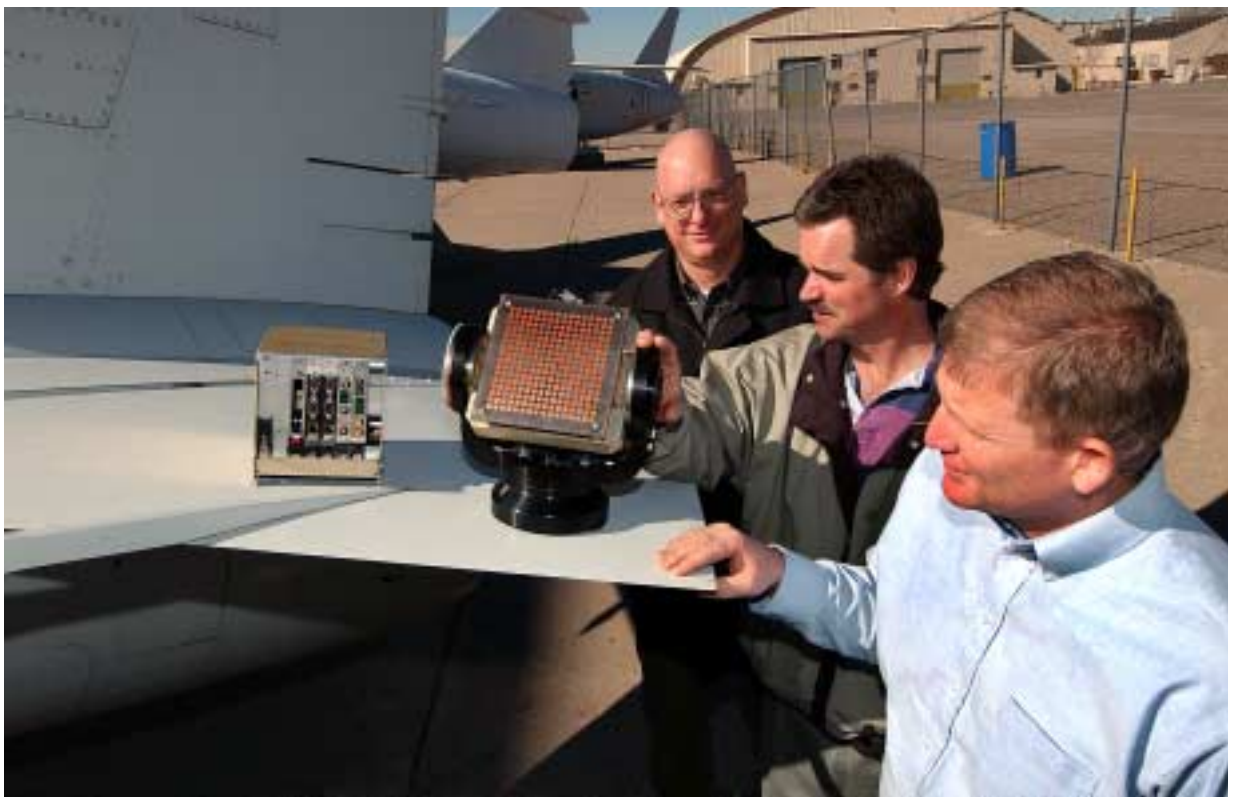
Sandia's miniSAR offers great promise for reconnaissance and precision-guided weapons

Revolutionary radar is five times smaller than existing technology



MINISAR — Sandia researchers, front to back, George Sloan, Dale Dubbert, and Armin Doerry look at MiniSAR assemblies meant to be used for reconnaissance on near-model airplane size unmanned aerial vehicles, precision-guided weapons, and space applications. (Photo by Randy Montoya)

By Chris Burroughs

Within a year Sandia will be flying the smallest synthetic aperture radar (SAR) ever to be used for reconnaissance on near-model airplane size unmanned aerial vehicles (UAVs) and eventually on precision-guided weapons and space applications.

Weighing less than 30 pounds, the miniSAR will be one-fourth the weight and one-tenth the volume of its predecessors currently flying on larger UAVs such as the General Atomics' Predator.

"This is a revolutionary way of doing radar," says Arnold Muyshondt, Manager of Mechanical Design & Analysis Dept. 2332 that designed the gimbal, part of the pointing system of the miniSAR. "Everybody is interested. We're number one in the world pursuing this technology."

The new miniSAR will have the same capabilities as its larger cousins. Like the larger class of Sandia SARs, it will be able to take high-resolution (four-inch) images through weather, at night, and in dust storms. The only difference will be range. The larger SAR can produce an image in the 35 kilometer range due to its larger antenna and higher transmitter power, compared to the miniSAR, which is expected to

(Continued on page 4)

DOE approves CINT construction

Thirty-five research projects receive 'jumpstart' DOE funds

By Neal Singer

During holiday break, when few Sandians were present, an Albuquerque construction contractor dug a deep, axle-breaking trench across G street to bury utility lines to the Center for Integrated Nanotechnologies' (CINT) core facility — a 96,000 square foot building to be built just north of the Kirtland AFB fence on Eubank Blvd. Sandia's construction manager for this project, Bill Hendrick (10824), made sure the contractor covered the hole back up before everyone returned in January.

"We were just a tiny bump in the road when people came back after the break," said Terry Michalske (1040), Director of the Sandia/Los Alamos joint Center for Integrated Nanotechnologies, describing with satisfaction the lack of upset that Sandians experienced when driving the well-traveled road in the new year.

Continued planning and energy are boding good things for the atypical nonclassified facility funded by DOE's Office of Science.

In the arcane but important language of funding, CINT has now passed DOE's Critical Decision 3, which means that all construction plans and activity, to the amount of $75.8 million dollars, have been approved. This includes construction of a gateway facility at LANL in addition to the core facility at Sandia. The core facility is the single point of focus for CINT users and the scientific program; gateways at each laboratory campus assure that outside researchers will have access to specialized capabilities and relevant scientists at each laboratory. (The gateway to Sandia's campus uses existing space in Bldg. 897.)

(Continued on page 5)

Sandia LabNews

Vol. 56, No. 3 February 6, 2004

Managed by Lockheed Martin for the National Nuclear Security Administration

Sandia National Laboratories

Decon formulation likely would stop SARS virus quickly, Sandia/K-State team shows

Results might help officials battle other viruses such as chicken flu

By John German

Decontamination formulations developed at Sandia to stop the deadly effects of chemical and biological warfare agents are likely effective at killing the virus that causes Severe Acute Respiratory Syndrome (SARS), a Sandia/Kansas State University research team has shown.

Last winter, spring, and summer the SARS virus infected 8,898 people in 30 countries and caused 774 deaths. Whether a SARS outbreak materializes this year on a broad scale remains to be seen. So far only a few cases have been confirmed in Asia.

In a series of tests conducted recently at K-State on Bovine coronavirus (BCV), the internationally accepted surrogate for the SARS coronavirus, modified versions of Sandia's DF-200 formulation, also known as "decon foam," fully inactivated BCV samples in one minute or less.

SARS STOPPER — Cecilia Williams (left) and Jill Bieker, two members of a Sandia/K-State research team, inject Sandia's decontamination formulation into a flask containing a surrogate of the SARS virus.

The team now is pursuing funding to conduct similar tests on the SARS coronavirus, and the team's members hope to test the formulations against other emerging infectious diseases such as the avian influenza virus, or bird flu, which now is spreading rapidly through Asian chicken populations and has infected some humans.

Super spreaders

Recent research suggests that the SARS virus can remain active on contaminated surfaces for days, and health officials speculate that places where infected people congregate, such as airports and hospital wards, might have served as super spreaders during the SARS outbreak.

The Sandia/K-State researchers believe that cleaning facilities with chemicals proven to inactivate the virus might significantly blunt an outbreak and possibly prevent regional epidemics from becoming worldwide epidemics.

(Continued on page 4)

What's what

Just so you know: Spell checkers are just sew-sow.

Christine White (1822) pointed that out last week, asking with good-natured sarcasm if the spell checker had "struck again" in a *Sandia Daily News* story about Pantex e-mail being piled up in a "cue" while it was checked for improper messages. "Cue or queue?" she asked.

Then she recalled a similar miscue (clever, huh?) a few pre-CSU years ago. The group that managed the e-mail servers for Bldgs. 805-6-7 sent a voicemail message to building residents noting that the e-mail server was down. When e-mail was restored, the computer group apologized for the downtime with an e-mail message that said: "We apologize for the incontinence this morning . . ."

"Apparently, the spell checker (we checked and it was so) did not know the word inconvenience," Christine recalled. "But after all, it was just a little piddling problem." (Ooooo! . . .)

* * *

By now, California Sandians either got a look at the state of Sandia straight from the horse's mouth (uh. . . apologies to the horse — Labs Director Paul Robinson) or from that old standby: watercooler office talk. But if you missed both of those, you'll be able to catch up on streaming video (watch the *Sandia Daily News* for information about that) or read the *Lab News* report in the next issue. The State of the Labs talk was delivered in Livermore Monday, and Albuquerque Sandians will hear it Feb. 11 in the Steve Schiff Auditorium. That session also will be video-linked live to Sandia offices at Carlsbad, Tonopah Test Range, Nevada Test Site, and Washington. The Albuquerque session was to have been presented Feb. 4, but had to be postponed when Paul was called away for a meeting with NNSA Administrator Linton Brooks.

In Monday's Livermore session, Paul laid out a picture of Sandia's exciting work in new technologies, special military and other national security projects, and "breadbasket" issues such as the outlook for staffing and budgets. It also included a short presentation by MESA (Microsystems and Engineering Sciences Applications) Program Office Director Don Cook (1900) on the importance of MESA to Sandia's future. Catch all this here next issue, or on streaming video — but don't miss it.

* * *

Anyone who's seen Sandia photographer Randy Montoya (12640) at work or marveled at the dimension his images add to the work of wordsmiths — both at the lab and in hundreds of magazines, newspaper reports, and other publications worldwide over the years — will appreciate the current Albuquerque Museum exhibit "The Pulitzer Prize Photographs: Capture the Moment."

The collection includes Associated Press photographer Joe Rosenthal's 1945 photo of Marines raising the US flag on Iwo Jima's Mount Suribachi and Robert Jackson's historic time-freezing image of Dallas nighclub owner Jack Ruby shooting Lee Harvey Oswald two days after the assassination of President Kennedy.

The exhibit will run through April 18. It's a fascinating look at what other members of Randy's fraternity have done to capture our world for the rest of us.

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

Sandia LabNews

Sandia National Laboratories

http://www.sandia.gov/LabNews

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

Sandia National Laboratories is a multiprogram laboratory operated by Sandia Corporation, a subsidiary of Lockheed Martin Corporation and a prime contractor to the US Department of Energy.

Ken Frazier, Editor **505/844-6210**
Bill Murphy, Writer. **505/845-0845**
Chris Burroughs, Writer. **505/844-0948**
Randy Montoya, Photographer **505/844-5605**
Nancy Garcia, California site contact. **925/294-2932**

Contributors: Janet Carpenter (844-7841), John German (844-5199), Neal Singer (845-7078), Larry Perrine (845-8511), Howard Kercheval (columnist, 844-7842), Will Keener (844-1690), Iris Aboytes (844-2282), Michael Padilla (284-5325), Rod Geer (844-6601), Michael Lanigan (844-2297) Michelle Fleming (Ads, Milepost photos, 844-4902).

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

Published on alternate Fridays by Media Relations and Communications Dept. 12640, MS 0165

LOCKHEED MARTIN

Recent Patents

Mary Crawford (1123) and Jeffrey Nelson: Broadband Visible Light Source Based on ALLNGAN Light Emitting Diodes.

John Stephens Jr., F. Michael Hosking, and Frederick Yost (all 1833): Silver-Hafnium Braze Alloy.

William Cook (5511), Sharon Deland (6222), and John Brabson: State Machine Analysis of Sensor Data from Dynamic Processes.

Lothar Bieg (1732), Bernhard Jokiel Jr. (1745), Mark Ensz (15415), and Robert Watson (11500): Highly Accurate Articulated Coordinate Measuring Machine.

Kenneth Peterson (14171) and Robert Watson (11500): Single Level Microelectronic Device Package with an Integral Window.

Steven Allen and Billy Brock (both 2345): Control of Reflected Electromagnetic Fields at an IFSAR Antenna.

Ronald Manginell (1764) and Gregory C. Frye-Mason: Temperature Programmable Microfabricated Gas Chromatography Column.

Daniel Rader (9112), John Torczynski (9113), Karl Wally (8144), and John Brockman (9117): Apparatus to Collect, Classify, Concentrate, and Characterize Gas-Borne Particles.

Ken Condreva (8223): Method for Detecting Moisture in Soils Using Secondary Cosmic Radiation.

Kenneth Peterson (14171) and Robert Watson (11500): Bi-Level Microelectronic Device Package with an Integral Window.

World's bioscience experts discuss securing pathogens

Labs playing a leading role in emerging field of 'biosecurity'

By John German

More than 60 scientists from government-operated bioscience research laboratories around the world are gathered in Albuquerque this week to discuss keeping dangerous pathogens and toxins out of the hands of terrorists.

Sandia's International Security Center is hosting the first-of-its-kind symposium at the International Programs Building in Research Park. One of the Center's missions is to improve US national security by working cooperatively with foreign governments to secure nuclear, chemical, and biological materials worldwide.

The goal of the International Symposium on Securing High Consequence Pathogens and Toxins, Feb. 1-6, is to share information and begin a dialogue with operators of US and foreign government labs conducting infectious disease research about the need for standards and

TALKING BIOSECURITY — Conference technical host Ren Salerno (left, 6924) discusses biosecurity issues with Won Keun Seong of the Republic of Korea's Research Center for Pathogen Control.
(Photo by Bill Doty)

protocols that would lead to improved security at those facilities, says Ren Salerno (6924), the conference's technical host.

Although most bioscience labs have systems in place to prevent people from being accidentally exposed to infectious diseases, no international guidelines exist that specify how labs should prevent malicious theft or sabotage of biological materials, says Ren.

"We recognize that it makes little sense to lock down US bioscience labs if those who intend to steal pathogens could more easily accomplish their objectives overseas," he says.

"It makes little sense to lock down US bioscience labs" without international conventions in place.

Since 9/11 and the anthrax attacks of 2001, he says, the US government has invested in various measures to improve the country's ability to respond to bioterrorism — new vaccines, therapies, sensors, disease-tracking systems, and improved public health infrastructures, for example.

Biosecurity, which aims to keep terrorists from obtaining the material necessary to make a biological weapon, is one of the only preventive measures that has been pursued, he says. It is now a federally mandated requirement for US bioscience laboratories.

Sandia is playing a leading role in the relatively new field of biosecurity, he says. Labs security experts are recommending that biosecurity standards be adopted worldwide and considered as national implementation measures for the Biological Weapons Convention.

NNSA's Office of Nonproliferation Policy is sponsoring the symposium.

California site holds annual royalty celebration

By Nancy Garcia

Saying "invention and innovation are an integral part of our charter," Sandia President C. Paul Robinson congratulated 96 inventors and authors for their intellectual property contributions at the California site in 2003 during a recent royalty celebration.

"To know that every once in a while, a thought you once thought, more likely than not, is one that nobody else ever thought," he remarked. "There is no greater real joy than that creative moment."

PRAISING the inventors and authors, California Laboratory VP Mim John said she appreciated the quotations they provided to read aloud at the event (see: http://nestor.ran.sandia.gov/CASBO/pages/buds/03_royalty_celebration/03_royalty_celebration.htm.) Labs Director Paul Robinson provided a quotation in his remarks from Arthur C. Clarke, saying, "Any significantly advanced technology is indistinguishable from magic."

Once the idea is reduced to practice and perhaps even commercialized, there's the further satisfaction of seeing that these ideas do really work and can help contribute to securing a peaceful and free world through technology.

Another tangible reward is receiving royalty revenues. Sandia has distributed more than $3.16 million to inventors and authors since royalty awards were initiated in 1992, California Laboratory Vice President Mim John said. The site's total income from active licenses was $1.6 million, nearly half Sandia's $3.3 million total.

PROUD RECIPIENTS of royalty recognition for 2003 pose together at the ceremony in mid-January.

Sandia's growing intellectual property portfolio has "proved to be extremely valuable to a lot of people out there in the real world," Mim said. "I can think of no better institution than the California site that embodies that."

Overall, Sandia filed 202 patent applications for a total surpassing 1,800 and received 125 issued patents, bringing the number of patents issued in total to 947. Another 170 licenses were negotiated last year and 820 are currently active.

In California 63 patents applications were filed for a total of 365 and 33 issued for a total of 152. Forty-four new licenses were negotiated for 147 total active licenses.

Inventors and authors receive 20 percent of royalty revenue, which amounted to almost $311,000 at the California site and almost $660,000 total.

Rick Stulen, Director of 8100 Center for Exploratory Systems and Development, praised the "incredible job" business groups in New Mexico and California are doing. "More than you probably know," he said, "they are working hard to make agreements and discoveries come alive."

Sandia CaliforniaNews

"More than you probably know, they are working hard to make agreements and discoveries come alive."

Denise Koker, Manager California Site Business Office Dept. 8529, said it was awesome to be in the company of so much creative brainpower before reading aloud the titles of the technical breakthroughs.

Recipients contributed some inspiration of their own by providing quotations to accompany their awards. They were each photographed with their awards flanked by Paul and Pace Vandevender, VP for Science, Technology, and Partnerships Div. 1000.

Sandia's review and approval process about to get simpler

Starting next month, IES-sponsored process goes online

The Review and Approval process for unclassified journal articles, videos, conference papers, and other items created for public release is about to get simpler.

Starting next month, the review and approval process can be done online.

"We expect this new system to be a significant time saver," says Anna Nusbaum, Manager of Recorded Information Management Dept. 9612. "Today's paper-based process can take up to two weeks. Our ultimate goal is a three-to-six-day turnaround."

The new process uses Sandia's SRN. The submitter gets into a review and approval software program on the SRN and is prompted for information about the release, such as title, author, event, etc. The submitter then identifies a Sandia contact. The application will store the unclassified electronic file in Web FileShare, Sandia's four-year-old web-based information management system. A document tracking number will be assigned and e-mail notifications will be sent to the appropriate reviewers.

The Sandia contact will receive an e-mail notification when the release has reached final approval. Any reviewer comments will be documented in the database.

Dorothy Martin (9612-1), Sandia's review and approval administrator, will work with the Sandia contact to make sure that any required changes are incorporated and a revised version of the electronic file is delivered to the Technical Library. Dorothy will also monitor the database to make sure that requests do not sit any longer than 48 hours with a single reviewer.

"We expect this new system to be a significant time saver. Today's paper-based process can take up to two weeks. Our ultimate goal is a three-to-six-day turnaround."

To supply additional aid to the user community, the new application allows submitters to track their review and approval submissions and includes a robust reports module, which supplies either an Excel spreadsheet or HTML printout of search results

The idea for an electronic review and approval application was first explored in August and November 2002. Participants included representatives from line customers and process participants — Records Management, Classification, Patents, Video Services, Lab Communications, WebCo, Printing and Duplication, Partnerships, Computer Security, and the Technical Library from both New Mexico and California. After studying the current workflow, the team identified areas for improvement, set new goals, and outlined the necessary application criteria.

"It was a pleasure working with the various R&A process participants. All of the representatives were so cooperative and truly focused on how we best serve the line customer," says project lead Jean Ann Plummer.

Anna presented the proposal to the Integrated Enabling Services (IES) Strategic Management Unit, which supported and funded the project. Allowing Sandians to have their information releases reviewed and approved electronically met all four of the IES objectives: agility, productivity, decreased hassle, and worth the cost. In particular, Sandians should expect to see increased productivity and decreased hassle once the application is deployed Labs-wide.

During February, focus groups will supply customer feedback on the product. The application will then be piloted in Division 9000 in March. Labs-wide deployment is scheduled for March 30. Two workshops to be held at the Steve Schiff Auditorium and video-linked to Sandia/California will be scheduled in February to introduce the new application to the Labs. *Sandia Daily News* will carry more information about the workshops over the next month.

Anyone with questions about the new electronic review and approval process can contact Jean Ann Plummer at 284-3536 or japlumm@sandia.gov. — *Chris Burroughs*

MiniSAR

(Continued from page 1)

get a range of about 15 kilometers — more than adequate for small UAV applications. SARs are commonly used for military reconnaissance purposes.

For two decades Sandia has been making major strides in shrinking SAR size and increasing performance.

MiniSAR is a revolutionary step forward in this long tradition that will open up a whole new class of applications, says George Sloan (2345), project lead for miniSAR development.

George, Dale Dubbert (2345), and Armin Doerry (2344) created the current approach for miniaturized SARs several years ago but couldn't garner much interest from funding sources. With a miniSAR vision in mind, they started designing key components under various Laboratory Directed Research and Development (LDRD), DOE, DoD, and NNSA technology programs. Since then, the effort has incorporated a number of key technologies, including mechanical design (2332), digital miniaturization (2341), RF miniaturization (2345), and navigation (2338) expertise. Today the separate programs have grown into a recognized project under manager Kurt Sorensen (2345).

After the gimbal and electronics teams got the miniSAR down to its diminutive 30 pounds, they took it to a UAV conference in November where it generated tremendous interest.

ONE PRIMARY APPLICATION of miniSAR will be reconnaissance on small UAVs, such as the AAI Corp. Shadow seen in this picture. This class of small UAVs can carry a payload of 50 pounds, which is considerably smaller than existing radars.

The tiny radar that no one wanted was now the talk of the radar world.

In recent months, more than 30 potential customers, including intelligence agencies, UAV manufacturers, and major radar vendors, have visited Sandia to discuss possible licensing and use of the miniSAR. They are all now waiting for it to fly so they can see an actual image. That is expected to happen in about a year.

The new miniSAR 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.

Through the creation of new ultra-lightweight antennas and miniaturization of the gimbal, the miniSAR team was able to reduce the AGA portion from 60 pounds, as in current UAVsystems, to 18 pounds. Through novel adaptation of state-of-the-art digital and RF technologies, the REA was reduced from about 60 pounds to eight. Future versions of miniSAR are planned that will shrink the total weight to less than 10 pounds by leveraging both in-development and yet-to-be developed Sandia microsystems technologies.

George says that miniSAR will have two primary applications. It will be used for reconnaissance on small UAVs, such as the AAI Corp. Shadow. This class of small UAVs can carry a payload of 50 pounds, which is considerably smaller than existing radars. Thus they are limited now to carrying video or infrared cameras. The small UAVs should easily carry a 30-pound miniSAR in addition to other sensors that together will provide a very detailed reconnaissance picture.

The other application is for precision-guided weapons. Current guidance systems for these weapons rely on target designation methods that are subject to jamming and have trouble operating in bad weather and dust storms. MinSAR is resistant to these problems. Previously SAR versions were too big, too heavy, and too expensive to use in precision guidance applications.

"We look to making the miniSAR small, light, and affordable," George says.

He says the researchers are now very close to having a miniSAR compatible with the small UAV requirements for cost, size, and weight. They are "a little farther away" for precision guided weapons, but are on the path to making it possible.

"A SAR on a small UAV should cost one-third of what the platform should cost," George says. "We have the cost down to about $250,000, which is acceptable."

Because a precision guided weapon would be destroyed, the miniSAR should cost about $60,000 and "we aren't at that point yet," George says.

George says the miniSAR is near to being flight-tested. The principal remaining tasks include the integration of the radar subsystems and the completion of the system software. Then the first version of miniSAR will be ready to go.

George anticipates that in about a year the miniSAR will be flight-tested on a Sandia test-bed aircraft. Then UAV vendors will demonstrate it on their own UAVs. The transfer of the technology to industry will follow.

But even as all this happens, the Sandia researchers will continue to make improvements and help miniSAR evolve into something even better and smaller. "We fully expect miniSAR to be the next big splash," George says.

MiniSAR consists of many technologies

MiniSAR consists of many technologies that will be of interest to different industries. The result is expected to be numerous licensing agreements.

The first will be the scaled-down gimbal that has caught the interest of Albuquerque-based gimbal manufacturer Sagebrush Technology. Sandia is in the process of licensing the technology to the company that may use it in SARs, movie cameras, and high-end surveillance cameras.

SARS virus

(Continued from page 1)

The Sandia decontamination formulations are designed to be less harsh and easier to use than other chemicals used for decontamination of biological agents, such as bleach and ammonia. Tailored formulations have been under development at Sandia for military and homeland security uses since 1996.

In 2001 the earliest version of the commercially licensed foam were among products used in cleanup efforts at facilities contaminated with anthrax in New York and Washington, D.C.

Margin of certainty

To give the researchers enough scientific confidence that the formulation would reliably stamp out SARS regardless of the circumstances, the Sandia/K-State team tested the formulations against BCV using cell culture methods with and without organic material present. Organic materials such as soil and feces may improve the survival rate of coronaviruses and can react directly with the disinfectant to make it less effective.

They also used diluted concentrations of the formulation, down to 10 percent of normal, and altered recipes of the formulation with similar results.

"We didn't want to test the formulations in the best-case scenario," says Cecelia Williams (6245). "We wanted the worst-case scenario to provide a margin of certainty that this would inactivate the SARS-causing virus under real-world conditions."

Two commercially available versions of the Sandia formulation also were effective in inactivating the virus in the tests, she says.

Currently no disinfectant products are registered with the Environmental Protection Agency (EPA) specifically for killing the SARS virus on surfaces.

Protocols for viral inactivation

A second significant outcome of the joint research is a set of protocols and a methodology to verify viral inactivation, says Mark Tucker (6245). A SARS workshop in October 2003 sponsored by the World Health Organization identified the standardization of test protocols as one urgent need in responding to future SARS outbreaks.

Currently very little information is available in the scientific literature regarding chemical inactivation of viruses, says team member Jill Bieker (6245), a Sandia student intern currently working on a PhD at K-State. The work at K-State is conducted under the guidance of Dr. Sanjay Kapil, a world-renowned coronavirus expert.

As part of the project, Sandia conducted experiments to develop methods of applying the formulation and to determine how inactivation can be measured and verified. The team also modified common laboratory diagnostic tools and assay techniques to test the foam's efficacy against BCV.

The work built on previous efficacy studies on chem-bio agents Sandia had performed for DOE, the

(Continued on next page)

Epidemics and national security

Minimizing epidemics is a national security issue for several reasons, says Mark Tucker (6245). Severe outbreaks originating in the US or elsewhere could kill or sicken Americans, contaminate food supplies, or destabilize foreign governments.

Such outbreaks also could cause fear and economic disruption. The rumor of a case of SARS in Singapore in December 2003 created a rapid, if temporary, spike-down in Singapore's stock market.

The virus' pervasiveness in China in November 2002 forced FIFA, soccer's world governing body, to move the Women's World Cup last summer from China to the United States, costing the Chinese billions in tourism dollars.

"The first SARS outbreak was estimated to have had a $30 billion impact on the economy worldwide," he says.

CINT

(Continued from page 1)

At Sandia, utility burial by Albuquerque's Gardner Zemke Company is already in progress for $1.2 million, and final procurement reviews certifying the suitability of bids for construction of the Core Facility should be completed by DOE about the time this article appears.

"By the end of March," says Terry, "we should have a winner [in bidding for the remainder of the project]. We anticipate groundbreaking in May."

Facility already accomplishes work

The CINT facility is unusual in ways other than its joint use of two defense lab facilities. Though in terms of bricks, glass, steel, and mortar, CINT is only a project under construction, programmatically the Center is already in operation. Advance DOE funding makes it possible for selected researchers around the world to use equipment and to partner with experts already available at both labs.

These projects are unlike others at the Labs because they are externally driven.

"CINT provides support for our Labs researchers to work on projects important to external users," Terry says of the international facility.

The far-sighted approach is expected to generate a productive cross-fertilization of ideas and, eventually, new deliverables beyond current imaginings.

Thirty-five projects proposed by researchers at 24 universities from 16 states and Great Britain have been approved for a total of $1.5 million in DOE "jumpstart" funds. The winning projects (out of 80 proposed) were evaluated by scientists external to the labs for their science quality, and by researchers within the two labs who certified that expertise and equipment were available for the proposed project. Final selection of approved projects was made by the CINT management team, consisting of Terry along with Don Parkin, CINT Associate Director on staff at Los Alamos.

The new projects will address the flow of liquids through nano-scale channels, advanced imaging of biological membranes, development of super-strong nano-composite materials, and other forefront scientific topics that build from CINT's core of expertise in nanoelectronics and nanophotonics, complex functional nanomaterials, nano-bio-micro interfaces, nanomechanics, and theory and simulation.

Work at the Center is deliberately non-classified to allow the widest range of input of seed ideas. Terry intends for future projects to demonstrate increased collaboration with industry as well as universities.

A CONSTRUCTION COMPANY dug a deep, axle-breaking trench across G Street and north of the Kirtland Air Force Base fence over the holidays to bury utility lines to CINT. (Photo by Bill Hendrick)

SARS virus

(Continued from preceding page)

military, and the Department of Homeland Security.

"The protocols developed for this project could be rapidly modified to help provide health officials and researchers around to world with a method of verifying viral inactivation," says Jill. "It would allow officials to respond more quickly to future disease outbreaks and to quickly identify the disinfection products that work best against a particular virus."

SARS and other viruses

The researchers are optimistic that the Sandia formulations could become an effective means of minimizing the spread of returning viruses such as SARS and the Norwalk (cruise ship) virus, as well as more common viruses such as influenza.

"Flu and other viruses have similarities that give us reason to believe our formulations would be useful for general viral disinfection and decontamination if used for regular cleaning of certain facilities," says Jill.

The Sandia decontamination formulations can be deployed as a foam, fog, mist, or spray, meaning they could be sprayed on walls or dispersed as a fog throughout the air-handling system of a building, says Cecilia.

Team members include Cecelia , Jill, Mark, Caroline Souza (6245), Dr. Sanjay Kapil (K-State), and Dr. Dick Oberst (K-State).

Needing data

The joint effort began in June 2003, just as the initial SARS outbreak was winding down, when Labs Executive VP Joan Woodard asked whether Sandia's decontamination technology would be effective against the SARS virus.

The foam team's response was, in essence: "We think it would be effective, but we won't know until we have some data."

"We thought it would work well against SARS, but we needed to work with something similar," says Cecelia Williams.

VP-6000 Bob Eagan helped secure mid-year LDRD funding, and the project was under way. The initial work to define study parameters and modify formulations was done at Sandia. Later work with BCV was done at KSU.

"We have made significant progress in a short period of time," says Mark. "The goal was to have something to contribute this winter in case SARS came back as a seasonal virus, like the flu."

Playing a leadership role

So far this year only a few SARS cases have been confirmed in Asia, but Mark says the effort puts Sandia in a position to play a leadership role in establishing consistent worldwide protocols for disinfection efficacy for SARS should the need arise.

"Being first and having solid scientific data and a protocol gives us a real strong hand in saying this is how you do it," he says.

The work to inactivate SARS is part of a larger Sandia program to develop a toolkit of technologies useful for responding to future infectious disease outbreaks. The program includes research to model air flow and predict the transport of airborne chemical and biological agents through buildings or aircraft.

CINT research projects deal with variety of subjects

CINT projects deal with a variety of subjects of interest to researchers working at very small scales. Among those:

Jim Eisenstein, Caltech physics professor, will collaborate with Mike Lilly (1123) in exploring a property of surface acoustic waves. "We are interested in the following apparently simple question: Is a low-density 2D electron system an insulator or a metal?" Eisenstein asks. "You'd probably guess metal, but at low enough density it is always an insulator. The transition between the two behaviors is our focus of interest."

SAWs will open a new window on this (very hot) issue, he says.

"Since the SAW carries an electric field along with it, it will interact with the 2D electron layer which is buried just below the surface. In effect, some of the energy in the SAW is dissipated in the 2D electron gas. By monitoring the attenuation (and velocity shift) of the SAW we learn about the 2D electron system on length scales given by the SAW wavelength. This is very hard to do by other means."

Tom Picraux, a former Sandia director who is now executive director of materials research and professor at Arizona State University, expects to combines surface chemistry expertise at ASU with surface characterization expertise at Sandia/CINT, particularly that of Jack Houston (1114) and Bruce Bunker (1141). The intent will be to develop photoswitchable surface monolayers that allow nanoscale control of interfacial properties for nanomolecular devices. Says Tom, "Applications exist for reversible photoswitchable materials in the fields of micro- and nanofluidic valves, pumps, preconcentrators, and separators and for use in the areas of drug delivery, sensing, and environmental monitoring."

Dawn Bonnell, professor of materials science and director of the Center for Science and Engineering of Nanoscale Systems at the University of Pennsylvania, is interested in furthering the synthesis of functionalized optoelectronic and ferroelectronic nanoparticles. "It's the expertise of the scientists more than the equipment that we're looking forward to sharing at Sandia," she says, mentioning in particular Tim Boyle (1846). She hopes to create "an extensive link between our scientists and the CINT center through this program."

Larry Sklar, a UNM pathology professor and research director of UNM Cancer Research and Treatment, says, "We're developing a high through-put technology for medical testing purposes. But in our system, there's [unwanted] carryover from sample to sample. Sandia has the potential for reducing that. We'd be working with [Sandia Fellow] Jeff Brinker (1002) and his colleagues. We have tools that will help him characterize performance, and he'd help us reduce carryover."

The project is based upon current UNM work to develop high through-put flow cytometry and its application in proteomics and drug discovery for the receptor targets of about 50 percent of prescription medicines — the G protein coupled receptors. "While we have solved some of the microfluidic problems, some persist, including carryover between samples and mixing." The aim is to find superhydrophobic materials, that when coated on the inner surfaces of delivery tubing, could help solve problems the UNM group has identified.

Atul Parikh, applied physics professor at the University of California at Davis, is interested in small-scale imaging the dynamics of biological membranes, both time-resolved and spatially. "At Los Alamos and Sandia, our collaborators have expertise and equipment unavailable at UC Davis," Parikh says. "[UC Davis scientists] may be working on DNA, for example; the question of membranes would not fall into their range of interest." He views the CINT project as a seed effort. "If a model system provides useful data, we could go on to more complex models." Parikh describes himself as a long-time collaborator with Jeff Brinker, Darryl Sasaki (1141), Allen Burns (1141), and Michael Kent (1851). He is already badged with visitor status at both labs.

Sankar Das Sarma, a Distinguished University Professor of condensed matter physics at the University of Maryland, says, "You have one of the best experimental groups working in an area [of materials properties] of interest to me." He mentions in particular Mike Lilly, John Reno, and Jerry Simmons (all 1123) and his materials group.

"I'm a theoretical physicist and it's natural for me to interact with them," he says, "because theoreticians need experimentalists to confirm their ideas and provide new ideas." In return, theoreticians provide explanations of current results and suggest avenues for new experiments. "It's a two-way street," Das Sarmar says.

His calculations are currently focused on systems being studied at Sandia. "It's a fabulous facility at Sandia," he says, "growing very fast samples that apparently are not grown anywhere in the US. Only at Sandia can it be done. We'll publish papers jointly. It's a wonderful situation."

Eleven teams win Gold President's Quality Awards

By Chris Burroughs

Eleven teams were named Gold Award winners Jan. 15 during the 11th annual Sandia President's Quality Awards (PQA) program. Also awarded were eight Silver Awards and five Turquoise Awards.

The PQA Program is designed to provide a self-evaluation of project activities. It encourages Sandia teams to identify customer needs and requirements, implement improved processes, as well as monitor and measure the quality of goods and services provided to the customers. The program is intended to be compatible with all customer-required quality systems at Sandia, including ISO 9000:2000, QC-1, or 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.

Here are this year's Gold Award recipients:

Model-Based Product Acceptance

In response to a request from DOE/NNSA Weapons Quality Division (WQD) and the ADAPT campaign at Sandia, Center 14100 formed the Model-Based Product Acceptance (MBPA) Product Realization Team (PRT) in June 2000. Its mission was to develop a model-based process that was documented and qualified and demonstrate the effectiveness of the process through the acceptance by DOE/NNSA of a war reserve (WR) product that had been manufactured, inspected, and submitted to DOE/NNSA using the process. On Dec. 17, 2002, DOE/NNSA's Weapons Quality Division accepted five B61 (a nuclear weapon in the US stockpile) trainer housings produced by the MBPA PRT using the MBPA generic process. The accepted parts were then shipped to the Kansas City Plant into its bonded stores for use in B61 trainers it would build in 2003. In recognition of these significant contributions, DOE/NNSA presented the PRT with its 2002 Weapons Award of Excellence on Aug. 12. The PRT used quality practices and principles to achieve this breakthrough result for Sandia and the Nuclear Weapons Complex.

Team members include: Stephen Baca, Terrance Smith, Maureen Roesch Baca, Patricia Barthelemes, Dan Rathbun, Peter Chauvet, Ronnie Albers, Edwin Bryce, Monico Lucero, Douglas Abrams, Raymond Sanchez, Louis Perez, William Nance, Perry Cowen, Jane Poppenger, Rick Pierson, Lee Rieger, Dan Pellegrino, James Paustian, Jamie Welles, and Larry Varoz.

Concurrent Design and Manufacturing Project Realization Team

Concurrent Design and Manufacturing (CDM) is a heavily matrixed program within the Nuclear Weapons Strategic Management Unit. CDM is made up of a leadership team from Division 14000 (Program Management), technical Product Realization Teams (PRTs) from Centers 1700, 2500, and 2600, other internal production at Sandia, and up to 20 outside suppliers/manufacturers scattered across the United States. CDM's role is to manufacture complex, high-quality weapons parts in small volumes within budget. Since its beginning as the Manufacturing Development Engineering (MDE) program in 1991, CDM has delivered more than 60,000 components. The goal of the CDM program is to provide the principal customer, the NNSA, with weapons parts delivered on time, within budget, and with 100 percent acceptance (no quality rejects). During Fiscal Years 2001 and 2002, CDM delivered 64 lots totaling 9,199 components to the NNSA. CDM achieved a perfect quality record for these years by delivering all parts on time, with 100 percent NNSA acceptance, and within program budget. This record of achievement has continued through FY 2003.

Team members include: John Sayre, Dexter Boone, Jim Salas, Timothy Mirabal, Robert Sanchez, Larry Moya, Richard Berget, Donald Hardy, Louis Malizia Jr., Edward Binasiewicz, Dana Thomas, Larry Demo, Michael Kopczewski, Clarence Collins, Hans Papenguth, Larry Whinery, William Shelton, Dennis Martin, Randy Dabbs, Bruce Fishel, Robert Baron, Raivo Leeto, Michael Beeler, and Nancy Clark.

Microsystems and Engineering Sciences Applications (MESA) Line-Item Construction Project

The MESA Project — the largest capital construction project ever undertaken at Sandia — will create three new facilities, upgrade an existing facility, and provide the equipment required to design, integrate, prototype, and fabricate qualified microsystems-based components for nuclear weapons. The MESA Project is an essential element of the Microsystems Engineering effort to integrate activities for the Stockpile Life Extension Program (SLEP) and to position DOE/NNSA to meet new national security initiatives and directives. MESA is a Congressional Line Item and was originally funded by DOE at a baseline level of about $61 million a year with a projected project completion date of FY11. One of MESA's ongoing challenges — and one of its measures of customer satisfaction — has been to work with Congress to obtain increases over the baseline allocation in order to accelerate construction to ensure that mission timelines are met. As a result, the projected completion date has been pulled in to FY10. The MESA Project Team is comprised of more than 40 people matrixed from 27 Sandia organizations, plus end users. Now in its fourth year, the MESA Project encompasses a wide range of activities.

Team members include: William Jenkins Jr., Karen Higgins, Edna Nolan, Cindy Olson, David Bailey, Tom Jarvis, Gilbert Aldaz, Dianne Sanchez, Adrianne Marquez, Diana Fox, Roke Diaz Muna, William Balassi, Donald Losi, Eddie Dumas, Michael Kupay, Gary Yuhas, Kirk Mcwethy, Jon Eberhart, Michael Street, Ivory Alexander, Mark Schaefer, Daniel Fleming, Frank Martin, Donald Cook, Stanley Harrison, David Plummer, Rickard John Davis, Christopher Armando Hall, Jeffrey Randall, Jeanette Norte, Karen Keyworth, Ronald Jones, Linda Roche, Richard Coy, William Paul Ortiz, William Kitsos, Marvin Clark, Rhonda Dukes, Jennifer King Girand, Peggy Warner, James Beals, Raylina Robertson, and C. Bryan Drennan.

Sandia Science & Technology Park

The Sandia Science & Technology Park (SS&TP) is a 200-plus-acre technology community located adjacent to Sandia along Eubank Blvd. in Albuquerque. The vision of the park is "to be the premier national technology community for the purpose of business and technology innovation, job creation, and economic development." The park provides locations for companies that are currently working with Sandia or have the potential of working with the Labs in the future. The SS&TP is a major partnership tool for Sandia. The park will enable Sandia to increase its business and mission capabilities. The park serves an economic development role for Sandia and the Albuquerque community. It is estimated it will create 6,000 to 12,000 technology-based jobs over the next 20 years, and thus is an economic driver for the entire region. Public and private investment in the park is more than $118 million and demonstrates the support the park has received from both public and private sectors. The park was recognized in March 2002 with a Piñon Level Quality New Mexico Award and in March 2003 earned a Roadrunner Level Quality New Mexico Award for the processes it has established and managed and the results it has achieved.

Team members include: James Clinch, Jacqueline Kerby Moore, Carmen Good, and Louis Carl Becker.

Managing Diversity Competence: Achieving Results through People (DVR502)

DVR502 is a Web-based, quick, simple, self-paced learning tool designed to develop competence in managing diversity. The Managing Diversity Competence (DVR502) project team was charged by Sandia's Diversity Leadership Program to create a learning tool to increase diversity awareness and competence of Sandia management while providing convenient access for all Sandia personnel. A sound methodology for strategic culture change includes the ongoing education and competency building of the people of the organization, a key element in building the foundation for change necessary in a model diversity program. DVR502 cultivates those behaviors, which, if manifest, bridge identified gaps to overcome "employer of choice" barriers and promote higher performance. Some of the strengths of this product are: user discretion regarding time, versatility for individual or team applications, rich resources for expanded learning, and relevant and interactive scenarios. Key customer requirements were determined by input from customer and stakeholder representatives. Upon implementation, customer satisfaction and feedback were continuously monitored and acted upon through end-of-scenario evaluations and comments and observations provided by users. The first DVR502 module was released in June of 1999, followed by 12 subsequent releases over the next three years.

Team members include: Elsa Glassman, Margaret Harvey, Patricia Layden Jerabek, Gail Szenasi, and Barbara Lucero.

The Sandia National Laboratories Corporate Mentoring Program

The unique variety of talents, skills and knowledge that enable Sandia to achieve technological and professional advancement are at risk of "draining" away with retirements and attrition. Yet, to succeed in its mission, Sandia requires a cadre of skilled, creative employees. The need to retain and develop staff, both for business results and for realizing good return on Sandia's investment in people, is made even more pressing by the challenges of globalization,

(Continued on next page)

Silver and Turquoise winners

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

Silver Award winners: Employee and Labor Relations Disciplinary Tracking System, Jannifer Levin; MC4655 Warhead Interface Module, Ronald Diegle; Weapon Program Phase 7 Process Development, Mark Ekman; The 2003 Logistics Forklift Safety Rodeo Event, Elizabeth Carson; Adult Treatment Panel III Salud Cholesterol Program, Karen Skousen; Operations Security (OPSEC) Awareness Initiative, Reginald Tibbetts; Decision Support Systems Operation Team, Christine Saavedra; and NELA Transportation Vehicle (NTV) Team, Grace Miranda.

Turquoise Award winners: Microsystems, Science, Technology and Components Personnel Introduction/Checklist, Rose Gehrke; Division 14000 Environmental Waste Management Program, Max Saad; Information Design Assurance Red Team Training Program, Ruth Duggan; Quick Bolt — Weapon Impact Assessment Transmitter, Vincent Hindman; Accreditation Association for Ambulatory Health Care Accreditation Project, Marta Leon.

Gold PQA

(Continued from preceding page)

generational changes, and technological advances. Sandia's Corporate Mentor Program offers a solution, providing a mechanism for the development, retention, and return on investment of the Laboratories' people and knowledge. The program was designed in 1995 in response to several business drivers, chief among them, the increasing threat of losing "living knowledge" and the need to increase productivity of new employees and leaders. By sheer numbers of participants, the program has been a success, increasing from 68 participants in 1995 to 454 participants in 2003. In addition, the program has sustained steady growth and has been used as a model for other Lockheed Martin companies. In 2003, Corporate Education, Development, and Training, in conjunction with LTD Unlimited, performed a study of the program. The purpose of the study was two-fold: first, to examine the program's past performance and sustainability, and second to explore ways to take the program to the next level. The Corporate Mentoring Program has been maintained through continuous monitoring and improvements. This latest effort provides data on the program's successes and improvement opportunities.

Team members include: Rebecca Burt, James Stephens, Timothy Skaggs, Debra Chavez, T. Bernadette Montano, Colette Bristol, Beverly Silva, Ellen Wilsey, Rebecca Campbell, Rose Gehrke, Lorraine West, Beverly Kelley, Patricia Sanchez, Deborah Nunez, Bonnie Hardesty, Jeraldine Dye, Charles Hollis, Linda Louise Logan-Condon, Charline Wells, Tiffany Tibbetts, Soila Brewer, John Shaw, Kathryn Knowles, and Maxine Koester.

US Savings Bonds Self-Service Web Application

In prior years recording an individual employee's US Savings Bonds deductions, selections, and co-owner and beneficiary assignments suffered from many problems. While employees could sign up for bonds via a Web application, the Web application did not communicate with the corporate system where those deductions and designations were required to be stored for access by the payroll system. This resulted in duplicate entry and inaccurate recording of this information within the corporate database. As a result, the Payroll Department, at considerable cost, instituted a 100 percent audit of every transaction to reduce errors. Since the commercial payroll software used by Sandia contains no adequate functionality permitting employees to maintain this information for themselves, a team was formed and chartered to develop a Web application that would permit employees to: enter and modify an amount to be deducted from each of their paychecks for the purchase of US Savings Bonds; designate which bonds they wanted to purchase with that deduction amount; designate who the beneficiaries and co-owners were for each bond purchased; and enter a one-time deduction from their paycheck to purchase bonds in addition to, or in place of, an ongoing deduction. The Web application development project began on Jan. 1, 2003 and the product was delivered on May 18.

Team members include: Brenda Delaurentis, Lisa Trainor, Renee Bustamante, Jason Follingstad, Teresa Bennett, and Alan Armentrout.

Corrective Action Management Unit Treatment Operations

An innovative approach for waste management associated with cleanup of Sandia Environmental Restoration's (ER) sites was proposed in 1996. This proposal was centered around the construction and operation of a Corrective Action Management Unit (CAMU). The CAMU allowed Sandia to manage wastes associated with cleanup of its ER Program sites without the need for manifesting, shipping, and off-site waste treatment and disposal. Managing the wastes on-site in the CAMU has saved the ER Program more than $200 million over the life of the CAMU project. On-site treatment from August 2002 to January 2003 of 33,000 cubic yards of hazardous soils by soil stabilization and low temperature thermal desorption helped make this savings a reality. Sandia/New Mexico teamed with stakeholders including, local, state, and federal regulators and DOE to assemble a proposal to construct, permit, and operate a CAMU at the Albuquerque facility. This facility was designed with the necessary waste management areas, storage areas, waste treatment pads, utilities, and support buildings to efficiently implement treatment and containment of contaminated soils. With a life cycle cost of approximately $35 million, this facility was a preferred approach to the local community, the regulators and the DOE and yielded a viable replacement for approximately $250 million in off-site transportation, treatment, and disposal costs.

CAMU TEAM — The Corrective Action Management Unit (CAMU) Treatment Operations team was one of 11 teams that recently won Gold President's Quality Awards. (Photo by Randy Montoya)

Team members include: Michael Irwin, Craig Wood, Adrian Jones, Rose Preston, Lorraine Herrera, Matthew Shain, Douglas Perry, MJ Davis, Don Schofield, Michael Spoerner, Jacquelyn Rambo, Lee Brouillard, Boyd Hamilton, Pamela Puissant, Rebecca Kupay, Brett Cummins, Eric Larsen, Hans Oldewage, Riyaz Natha, and Saul Alanis.

Cost Plan Tool (CPT)

The Cost Plan Tool (CPT) Project was born from the aging architecture of a former cost-plan application that was to be phased out of the supported Integrated Information Services (IIS) infrastructure. Although the former cost-plan application was being phased out, a corporate need still existed to plan, measure, and forecast costs for programs and projects quickly and efficiently. This corporate need necessitated a complete re-build of the cost-plan application, one that used a common set of tools to capture all financial data elements. The CPT Project began with requirements gathered in February 2002 and concluded with implementation of the CPT in July 2003. Existing Sandia corporate quality processes (Software and Information Life Cycle, Oracle, and the Spend Plan Tool rules) were used in the application redesign. A team of financial analysts and program and project managers was selected to identify requirements for the new CPT. These individuals were selected because they were users of the tool and, therefore, were also customers. Their requirements covered all types of funding as well as special functionality. The CPT Project goal was to provide a user-friendly tool that would free up time program/project managers and financial analysts spent processing financial data when they used various other data collection mechanisms. The new CPT now allows project managers to plan at a low level of detail within the corporate system, rather than having to spend time creating their own spreadsheets and then transferring that data into the corporate system.

Team members include: Gwen Pullen, Rosemae McKillip, Angela Ortiz, Veronica Lopez, Ernie Limon Jr., Patricia Salgado, Mary Chapel, Lucille Garcia, Tonimarie Dudley, Sharon Sargent, Victoria Gutierrez, Kathryn Fortune, Delene Cox, Sharon Ann Chino, Tamara Orth, John Moleres, Marie Myszkier, Joseph Durham, Peggy Stevens, Linda Blevins, Melody Larkin, Marilynn Barr, Kathy Champney, Robert McCornack, Donald Flores Sr., Kathleen Sauer, Richard Casey, Michael Hagengruber, Geraldine Velasquez, Larissa Velasquez, Janet Schow, Bobbie Vital, Rose Mary Chavez, Carl Skinrood, James Hilts, and Susan Schear.

Test Capability Revitalization (TCR) Phase 1 Design

The Test Capabilities Revitalization (TCR) Line Item construction project will refurbish and modernize Sandia's full-scale non-nuclear field testing and experimental infrastructure. The test infrastructure simulates extreme thermal and mechanical environments used to test, model, and improve the safety, security, and confidence of the nation's nuclear stockpile. Most of the current test facilities are more than 50 years old and almost all of the capabilities are in need of significant refurbishment. A study conducted in 2000 found that 89 percent of the facilities were inadequate or marginal, while only 11 percent could meet current mission requirements, and these capabilities would be inadequate in the next five years. The TCR Project has been divided into two phases. TCR Phase I, which is the focus of this PQA submission, will revitalize the Aerial Cable (AC) Facility in Coyote Canyon and construct the new Thermal Test Complex (TTC) in Technical Area III. The product of TCR Phase I, at this stage, is the 100 percent design submission for both facilities. The Aerial Cable capabilities include conducting pull-down tests, gravity drop tests, and simulated flight along a cable. This Aerial Cable design work includes the replacement of all four cable systems, installation and construction of new anchors, pulleys, sheaves, control winches, and a rocket sled catch box, and the construction of a new central control building.

Team members include: Paul Schlavin, Michael Valley, John Scott, Thomas Romero, Carlos Medrano, Florian Lucero Jr., Jason Casperson, Steve Maggart, Jerry Francis, Scott Leonard, Mike Dexter, Wayne Evelo, Bill Johns, Michael Kupay, Christine Cooper, Michael Edstrom, Jaime Moya, Regina Sanchez, Dianne Duncan, and Scott Rowland.

W62 Firing System Test Team

Modern diagnostic tools were brought online recently to investigate the explosive interface on an Air Force stockpiled nuclear warhead. Originally designed in the 1960's by Sandia and LLNL, this interface is key to weapon performance and potentially subject to aging. The team assembled by Sandia and LLNL applied stringent modern quality criteria and documented procedures to assess this important strategic asset.

Team members include: Ronald Sauls, Lee Rieger, John Lanoue, Doug Hargrove, Glen James, Vince Farfan, Betty Cavender, Kenneth Miles, David Paul, Gordon Groves, Mark Cannell, Mark Nissen, William Curtis III, Joseph Bonahoom, John Fuller, Samuel Johnson, and Rudy Jaramillo.

Z machine back in business after beryllium dust suspends operations for four weeks

Highly conservative short-term safety measures adopted until long-term plan complete

By John German and Neal Singer

Things were quiet around Sandia's Z machine for four weeks in December and January.

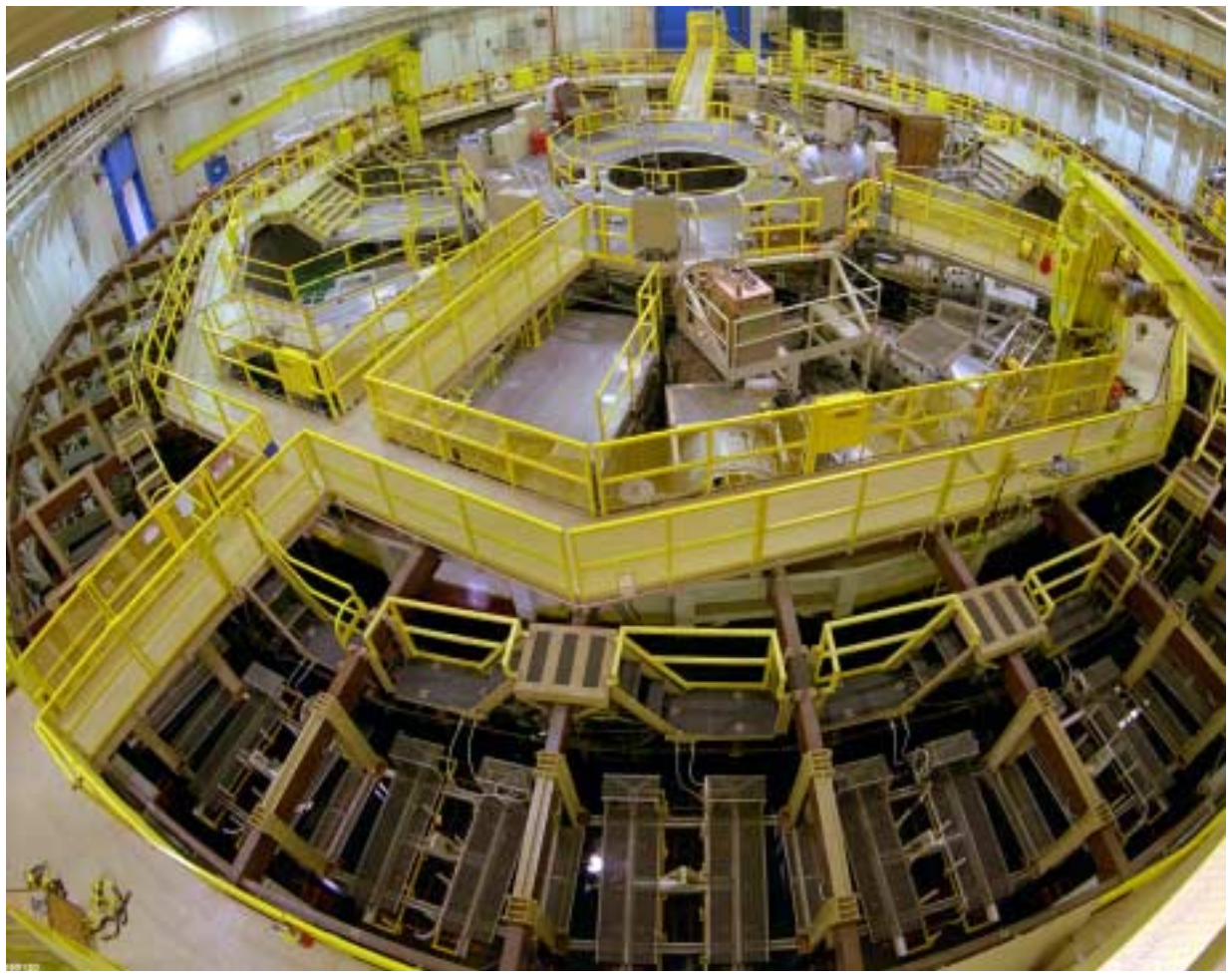
Normally the building would rumble about once a day as each Z shot — producing 80 times the output of all the power plants on Earth for a few billionths of a second — provided new insights about the high-energy physics inside a nuclear weapon and, in some tests, even produced neutrons, the first step toward controlled nuclear fusion.

But for 11 work days between Dec. 19 and Jan. 15, there was no rumble.

Instead of preparing for Z shots, staffers were working quickly to clean the facility, write new protocols, examine operating procedures, and hire an outside consultant to review industrial hygiene practices in Bldg. 983.

On Dec. 19 Pulsed Power Sciences Center 1600 ordered a suspension of Z operations after uncertainties arose about levels of beryllium dust in some areas of the building and after materials were removed from the building without authorization.

"We realized we needed to step back and take a careful look at our operations to make sure we were doing everything as safely as possible," says 1600 Director Jeff Quintenz.



SANDIA'S Z MACHINE, seen here between test firings, is back in business after operations were temporarily suspended due to concerns about beryllium dust in Bldg. 983. (Photo by Randy Montoya)

Some beryllium expected in Bldg. 983

Beryllium is a toxic metal that is heavily regulated by DOE. It occurs naturally in small amounts in New Mexico soils.

Some people who have been exposed to beryllium develop a sensitivity to the metal after exposure, says Larry Clevenger, Director of Medical Services Center 3300. A small percentage of these individuals might later develop a lung disorder known as chronic beryllium disease (CBD), he says. But most people who become exposed to beryllium do not develop a sensitivity to it, nor do they develop the disease.

Normally a small amount of beryllium dust is not a problem in Bldg. 983. It is expected, in fact.

Parts of Bldg. 983 are designated as beryllium operational areas because beryllium is used inside Z's firing chamber to create special effects, and because beryllium-coated parts sometimes are machined in the building.

The building operates under a corporately approved beryllium plan based on new DOE rules that took effect in January 2002. The plan specific to Bldg. 983 includes controls on how and where beryllium-containing parts can be handled, as well as requirements that regular air and surface sampling be done in work areas to ensure that beryllium levels remain well below those that are considered a safety hazard, says Al West, Director of ES&H and Emergency Management Center 3100.

For surface contamination, those levels are expressed in tenths of micrograms per 100 square centimeters, which translates to less than a millionth the amount of material found in a packet of Sweet 'N Low, on a Z surface area the size of a piece of toast.

Concerns brought forward

The concerns that led to the suspension of operations at Z were brought to management's attention in early December.

First, an industrial hygienist discovered a discrepancy in some records regarding the past shipment of a crane from Bldg. 983 to a local company. He found that although the crane had been cleaned prior to the shipment, it had not been labeled as previously contaminated with beryllium, as required by the DOE regulations.

At around the same time, Facilities workers who had previously done some electrical work high up in the rafters of Phase B, one of the smaller high-bays adjoining Bldg. 983's cavernous "Phase A" high bay where the Z machine is located, raised a question.

Why, they asked, were they required to wear protective gear, such as respirators and disposable coveralls, to perform their work in Phase C when a few months before they had performed work in Phase B, the next room, without any protective gear?

The protective gear was recommended in Phase C because of the concern that beryllium dust that had settled over several years on hard-to-reach surfaces could get stirred up as construction or maintenance work was performed, possibly leading to an inhalation hazard to the workers.

The question led to a concerted review of Bldg. 983's beryllium operations, says Lisa Hooper (3127), who coordinated the IH effort to understand the problem.

"The bottom line is that while we routinely monitored the beryllium levels near the ground level where people normally worked, we didn't have a good enough sense of how much legacy beryllium dust was up there above the normal working environment," she says. ("Legacy" refers to the beryllium dust that was present before the new regulations took effect in 2000.)

ES&H the top priority

Subsequent sampling — more than 600 surface wipes and roughly 80 breathing zone samples were taken — confirmed that except for a few limited-access hazard zones in Bldg. 983 where beryllium is routinely handled, the concentrations of beryllium on surfaces in Bldg. 983 were generally lower than the DOE regulations required, and in many areas were so low as to be undetectable.

"We believe that the risks of anyone becoming ill from beryllium dust in Bldg. 983 are minuscule," says Al. "We are not seeing a lot of opportunities for people to be exposed. Nevertheless, we want to be sure. Worker health and safety is our first priority."

Sandia has notified hundreds of employees and contractors who performed work in Bldg. 983 and offered free and confidential beryllium screenings.

So far, some 80 people have contacted Medical since mid-December for the screenings, says Larry Clevenger.

"We would not expect to see anyone from Bldg. 983 test positive for sensitivity to beryllium," he says. "But because this is important, we don't want to guess."

For a beryllium screening, contact Anna Miller (3335) at 844-5411.

Interim and long-term plans

By the time Z's operations were resumed on Jan. 15, hundreds of wipe samples and breathing-zone samples had been collected and analyzed; Phase B was being cleaned from top to bottom; new procedures were adopted requiring prior approval for all work and for removal of anything, including trash, from the building; and a root-cause investigation was under way.

In addition, numerous outside companies performing work in Bldg. 983 or providing services in support of Z machine operations were contacted to make sure their concerns were addressed.

Taken together, these actions constituted Sandia's "interim plan" intended to get Z operating again as safely as possible, says Jeff. An outside IH consultant reviewed Sandia's plan for soundness prior to the restart.

"The interim procedures are highly conservative to make sure that we were doing everything safely as we resumed operations," says Jeff.

Z continues to operate under this interim plan even as a long-term, more sustainable plan is under development. The long-term plan likely will take months to develop and will be reviewed by a team of IH specialists from around the NNSA complex, says Al.

"We feel comfortable Z is operating safely," says Al. "This is a good example of Sandia responding rapidly to a safety concern and using our experience with the radiation exposure principle of ALARA, or 'as low as reasonably achievable,' to reduce the risk to our employees in the workplace."

Lab News/Daily News readership survey shows Sandians pretty consistent with their views

Here's what a group of randomly selected employees think about these news publications

By Rod Geer

Results of the most recent *Labs News/Daily News* readership survey, conducted late last year, show that readers who responded to it offered answers and opinions pretty consistent with Sandians selected for previous surveys. Over the years — dating back to 1995 at least — Sandians have tended to favor the same sorts of items in these publications and over the years they have tended to be, bit by bit, more satisfied with these employee communications tools.

For example, the five most-often read *Lab News* features as indicated by results of the 2003 survey are the same as in the 2001, 1997, and 1995 surveys. Those are, in the current order of preference: Mileposts, retiree photos, human resources-related news, stories of technical/R&D achievements, and "Feedback."

Growing steadily in *Lab News* readership, based on the 2003 survey results, are employee profiles and features and the annual "Labs Accomplishments" issue.

Sandians are again, consistent, in another way — their independent thought. Some see the *Lab News* as an employee newspaper that offers, as a number of respondents described, "balanced news coverage," while others see it as a propaganda piece for senior management that "speaks the corporate line."

Likewise, employees' impressions about the *Sandia Daily News*, which was born in 1996, generally are positive, but the survey produced some consistent comments. Although readers appreciate the many links to web sites that provide additional information, they dislike being directed to urls that require registration to view the referenced material, i.e., *The New York Times*, and they would like the *Daily News* to be "published," either into their e-mail in-boxes or on the internal web earlier in the day.

Who responded to this year's survey?

The 2003 survey — sent to 600 randomly selected Sandians in mid-November (mostly by e-mail) — yielded almost a 30 percent response rate, which studies show remains good for such a distribution approach. However, this is significantly lower than the e-mail-distributed surveys of 1997 (72 percent response rate) and 2001 (52 percent response rate).

Despite the lower response rate, the demographics of those responding closely parallel the Labs workforce. For example, 41 percent of those responding to the 2003 survey had been at the Labs less than 10 years, 31 percent between 10 and 20 years, and 28 percent more than 20 years. The Labs' actual breakdown for employee tenure: <10 years, 37 percent; 10-20 years, 30 percent; >20 years, 33 percent.

Also, the percentage of respondents in divisions 3000, 5000, 6000, 10000, 11000, 12000, 14000, and 15000 parallels within a percentage point those groups' slice of the total Labs population.

Selected survey results appear on the rest of this page. (For complete results contact Rod Geer at 505-844-6601 or wrgeer@sandia.gov.)

(Photo by Randy Montoya)

In general, how do you rate the *Lab News*?

	2003	2001	1997	1995
Excellent	23%	21	22	18
Very Good	57	52	51	50
Good	18	23	23	30
Fair	1	3	4	2
Poor	1	1	0	0

In general, how do you rate the *Daily News*? (The *Daily News* began in 1996)

	2003	2001	1997
Excellent	31%	31	13
Very Good	47	44	31
Good	18	21	44
Fair	3	4	11
Poor	1	1	2

On a scale of 1-5, 5 being best, rate the *Lab News* in terms of the following attributes.

	2003	2001	1997
Readability	4.36	4.30	4.15
Credibility	4.34	4.23	4.08
Relevance/ Usefulness	3.88	3.86	3.63
Timeliness	4.08	4.05	3.82
Thoroughness	4.05	3.86	3.77
Photos/ Illustrations	4.37	4.19	4.13
Average	**4.18**	**4.08**	**3.93**

On a scale of 1-5, 5 being best, rate the *Daily News* in terms of the following attributes.

	2003	2001	1997
Readability	4.25	4.25	3.88
Credibility	4.24	4.14	3.92
Relevance/ Usefulness	4.05	4.00	3.53
Timeliness	4.19	4.5	3.91
Thoroughness	3.84	3.72	3.49
Average	**4.11**	**4.13**	**3.75**

Porcelain Press shines

Although the survey primarily included questions about the *Lab News* and *Daily News*, one question asked what additional Labs publications — ones that appear on paper, on the internal web, or even in other formats — Sandians rely on.

More than two dozen titles were listed; however, the *Porcelain Press* — available on the Web and in…well…conveniently located "water closets" throughout the site — received more than twice as many mentions as the next two most cited publications, the Wednesday secretarial bulletin and *The Travel Bulletin*. (Editor's note: Makes a strong statement about a captive audience, right?)

Readership survey, simultaneous focus groups support each other

As some Sandians were completing their *Lab News/Daily News* readership surveys late last year, others at the New Mexico site were attending a series of moderated Employee Communications Focus Groups.

Although, by design, the discussion was oriented toward *Lab News* and *Daily News*, attendees were free to offer comments about any products or activities with an "employee communications" element.

For complete results, which have been provided to the Labs' senior management team, contact Rod Geer at 505-844-6601 or wrgeer@sandia.gov.

A number of parallel observations emerged from both the focus groups and the readership survey. Some examples:

- There's a concern that *Lab News* coverage focuses on too few high-visibility-type research groups or projects, while the lower key, in-the-trenches R&D efforts can be forgotten.
- *Daily News* readers appreciate its repetition of items that "need to be remembered" and its use of hyperlinks to web sites, but become frustrated when those links require registration — even free registration — to view the material.

There were five discussion sessions, each with a different "cohort" group: non-managers, MLS, 10-20 years at Sandia; non-managers, MTS, 10-20 years at Sandia; non-managers, MTS and MLS, less than five years at Sandia; non-exempt, union, tiered, 10-20 years at Sandia; and Level I managers, less than five years in that position. Each session contained 10-12 participants.

The groups independently came up with a number of consensus recommendations. Some were directed specifically toward the *Lab News* and *Daily News*; others were directed toward the Labs management team or the Labs as a whole. Some examples:

- Significantly improve the internal web's search engines.
- Be honest.
- Increase direct verbal communication from senior management to personnel in their organizations.
- Pay attention to specific audiences being addressed.
- Reduce the average length of *Lab News* stories.
- But, through a variety of mechanisms, provide more information about strategic planning processes so that results will be more meaningful to employees.

Mileposts

New Mexico photos by Michelle Fleming
California photos by Bud Pelletier


Evelyn Harris
35 2613


Dennis Miyoshi
35 4200


Tom Wright
35 5923


Jim Buttz
30 15252


Gary Holmes
30 5920


Bernard Jacksits
30 14406


Richard Kinchen
30 5926


Kit Schmitz
30 8225


Vernon Koonce
30 4145


Johnson Morgan
30 14172


Dave Neustel
25 8241


Jim Knapp
25 1111


Robert Martinez
25 4149


Kirk Rackow
25 6252


Manuel Trujillo
25 14172


Carol Dewolf
20 8200


Patti Comiskey
20 6951


Howard Royer
20 8512


John Friddle
20 8225


Warren Klein
20 9720


Jim Lenhart
20 5531


Tony Teague
20 4222


Paul Yourick
20 3130


Peggy Desko
15 6900


Don Flores
15 10016


Michael Garcia
15 14112


Mary Girven
15 9524


Joe Jones
15 6874


Ken Kvam
15 2913


Richard Lucero
15 10843


Robert Martinez
15 9616


Kevin McMahon
15 1304


Johnny Molina
15 15406


Marti Peters
15 3333


Philip Sackinger
15 9113


Paul Sands
15 9322


Barb Wampler
15 2331


Char Wells
15 3520


James Wiseman
15 4152

Sandia helps Z-Coil add spring to its step

Through New Mexico Small Business Assistance program

By Iris Aboytes

"The first pair of shoes that I put together was crude," says Al Gallegos, "but I knew I was headed in the right direction. They felt better when I ran in them."

Gallegos, founder and chairman of the board of Z-Coil Footwear in Albuquerque, is the man with the vision, the inventor of the shoe with a visible spring under the heel.

In the mid-1980s Gallegos was running an

average of seven miles per day. As a result, he developed all the normal injuries associated with running: heel spurs, plantar fasciitis, knee problems, and back pain. He realized that his injuries were caused by the impact of hitting the ground while running.

"Think about it," Gallegos says. "When you run, your knees, ankles, and back absorb about four times your body weight." He believed that by putting a "shock absorber" in the heel of his shoe, he could reduce the impact and therefore the pain. He figured a coil would provide some form of energy return, which would allow him to run faster and farther.

He tried various types of springs before finding the one that worked best, a three-inch-wide conical coil steel spring that when totally compressed was about a quarter of an inch high. He had the local butcher cut the soles of his shoes so the springs could be glued in.

Over the years he began to think seriously of manufacturing shoes. He realized that if the spring shoes helped him and a few friends, maybe they would help a lot of people.

"It is not natural for a scuba diver to breathe underwater," Gallegos says. "But if you furnish him with the proper equipment, he can. Perhaps it was more common sense than vision that made me think that I could help people."

In FY01 a New Mexico Small Business Assistance (NMSBA) project was established between Sandia and Z-Coil. Under the NMSBA program, Sandia can provide up to $5,000 in technical assistance to urban-based small businesses. Sandia performed mechanical stress tests on the shoes to determine force vs. displacement in the heel and toe box — force vs. displacement of three different springs; and determine stresses at various locations within the arch support. Sandia made a prototype of a safety toe for the shoe. "Sandia was very prompt, very pleasant, and they knew what they were doing," Gallegos says.

Z-Coil reported record sales of $6.3 million for 2003. This represents a 139.5 percent increase over the previous year's sales. Al is very pleased. To become a Z-Coil dealer, attendance at a five-day workshop is mandatory. He says his son, 36-year old Andres, CEO and president, runs the company. "I could not have gotten anyone better than my son," Gallegos says. "During the hard years, I mortgaged some of my own personal property and Andres questioned my doing it. I just responded, 'if we lose everything, I will go work for Wal-Mart.' "

Gallegos, an Espanola native, is a simple, deeply religious family man. His office has an old desk, a book case, and several samples of his shoes. In a corner of his office is his workshop. In it are all the tools needed by a cobbler.

He says he does not know where he comes up with his ideas.

"I was married for 20 years to a special woman," Gallegos says. "Her name was Marcella. She has been gone for 20 years, but sometimes I think that the ideas come from her. Since she is not here, this is her way of helping me. Who knows? Maybe together, we can make this a better world."

For more information on the inception of Z-Coil Shoes go to http://zcoil.com.

Recent Retirees

William Paulus
45 5841

Bob Prew
40 12345

Russ Haushalter
33 2542

Frank Carrillo
29 14181

Robert Johnston
25 1646

Dolores Grumblatt
26 6116

Jeff Everts
17 1734

Feedback

Q: *Recently Janus Capital Group Inc. has been named in a probe of mutual fund trading and has admitted to instances of unethical frequent market timing and late trading of its funds. Janus Capital said it plans to restore approximately $31.5 million to funds and shareholders harmed by discretionary market-timing arrangements. In some reports the Janus Worldwide fund was listed as one of potential market timer activity. There are many Sandians that have put their money in Janus Worldwide fund as part of their 401k during the market timing period of Oct. 1, 1998 to July 3, 2003. What is Sandia doing in our behalf to recover the money that is due to the employees who invested in this fund? Also will Sandia be looking to replace this fund since Janus was involved in unethical behavior?*

A: This topic is important and timely. Janus Capital Group, which manages one of the funds Sandia offers, has confirmed that there were 10 frequent trading arrangements that involved seven Janus funds, including the Worldwide Fund, an investment option in Sandia's Savings Plans. The question states that Janus has admitted to both market timing and late trading, but this is not entirely the case. There is a distinction to be made between market timing (rapidly trading in and out of funds) and late trading (entering a trade ticket after 4 p.m. Eastern Time, but receiving the same day's price). Market timing, while questionable, is not illegal. Late trading is illegal. Janus has admitted to having allowed market timing, but a recent audit of its trades by Ernst & Young says there was no evidence of late trading.

Sandia has been monitoring the mutual fund investigations closely. Sandia understands from Janus that the restitution amounts made public in December — $31.5 million — will be paid in the first part of this year. Janus is working with record keepers (e.g., Fidelity, in Sandia's case) to determine the method that will be used to reimburse funds or individual participants. This method has not yet been determined.

Ernst & Young has estimated the restitution amounts to be about 1 cent per share on average as of Nov. 30, 2003.

Although the mutual fund scandal has drawn criticism to Janus, Sandia had been evaluating the Janus Worldwide Fund based on its performance, organizational strength, and personnel. In light of these factors, Sandia's Investment Committee recently decided to close this fund to new investments (effective in early spring) and eliminate the option a year from that point. Further communication to savings plan participants on the fund closing will be released soon.

Other options for international stock exposure are available to Sandians within the Savings Plans, including the following: Templeton Foreign, the Spartan International Index, and the three Life Strategy Options, which hold between 5 percent and 15 percent in international stocks.

— Bonnie Apodaca (10500)

Atomic Museum hosts 'Strange Matter' exhibit through May 1

The National Atomic Museum is the premiere site for the "Strange Matter" exhibit, which opened Sunday and runs through May 1.

The exhibit will allow visitors to experience the science behind the stuff of everyday life — from shock absorbers, to DVD players, to golf clubs — while gaining a glimpse of where the future of materials research might take our world.

Visitors will see the future of metals while watching a standard ball bearing bounce for an extended period of time on a platform made of amorphous metal. Children can play with amazing magnetic liquids to discover whether they are solid, a liquid, or both.

The exhibit is presented by the Materials Research Society and made possible by Lockheed Martin, Los Alamos National Laboratory, and Sandia.