



ALPENGLOW AND EARLY SNOW — The Sandia Mountains give off a spectacular sunset glow as clouds loom and early snow hints of winter soon to come. The Sandias, from which the Labs took its name, help define Albuquerque. This scene, captured recently by *Lab News* photographer Randy Montoya at the Elena Gallegos open space area on the northeast edge of Albuquerque, heads this special year-end holiday issue of the *Lab News*. See note on page 2.

Sandia gets a new GIF for the new year

More capable Gamma Irradiation Facility opens

By John German

Got a satellite, tank, or favorite weapon component you'd like to irradiate?

Early in January workers plan to move 270 pins made of cobalt-60 into a pool of water at the new Gamma Irradiation Facility (GIF) in Area 5, officially welcoming Bldg. 6586 into Sandia's family of experimental nuclear facilities. The pins will become the gamma source arrays used to subject test objects, such as weapons electronics, to radiation.

The new GIF combines the capabilities of three older radiation facilities — the old GIF in Bldg. 6588, the Low-Intensity Cobalt Array in Area 1, and the Low Dose Rate GIF in Area 3 — into one all-purpose gamma facility. It also adds some experimental capabilities never before available at Sandia.

The facility includes two 10 x 10-ft. test cells, one cavernous 18 x 30-ft. chamber that can accommodate large test objects such as weapon assemblies, military vehicles, or space equipment, and an 18-ft.-deep pool of water where underwater experiments can be conducted.

Lots of concrete

"We are pleased to bring the new Gamma Irradiation Facility on line to support the nuclear weapons complex and our work-for-others customers — principally DoD and the NRC," says Sandia Nuclear Facilities Manager Ted Schmidt (6430). "This facility incorporates multiple levels of safety and has significantly enhanced capabilities compared to the previous facility. It will satisfy Sandia's

(Continued on page 4)

Sandia Lab News

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Happy holidays? How about 131 million reasons to celebrate?

Fourteen Sandians share mega-Powerball payoff



By Bill Murphy

The clichés bubble boisterously in the brain and flow extravagantly from the lips: "You're my new best friend" . . . "You look like a million bucks" . . . "Have you turned in your notice yet?" . . . "Who wants to be a millionaire?"

Clichés? Sure, and by midmorning of Nov. 30, the 14 Sandians had already heard them — and tons more in the same vein — dozens of times. But still they smiled. They laughed. And why shouldn't they? Each of them had learned just hours before that they had won the latest 20-state Powerball lottery and would share a \$131 million jackpot. (Well, actually, they'll split a measly \$70 million jackpot if they go for the cash-up-front payoff, the option the group was inclined to choose as of *Lab News* press time. That's \$5 million apiece before Uncle Sam and the State of New Mexico take their cuts, or somewhere in the neighborhood of \$3 million free and clear per person.)

(Continued on page 5)



Shoes for kids!

For more than 40 years, Sandians have contributed generously to the Shoes for Kids program. For the past 15 years, *Lab News* photographer Randy Montoya has been taking photos of the big day when disadvantaged kids get their new shoes. This year, in a first-person account, Randy talks about what his personal involvement in the annual holiday tradition has meant to him. See his story — and pictures — on page 8.

Atom islands move: Researchers identify new materials process **3**

Labs-developed synthetic aperture radar succeeds in real-world tests **6**



9 Sandian Jerry Gorman's paintings in demand in Santa Fe, Sedona

16 Sandia employees come through again; top \$2 million in giving

This & That

Next issue is Jan. 12 – This is it, our last 2000 issue. We publish next on Friday, Jan. 12, when we resume a regular biweekly schedule. The deadline for all news and ads is noon, Friday, Jan. 5.

* * *

Complete Lab News Web pages – Although we've long put selected stories on the Web, thanks to *Lab News* writer Bill Murphy, we now offer it all electronically. Our Dec. 1 issue is the first to go on the Web in full, in pdf pages. I can never remember what pdf stands for, but we'll say "pretty darn fast," because on the Sandia network the pages download and then open quickly using Acrobat Reader 4.0. Another dividend is that some photos on our Web pages are in full color. You can check it out at <http://www.sandia.gov/LabNews/LabNews.html> and bookmark it for future use.

Retirees and other readers outside Sandia can also access the Web pages, but a little patience may be helpful – especially if you use an older home computer or your modem is slow. If you don't already have Acrobat Reader, clicking on the issue link should automatically launch it. I was viewing pages on my home computer (350 MHz, 56K modem) in just over one minute after clicking on the Dec. 1 link. (That issue is only eight pages. Longer issues may take more time to download and display.)

A few strong words of caution: We can't promise to have each issue on the Web immediately. Our hard-working staff has many duties, and we'll get to this one as quickly as possible for each issue, but it may sometimes be several days after the paper-copy date. We are rowing this boat as fast as we can and sometimes have to fight powerful headwinds.

* * *

Core values test – We published Sandia's new set of four core values Nov. 17, and this is a test. Can you name them all? Hint: They DON'T include pride, envy, gluttony, lust, anger, greed, or sloth.

Our core values are very important, management says, so if you can't name all four, I suggest you write them in ink in the palm of one hand and not wash it until you memorize them all. Here goes: We Sandians value "integrity, excellence, service to the nation, and each other." All are fine values, but I must be totally honest about that last one because I recently had ethics training. I value some of you more than others, but please don't ask me for names. I can't afford to be *that* honest.

Finally, someone near and dear to me – I value her muchly – thinks I should mention that there is absolutely no truth to the rumor that we now have fewer core values than before because our workforce is aging and can't remember more than four. No truth whatsoever.

OK, without looking up, what are our four values? Start writing.

* * *

Me, a prevaricator? – I'm not sure I can ever trust Editor Ken Frazier to columnize for me in the future when I'm on vacation. He did that in the last issue and had the nerve to say in print that I have a "propensity for creative prevarication." If he doesn't stop saying such naughty things about me, he could easily become one of those Sandians I don't value quite as much as others (see previous core values item).

– Larry Perrine (845-8511, MS 0165, lgperri@sandia.gov)

Bioassays recommended for some Bldg. 807 occupants

Urinalyses address employee concerns about chronic exposures to thallium, other metals

By John German

Forty-four employees and contractors voluntarily participated in a Sandia-sponsored bioassay program last week following a recommendation that current first-floor occupants of Bldg. 807 be tested for the presence of certain metals in their urine.

The participants — first-floor occupants as well as some current and former occupants of the building's 2nd and 3rd floors — voluntarily submitted urine samples collected over a 24-hour period to Sandia's Medical Clinic on Dec. 8.

Seven other non-occupants participated as members of a control group. Samples from about 30 more people are expected this week, says Dr. Larry Clevenger (3300), Sandia's Medical Director.

The samples are being analyzed by a consulting toxicology lab in Salt Lake City for the presence of thallium, manganese, lead, mercury, and arsenic. Test results will be reported to participants during the next several days.

The Bldg. 807 Management Action Team, which is guiding Sandia's investigation into the health concerns of some 50 current and former occupants of the building (*Lab News*, May 28, 2000), recommended the urinalyses following reports by several employees that bioassays conducted by their private physicians indicated the presence of thallium in blood samples, says Larry. (See <http://www.sandia.gov/health/advisory/bioassay.htm> for details.)

Additional bioassays were being planned after results of a University of New Mexico epidemiology study came in, but reports about the current blood tests "suggested it is prudent to gain additional information at this time," says Larry. "The intent is to clarify the implications of these test results for individuals and for the overall investigation."

No consensus on thallium

The five metals were chosen because of their known toxic effects on the neurological system.

Results of bioassays for mercury, performed earlier this year for several Bldg. 807 occupants, were normal.

Because research about the health effects of low-level, chronic thallium exposure is limited, no clear consensus exists among toxicologists about whether such exposures cause neurological symptoms, says Larry, although one study suggests that health effects are possible.

An industrial hygiene evaluation conducted in November found no evidence that either current or past uses of thallium-containing solutions in Bldg. 807 chemistry labs have resulted in laboratory contamination or significant human exposures to the metal.

Meanwhile, the Bldg. 807 investigation continues. (See <http://www.sandia.gov/health/advisory/index.html> for details and sampling data.)

The University of New Mexico Health Sciences Center is conducting an epidemiological study to look at prevalence rates and distributions of symptoms experienced by individuals who have occupied Bldg. 807 since 1990 and by members of a control group. A questionnaire is being distributed to hundreds of people this week.

"If you receive one of these UNM questionnaires, please complete it," says Larry. "The survey results will help the investigation team better understand the health issues being experienced by concerned employees."

In addition, a company that specializes in industrial hygiene investigations is being selected to conduct an independent and rigorous building-health evaluation.

Watch for details of these studies and a full update on the Bldg. 807 investigation in a future issue.

"[I]t is prudent to gain additional information at this time."

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This special year-end issue

We hope you enjoy this special year-end holiday issue of the *Lab News*. It is packed with important Sandia news: The discovery of an unexpected new way large islands of atoms move, the opening of the new Gamma Irradiation Facility, funding for the MESA facility, successful missions of Sandia's Lynx synthetic aperture radar, royalties awards to Sandia inventors, a new program to increase skilled trades workers, Sandia's electricity-purchase-driven stimulation of wind energy, and a report on our renewable energy programs with Mexico.

This issue has a few things extra, however — starting with Bill Murphy's feature on the exciting news that had all Sandia and all New Mexico talking: 14 Labs security police officers winning the multistate \$131 million Powerball lottery. We also present Randy Montoya's photos of local kids getting new shoes as a result of employees' generous contributions to the Shoes for Kids program, a report on Sandians' \$2 million (again) contributions to community charitable organizations, and short features on Sandia's new vacuum-pack team cleaning crews and on Sandia artist Jerry Gorman. Several of these are presented in color, something we can do only occasionally, and we lead it all off on the front page with Randy's beautiful and moody photo of the dramatic mountains on the edge of Albuquerque from which Sandia takes its name.

Happy holidays from our entire staff! We will be back with our Jan. 12 issue reporting on Sandia Science Day. — Ken Frazier, Editor

Atom islands move: Sandia team discovers surprising materials process, publishes results in authoritative journal *Science*

Unexpected dynamics of bronze formation might be harnessed for nanodevices

By Nancy Garcia

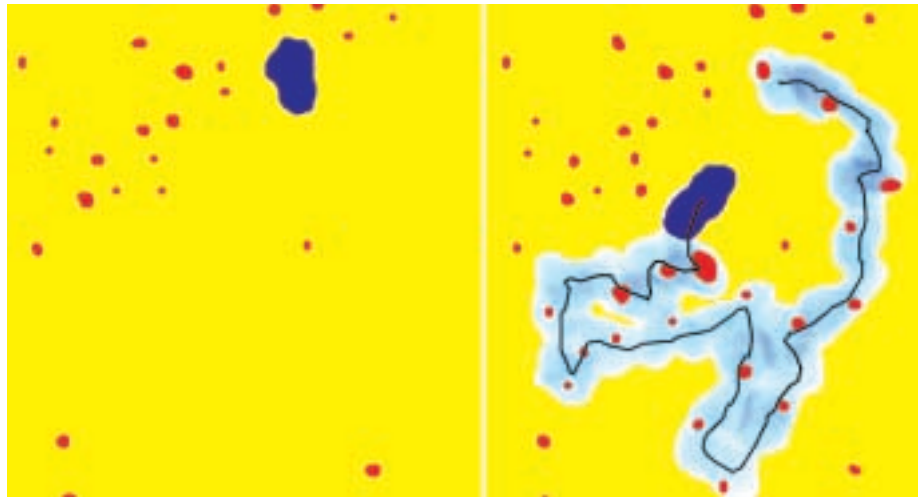
The invention of bronze — the first intentional alloy, a coppery brown metal still commonly used in industry and sculptures — brought ancient civilizations out of the Stone Age and essentially launched modern materials science.

Much lore and insight have accrued about metallurgy in the intervening millennia, causing intuitive pictures of how alloys are formed to mature. But the formation of alloys on surfaces has led to new and surprising concepts, as shown by the work of a Sandia team published in the Nov. 24 issue of the prestigious journal *Science*. Their discovery of an unexpected process for bronze formation holds promise for nanotechnology.

Observing tin vapor

Aided by a new microscope to observe tin vapor as it formed bronze crystals on copper, Andreas Schmid, Norm Bartelt, and Bob Hwang (all 8721) were startled to see the tin atoms clump and skitter like water spiders atop a rivulet. Not only did these clumps, hundreds of thousands of atoms across, leave bronze crystals in their wake, they also appeared to avoid alloyed areas — sometimes appearing to “paint themselves into a corner” by pausing rather than cross their track, or narrowing to squeeze through a region that already contained a little tin.

The process is directed by the “desire” of tin to lower the copper surface tension by forming bronze. This converts chemical energy to mechanical energy, perhaps more efficiently, the



BACK TO THE FUTURE — Civilization’s first alloy is yielding more insights into processes that could propel future inventions in nanotechnology. In these images, extracted from micrographs, a large, dark island of tin on a light copper surface is depicted alongside smaller crystals of bronze alloy. The image on the right was taken four minutes after the one on the left, and indicates the path taken by the tin island. The darker the path, the longer the tin remained over that region. Islands avoid crossing their own track. (The images, 600 nanometers across, were taken with low-energy electron microscopy, which permits observing the motion in real time. For a striking color version of this image, see box on page 9.)

Sandia CaliforniaNews

authors calculate, than an automotive engine. That propulsion might be harnessed to power nanomotors, or to direct construction of nanodevices such as catalysts.

“It’s not random,” Bob said. “If an area has clean copper, the islands will move toward that area.”

The Sandia research team has been investigating surface alloys for seven years because of their novel properties, promise for catalysis, and tai-

lored friction, among other qualities, Norm says. “Almost all useful metals are alloys because of their improved properties,” he pointed out, “and you can create some alloys on surfaces that you can’t create in bulk.”

The static images of bronze formation they obtained with a scanning tunneling microscope were perplexing, however. Tin clumps could not be reliably tracked from one minute to the next over the time needed to acquire the high-resolution images. “It’s like looking at a mountain range, turning your back for a second, then looking back and the mountain range isn’t there,” Norm says. A year ago, his group obtained a low-energy electron microscope that is adept at recording images of the surface 30 times per second.

Incredibly enlightening

“Applying this to metal alloys has been incredibly enlightening,” Norm says. “We had no idea how they formed, and it’s totally not what we expected.”

Rather than a simple exchange of tin atoms for copper atoms, the process shows a more complex cooperative behavior. From the dilute tin vapor deposited on the surface, tin clumps coalesce. These clumps then sweep along, picking up copper atoms. When the density of copper in the tin islands becomes sufficiently large, ordered bronze islands are nucleated and left behind.

The movement is reminiscent of a phenomenon, first observed 300 years ago, that 19th century British scientist Lord Rayleigh used to calculate the surface tension of water: the skittering, twirling motion of bits of camphor dissolving. The camphor will seek out clean regions of water, leaving in its wake a thin film.

New understanding of the alloying process on solid surfaces represents a fundamental discovery that may guide the creation of nanostructures at surfaces, says Andreas. In the near term, along with researchers in Sandia/New Mexico, they are also investigating tin/lead solders through a Laboratory Directed Research and Development grant.

The team has posted a movie of the process (<http://www.sciencemag.org/cgi/content/full/290/5496/1561/DC1> or <http://www.eurekalert.org/releases/aaas-sni111500.html>). Team members also demonstrate the motion during scientific talks by scraping camphor particles into a clear dish of water placed on an overhead projector, displaying swirling flecks skating along like winter revelers at Rockefeller Center.

Further information:

Science: <http://www.sciencemag.org/cgi/content/full/290/5496/1561>

Science Perspectives: <http://www.sciencemag.org/cgi/content/full/290/5496/1520>

AAAS: <http://www.eurekalert.org/releases/aaas-sni111500.html>

London Financial Times: <http://globalarchive.ft.com/globalarchive/articles.html?id=001130001409>

Science News: <http://www.sciencenews.org/20001125/fob2.asp>

Chemical & Engineering News: <http://pubs.acs.org/cen/topstory/7848/7848notw1.html>

New York Times: <http://www.nytimes.com/2000/11/25/science/25NANO.html>

San Francisco Chronicle: <http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/2000/11/24/MN119413.DTL>

Tri-Valley Herald: <http://www.visitron.com/index3.html>

1,000 accident-free days at Sandia/California



SAFE TEAM — Logistics & Procurement Dept. 8523 reached a major milestone recently with 1,000 days without any injury accidents. Department Manager Jeff Manchester and Center 8500 Director Pat Smith hold a sign marking the event at a celebration with department employees in Bldg. 928’s warehouse. Jeff says the achievement is due to the entire department’s efforts to make safety and security a process, then thinking and talking about this process on a daily basis, so that now it has become second nature to employees. He points out that they have high-risk jobs that involve moving more material around the California site than any other group. “Now the staff brings suggestions to me on a regular basis and people feel comfortable in pointing out safety concerns to each other,” says Jeff. “They each take ownership of the processes and safety concerns. We simply think and act ISMS as the way we do business.”

New GIF opens

(Continued from page 1)

needs for decades.”

The new GIF is safer. Its test cells feature 6-ft.-thick concrete walls, four-pane leaded-glass windows, and serpentine entryways — which together virtually eliminate worker radiation exposures during experiments.

More than 2,600 cubic yards — about 430 truckloads — of concrete was used in constructing the chambers and pools, says Norm Schwerts, Manager of Hot Cells & Gamma Facilities Dept. 6432.

The cobalt source arrays move along underwater tracks beneath the test cells and are automatically raised into and lowered out of the chambers to deliver the desired dose of gamma radiation to test objects placed in the cells. (See “What’s GIF good for?” below right.)

A single test can last seconds to months



DANG BIG DOOR — Don Berry opens the “door” to GIF’s large test chamber. The door is a 480,000-lb block of solid concrete that rides on air bearings, allowing large test objects such as military vehicles, space equipment, and weapons assemblies to be placed in the chamber.

depending on the test designer’s gamma needs, says GIF facility supervisor Don Berry (6432). Gamma dose rates as low as tens of rads per hour to as high as 300,000 rads per hour can be delivered.

The 10-year design and construction process for the new GIF was completed in May, says Norm. Since then, Dept. 6432 staffers have been preparing for and responding to a series of operational readiness reviews.

The GIF passed a DOE review early this month allowing the radiation sources to be moved into GIF’s pools soon. The building’s official designation as a nuclear facility is expected before the winter shutdown.

The first radiation tests to verify the chambers’ shielding integrity and characterize their radiation environments are scheduled to begin in January.

Safety and thrift

Creating a high degree of safety and security while minimizing costs were two key considerations during GIF’s construction, adds Norm.

“We looked at all the accidents that could happen and designed against them,” he says. “We considered safety to workers and the public at every possible point.”

As a result, GIF will be certified by DOE as a Category 3 nuclear facility, meaning the threat to the general public is minimal even if the worst possible consequences of an accident or attack were realized.

“It’s unusually safe for a nuclear facility,” he says.

To bring construction costs down, Sandians Mitch McCrory (6431) and Milt Vernon (6422) visited decommissioned nuclear facilities at other DOE sites, salvaging the leaded-glass window panes used



GAMMA GOES HERE — GIF facility supervisor Don Berry (left) and Norm Schwerts, Manager of Hot Cells & Gamma Facilities Dept. 6432, review procedures used in GIF experiments inside the largest of GIF’s three test cells. (Photos by Randy Montoya)

in GIF’s test chambers from Pacific Northwest National Laboratory and hoarding manipulators from the Nevada Test Site, “just in case we ever need to do any hot cell work,” says Norm.

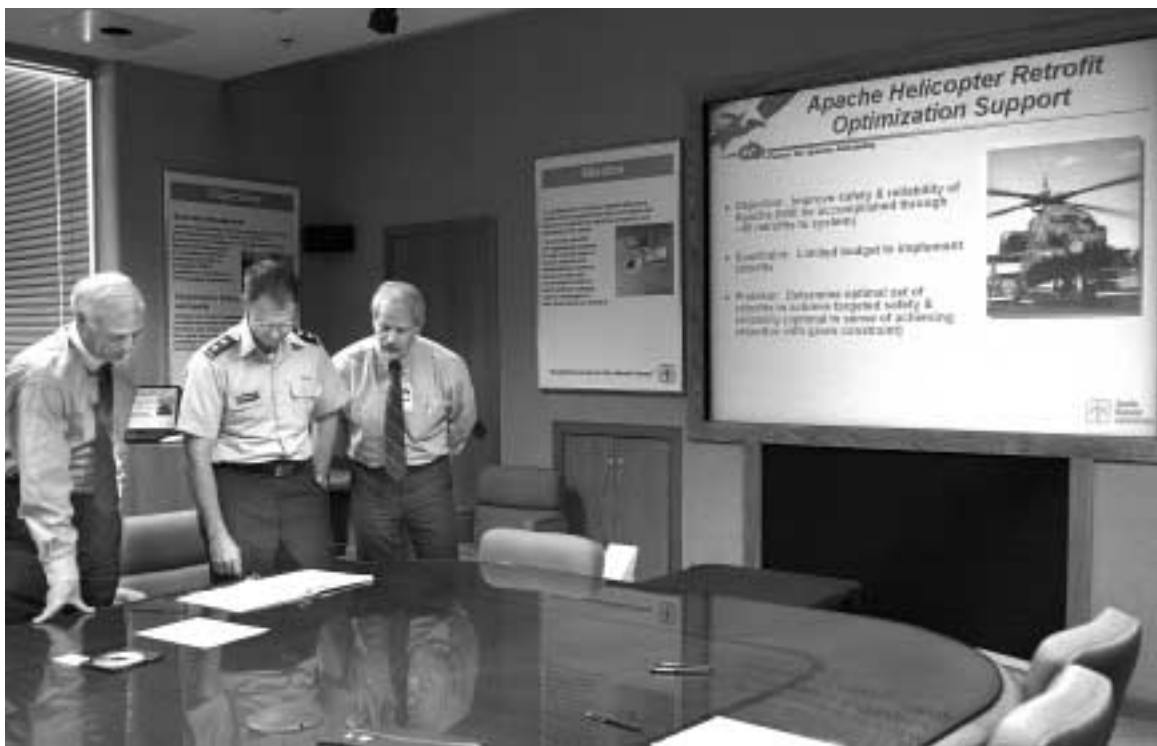
“We estimate we saved well over \$1 million in glass and manipulators,” he says.

The total cost of the GIF’s design and construction was approximately \$6 million. The facility’s final design was performed by the Facilities Systems Engineering departments and Mitch McCrory.



BLDG. 6586 in Area 5, which houses the new GIF.

Army general visits Labs, tours facilities



GENERAL MATTER — US Army Maj. Gen. Joseph Bergantz, center, is briefed on Sandia’s Apache helicopter retrofit support program by VP for DoD Programs Jim Tegnalia (15000), left, and Bob Cranwell, right, Manager of Systems Reliability Dept. 15312 and head of Sandia’s Apache program. Bergantz is the program executive officer for aviation at the Army’s Redstone Arsenal in Alabama. Sandia’s Apache support program is working with the Army to improve the safety and reliability of the Apache helicopter through 15 retrofits to systems. Bergantz visited Sandia Dec. 1 and had briefings on the Apache initiative, advanced tools for optimizing maintenance and readiness, lessons from the aging electronics surveillance program, and other Sandia technologies of interest. (Photo by Randy Montoya)

What’s GIF good for?

Subjecting nuclear weapons components and other electronic systems to different types of radiation is an essential element of Sandia’s experimental capabilities and the Labs’ support of DOE’s science-based stockpile stewardship mission.

When a nuclear weapon sits idle in the stockpile, its fissile materials give off a continual, low-level buzz of radiation, primarily gamma. Over time, this exposure can damage the weapon’s electronic components, eroding the overall reliability of the stockpile.

The hostile radiation environment a weapon experiences during flight in space also can damage electronics. And in a war situation, a nuclear weapon’s detonation produces a burst of radiation that could destroy the electronic components in weapons targeted nearby — an effect called “fratricide.”

The ability to simulate both low-dose-rate, high-dose-rate, and total-dose gamma radiation effects in a laboratory setting allows designers of weapons components to anticipate component failure or certify new weapons subsystems that can withstand these radiation effects.

It also allows computer analysts to create and validate computer models that simulate such radiation effects so that full-scale nuclear testing is not necessary.

Sandia’s current suite of experimental radiation facilities includes the GIF, Sandia Pulse Reactors, Annular Core Research Reactor, Hot Cell Facility, and the Hermes, Saturn, Sphinx, and Z accelerators.

DOE to provide \$20 million for Sandia's MESA project

MESA, Sandia's proposed \$400 million Microsystems and Engineering Sciences Applications complex, will receive a shot in the arm with \$20 million in new money to proceed with engineering design and infrastructure upgrades for the major project, says MESA Project Center Director Don Cook (1900).

Approval of the DOE funds, intended for this fiscal year, is expected to be announced today (Thursday, Dec. 14, the date this *Lab News* is distributed at Sandia/Albuquerque) at Sandia Science Day in the Steve Schiff Auditorium by Gen. John Gordon, head of the National Nuclear Security Administration (NNSA). NNSA is the new semiautonomous agency within DOE to which the two New Mexico DOE defense labs and Lawrence Livermore National Laboratory now report.

Engineering design of infrastructure upgrades, to begin in January, include improvements in systems that provide process chilled water, acid exhaust, de-ionized water, nitrogen, communications, power, steam, and other relevant facilities.

MESA is expected to make major advances in the ability of the US to devise and use microsystems for military and commercial systems.

A conceptual design for MESA was accepted and approved by DOE after review in November of this year. — *Neal Singer*



MESA MICROLAB — An architectural rendering of the entrance of one of MESA's several buildings, the MicroLab. The MicroLab will consist of three specialized building components — a three-story workspace building, a three-story laboratory building, and a one-story, high-bay design and education center.

Lottery winners

(Continued from page 1)

The 14 Sandians — they dubbed themselves "New Mexico's First" in recognition of the fact that they are the state's first big Powerball winners — are all Security Police Officers or Team Lieutenants in Protective Force Dept. 7140. The 14 are: Robert Adkins, Mary Batson, Cecil Blancett, Duane Carr, Ernest Curley, Nelse DeLoach, Almer Dial, Dwayne Haden, Mark Madrid, Jeff McCullough, Felix Silva, Charles Tabet, Vern Valdez, and Jim Young.

Duane Carr and Charles Tabet were named by their colleagues to serve as group spokesmen to deal with the inevitable media barrage. Duane recalled for reporters that the evening of Nov. 29 began with incredulity: When a fellow winner called Duane to tell him that one of their 140 \$1-tickets was the big winner (the group had chipped in 10 bucks apiece to buy the 140 tickets), Duane says his first reaction was "like, yeah, right."

When the stunned realization sank in that the group had, indeed, won, incredulity morphed into revelry.

Up all night

"We were up all night; none of us got any sleep," Duane recalled, adding that the champagne flowed as freely as their flights of fancy.

During a news conference at New Mexico Lottery headquarters, Charles Tabet fielded the inevitable question: "Have y'all decided what you're gonna do with the money?" by saying that during their first feverish flushes of fantasy, the winners spent it a thousand different ways, saved it all, and then spent it again.

After more sober contemplation — and consultations with attorney Cheryl McLean (invited by the team to represent their interests) — Charles said the 14 intend to be very deliberate and conservative in their decision-making process.

Duane's wife, Mary Ann Mitchell-Carr, knows how some of the money will be spent: "We're going to give back to the community, specifically to the Albuquerque Rescue Mission," which helps homeless men and women. Mary Ann has a spe-



O LUCKY MAN! — New Mexico's First spokesman Charles Tabet, right, talks to a KROE TV-13 news reporter about the 14 Sandians who shared a \$131 million Powerball payoff. In the center of the photo is fellow Powerball winner Duane Carr; to the right of Duane is Cheryl McLean, the group's attorney. (Photo by Randy Montoya)

"Most of these folks feel a dedication to the mission; they won't leave us short-handed. They'll stick around and help see us through any transition period where we might have to bring new officers up to speed."

cial affection for the mission; her mother Annie for years and years volunteered at the mission and provided "Annie's blankets of love" to folks down on their luck.

While the winners celebrated, thousands of their New Mexico neighbors enjoyed the success story vicariously. At water coolers around the Labs and around the city, at convenience stores, in checkout lines at the supermarket, it was the subject on everyone's minds.

Luckless Powerball ticket holders offered each other pearls of wisdom about how they'd spend the money. On radio talk shows, callers had plenty of advice. One expert suggested that the winners should do two things immediately:

get a good financial adviser and a reputable family counselor (apparently, all that money makes some families just miserable). A self-described financial planner showed up at the Labs' communication office and dropped off his business card. Nothing ventured, nothing gained, right?

Early the next morning, Dec. 1, the group appeared live from Albuquerque on ABC's "Good Morning, America," interviewed by Diane Sawyer.

Meanwhile, the New Mexico's First lawyer, Cheryl McLean, was handling her 15 minutes of fame with the media savvy of a Palm Beach attorney. A graduate of the UNM law school who runs her own one-person shop, McLean allowed as how this was the biggest thing that has happened to her so far in her legal career.

They'll be missed

While the Sandia 14 considered options they never thought they'd have to deal with, their boss says if they leave, they'll all be missed. Frank Alton, Manager of Protective Force Dept. 7140, says, "All of them are good people who have put in a lot of hours working security here at the Labs, working holidays, weekends, nights. They'll all be missed; with their experience, and their dedication, they'll be hard to replace."

Frank says so far he hasn't received "a pile of 14 resignation notices on my desk." Some will be gone before the holiday shutdown, some short-timers will stick around to qualify for well-earned retirement benefits. Most of the winners, though, are taking a wait-and-see attitude, Frank says. Those folks are already back on the job, doing their work protecting the Labs' resources. And Frank offers an insight into what the Sandia 14 are made of: "Most of these folks feel a dedication to the mission; they won't leave us short-handed. They'll stick around and help see us through any transition period where we might have to bring new officers up to speed."

At the news conference, a reporter asked Duane if ever "in your wildest dreams, did you think this would happen?" His answer? Yes, of course, in his wildest dreams he fantasized about this moment every time he bought a lottery ticket. Did he ever think it would happen, though? No.

And his advice for all would-be millionaires? "You just gotta believe."

Sandia-developed Lynx successfully used in data gathering and imaging exercises on military aircraft

By Chris Burroughs

Lynx™, a fine-resolution, real-time synthetic aperture radar (SAR) developed by researchers at Sandia for General Atomics of San Diego, has successfully operated on US Army C-12 and U-21 aircraft in several recent data-gathering and imaging exercises.

Since June the Lynx has conducted Army reconnaissance and surveillance missions on the C-12, both in the US and overseas. It operated on an Army U-21 aircraft under the direction of the Science Applications International Corporation. Also, data has been collected in several different exercises using the radar.

Brett Remund, Manager of Synthetic Aperture Radar I Dept. 2348 and program manager for General Atomics/Sandia programs, says he is pleased to see the Labs' technology being used so successfully.

"Our relationship with General Atomics has been a successful and satisfying experience as we've helped them take leading-edge technology developed at Sandia and implement it in manned and unmanned aircraft for use in national security and defense applications," Brett says. "It is clear — both from current users of General Atomic's demonstration systems and from potential customers — that the Lynx SAR system provides a powerful and unmatched solution to the fundamental problem of getting high-quality reconnaissance information to the war-fighter."

At Eglin Air Force Base, Florida, Lynx was put through its paces collecting four-inch spotlight imagery. In Alabama, the U-21 collected Lynx data



LYNX radar image of Washington, D.C.

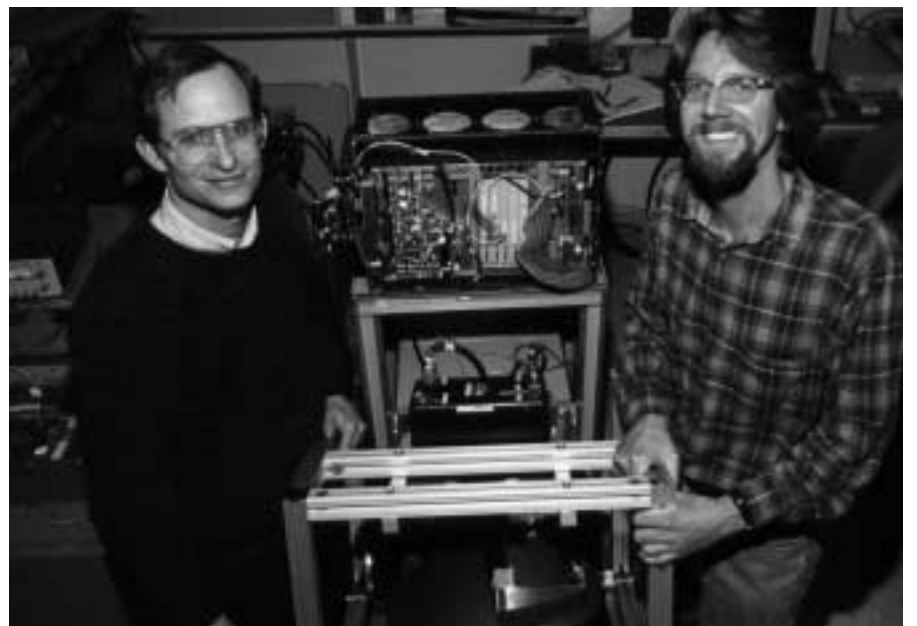
to assess the possibility of using the SAR to characterize drug-related plantings, such as poppies. Lynx operated successfully at Fort Polk, La. by providing high-resolution imagery taken through clouds during a joint Army/Air Force exercise. The Lynx system has also been used to collect high-quality ground moving-target data in support of Defense Advanced Research Projects Agency research.

General Atomics is currently under contract with the US Marine Corps to demonstrate the Lynx in the location and precision engagement of stationary targets. Earlier this year, Lynx was demonstrated for several months in a Predator unmanned aerial vehicle. This involved the collection of high-resolution image data for the Defense Evaluation and Research Agency of the United Kingdom.

Designed to be mounted on both manned and unmanned aircraft, the Lynx is a 115-pound sophisticated all-weather sensor capable of providing photographic-like images through clouds, in rain or fog, and in day or night conditions, all in real time. The Lynx produces images of extremely fine resolution, far surpassing current industry standards for synthetic aperture radar resolution. Depending on weather conditions and imaging resolution, the sensor can operate at a range of up to 90 kilometers.

Flying at an altitude of 25,000 feet, the Lynx SAR can produce one-foot-resolution imagery at standoff distances of up to 55 kilometers. At a resolution of four inches, the radar can make images of scenes that are 25 kilometers away (about 16 miles) even through clouds and light rain.

Sandia and General Atomics joined forces in 1996 to develop the Lynx. General Atomics



JEFF HOLLOWELL (2348), left, and Don Small (2341) stand next to the body of the Lynx, which has been successfully operated on US Army C-12 and U-21 aircraft in several recent data-gathering and imaging exercises. Sandia researchers developed the Lynx for General Atomics of San Diego. (Photo by Bill Doty)

funded Sandia, which already had a sophisticated SAR, to implement an enhanced design as a commercial product and deliver two prototype units together with licenses and manufacturing information to produce the unit. General Atomics is now manufacturing and marketing Lynx on its own, with Sandia continuing to provide R&D support for new concepts and applications.

Brett says Sandia works regularly with General Atomics on the Lynx through an ongoing contract. The Labs helps with radar installation, along with maintenance and new system development. Also, Sandia has provided significant guidance as General Atomics begins manufacturing the radar.

Some 10 to 15 people from Sandia currently work with General Atomics on the Lynx project. One of the current projects is to get the radar to work on faster aircraft, at velocities approaching mach 1.

"We have it flying on slower aircraft, both unmanned and manned," Brett says. "We want to now take it to the next level."

Recent Retirees



Harold Roberts
42 15322



Thurlow Caffey
37 6116



David Ryerson
35 2660



Robert White
35 1123



Robert Hatcher
34 10268



Neil Hartwigen
33 7000



Joseph Honest
31 10001



Miguel Robles
31 12700



Keith Taylor
30 2913



Ian Fritz
29 1742



Marilyn Minton
23 2955



Barbara Walling
10 15341

Inventors, authors, Sandia divisions share \$1.7 million in royalty awards for the year

271 individuals share \$409,000; divisions divvy-up \$1.3 million

By Howard Kercheval

Dinner, recognition of their achievements, and — perhaps best of all — cold, hard cash made the holiday season much cheerier for 271 inventors and authors who shared in \$409,000 handed out during Sandia's eighth annual Royalty Awards Celebration last week.

Awards ceremonies were held in Albuquerque Dec. 5 and in Livermore Dec. 6.

At Sandia/California, the process manual for LIGA microfabrication earned royalties of \$400,000, thanks to 19 Sandians. LIGA is a newly commercialized procedure for the fabrication of extremely precise, deep, two-dimensional microstructures such as gears, heat exchangers, optical devices, and the like.

The \$409,000 represents an increase of 119 percent over last year's money. The top individual award was \$15,200, and there were dozens of awards ranging from \$500 to \$5,000, for an average of about \$1,500 per person.

In addition, nearly \$1.3 million went to nine divisions that will be responsible for future applications of the technologies honored. Divisions receiving money, and the amounts going to each of them were:

1000 —	\$581,910
2000 —	\$42,560
5000 —	\$12,799
6000 —	\$98,249
8000 —	\$418,895
9000 —	\$123,019

11000 —	\$1,662
14000 —	\$6,260
15000 —	\$13,300

The Royalty Awards Celebration is an annual event sponsored by Corporate Business Development and Partnerships Center 1300 recognizing inventors and authors who will receive royalties for technologies they developed that were subsequently licensed and brought royalty funds into Sandia.

Royalties received by Sandia for licensed intellectual property are distributed according to the Royalty Sharing Program (RSP) in this way:

- 20 percent of royalties received is distributed as RSP Inventor/Author Awards (RSP-I) to the intellectual property inventors and authors (employees and former employees only) for past creative work.

- 70 percent is distributed as RSP Division Awards (RSP-D) to the divisions responsible for the future application of the technology for the benefit of DOE missions.

- 10 percent is distributed as RSP Contributor/Classified Developer Awards (RSP-C) to employees and contract personnel (to be recognized and compensated via their employer) who provide technical, legal, licensing, and/or business support toward the development and deployment of Labs intellectual property; and developers of significant classified noncommercial technologies.

The Labs earned slightly more than \$2.3 million in FY00 licensing income, which includes

funds received from a license agreement for royalties, cost recovery, technical assistance, and third-party receipts or money paid to joint owners of licensed technology, such as universities. This year the royalty portion of the licensing income was \$2 million. The Royalty Awards Celebration distributes the royalty portion of the licensing income only.

Taking note of the royalty success, keynote speaker Larry Willard, board chairman and chief executive officer of Wells Fargo Bank New Mexico and West Texas Region, said, "Your past efforts have been very successful, but now is the time to increase the leveraging of lab technology developed for mission benefits by aggressively supporting regional technology-based companies and the diversification of the local economy."

He said investments in intellectual property "must be converted to long-term benefits," and pointed out that the Greater Albuquerque Chamber of Commerce, the Hispano Chamber of Commerce, the University of New Mexico, New Mexico State University, New Mexico Tech, the Legislature, the city and the county, Next Generation Economy, and Albuquerque Economic Development are working with Sandia to make that happen.

"In the final analysis, it is hard for us to have any degree of meaningful success without Sandia National Labs," Willard said. "Sandia's role is critical for the success of our economic development efforts. Sandia has the exciting cutting-edge technology from which new companies and new jobs are created."

Spiffy makeover in works for South Eubank



EUBANK MAKEOVER — The stretch of Eubank Boulevard from Central Avenue south to the Kirtland AFB gate (photo at top, looking north) will soon get a makeover that will widen it to six lanes and add curbs, gutters, bike paths, medians, turn lanes, sidewalks, and landscaping. The effect — represented in the drawing above — will be a much cleaner and easier approach to Kirtland, Sandia, the Willow Wood residential area, and the Sandia Science and Technology Park. The Albuquerque City Council unanimously approved a resolution Dec. 4 clearing the way for the changes. The project was supported by Albuquerque Economic Development, Albuquerque Hispano Chamber of Commerce, City of Albuquerque Mayor's Office, Economic Forum, Greater Albuquerque Chamber of Commerce, Kirtland Partnership Committee, Sandia, Sandia Science and Technology Park tenants (EMCORE, Team Specialty Products, Analytical Solutions, Training Solutions, MicroDexterity Systems, and Quetana), Technology Ventures Corporation, and Willow Wood Homeowners Association.

Roadrunner RV Club sets rally schedule for next year

The Roadrunner RV club consists of about 50 retired Sandia couples, and is a subgroup of the Coronado Club Thunderbird retirement group (consisting of about 300 retired Sandians). It originated in the early 1980s as a group of Sandians wanting to promote good fellowship among recreational vehicle owners and to have RV rallies within New Mexico and the neighboring states of Colorado, Arizona, Utah, and Texas.

The club has five officers, two chairpersons, a historian, by-laws, and a position guide. Our rallies start in February, end in October. They usually begin on the third Monday and end on Friday. One of the officers is a Wagonmaster who oversees all rallies and teams with the rally trailboss. The trailboss plans a specific rally and researches the rally location.

A typical rally will consist of: 1) travel to the rally site on Sunday or Monday, 2) coffee and donuts at 8:30 each morning, 3) happy hour at 4:30 each afternoon, 4) potluck at 6 p.m. on Wednesday, 5) visiting local places of interest proposed by the trailboss, and 6) for those who want, playing games each evening at 7.

Our planned 2001 rallies are:

Feb. 4, Puerto Penasco, Mexico, Playa Elegante RV Park; **March 18**, Laughlin, Nev., AVI Resort; **April 22**, Tor C, N.M., Cielo Vista RV Park; **May 20**, Las Vegas, N.M., Storrie Lake State Park; **June 10**, Dolores, Colo., Dolores River RV Park; **July 15**, Eagle Nest, N.M., Golden Eagle RV Park; **Aug. 19**, Jemez Mountains, N.M., Jemez Falls State Park; **Sept. 16**, South Fork, Colo., Fun Valley Resort; **Oct. 7**, Branson, Mo., Acorn Acres RV Park.

All retired Sandians interested in RV rallies are welcome to join us and can be a guest of a Roadrunner member. To become a Roadrunner RV club member you must be a member of the Coronado Club and also the Thunderbird retiree club.

For more detailed information call DuWayne Branscombe at 881-4589 or e-mail him at LoisDAB@AOL.com. —DuWayne Branscombe

Shoes for Kids represents Labs at its best



Children with wide eyes wait as patiently as they are able for their Christmas gifts from Santa, but each gift is far more precious than a Sony Playstation. New warm, well-fitting shoes are the order of the day. Sandians take the place of Santa Claus, and laughter, jumping, and holiday spirits are handed out in Reebok and Nike boxes.

"Those shoes are nice, but can you get some for my little sister first? I don't want them to run out before she gets hers," says one little boy about the age of 8 who's already filling big shoes looking out for his family. Sandians have celebrated the holidays for 43 years by giving shoes to children whose families have a difficult time providing them. Sandia hopes to provide 350 children with shoes this season.



Photos and story by Randy Montoya

Each little face has its own story. Some are well hidden and some pop out through missing teeth and freckles. "I need snow boots," says one small boy who is new to the city. "I gotta do lots of stuff and help my mom and it snows here in Albuquerque for Christmas, doesn't it?"

In 15 years at the *Lab News*, I have photographed hundreds of polite, eager children lacing up new shoes with such intense levels of excitement that I have always left this assignment with *my heart soaring*, too. It's just the left-over emotion that the kids want to give back in some way. It's evident on the faces of the Sandia volunteers who help hundreds of kids get properly fitted each year. I don't think anyone could watch these busloads of skipping and singing children leave the Mervyn's shoe depart-

ment and still grumble about the holidays.

Last year \$11,800 was raised by Sandians led by Pam Catanach (12650), and 375 smiling children were sent home from Mervyn's Department Store with new shoes.

This year a new set of emotions was stirred for me when an adult approached me with slight tears in his eyes. "Who are these kids?" he asked. As I began to tell him about Sandia's program he motioned me to stop. "When I was a little boy, I used to be one of them. I used to get a new pair of shoes from you guys for Christmas." He smiled and patted me on the back and then he left before we had to see each other's emotions. I am privileged in my job to photograph many of Sandia's finest technological accomplishments, but I left that day feeling that this might just be our finest hour.

Send contributions to SLFCU account #223180.
Call Pam Catanach at 284-5211 for information



Sandia artist Jerry Gorman moonlights as an ... artist



JERRY GORMAN with his four-panel, oil-on-canvas view of a Dixon, N.M., apple orchard. The painting was recently on display at Houshang's Gallery in Santa Fe.

(Photo by Randy Montoya)

How many photographers, poets, and painters have been inspired by a New Mexico sunset? Whatever that number, add Jerry Gorman to the list.

Twenty-eight years ago Jerry, then a bridge builder, was sitting on the porch of a Lords-

burg, N.M., hotel, having a beer with his work crew, watching one of those fiery orange and red sunsets.

"I said to myself, 'I should paint that,'" he says.

Trading in his hard hat

So he gave it all up — road construction, that is — and enrolled in the Art Department at New Mexico State University. He won several international painting competitions and had his work displayed in Paris and New York. He went to West Virginia University and Clemson University for graduate degrees in fine arts.

Today Jerry's paintings — signed "JA Gorman" — are selling at a healthy clip from galleries in Santa Fe, N.M., and Sedona, Ariz. He paints in two styles: contemporary Southwestern landscape and surrealism.

His day job since 1983, as a technical illustrator in Creative Arts Dept. 12620, has provided the financial stability he needs to build his art career, he says.

It doesn't seem a bit odd to Jerry spending the day creating concept drawings of weapons, then spending the evening painting a New Mexico apple orchard.

Feasting on art

"I look at my art like I'm sitting in the middle of one big banquet table, with my Sandia work on one end and my fine art on the other end," he says.

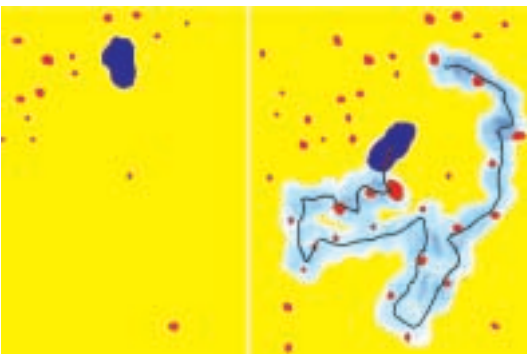
His landscapes feature lots of sky, which is "what you see when you look out on New Mexico," he says.

His surrealist paintings typically interpret a memory of his, perhaps recalling time spent on an Italian market street or a Mexican beach.

"Usually the canvas tells me what it wants to be, and I'm just the observer," he says.

Many of his works are tall, multi-panel pieces whose canvas edges are painted so that "someone could hang the painting around a

The color of science



Researchers at Sandia/California have gained new insights into the processes that occur at the atomic level in the formation of metal alloys. Nancy Garcia's page 3 story offers more details about their findings, but the *Lab News* wanted to reproduce in color a couple of key micrographs that graphically highlight their findings. In these images, extracted from micrographs, a dark blue island of tin on a light yellow copper surface is depicted alongside crystals of bronze alloy (shown in red). The image on the right was taken four minutes after the one on the left, and indicates the path taken by the tin island. The darker the path, the longer the tin remained over that region. Islands avoid crossing their own track. (The images, 600 nanometers across, were taken with low-energy electron microscopy, which permits observing the motion in real time.) The Sandia team published results of its work in the Nov. 24 issue of *Science*.



SURREALIST INTERPRETATION of Jerry's memories of his stay in Europe and travels in Mexico, a painting he titled "Italian #4."

corner," he says.

He paints four to six pieces a month, mostly during weekends. Sometimes the demand for his works outpaces his ability to paint them, other times it doesn't. Overall the demand is increasing, he says.

"I can't paint unless I'm inspired," he says. "I never try to force it."

Incidentally, Jerry isn't the first member of Sandia's technical arts group to find fame as an artist on the outside. Nationally renowned American West "cowboy" painter Gordon Snidow also worked as an artist at Sandia from 1960 to 1971.

— John German