks says farewell after nearly 48 years of public service

Note: Ambassador Linton Brooks, who capped a distinguished career as a public servant with a notable tenure as administrator of the National Nuclear Security Administration, kept in touch with his far-flung official family via periodic "Lintgrams." Like the man we all got to know on his occasional visits to the Labs, the Lintgrams were classy, honest, informative, and to the point. Brooks was asked to resign by DOE Secretary Samuel Bodman in the wake of a security lapse in the summer of 2006. Here is Ambassador Brooks' final Lintgram:

At the end of the day today, I will step down as Administrator and turn over my responsibilities to Tom D'Agostino. Within a few days I will leave Government service, probably for the last time. During my tenure, I have sent a number of Lintgrams to all of you. In those messages, I have provided you as much information as I could. People deserve to understand what is going on and perform better when they do. Far more importantly, however, I have tried to convey to you my vision for NNSA, the values I want the organization to embody, and my pride in all of you.

Management experts say the head of an organization should focus on establishing a vision, picking the top leaders, and allocating resources. My interests are too eclectic for me to limit myself to those alone, but I have tried to focus on all three. I am especially proud of the leadership

team we have assembled. Tom is one of the best of those leaders. I know he will do a wonderful job until the President selects a permanent administrator. I am pleased to be leaving NNSA in such good hands.

I have been gratified, overwhelmed, and humbled by the number of you who have expressed your best wishes as I depart. I thank you. If you really want to honor my service, keep working toward our common goals. I had planned to leave in 2009, and hoped that by then: the RRW and Complex 2030 would have been firmly established; we would have completed our scheduled nonproliferation work; our plants would be more efficient; Los Alamos would have solved its current problems; the Livermore transition would have gone smoothly; the Sandia Model Contract would be effective; our oversight model would be accepted and effective; and, above all, that we would have continued our progress toward making the "NNSA of



LINTON BROOKS

the Future" the best place to work in Government. You can still do all of that. Nothing would make me happier than to look at NNSA when the President's term comes to an end and know that you had done so.

Early in the morning on June 8, 1959, under a brilliant blue sky, I stood on the steps of the great Gothic Chapel at Duke University in my new Navy dress whites and promised to "Support and defend the Constitution of the United States against all enemies . . . and to bear true faith and allegiance to the same." I thought then that I was embarking on three years of military service before returning to a life of research. Instead, I spent 47½ exciting years serving America, culminating in the incredible privilege and joy of leading NNSA and working with all of you. It would be foolish to pretend that this is the way I wanted that service to come to an end, but if I had known from the beginning that it would end this way, I would not have hesitated a minute.

Thank you for all you have done for me, for NNSA, and above all for America, which, with all the challenges she faces, is still the greatest country in the history of the world. I will miss you more than you can imagine and I am prouder of you than words can tell. God bless you all, God bless NNSA, and above all may God continue to bless America with dedicated public servants like you.

Good-bye.
Linton

Mileposts

New Mexico photos by Michelle Fleming
California photos by Randy Wong



Linda Garcia
25 4538



Dale Brandt
20 5351

Recent Retirees



Sandra Monroe
30 1825



Anne Gigante
20 1541



Randolph Shibata
20 10245



Biu So
20 2956



Roy Gideon
15 10861



Joseph Padilla
15 4211



Joseph Schoeniger
15 8321



Michael Siegal
15 1112



Ivory Smallwood
15 8514



Clare Stanopiewicz
15 1055



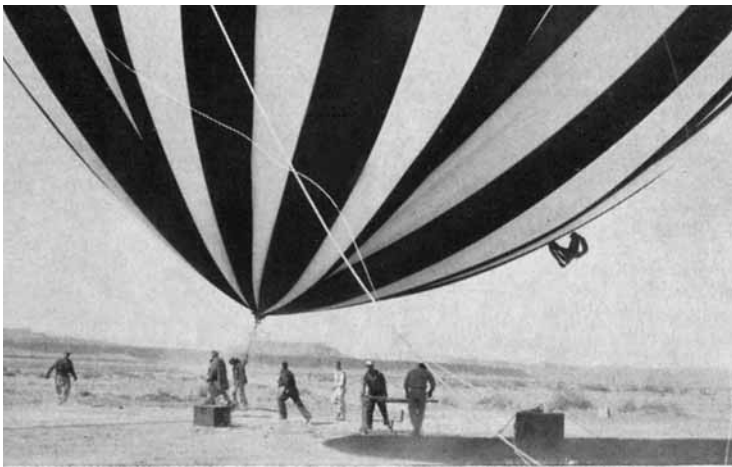
Howard Thomas
15 4241



Bobbie Vital
15 8521



50 years ago . . . Sandia Tests Balloons as Nuclear Detonation Platforms — The real reason for Sandia Corporation's extensive experiments with captive balloons has been revealed by the AEC. During the past two years tests have been conducted by Sandians to determine whether balloons could be used as detonation platforms in Nevada nuclear tests. **Sandia Starts Use of Tonopah, Nev., Range . . . Non-Explosive Tests Use Flares For Night Photos** — First



CAPTIVE BALLOON tests were conducted at the Nevada Test Site to determine whether balloons could be used as detonation platforms in nuclear tests.

use of Sandia Corporation's Tonopah Ballistics Range was made Feb. 8. The range, which is southeast of Tonopah, Nev., was used for practice and instrument-checking operations. Various electronic equipment was calibrated during the day's operation, which involved a B-47 and a B-36 from the 4925th Test Group (Atomic), Kirtland Air Force Base. The Tonopah Test Range will be used periodically in the future for air drops of inert weapon shapes as part of the Sandia development program. Some operations will be in daylight, but others will be at night when better photographic results are possible. The ballistics tests do not involve explosives.

40 years ago . . . New Computer Graphics System Aids Design Engineering at Lab — A new computer graphics system which enables engineers and a small computer to solve problems together was recently installed at Sandia. Such a computer-aided design graphics system requires a tremendous "software" base of graphic data manipulation and design analysis programs linked together in a system tailored to Sandia's specific areas of application. Heart of the Sandia graphics system is a Digital Equipment Corporation Programmed Data Processor-7 (PDP-7), which is a general purpose, solid-state, digital computer. The basic PDP-7 includes the processor with operator console, 16,384-word core memory, a tape reader, paper tape punch, and teleprinter. In addition, peripheral equipment at the Laboratory includes magnetic tape equipment and card equipment. Connected to the computer is a cathode ray tube display (PDP-340) which permits rapid conversion of digital computer data into graphic and tabular form. Location of any desired point may be specified by



A LIGHT PEN was used to sketch an electrical diagram on the Sandia computer graphics system.

any of the 1024 X and 1024 Y coordinate addresses contained in a 9-3/8-inch square on the tube face.

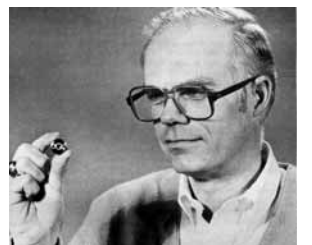
30 years ago . . . E-Beam Machine Will Advance Fusion Research — Sandia Laboratories has begun testing the nation's most powerful electron beam fusion accelerator, a machine that ultimately will produce power outputs of eight trillion watts in



PROTO II electron beam fusion accelerator.

pulses lasting 24 billionths of a second. Named Proto II, the new accelerator is being test fired at a level of about four trillion watts. At full power the accelerator will be used in fuel pellet irradiation experiments to determine if electron beams can be used to produce electric power by controlled thermonuclear fusion. **Labs to Manage Solar Program** — Sandia Laboratories has been named technical project manager for ERDA's Solar Total Energy Program (STEP). Funding for the effort totals \$1.2 million for the fiscal year ending in October. The effort will be centered in Solar Energy Projects Department 5710, which will monitor technical goals and schedules for the nationwide program. The Labs will also provide in-house technical support and undertake tasks complementary to those performed in the industrial sector.

20 years ago . . . Smarter, Smaller, Swifter, Safer . . . SCB: Plasma Generator for Ignition of Explosives — The possible uses to US Industry for a tiny device that precisely ignites explosives a thousand times faster than conventional "hot wires" can set the imagination ablaze. The device could be used to set off air bags in automobiles, collapse old buildings in congested urban areas, fracture rock along a desired contour in mining and prospecting operations, blast irrigation and drainage



SCB PLASMA GENERATOR is a tiny device that precisely ignites explosives a thousand times faster than conventional "hot wires."

ditches, drive cable and wire cutters, and ignite fancier-than-ever strings of fireworks displays. The foundation for such a device is the semiconductor bridge (SCB), developed at Sandia by Bob Bickes Jr. (2515) and Al Schwartz (ret.) and first fabricated at UNM's Center for High-Technology Materials. SCB prototypes were designed in Sandia's Initiating and Pyrotechnic Components Division 2515, supervised by Paul Wilcox, primarily for setting off small charges that actuate a number of functions in weapons.

—Janet Carpenter



THE WORLD IS ROUND — The National Solar Thermal Test Facility — the solar tower — is a familiar landmark in the open spaces out near tech areas 3 and 5. The tower is visible from miles away; early morning commuters traveling south on Juan Tabo Blvd. in Albuquerque can often see the tower glinting in the sun. Most folks — even most

Sandians — have only appreciated the solar tower from afar, but over the years, *Lab News* photographer Randy Montoya has photographed the tower from every conceivable angle and perspective. The image above, shot in the spring of 2006 from the top of the tower looking north, is one of Randy's recent favorites.

You be the judge

Intel International Science and Engineering Fair looks to Sandia for judges for mid-May event

Sandia employees are encouraged to volunteer as judges for the 58th Intel International Science and Engineering Fair (ISEF), to be held May 13-19 at the Albuquerque Convention Center and Tingley Coliseum. The annual week-long event is the world's largest precollege celebration of science and engineering. ISEF brings together approximately 1,500 high school student finalists from more than 47 countries, regions, and territories to compete for more than \$3 million in scholarships, tuition grants, internships, and scientific field trips. The top winners receive \$50,000 college scholarships.

Grand Award judges must have a minimum of six years of related professional experience beyond receiving their BA, BS, or master's degree or must have a PhD, MD, or the equivalent.

About 1,200 judges will be needed to assess the quality of research done by the students. The hosting community is responsible for securing the required judges. Albuquerque was selected as host in part because of the large number of potential judges in the area.

Each year, more than 1,000 professionals including university faculty, medical researchers, industrial scientists, engineers, and representatives of private and federal research centers volunteer their time to interview and reward the participating high school students at the ISEF.

The ISEF has a tradition of attracting extraordinary talent. At the 57th Intel ISEF held in Indianapolis, Ind., for example, 329 of the 1,470 registered finalists were seeking patents.

To become a Grand Award judge, complete the online form at www.intelisef2007.org/judges.asp to provide the information on your area of scientific expertise, any specialized area of concentration, and some personal information that will help officials to assist you while you are at the fair.

Sandians are also encouraged to sign up as category cochairs who will recruit Grand Award judges in their categories and manage/facilitate category Grand Award judges during the two judging days May 15 and May 16. Cochairs are needed in the following categories: biochemistry, materials and bioengineering, energy and transportation, microbiology, physics and astronomy, and animal and plant sciences. Cochairs can go to www.intelisef2007.org for more information.

Sign up as early as possible so that you can guarantee a spot as a judge in your subject of expertise.

— Erin Gardner

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Contact the Host Committee:
 For Intel ISEF 2007:
 505-867-2007 or
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