Sandia designs, tests, builds non-nuclear guided penetrator weapon for military targets of tomorrow

It will be first time a Sandia-fabricated weapon system will directly enter the US conventional arsenal

By John German

Sandia engineers are designing and soon will test a new conventional (non-nuclear) weapon that gives US forces a way to penetrate hardened and shallow buried targets quickly, precisely, and safely.

Currently the military's conventional options for attacking such targets are limited to aircraft-delivered penetrating bombs — which generally don't reach the needed levels of precision, rock-smashing velocities, or nearly straight-down impact angles.

As part of the accelerated three-year effort, Sandia not only will design and develop the new Tactical Missile System – Penetrator (TACMS-P) and flight-test three prototypes at White Sands Missile Range, N.M., it also will produce six battle-ready weapons — called residual units — for immediate inclusion in the US Army's arsenal.

The program is co-sponsored by the US Army and US Navy as an Advanced Concept Technology Demonstration.

Proven expertise

The Sandia portion of the program, being managed out of Aerospace Systems Development Center 15400, requires the mating of an existing tactical weapon design — the Army Tactical Missile System (ATACMS) — with the design of a new warhead developed under Navy guidance.

It draws on a broad spectrum of Sandia capabilities from centers including 2300, 2500, 2600, 2900, 3100, 9100, 14100, and 15400, says 15400 Director Jerry McDowell.

The Navy chose Sandia to develop TACMS-P based on the Labs' proven expertise in high-speed flight system design; precision navigation, guidance, and control; and earth penetration technology, he says.

"Sandia has been involved in launches and flight tests, fuzes, precision guidance and control, earth-penetration technologies, and other relevant technologies for decades," says Jerry. "This program is a confluence of a great many Sandia capabilities."

Hours to minutes

Like the ATACMS, a standard ground-to-ground missile in the Army inventory, the TACMS-P will be launchable from the Army's Multiple Launch Rocket System (MLRS) and, following further development, potentially from US Navy submarines.

TACMS-P program manager David Keese (15404) says the ability to launch penetrators from mobile launchers hundreds of miles away not only removes aircraft from harm's way and provides for greater precision and depths of penetration, it also speeds the time between target selection and weapon delivery to minutes rather than hours, a desirable capability when targeting scenarios change quickly and frequently.

"The TACMS-P would provide a capability the Army and Navy have said they need in today's war fighting situations," he says.

The six residual units also represent the first time a Sandia-fabricated weapon system will directly enter the US military's conventional

(Continued on page 4)

RING OF ELECTRONICS — Mark Beader (left) and Randy Swier (both 2334) examine a Toroidal Electronics Package (TEP), designed at Sandia, that serves as the navigation, guidance, and control system for TACMS-P. (Photo by Randy Montoya)

VP Jim Tegnelia talks about key issues in Sandia's DoD-oriented SBU

SANDIA'S EMERGING THREATS SBU is a major component of the Labs' response to the new set of problems in today's new security environment, says Div. 15000 VP Jim Tegnelia in his capacity as head of the Labs' Emerging Threats Strategic Business Unit (SBU). Read more about his SBU in an interview on **page 6**.

Got spam? Labs' e-mail team eighty-sixes thousands of junk messages a day

By John German

At Sandia these days, unsolicited commercial e-mail (UCE) messages are like roaches. For every one you see, there are 10 you don't see . . . or 50.

Although most Sandians still receive some spam, says Kelly Rogers (9329) of the Sandia Enterprise Electronic Messaging Service (SEEMS) team, new filtering software installed last summer is intercepting a quarter-million UCE messages a month.

Unwanted e-mail accounts for about 17 percent of the roughly 1.5 million messages sent to Sandia employees during a typical month, he says.

And the trend is toward more UCE, not less. IDC, an Internet analyst company, estimates

(Continued on page 5)

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Sandia National Laboratories

New construction causes parking woes

Problems should improve somewhat with some quick fixes

By Chris Burroughs

Does this sound familiar? You return to work after a meeting off base and find *no* parking spaces available. Either you circle the lot half an hour until someone leaves so you can nab the one and only vacant spot or you park across the street from Hardin Field and make the long hike to your office or lab.

Ed Williams, Manager of Building Management Dept. 10864 and by default responsible for addressing near-term parking issues, knows it's tough to find parking spaces at Sandia these days — mostly due to the huge volume of construction workers on site and the new buildings underway. Ed and the Facilities team are doing their best to squeeze additional spaces where possible and by the end of the fiscal year will have added more than 150 spaces in key locations .

"We didn't wake up one day and discover that people were complaining about parking," Ed says. "We anticipated parking was going to be congested, especially in areas west of Bldg. 800 and the northwest corner of Area 1, and are taking immediate steps to alleviate the situation."

Complaints have come in the form of a petition signed by 110 employees presented to the Sandia Traffic Safety Committee, of which Ed is a member, and numerous e-mails.

Some of the solutions have been the addition of 42 spaces near Bldg. 832 (Personnel) where three mobile offices were removed and replaced with parking spaces. Some 222 slots were added to the 887 north lot at the end of FY02. An additional 50 spaces were added near Bldg. 905. Soon additional spaces will be added west of Bldg. 831 (Medical), and more parking

(Continued on page 5)

What's what

As most reporters know, there's a story of some kind in every person and place. The same is true of humor; there's always something funny and amusing around, if you just look at it the right way. The recent rains in New Mexico, for example.

First, there are the gawker/revelers. Most places, when rain threatens, people go inside. Here, we — many of us, at least — hurry out to admire the gathering gloom, chat amiably as the first few drops begin to spot the sidewalk, and break into smiles and animated conversation when the rain actually begins to fall. We don't stand right out in it, of course; we do have more sense than that.

But we like it. What sunshine and midwinter temps in the 30s or 40s are to Bostonians, heavy gray clouds and a drenching rain are to us — a lovely day. So, stuck in a pretty severe drought for the last few years, we're always happy to see rain.

Then there are umbrellas. Although we don't use 'em much here, when it does rain, out they come. In all sizes and colors: multi-colored panels, the small telescoping kind you can stick in your case, the jumbos that hotel doormen use in places where it actually does rain regularly, brand new ones, cane-handled ones — a real variety. In a place where the average rainfall is less than nine inches a year. You would expect such a variety in Seattle or New Orleans. But not here.

And they're *seasoned* umbrellas — the ones you have to shake the dust off of before deploying; the ones whose automatic-opening mechanisms have fused from midsummer, inside-the-closed-up-pickup heat; the ones with ribs mangled by heavy grocery bags; those with dog-eared fabric panels flapping in the rainy breeze, bent shafts, and all kinds of other eccentricities.

It's always a show.

* * *

And about the reader who didn't mind naming buildings, as long as the names didn't lengthen what we actually *call* the buildings, Chuck Miller (5713) sent this:

"Let's compare apples to apples — 'SSA' is as short as 'TTC.' 'Steve Schiff Auditorium' (7 syllables) is *shorter* than 'Technology Transfer Center' (8 syllables plus a glottal stop). *Plus*, you can always say 'Schiff Aud' (2 syllables). What's the alternative, 'Tech Tran Cen?' Ugly!"

Just had to ask, didn't I?

Meanwhile, retiree Donald Goodrich e-mailed that before RMSEL — the Robotics Manufacturing, Science, and Engineering Laboratory — was dedicated, he suggested naming it for "the very prolific author Isaac Asimov in recognition of the immense scope of his contributions to both the vocabulary and the ethics of 'robotics,' a word which he popularized or perhaps even invented.

"The reply I received . . . cited 'great expenses' and multiple approval authorities needed for a name change. Perhaps the 'climate' has changed? If so, consider this a resubmission of the suggestion."

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

Homeland Security update is Monday, March 24

Sandians working on homeland security projects and those who hope to are encouraged to participate in a Labs-wide meeting 10:30 a.m.-12 noon MST, Monday, March 24. The meeting is live in the Steve Schiff Auditorium, with video links to Sandia's Carlsbad, N.M., office, Sandia/California (9:30 a.m. PST in CRF Auditorium), and Sandia's Washington, D.C., office (12:30 p.m. EST).

T.J. Allard, head of Sandia's Homeland Security Office (50), says this meeting will emphasize what Sandians need to know to work effectively in the homeland security area since the new federal Department of Homeland Security (DHS) officially began operating March 1.

T.J. will explain some new and evolving Sandia organizational and operational details and then lead a question/answer and discussion session.

Among the topics to be discussed:

• How Sandia has organized to be as effective as possible serving the new DHS while continuing to serve DOE, DoD, and other traditional customers.

• How Sandia will cooperate with other NNSA and DOE national laboratories working on multilab projects for DHS.

• How Sandians John Vitko (8100), Holly Dockery (5350), and John Cummings (1000) will serve DHS Headquarters as technology "portfolio managers."

T.J. says the meeting will also announce recently appointed Sandia leads and other major participants in the following homeland security areas: Chemical/Biological, Explosives, Radiological/Nuclear, Cyber, Information Analysis/Infrastructure Protection, Borders/Transportation, Systems Analysis, Red Teaming, and Emergency Response.

Many of the Sandia leaders in these areas are expected to participate in the March 24 meeting along with David Nokes (5000), Sandia's lead VP for homeland security, and California Lab VP Mim John (8000), who coordinates California's work in this area.

Although Sandians now working in homeland security areas or hoping to are especially encouraged to attend, the meeting is open to all interested employees. *— Larry Perrine*

For the record

In "Sandia helping shape the new Department of Homeland Security" in the March 7 issue (page 8), the last line was inadvertently dropped in final layout. The final sentence should have read: "'In fact,' he said, 'John Vitko, John Cummings, and Holly Dockery have been asked to take long-term assignments in the Department."

Sandia showcases latest work at Houston expo

CYBERSECURITY DEMO — Juan Torres (6517, second from left) explains at a March 4-5 Houston event what Sandia, DOE, and other DOE labs are doing to help ensure cybersecurity for the nation's energy infrastructure. Juan was one of several Sandians and other DOE lab representatives participating in the "Homeland Security Technology for Our Energy Infrastructure" exposition. DOE's Office of Energy Assurance sponsored the expo, held in cooperation with the National Petrochemical and Refiners Association, and 11 DOE labs displayed technology for the 18 exhibits. Sandia Director Sam Varnado (6500) is currently serving a temporary assignment at DOE to advise the Deputy Secretary on the long-term strategy for the Office of Energy Assurance.

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LOCKHEED MARTIN

In our next issue

Following a tradition that goes back more than 20 years, the next issue of the *Lab News* (April 4) will present our annual *Lab News* State of the Labs interview with Sandia President and Labs Director C. Paul Robinson and Executive VP and Deputy Director Joan Woodard.

The wide-ranging interview, conducted March 6, covers a broad range of topics of interest to Sandians, most of them different from those they discussed in their recent, coincidentally named State of the Labs talks to the community and employees.

Congratulations

To Debra (1701) and Eric (3114) Chavez, a son, Jonathan Ray, Feb. 20.

Take Note

Retiring and not seen in *Lab News* pictures: **Rene Mercado** (10842), 21 years; **Mona Plummer** (1302), 23 years; and **Eva Maria Renninger** (15419), 33 years.

Materials advance with silicon/graphite composites may lead to more powerful, longer-lasting lithium batteries

Discovery could have wide-ranging impact on both consumer and national defense applications

By Mike Janes

California site researchers are developing a new class of composite anode materials composed of silicon and graphite that may double the energy storage capacities currently possessed by graphite anodes, potentially leading to rechargeable lithium-ion batteries with more power, longer life, and smaller sizes.

"Manufacturers of electric automobiles, laptop computers, cell phones, power tools, and other hybrid microsystems will likely all benefit from this kind of technology," says Scott Vaupen of Sandia/California's Business Development Dept. 8529. Sandia is actively seeking collaborators to further develop the technology for eventual licensing and commercialization.

The marriage of silicon and graphite may improve the specific capabilities of commercial graphite anode materials up to 400 percent, says Analytical Materials Science Dept. 8723 Manager Jim Wang.

"Currently, no device exists that is altogether small, robust, long-lasting, and high-powered enough to meet the requirements of hybrid microsystems," Jim says. "Electronics designers are forced to use low-power-consumption components and designs that are limited in their longevity. Our newly discovered anode materials can improve the performance of microsystems by allowing for more powerful, sophisticated electronic components and by reducing the size and weight of the overall system."

Sandia turned to silicon, which offers more than 10 times the lithium capacity potential of graphite.

Jim says researchers have, for years, been vexed by the capacity limits associated with traditional lithium battery anodes. Sandia turned to silicon, which offers more than 10 times the lithium capacity potential of graphite, but is hampered itself by a rapid capacity loss during the battery cycling phase. When small particles of silicon are combined within a graphite matrix, however, the large capacities are retained.

"The promising aspects of these materials are the large capacities, the capacity retention during cycling compared to other high-capacity materials, and the ability to control its performance by changing the composite composition and microstructure," Jim says.

PROMISING MATERIAL — Greg Roberts holds an electrode coated with the new silicon/graphite material for improving lithium batteries. (Photo by Bud Pelletier)

Karl Gross (8723) is one of the principal investigators on the team. He says the silicon/graphite composites can be produced via a simple milling process, a production technique common within the battery industry. The raw materials needed to produce the electrode material have proven to be inexpensive and abundant.

The discovery could have wide-ranging impact on both consumer and national defense applications, according to Ken Wilson (8703), section leader for engineering materials & mechanics in Materials & Engineering Sciences Center 8700. Sandia's hybrid microsystems program, he says, focuses in part on wireless radiation detectors and other microsensor systems and devices used for homeland security applications and is in constant need of enhanced sources of power and longevity.

In assessing the new material's performance, research team members carried out a just-completed Laboratory Directed Research and Development project over three years in collaboration with David Ingersoll of Lithium Battery R&D Dept. 2521. They first produced composite powders with varying silicon-to-carbon ratios and microstructures, then produced electrodes from those powders and evaluated their performance by electrochemical measurements.

Sandia CaliforniaNews

They then examined structural changes in the electrodes during cycling to understand the lithium transfer mechanism and materials phase changes to further improve the new material.

Research and development focusing on the replacement of graphite electrodes in rechargeable lithium batteries has taken many forms over the years. Nongraphitic carbons, doped graphite, intermetallics, convertible oxides, nitrides, active-active, and active-inactive composites have all been examined but have failed to generate significant improvements.

Project lead Greg Roberts (8723) acknowledges that some potential vulnerabilities exist with the new material. The complete elimination of fading of long-term cycling capacity in the silicon-based electrodes, Roberts says, may not be possible, though it can likely be minimized by the design of the carbon-silicon composite microstructure.

Still, Jim is confident that the silicon/graphite electrode materials have set the bar for future breakthroughs. "We believe that only other silicon-containing electrode materials can compete with the large capacities that our silicon/graphite composites have demonstrated," he says.

Retiree deaths

Jack A. Barber (83) .....Oct. 13
Doris R. Cole (86) .....Oct. 31
Elnora Mallard (79) .....Nov. 1
Edward F. Erhman (82) .....Nov. 6
Allen F. Beck (85) .....Nov. 7
Clarence J. Domme (85) .....Nov. 7
Donald J. Bliss (89) .....Nov. 8
Robert D. Jones (83) .....Nov. 13
Vincent G. Redmond (86) .....Nov. 15
M. Muriel Denison (92) .....Nov. 17
Oscar H. Berlier (78) .....Nov. 19
Paul L. Stewart (94) .....Nov. 19
Martin A. Serna (86) .....Nov. 22
Donald L. Markwell (76) .....Nov. 22
Maurice E. Richards (85) .....Nov. 24
Frank E. Hensley (84) .....Nov. 24
Edwin D. Machin (74) .....Dec. 2
Edward C. Hirt (85) .....Dec. 3
Glen O. Corbett (79) .....Dec. 8
Vlasta E. Hruska (91) .....Dec. 8
Herbert D. Abbott (63) .....Dec. 9
Joseph G. Brooks (87) .....Dec. 14
Patricia A. Chisholm (70) .....Dec. 14
Frank L. Leyba, Jr. (82) .....Dec. 19
Joseph C. Asturias (83) .....Dec. 20
Joseph Hernandez (79) .....Dec. 23
Harold W. Hanna (83) .....Dec. 24
Robert P. Kelly (73) .....Dec. 27
Kathryn Matijerich (71) .....Dec. 27
Phillip L. Wehrman (68) .....Dec. 29
Armstead Arrington (83) .....Dec. 31
Robert W. Seavey (75) .....Jan. 2
Delmar W. Dufty (88) .....Jan. 2
Mary E. Barnhouse (83) .....Jan. 6
Gilbert R. McGuiness (77) .....Jan. 8
Richard C. Moyer (81) .....Jan. 8
Clarence W. Huddle (68) .....Jan. 10
Margaret V. Potts (94) .....Jan. 14
James R. Kelsey (58) .....Jan. 14
Armand F. Fink (85) .....Jan. 14
Joseph Danclovic (76) .....Jan. 16
W. S. McElvaney (91) .....Jan. 18
Joseph R. Heaston (93) .....Jan. 19
Charles E. Runyan (91) .....Jan. 20
Walter G. Self (84) .....Jan. 20
John W. Richardson (85) .....Jan. 27
Charles K. Lumpkin (90) .....Feb. 1
John Paul Pupelis (88) Feb.2
Richard C. Beckmann (60) .....Feb. 28
Thomas J. Chiado, Jr. (83) .....Feb. 6
William O. Short (78) .....Feb. 8
Eugene E. Medina (81) .....Feb. 9
Juan R. Marquez (78) .....Feb. 11
Ramon Armijo (76) .....Feb. 11
Robert E. McCallum (91) .....Feb. 11
Juliette O. Wolff (67) .....Feb. 12
Louis V. Perea (78) .....Feb. 14
Robert L. Rutter (69) .....Feb. 16
Waldo Lucero (93) .....Feb. 17
Lorna F. Peterson (92) .....Feb. 19
Jose M. Sanchez (92) .....Feb. 20
Lewis S. West (82) .....Feb. 24
Frank W. Millikin (86) .....Feb. 27
Ludwig A. Eversgerd (92) .....Feb. 28

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Penetrator

(Continued from page 1)

arsenal, he says.

"Usually we conduct the flight tests and someone else picks up, modifies for production, and manufactures the systems," he says. "In this case the Army wants a few of the units right away. We're going to make the first six for them."

Design, build, test

The Army says it might choose eventually to have a hundred or more TACMS-Ps built by a manufacturing contractor, he says.

Sandia's responsibilities, says TACMS-P project leader Walt Gutierrez (15425), include designing, fabricating, testing, and delivering the TACMS-P's new payload and flight system.

These systems include actuated fins that provide enhanced maneuverability during flight, advanced fuzing systems that sense depths and underground features, and improved navigation and control systems.

The redesigned warhead also will contain a new penetrator — a Sandia-patented cast steel sleeve called the Monolithic Ballasted Penetrator — designed to shed its skin as it rumbles through packed earth and concrete at thousands of feet per second.

The penetrator contains insensitive high explosives and a Sandia fuze that will ultimately trigger the warhead and destroy the target

Immediate and future capability

Sandia also will integrate the new warhead with the TACMS-P transition system (the section between the warhead and rocket), now being modified by Lockheed Martin's Missile and Fire Control Division.

The Sandia team recently passed the first critical design review (CDR) by the program's Army and Navy sponsors.

"This is a critically important effort for Sandia, the Army, and the Navy to demonstrate our ability to cooperate on a program of mutual interest," said Barry Hannah, US Navy Strategic Programs Reentry Systems Branch Head, the program's primary sponsor, during a break in the CDR proceedings at Sandia.

"The TACMS-P will provide an immediate capability for the Army, and a future capability for the Navy, to destroy hardened and buried targets, which has been identified by the services as a critical need," he says.

The first TACMS-P flight test is scheduled for September 2003 at White Sands, with the two additional flight tests approximately five and ten months later.

The six usable residual units are scheduled be delivered to the Navy, then by the Navy to the Army, by late fall 2004.

Aerospace systems mission is important, growing

Members of Sandia's aerospace and flight test team are simultaneously managing a mature missile defense flight test program; a growing precision-strike program aimed at improving missile guidance, accuracy, and lethality; and several smaller R&D programs to improve rocket flight, guidance, target acquisition, and other related capabilities.

Center 15400 Director Jerry McDowell says Sandia has earned a presence in these programs through years of successful flight tests and technology demonstrations.

"The continued success of these programs is a testament to the hard work and dedication of hundreds of Sandians from across the Labs, all working together in the common goal of providing exceptional service," he says.

"We're known and we're respected and we've been involved in this kind of work for 25 years," he says.

The team's work takes its members far and wide. They've spent weeks near frigid Kodiak, Alaska, to support Strategic Target Systems (STARS) launches sponsored by the US Missile Defense Agency (MDA) in an effort to develop a mid-course ballistic missile defense capability.

They often visit their home away from home — the Kauai Test Facility on the island of Kauai, Hawaii, part of the US Navy's Pacific Missile Range — to support launch operations for various customers, including ship launches of "kill vehicles" for intercepting ballistic missiles.

They support MDA-sponsored flight tests from Vandenberg Air Force Base, Calif., where target payloads created by Sandia are launched over the Pacific, and from Kwajalein Atoll in the south Pacific, the business end of the launches where target vehicles are radar-tracked and kill vehicles are launched, and over which the kill vehicles seek and destroy the Sandia payloads in the night sky.

"We're engineers," says Jerry, "so we like to build things and see them work. When it's time to put a system in the air, we fly them. Sometimes they work, sometimes they don't. That's how advanced concept development plays out. The risks are great and the potential rewards very exciting."

Balancing prudent risk with an opportunity to advance the state of the art creates a stressful environment, he adds.

"Our folks handle the stress and pressure very effectively," he says. "Our track record for successful demonstrations of advanced concepts is a big reason our customers return."

The missile defense component of Sandia's work comes in at about $60 million for FY03. The precision strike work, in its infancy but growing, now accounts for about $15 million of Sandia's annual budget, he says.

But it's the people who make the program a success.

"We have some very dedicated, very hard working people who are doing extremely important missions for this country, and they are doing it very well," he says.

Watch for a future *Lab News* feature issue about the people and places that make up this important component of Sandia's mission.

School to World

TOOLS OF THE TRADE — Chris Catechis (3121) and Mark Nielipinski (3127) discuss radiation measuring equipment with a few of the 2,700 students who participated in this year's School to World event, held Saturday, March 8, at the Albuquerque Convention Center. Among the more than 500 volunteers supporting the event were 76 from Sandia. Some 560 parents, including many Sandians, were involved in allowing middle school students to explore various career opportunities. "I do not exaggerate when I say that it may have changed the course of some of our young people's lives," said one middle school counselor.

(Photo by Bill Doty)

New 401(k) Savings Plan brochures available online

Several significant changes were made to the Sandia Savings Plans in the summer of 2002. Two new brochures created to reflect the plan following the changes are now available electronically.

The "Highlights of the Sandia Laboratories Savings Plans" brochure briefly explains just that, plan highlights, and offers a list of resources with additional information. Also available is "Retirement Strategy and the Sandia Savings Plans Investment Options." This brochure explains the classification of each investment option, states the goal of the option, what it invests in, and who might want to invest in the fund option.

Participants may view the brochures online at NetBenefits, www.401k.com, listed under Your Company Plan on the Planning tab. Or call Fidelity at 800-240-4015 to request that a copy be sent to you.

Recent Patents

Barry Spletzer (15211) and Diane Callow (15272): System to Extract Liquid Water from a Loaded Desiccant.

Daniel Barnette (9224) and Curtis Ober (9233): Adjustable Shear Stress Erosion and Transport Flume.

Kevin Linker (5848), Francis Bouchier (3112), David Hannum, and Charles Rhykerd Jr. (both 5848): Human Portable Preconcentrator System.

Steven Goldsmith, Laurence Phillips, and Shannon Spires (all 6517): Method and Apparatus for Managing Transactions with Connected Computers.

Parking

(Continued from page 1)

will be developed when the dome (Bldg. 852 is torn down later this year. The Facilities team is also looking at other areas for parking additions.

That doesn't make up for the lost parking spaces west of Bldg. 878 due to construction, or the spaces in front of Bldg. 800 that were eliminated after 9/11, or west of Wyoming where a new Air Force building was constructed.

The "good news" is that by the end of FY08, when much of the construction will be done, there should be plenty of parking.

"Over the next three to five years we will see a migration of people from the northwest side of Tech Area 1 to the southeast side because that's where the new labs and buildings will be constructed as part of the MESA complex."

He adds that as part of the MESA construction project, two parking lots will be added to accommodate the shift.

Ed notes that construction isn't the only reason parking has become a problem over the past year. One is the increased population of Sandians and contractors due to aggressive new hiring. Another is the fact that fewer people are riding the bus to work. Several years ago bus ridership averaged 500 people. That has reduced to slightly more than 100. This is due to several reasons, he says. After 9/11 buses could no longer come through the tech area. Also a lot of people who started riding the bus in the 1970s during the energy crisis are retiring. Another reason for the shortage of parking spaces is that fewer people are carpooling and biking to work. The most recent carpool registration shows a reduction of 150 requests.

In doing benchmark surveys with private industry, Sandia doesn't come out too badly. Industry designs have .65 parking slots per person. Sandia has .79 slots per person — actually ahead of industry standard. However, many of these slots may not be near where people are located. In addition, the industry practice is to design for an average walk from parking lot to work location of 1,000 feet. Sandia's average is 975 feet.

"These statistics don't mean much to the person circling a parking lot looking for a space," Ed says.

Sandia has investigated the possibility of building a parking structure. The costs are significant. To build a parking lot, including earth work, drainage, paving, striping, and installation of bumpers, the average cost is $1,500 a slot. That can be compared to a parking structure where the average cost is $5,000 to $6,000 a slot.

FINDING PARKING at Sandia is a problem these days, largely due to the new construction under way. For Sandians, parking has always been relatively close by, convenient, and free. (Photo by Randy Montoya)

Bound by Air Force property to the west and north, Sandia is limited about where it can build new lots. To put in new lots, the Labs must get a Land Use Permit from the Air Force, which may have use for the desired property. The Air Force has granted permission for Sandians to park in additional areas west of Wyoming Boulevard and north of Bldg. 852 (the dome). Sandians should take advantage of these opportunities.

Ed asks Sandians to be patient about the parking situation.

"For Sandians, parking has always been close by, convenient, and free," he says. "We intend to keep it that way."

Working with Sandia to help solve the parking problems are Roy Hertweck (10853), an architect; Nydia Schmidt (10861), a civil engineer; and Linda Stefoin, a benefits specialist (3341).

Spam

(Continued from page 1)

that the total number of spam e-mail messages sent will increase from 10 billion per day today to 30 billion per day by 2006.

A numbers game

Spam reaching Sandia takes many forms. Invitations to visit porn sites. Scam letters from Nigeria. Debt consolidation offers. Suspiciously cheap printer cartridges. Chain letters. The list goes on.

A survey by anti-spam software maker SurfControl Plc claims each message costs the recipient business a dollar in lost productivity and additional infrastructure costs.

At Sandia, says Kelly, the cost of weeding out spam is roughly seven-tenths of an FTE (full-time equivalent employee).

But it could be more, way more, if the SEEMS team didn't stop most of it at the server, he says.

For the international syndicates sending most of the world's spam, a million messages costs about $30. The average rate of response to their spam-borne pitches is approximately one quarter of one percent. Thus, a $30 mailing to a million recipients might generate 2,500 new customers.

And most spam is either originating from or is being routed through overseas servers, so emerging federal anti-spam legislation is unlikely to stop it, he says.

A long day of screening

Here's how Sandia's spam filtering works:

All incoming e-mail is routed through two layers of UCE-detection software, similar to virus-detection software. The programs are trained to recognize specified source servers, header types, subject-line content, offensive language, animated attachments, and other features common to UCE.

Mail that is suspect is quarantined in a separate in-box accessible only to members of the SEEMS team. Non-suspect mail is routed directly to your in-box.

Throughout the day, the five-member SEEMS team shares the duty of manually screening the quarantined mail, some 13,000 to 15,000 messages in a typical work day, with help from software that groups the mail by common characteristics and allows some e-mails to be deleted *en masse*.

The screening day is long. It begins at about 3 a.m. when team member Carolyn Kumashiro (9329) screens the previous evening's catch.

If a message appears to be legitimate or doesn't match typical characteristics of junk mail, the SEEMS screener sends it on to its intended recipient; otherwise, he or she spikes it.

(Ten minutes into the *Lab News* interview, Kelly checked the quarantine box, which already contained more than 200 new messages.)

"We see a lot of spam," Kelly says. "We pretty much know what's spam and what's not. It's fairly intensive for us, but this is more efficient than 10,000 end users doing it themselves."

"If we weren't doing this," he adds, "the cost would be astronomical . . . scary."

Spam brinkmanship

Most of the quarantined e-mail gets deleted, but 100 to 1,000 originally quarantined messages per day get forwarded to Sandians' in-boxes after a short delay.

Some spam gets through. As filtering software gets better and more sophisticated, so do the spammers.

"Some of what's getting through is indicative of the brinkmanship going on between the spammers and the filterers," says Roger Suppona of Computer Security Dept. 9311. "It's an ongoing battle."

Recently, for instance, Sandia began receiving a large number of UCE messages relayed through a newsgroup hosted at Lawrence Livermore National Lab. To the Sandia filters trained to accept all mail from the sister lab, it looked like legitimate mail.

Other common deception techniques include use of subject lines that look like business or personal mail, such as "How are you?" or "Hello!!!!!!!!!!!!!!"

"It's a little bit like the game 'whack-a-mole' at the amusement park," says Kelly. "Every time you whack one technique down, another pops up somewhere else."

So what should you do when the spam gets through?

"The best thing people can do is nothing," says Roger.

If you can readily identify a message as spam, delete it without opening it. If you open it and it is spam, delete it.

He says some of the pornography being distributed through UCE these days is "too offensive to describe." At a minimum, all spam is annoying, he says.

Never respond, ever

Spammers typically get your e-mail address off the Internet or newsgroup chat sites. Often your address is harvested automatically with no human intervention. Or it is discovered by spammers' newest tools: random character name generators.

"Some people think this stuff is directed at them," he says. "But you're just an address. We advise people not to take this stuff personally. Getting spam is one cost of using the Internet these days."

And never, ever follow the "unsubscribe" or "remove from list" instructions contained in some messages in hopes of being left out of future mailings. When you do that, he says, the e-mailer knows your address is valid and current, which makes your address even more valuable than before you responded.

To a spammer, lists of valid addresses are like gold, he says. Unsubscribe instructions are a ruse, he says.

We're all human, he adds. Some people want to fight back.

But resist the temptation, he says. In the best case, your carefully worded expression of outrage gets deleted without being read. In a relatively few documented cases, an angry outburst has made the responder the target of harassment and crime, such as identity theft.

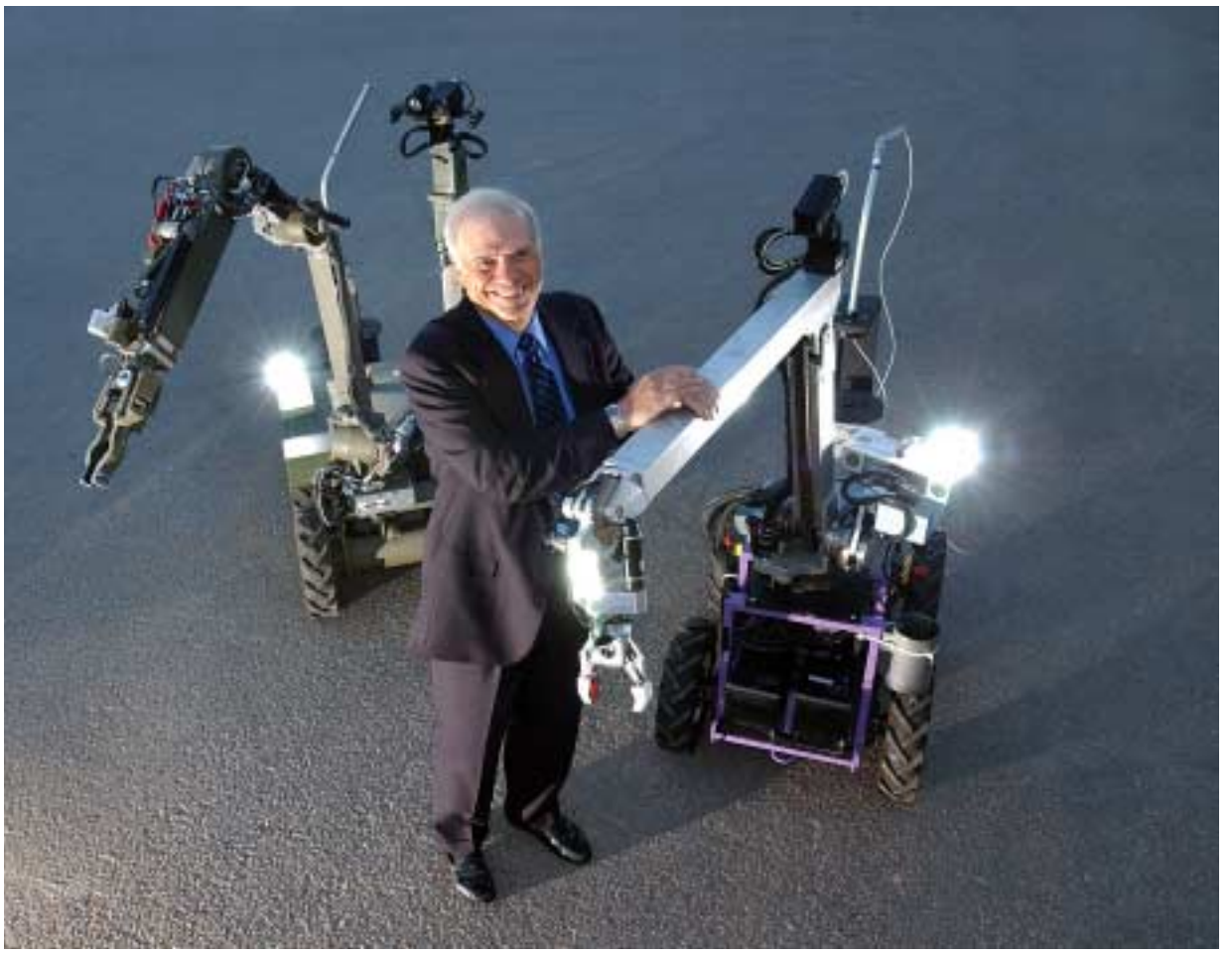
The Sandia SEEMS team includes Bob Pastorek, Mark Stilwell, Janet Padilla, Robert Price, Carolyn, and Kelly, all of Infrastructure Computing Services Dept. 9329.

Missile defense, homeland security, future combat systems, directed energy: What's hot in Emerging Threats?

VP Jim Tegnelia talks about key issues in Sandia's Department of Defense-oriented Strategic Business Unit

By Bill Murphy

This is the fourth in an occasional series of Lab News *interview articles with Sandia vice presidents who head Labs' Strategic Business Units (SBUs), Strategic Management Units (SMUs), or Strategic Services Units (SSUs). The emphasis is on timely current programs, evolving opportunities, and how recent national and international events may be changing their focus. The articles are not intended to be a comprehensive overview of all work carried out in the units. The previous interviews were with Bob Eagan (6000), Energy & Critical Infrastructure SBU (*Lab News, *July 12, 2002); Al Romig (1000), Science &Technology SMU (Nov. 1, 2002); and Lynn Jones (7000), Integrated Enabling Services Strategic Services Unit (Nov. 15, 2002).*



EMERGING THREATS VP Jim Tegnelia shows off some of Sandia's latest robotics technology. Devices such as these have broad application in the war on terrorism and homeland security. A robot much like the ones pictured here was used by the Albuquerque Police Department in helping to resolve a very sensitive confrontation with an accused triple murderer. (Photo by Randy Montoya)

"History tells us that we're never going to be without problems in this world," says Sandia Div. 15000 VP Jim Tegnelia thinking out loud in his capacity as head of the Labs' Emerging Threats Strategic Business Unit (SBU).

The Cold War, Jim says, posed a certain set of national security problems for the nation; the nuclear weapons labs were established to provide technology-based answers to those problems. Likewise, in today's new security environment, the question the nation — and the national labs — must ask is: "What is the new set of problems that we're going to encounter and how are we going to respond to them?"

Sandia's Emerging Threats SBU is one component — a major one — of the Labs' response.

"Emerging Threats," in Sandia parlance, is the term applied to most non-nuclear national security work. Emerging Threats is a large umbrella, but in general terms, think homeland security, think counterterrorism, think asymmetrical warfare, think national missile defense — in short, think broadly about the "war on terrorism" in both its highly visible and in its less visible or shadowy aspects. The Emerging Threats SBU is currently doing work related to all these challenges.

While DOE/NNSA-sponsored nuclear weapons work constitutes some 60 percent of the Labs' $2 billion budget and represents the Labs' primary mission, so-called "Work For Others" income has been increasing significantly in recent years, including more than $160 million in direct Emerging Threats SBU work and a total of $329 from the DoD.

While many Sandians use the Labs' divisional structure as their primary frame of reference, the actual functional underpinnings of the Labs are built around the SBUs and SMUs (Strategic Management Units).

The SBUs, as the name suggests, are tied to the Labs' lines of business. In addition to Emerging Threats, they are: Nuclear Weapons ("owned" by Senior VP 9000 Tom Hunter); Nonproliferation and Materials Control (VP 5000 Dave Nokes); and Energy and Critical Infrastructure (VP 6000 Bob Eagan). The SMUs — Science & Technology and Partnerships — are both headed by VP 1000 Al Romig.

Jim thinks the Labs' SBU structure has proven invaluable in fostering strong relationships among Sandia and its various funding entities.

"To me," Jim says, "the SBU structure offers us a very effective way of representing the sponsor or the customer inside of the Laboratories. I think it gives us a unique opportunity to get the perspective of the outside sponsor — a perspective we wouldn't have any other way. No other federally funded research and development center I know of has an arrangement where various sponsors are represented by internal business units to make sure their point of view is heard."

Jim says the SBU/SMU mission council meetings bring to Sandia's strategic planning process the viewpoints, concerns, and requirements from all of the Labs' sponsors. And that's a good thing, he says.

"I come from an industrial background, and making sure your sponsor is represented in your planning and in your thought process is an important principle. There's always some mechanism for doing that in the corporate world, and I think Sandia does a smart thing by having this mechanism for getting represented. I think it's a pretty good approach."

Jim notes that doing DoD-sponsored work has different requirements from DOE, and one of the key functions of the SBU is to help researchers doing such work to understand those differences.

"The staff members who want to work for DoD really have to understand it. And since their line organizations probably focus most of their effort on DOE work, it's up to the SBU to help the staff member understand that the DoD is different and that there are different approaches that have to be used. Somebody has to help them with that process. And their line is not going to do that. [The line] is not prepared to do that, it's not their primary responsibility. That's what an SBU is responsible for doing, and we try hard to serve that purpose."

The SBU, as a business unit, also supports initiatives by individual researchers who may be

(Continued on next page)

Is Sandia pushing the envelope on capacity?

Jim Tegnelia notes that when he first came to Sandia in 1993 with the change in contract manager from AT&T to Lockheed Martin, the Labs' budget was "a little over a billion dollars."

"Right now," Jim adds, "Tom Hunter's SBU [Tom is Senior VP for Information, Computation, and Engineering Sciences and head of the Nuclear Weapons SBU] is more than a billion dollars all by itself. And the Laboratory [annual budget] is approaching two billion dollars."

That sounds like good news, indicative of a healthy laboratory. But Jim has some concerns.

"The space we have is pretty fixed; the physical plant that we have is pretty fixed; the number of people is reasonably fixed. So the question that I worry about is what is the capacity of the laboratory. Tom [Hunter] is the primary sponsor [via DOE DP work] of this organization. How much work can we really take on outside of our primary mission before we're overworking the facilities, we're overworking the people? These were questions you wouldn't have had to ask three years or four years ago. There is, at least in my mind, a concern about how much we can take on, where ought we be positioned, how much can we do. And that's particularly the case since the mission continues to expand. The Homeland Security Department is coming on line now and there's certainly going to be a lot of potential new work that they could sponsor in the laboratory. In my mind, we're getting close to having to make some pretty tough choices.

"So the thing that I'm worried about — and it's one of the things that I feel very strongly about — is that we don't make a commitment to a sponsor until we guarantee that we can do that in a quality way. You can stretch yourself to the point where you're taking on work, even as you're worried about whether you've got the people to do it. It's a tough issue; I don't profess to know what the exact capacity of this place is. If you went down to Fort Worth and you asked them what the capacity of the F-16 line was, they could tell you the number of aircraft per month they can deliver. A research laboratory isn't like that, it's kinda hard to judge when you're at capacity. But I think we need to worry about that."

— Bill Murphy

Emerging threats

(Continued from preceding page)

seeking new DoD work for their organizations.

"If somebody wants some help on, for example, 'How do you approach the Department of Defense?' we can provide that. We've conducted training courses to help staff members become more effective in representing Sandia to different sponsors. I don't believe that the line can do that. I've managed both a line and an SBU and there are basic differences in their functions. The line is responsible for getting products out."

National missile defense

Not that the SBU isn't about products. It is. Indeed, under the Emerging Threats SBU umbrella, Sandia is working on a wide range of specific technologies aimed at addressing specific challenges.

For example?

"This country is going to field a national missile defense capability. And it's going to happen reasonably quickly," Jim says. And Sandia, through the Emerging Threats SBU, is playing a critical role in moving toward implementation of that capability.

"Jerry McDowell [Director of Aerospace Systems Development Center 15400] and his people," says Jim, "are basically acting as a 'Red Team' for them. We are the person who represents the bad guy. We shoot the targets up there that they shoot at. We do the lethality calculations for them. We look at countermeasures for them — and that's based on our ability to understand the intelligence picture for what the other guy might do. This is very important work for us."

Jim acknowledges that early critics of the way missile defense tests have been conducted were not necessarily mistaken in their assertion that the targets were "softballs," but says thinking in those terms is misleading.

"In those first flights," Jim says, "you're just trying to debug your hardware and trying to make sure that everything works. You're not going to throw everything but the kitchen sink out on the first test. The first tests are going to be simpler, they're going to use simpler kinds of targets and decoys."

That's standard engineering principles at work, Jim says, "but the result is that the critics, who would like to tell you that this stuff doesn't work, will tell you that these are 'softballs.'

"My view is that, slowly but surely, as we continue to make progress, [the critics] are seeing their areas of criticism reduced in size continually. . . . The hard question — and this is one the administration has had to answer — is: If the countermeasures are so simple that everybody can counter it, should you deploy? Now, the administration has made the decision that given the countermeasures we've deployed — and given what we expect the threat to be — this [missile defense] capability is, on the whole, better than not having a capability and [thus is]worth the effort to deploy."

SANDIA'S TARGETS TEAM provides target objects for the Missile Defense Agency's flight test program.

Working with NORTHCOM

While national missile defense is a hot topic and a highly visible one, the Emerging Threats SBU is making vital contributions in lower-key but equally important areas.

"We just had the Deputy Commanding General of NORTHCOM down here, and we're in a process of determining how we might support them. [NORTHCOM, based in Colorado Springs, is the US Northern Command, established after 9/11 as the military command charged with protecting the US homeland.] They were down here looking at the work we've done for Homeland Security. It's interesting to get some of these senior generals to come down and see what we're doing, because their first expectation is that 'Well, you guys are a nuclear weapons lab — what does that have to do with us?' When we show them all of this stuff that we've got going around here, their immediate reaction is, 'How do I get this stuff out of the Labs and into my force?' "

SANDIA technology is finding its place in next generation combat aircraft such as this F-22 Raptor.

NORTHCOM has been up and running just since the first of October 2002. "They're still in the process of understanding what their role in the world is and what their requirements are going to be to satisfy all this. We're trying to go in there and help them from the technological point-of-view."

Future Combat Systems

There's a new word gaining traction around the Pentagon these days that has some special relevance for Sandia and its Emerging Threats SBU. As Jim puts it, "The Army is in the process of — the magical word in the DoD is 'transforming' — from the heavy force in Central Europe to a light, strategically deployable force that would, for example, go into Afghanistan and be able to fight those kinds of battles."

"Let me give you a simple example," Jim says. "When they went into Afghanistan there was no artillery — too heavy to get there. No combat vehicles in Afghanistan — too heavy to get there; war was over by the time they could get them in."

The current force-deployment posture, Jim says, had implications for the way the war in Afghanistan was fought: "The Army, rather than send in their regular fighting force, sent in the Special Operations Command because heavy force was too heavy to strategically deploy into Afghanistan. So they sent in Special Ops with the Air Force. It's not clear that's the answer to every conflict. And when you hear "a quarter-of-a-million troops in Iraq," that's not Special Ops — that's many, many times the size of the military's entire Special Ops capability. Clearly, there is a need for an Army that is transformed from being able to fight on the central plains of Europe to one that is able to be deployed to these hot spots and can be deployed in a very short period of time — a fighting force in the theatre, in 96 hours. And they're in the process of working with DARPA [Defense Advanced Research Projects Agency] to find what that force is, what it's going to look like, how it's going to be organized. It's called the Future Combat System. And Russ Skocypec [Level II Manager, 15310] and Bill Guyton [Director of Applied Physics and Technical Development Center 15300] have a tri-lab — plus Oak Ridge — DOE laboratory team working with the Army on this Future Combat System concept."

Next generation aircraft

The Emerging Threats SBU is also deeply involved with the Air Force on its own future war-fighting capabilities.

Jim explains: "We're working with the Air Force and with the industrial base on the new generation of aircraft that are coming out. We're working with F-22, we're working the Joint Strike Fighter and trying to get a lot of Sandia's technology into that process — things like robotics application of RCS [radar cross section] coatings, anti-tamper software, and advanced computer hardware and software systems."

Directed energy is hot

As innovative as they are, the Army's Future Combat Systems concepts and the Air Force's next-generation aircraft programs seem to be straight-line extrapolation of existing capabilities. By contrast, directed energy has a science fiction sound to it — rays of highly focused energy (heat

(Continued on page 12)

The new deterrence triad isn't all nuclear

The US Nuclear Posture Review (NPR) released in April 2001 recasts the Cold War-era notion of a "nuclear triad" involving ballistic missiles deployed via silos, bombers, and submarines into three new — and not primarily nuclear — foundations of deterrence.

The new triad includes: 1) nuclear and non-nuclear precision-strike weapons, 2) a strategic defense capability, and 3) a responsive lab and industry infrastructure to rapidly support future US weapons needs.

In an effort to align Sandia's work for others with the foundations set forth in the NPR, Emerging Threats SBU Vice President Jim Tegnelia (15000) last year renamed one of the SBU's five business areas the "New Triad Line of Business" (NTLOB) and assigned Jerry McDowell as the NTLOB manager.

"Sandia's strengths obviously align perfectly with the concepts in the NPR," says Jerry. "We see ourselves as a major player in all three nuclear triad areas now and in the future."

A large-scale way to prevent water shortages

Hydroponically grown grain points toward enormous efficiencies

HERD HESITATION — Early efforts by Phil Pohl at wooing cattle to the new grain produced temporary puzzlement among Cyle Sharp's herd in Estancia.

A small project initiated without fanfare by Sandia in the high plains east of Albuquerque gives unusually strong indications that its method could save more than 50 percent of the water used in high-desert regions, if widely adopted by livestock growers and farmers.

This is because the bulk of water used in such regions — whether in New Mexico, the American Southwest, the Middle East, or the Pakistani-Indian border — is not used directly by humans but for the production of livestock forage like alfalfa, triticale, and barley, says Sandia researcher Phil Pohl (6804).

"Consumer water-conservation methods, like low-flow toilets and showers, are useful but, in the broader picture, provide insignificant water savings compared to decreasing the water needed to grow forage for cattle, pigs, sheep, and other livestock," he says.

The Sandia project investigates the benefits and disadvantages of growing animal feed hydroponically; that is, in water containing dissolved inorganic nutrients rather than soil. It began when Phil's research group, the International Environmental Analysis Department, intersected Sandia's Advanced Concepts Group (ACG), charged with detecting future threats to US security.

Water shortages are high on the ACG's list as possible instigators of future conflicts between nations in the Middle East, India-Pakistan, and even the US and Mexico. Members of that group, led by Sandia VP and principal scientist Gerry Yonas (16000), along with Phil, in the course of their business observed successful efforts by agricultural expert Hector Leon Gallegos in Chihuahua, Mexico, to produce tomatoes hydroponically.

The current project, initiated in February in a privately owned greenhouse in the small high-plains town of Estancia, is producing forage for 44 cattle at approximately 1/10 the water use currently necessary in an open field, says Ross Bird, owner of Ross' Gardens in Estancia.

Even this 90 percent savings in water is low, says Phil, because this early effort in hydroponically grown feed is achieved by greenhouse personnel who water triticale and barley by hose from a backpack, rather than through more carefully metered methods expected to follow upon more research.

Studies from the Chihuahua government show that a more labor-intensive effort currently in use there for growing tomatoes uses even less water, says Phil.

"The goal is to have virtually every drop of water go to the plant," says Phil. "This would solve a lot of water woes in this state, other states, and throughout the world."

In dry regions, he says, it can take from four to seven acre-feet of water for every acre of alfalfa. (An acre-foot is an acre covered by water to a height of one foot.) The hydroponic method uses far less water, and because the plant roots are not buried in soil, they are easily available to cattle for increased nutrition (carbohydrates) to supplement that found in the leaves and stems of the plant.

Says Bird, "Every day, we take out 200 trays of feed. The cattle are eating it like crazy [at Cyle Sharp's Estancia ranch]. We've got a greenhouse full of forage, the cattle [we feed it to] love it, and it took one-tenth the water it would have cost me to grow it in the open air."

The amount of water saved using Ross' Gardens forage to feed Sharp's heifers is about 1 acre-foot over the last 10 days, says Phil.

The seed is from Curtis and Curtis Seed, in Clovis, N.M.

A worker at the greenhouse, Annie Kern, has taken the feed home for her 30 chickens. She says that the feed — green and lush compared with the Estancia Valley's winter hard-scrabble surroundings — has increased the weekly output of her hens from six eggs a day to 20-25 eggs, and she is buying more chickens.

A no-frills greenhouse 50 by 150 feet should be able to grow forage for 40 head of cattle year round, says Phil, who aided Ross in achieving a $10,000 small business technology grant from Sandia to implement the project. The greenhouse crops of triticale and barley mature every 10 days, so the greenhouse plants on a staggered 10-day cycle.

Following a concept suggested by Sandia researcher Maher Tadros (16000), scientists believe that specialized films applied to the greenhouse surfaces can reduce temperatures within the greenhouses, and provide plants with exactly the right wavelength needed for optimum growth. Films that limit transmission to those light frequencies required by photosynthesis are already available. Further work is needed to monitor temperature, water use, nutrient content, and production.

"Feed for animals, as well as food for people, grown in enclosed greenhouses can simultaneously save water and greatly reduce the vulnerability of these fundamental commodities to terrorist attack, especially when combined with a secure chain of custody from farm to fork."

Scientifically, Phil says, "Sandia is interested in optimizing hydroponic forage growth by determining the right kind of radiation to allow into the greenhouse. We're also interested in learning the amount of nutrition available from hydroponically grown plants, and the best kind of plants for the animals to be fed."

Questions also concern whether the amount of moisture in the plants would produce too great a run-through effect in bovine alimentary canals. Currently, Sharp's animals are receiving approximately 30 percent dry food (hay and silage) and 70 percent hydroponic, determined primarily by greenhouse production (currently 1,700 lb/day and rising).

HAPPINESS — Sandia researcher Phil Pohl examines one of the first batches of grain grown in his greenhouse project. Besides saving large amounts of water, the exposed roots of the grain are available for additional nutrition for livestock.

"All we've shown so far is that we can grow [hydroponic feed]," says Phil. "The carbon, nitrogen, heat, water, light — all have to be arranged for the best result. A horse eats differently from a dairy cow, from a range cow, from a pig."

"The problem of introducing this method will be cultural, not scientific," says Phil. "Farmers and ranchers will feel that irrigation's been done for 5,000 years. It works, why change it?" Here's why, he says: "We're spending all our water budget to grow food for animals when we can grow it in a greenhouse at competitive prices, without messing up the environment, yet offering livestock owners a reliable food supply, and in the process do a bunch of cool science."

The method would require either that ranchers build greenhouses on their land, with a part-time person to tend the growing feed, or buy the forage from independent greenhouse producers much as they currently may buy hay.

As for overall start-up costs, "For $4 million, at $20,000 per acre on 200 acres, we could save approximately a million acre-feet of water in New Mexico," says Phil. New Mexico is one of the top 10 hay-producing states in the US, he says, providing annual revenue for hay/alfalfa of roughly $100 million.

Whether the ranching and farming communities accept the innovation depends in part upon results. "We'll see how many pounds the cattle gain," says Bird. "I'm sure I'll get a lot of interest if they gain, and if not, there'll be caution, which there is a lot of, anyway."

At this writing, the cattle are "holding their own, though not bulking up like Schwartzeneger," says Phil, referring to the famously muscular actor. "We need to work with the feed to get it more exact."

This work is part of the Sandia initiative called the Agricultural Security and Food Safety program.

"Feed for animals, as well as food for people, grown in enclosed greenhouses can simultaneously save water and greatly reduce the vulnerability of these fundamental commodities to terrorist attack, especially when combined with a secure chain of custody from farm to fork," said director Dennis Berry (6800) of Environmental Security Technology, which oversees Sandia activities associated with agricultural and food safety.

NOT YOUR NORMAL CHICKEN FEED — Hens belly up to their latest installment of hydroponically grown grain.

ST. ANNIE OF THE VALLEY? No, but a happy Annie Kern (in photo at right), an Estancia part-time chicken farmer, examines the increased output of her hens as they attack their latest supply of green, hydroponically grown grain.

Story by Neal Singer

Photos by Randy Montoya

HEY! THIS STUFF'S NOT HALF BAD! — The cattle decide to dine in.

Occupants of 18 buildings count their kilowatts, shave $30,000 off Sandia's power bill

'It's a good start, but we need more buildings to engage'

By John German

The envelope please . . .

Eighteen Sandia buildings signed up to participate in the Labs-wide energy-saving contest announced in the Sept. 20, 2002, *Lab News*, sponsored by Sandia's Energy Management Program.

And the first-quarter winner is . . . Bldg. 895.

Bldg. 895 residents cut their overall per-square-foot electricity consumption by 30 percent, earning a Gold award for the three-month period from October through December 2002.

Buildings 869 and 821 were close seconds with savings of 26 and 23 percent respectively, earning their residents a Silver award each.

Earning Bronze awards were occupants of Bldg. 887, at 20 percent, Bldg. 905, at 18 percent, and Bldg. 811, at 15 percent. (See the table at right for results for all 18 participating buildings.)

To arrive at each building's reduction figure, its total per-square-foot electricity consumption during October, November, and December 2002 was compared to its consumption for the same three-month period in 2001.

Together the participating buildings averaged a reduction of 4.5 percent. Their combined efforts saved almost 600,000 kilowatt-hours, which shaved about $30,000 off the Labs' total energy bill for the three-month period, says Malynda Aragon (10862) of Sandia's Energy Management Program.

Jason Strauch, Bldg. 895's official energy nag, says he's usually among the last to leave the building so he was in the habit of turning off common-area and unoccupied office lights on the way out.

When the contest began, other building residents, including Cary de la Fe and Charlene Lennox, each adopted switch-off duties for a different portion of the building and encouraged others to power down their appliances, such as monitors, at night. Center Director Steve Roehrig was supportive of the effort.

"I work in a great building with a great group of people," he says. "I feel honored that we won this, but it's not that we had to make a lot of changes. Many in the Robotics Center are individually motivated to save energy."

"Besides, computer monitors are notoriously bad space heaters," he adds.

Bldg. 895's reductions were complemented by the efforts of several people in Facilities, says Malynda. Mike Rymarz (10848) reprogrammed computer systems that control the building to optimize the building's chilled water consumption. The Facilities swing shift crew fixed valves throughout the building to correct inefficiences.

But the contest winners were not announced without controversy.

The original Energy Nag (*Lab News*, Aug. 9, 2002), whose real identity is a closely guarded secret, says he performed an analysis of the contest results and found the greatest statistical variances between before-nagging and after-nagging electricity use for Bldgs. 821 and 810. Plus, some chads were hanging, he says. Div. 5000 is hosting a burrito breakfast for occupants of those two buildings.

He adds that 53.8 percent of all statistics are incorrect anyhow.

Electricity consumption for the Labs as a whole dipped only about one percent during the three-month contest period, compared to the same three months the previous year, adds Malynda.

"It's encouraging that so many buildings have signed up and are significantly reducing their energy consumption," she says. "It's a good start, but we need more buildings to engage."

The contest continues. The first round of prizes will be awarded for participating buildings achieving the greatest savings for the six-month period beginning Oct. 1, 2002, and ending March 30, 2003. The six-month results will be announced in the *Lab News*.

To enter your building in the contest or for energy-saving assistance, call Malynda at 844-1288.

For information about Sandia's Energy Management Program, see its web site at http://www-irn.sandia.gov/facilities/engn_proj/energyplan.htm.

Eighteen buildings enter contest, 12 reduce energy use

Here are results of the contest for the 18 participating Sandia buildings. (Percent reduction is in kilowatt-hours per square foot.)

Award	Building	% Reduction	Nag(s)
Gold	895	30	Jason Strauch
Silver	869	26	Theresa Rolfe
Silver	821	23	Judy Sesma, Tommy Goolsby, Gwen Sorensen, Michael Benson, Elizabeth Scott-Patterson
Bronze	887	20	Rick Hartzell, Anthony Baca, Malynda Aragon, Ralph Wrons, Mary Blemel
Bronze	905	18	Mae Lambert
Bronze	811	15	John German

Honorable Mentions:
878 (4%), 807 (3%), 823 (3%), 827 (2%), 810 (2%), 891 (0.01%)

Also participated:
894, 6585, 890, 868, 886, 857a

"It's encouraging that so many buildings have signed up and are significantly reducing their energy consumption. It's a good start, but we need more buildings to engage."

DOE, Albuquerque recognize Labs with seven environmental awards

By Will Keener

Environmental Monitoring and Pollution Prevention efforts at Sandia have been recognized at the federal and city level with several recent awards. Karen Boardman, manager of DOE's Sandia Site Office (SSO), announced seven awards in a late-February ceremony.

A Sandia team working on dedicated purchasing contracts won a DOE 2002 Pollution Prevention Award for dramatically improving the Labs' compliance with affirmative procurement regulations. These regulations ensure that environmentally friendly products, such as recycled goods, will be purchased whenever possible. The team developed the first Sandia contracts that include language calling for a purchase preference for environmentally friendly products.

Team members include James Romero (10253), Donald Larrichio, Jeffery Miller, Judy Jojola (all 10254), and Anastasia Richardson (3124.)

In total the contracts have saved Sandia an estimated $72,000, while increasing the total dollars spent on recycled products from $223,000 to more than a million dollars. On a percentage basis, Sandia's compliance with affirmative procurement regulations has doubled — from 42 percent in FY 1998 to 85 percent in FY 2002.

Another Sandia Pollution Prevention Team won the DOE's Pollution Prevention Award in the category of "Sowing the Seeds for Change," based on successes in using sustainable design approaches in several recent construction projects. These approaches include using renewable resources, conserving water, maximizing energy efficiency, and reducing environmental impact.

Team members include Ralph Wrons and John Harding (both 10827); Jack Mizner and Doug Vetter (both 3124); George Hubert, Dan Williams, and Manager Darrick Jones (all 10862); Florian Lucero (10861), Nick Durand (10826), Roy Hertweck and Cynthia Figueroa-McInteer (both 10853); Paul Smith (10863), and Wayne Burton (5831.)

The team has worked to ensure that construction projects make use of sustainable design principles as part of basic design requirements. Sandia has begun a systematic program for review and revision of its Standard Construction Specifications and Design Manual to ensure that sustainable design is fully integrated into all aspects of construction projects.

Five gold awards

Sandia's record with the City of Albuquerque for wastewater management has been excellent in recent years. In announcing the awards, SSO's Boardman said that the 2001-2002 performance marked the first time in several years that the Labs earned Gold Awards for all five of its waste streams. DOE is the permit owner, while Sandia is listed as the operator on the city wastewater permits.

For facilities like Sandia the criteria for Albuquerque's Industrial Pretreatment Program Gold Awards are 1) operation of an active pretreatment system, 2) 100 percent compliance with the reporting requirements of the permit, and 3) 100 percent compliance with permit discharge limits.

"These awards are given to permit holders that demonstrate an exceptional level of compliance with the permit requirements," Boardman said. "We want to take this time to thank Sandia for its contributions in meeting our 100 percent compliance goal for 2002."

Wastewater from Sandia is monitored at four stations before it flows to city sewer lines, says Adrian Jones (3121), wastewater program project leader. A fifth station monitors wastewater from the Microelectronics Development Laboratory (MDL). Activities within MDL can impact the compliance status of not only its permit, but also one of the four sewer line permits. Ron Jones, Manager of the Labs' Integrated Safety and Facilities Dept. 1741, and John Jewell, Facilities Manager from the MDL (also 1741), were instrumental in addressing obstacles created by nearby JCEL (Joint Computational Engineering Laboratory) construction activities and MDL modifications, while continuing to meet an active production schedule.

"We recognize that these pretreatment awards could not be obtained without the support and effort of all of Sandia and DOE working together," Boardman said. "Sandia has done an outstanding job of meeting the permit requirements and demonstrating a continued commitment as good corporate citizens to the City of Albuquerque and the environment. Let's continue to work together to make this an annual event."

Talking trash: Solid waste can be a tricky, risky business

By Will Keener

Even the lowly subject of trash at a large institution like Sandia can be complex, says Dave Castillo. And he should know. Dave — from Sandia's Hazardous, Solid Waste and Pollution Prevention Dept. 3124 — is site coordinator for the Labs' Solid Waste Transfer Facility (SWTF) in Albuquerque.

This high-bay structure south of Tech Area 1 is temporary home to 500,000 pounds of solid waste and an additional 100,000 pounds of recycled materials each month. The main difference between trash at Sandia (more appropriately termed "commercial solid waste") and trash in your home (appropriately called trash) is the people who work at SWTF.

Built in 1996, the main purpose of SWTF is to screen the Labs' solid waste for potentially hazardous materials, thus protecting the environment (by keeping hazardous materials out of landfills) and reducing Sandia's exposure to fines and other legal liability.

"When you toss something into a wastebasket at home, you carry it out to the curb, the city picks it up and tips it into a landfill, and no one ever touches it again. That's not the case at Sandia," Dave says. Workers at the SWTF get a lot closer to the waste stream to ensure we comply with the regulations associated with it.

Commercial solid waste for a facility like Sandia means office and business waste, excluding manufacturing-type wastes and restaurant wastes, Dave explains. From the time a reader of this newspaper tosses a used paper cup into the office trash basket until it is baled with other trash and delivered to a commercial landfill, solid waste is regulated.

"When you toss something into a wastebasket at home, you carry it out to the curb, the city picks it up and tips it into a landfill, and no one ever touches it again. That's not the case at Sandia."

The main instruments of that regulatory process are the workers from the SWTF, who work to pick up solid waste around the Labs, screen it for prohibited materials, compress it into large rectangular bales, and safely deliver the bales to a nearby commercial landfill.

Baling reduces dumping fees at landfills by greatly reducing the space taken up by the material. Baled waste is also more cost-efficient to transport, requiring far fewer trips to the landfill than loose waste. Bales of recycled materials, such as cardboard, white paper, and aluminum, bring in significantly more revenue than equal amounts of loose materials.

Sandia's facility also serves other DOE and Kirtland Air Force Base facilities as well. The waste streams are processed at different times for accounting purposes, with about 45 percent of the current solid waste attributed to Sandia sources.

"There is a set of environmental regulations that must be complied with," says Lewis Marlman (3124), environmental coordinator assigned as liaison to Sandia's SWTF and the nearby Hazardous Waste Treatment Facility (HWTF.) "An assortment of inappropriate and potentially dangerous materials continues to arrive in the waste stream and must be removed, stored, and disposed of appropriately by our staff."

Last year, both the SWTF and HWTF had to be evacuated when a series of loud "bangs" and smoke forced a facility shutdown. The incident commander was called and the Emergency Operations Center was activated. Kirtland's bomb squad responded to assist. The findings: residues in "empty" chemical containers combined with improperly disposed used oil created a reaction that caused the smoke and explosions. Other, less dramatic cases have occurred since. "These delays and shutdowns are very costly," Dave notes.

Inappropriate materials (see "What not to toss" at right) continue to show up at the SWTF and make life difficult, Dave reports. Recently several hundred expended "flash bang" devices (often used in security training) turned up at SWTF. Although they weren't harmful, "They looked ominous and caused a lot of concern and stoppage of work," says Dave. (Spent flash bang grenades are excellent candidates for metals recycling.)

And speaking of recycling, Dave lifts a 3x12-inch cylinder from his desk. It's a combination of nickel, chromium, and iron, called Inconel-718, and is very much like steel, only formulated for special projects. "We found this in a waste stream," says Dave, who is temporarily using it as a very expensive paperweight.

Through recycling revenue, Sandia is able to offset some operation costs. Recyclables include cardboard, white paper, and aluminum cans at present. SWTF personnel attempt to sort incidental recyclable materials from the solid waste stream, but their main objective is to screen for prohibited materials.

"In recycling, the key is to keep the streams pure," says Dave. "We do it with expensive manual labor when it could be separated more easily at the source. On most days more than 1,000 pounds of cardboard are removed from the solid waste stream that should have been placed in the blue cardboard recycling containers in the first place."

SCREENED OUT aerosol spray cans, a propane bottle, and a partially full container of solvent are examples of hazardous items pulled from the waste stream at the Solid Waste Transfer Facility. (The tires are primarily pulled from a Kirtland Air Force Base waste stream also processed at the facility.) (Photo by Randy Montoya)

SCREENING WASTE for Josue Gonzalez (10827) means checking a mountain of clear plastic bags each day at Sandia's Solid Waste Transfer Facility. Here he pulls recyclable cardboard from the stream of waste being fed onto a conveyor belt for baling. Although Josue and his fellow workers are able to separate out some recyclables, others escape due to the volume of material that must be processed.

(Photo by Randy Montoya)

What not to toss

Most Sandians have a working knowledge of what can go in the trash at the Labs. However some inappropriate and potentially dangerous materials continue to arrive in the waste stream, says Lewis Marlman, environmental coordinator for the Solid Waste Transfer Facility (SWTF).

In addition to the "No metals, wood, or liquids" labels on all Sandia dumpsters, Lewis suggests three categories that Sandians should pay special attention to:

- Hazardous wastes, including aerosol cans and containers that aren't empty.
- Items with recycle value.
- Items that can injure SWTF staff or damage the equipment, including wire, rebar and similar items.

Liquid wastes are a frequent problem at the SWTF. All liquids are prohibited because of the potential leaching of toxic chemicals into the groundwater beneath landfills.

About half the aerosol cans that arrive at the SWTF aren't empty, says Dave Castillo, facility coordinator. "If you can shake it and feel anything move besides the mixing ball, it's not empty." Many nonaerosol containers don't qualify as "empty containers" according to the regulatory definition, either. Temperature and viscosity have to be considered, especially in cold weather. "Ask yourself 'is it cold right now? Will it pour more, when it's warmed up?'"

"Remember, if something has recycle value, it's a good idea to collect it and manage it appropriately instead of throwing it into a dumpster and expecting our staff to dig it out as it comes through the SWTF," says Dave.

Construction and restaurant wastes are handled separately at Sandia, and bringing household wastes for disposal in Labs dumpsters is strictly against regulation. "We occasionally have to censure someone for dumping household wastes," says Dave.

Section 19F of Sandia's ES&H Manual (http://www-irn.sandia.gov/corpdata/eshmanuals/mn471001/s19f.htm) can provide guidance for many items, but "Strict legality shouldn't be the sole consideration," suggests Lewis. "Even though something can legally be placed into a dumpster or trash can, you need to ask, 'Is this the most appropriate disposition?' We just ask people to remember that our solid waste is screened by human workers and we don't want to put these people at risk."

Paul Hommert returns to US after three years at AWE

This article is reprinted by permission from the February 2003 AWE Today, *the employee newspaper of the UK Atomic Weapons Establishment in Aldermaston, United Kingdom, with a sidebar about AWE provided specially for the* Lab News. *We've left the British spellings and stylisms. — Editor*

Paul Hommert, AWE's Director of Research and Applied Science for the past three years, will be leaving AWE next month to return to the Sandia National laboratory in the US.

His new role will be to support Sandia's programmes for conventional defense in its relationship with the new Homeland Security Department, established following the 9/11 terrorist attacks. Specifically, he will be tasked with co-ordinating research to discover if the Department of Defense requires improved technology.

Managing Director Bill Haight paid tribute to Paul's "significant contribution in shaping the Company into one that will be capable of meeting the scientific and technical challenges of the future."

Indeed, Paul is proud of his team's achievements in setting AWE's science and technology programmes on a new course to meet the Company's vision of being internationally recognised for delivering scientific excellence in strategic defence.

The arrival of Blue Oak, the new supercomputer, and the potential siting of a new laser facility at Aldermaston have put AWE in an internationally acknowledged position.

The US/UK CONNECTION — In the three years that they have been at the UK's Atomic Weapons Establishment (AWE), Americans Jim Stout (left) and Paul Hommert (right) have strengthened the working relationship between AWE and laboratories in the US. Paul is returning to Sandia. Stout, who joined AWE as director of stockpile management from the weapons facilities in Oak Ridge, Tenn., is retiring to East Tennessee. (Photo courtesy *AWE Today*)

Paul and his wife Elizabeth have enjoyed their time in England, especially the country's culture, history, and the beauty of the countryside. They will especially miss the accessibility of getting to places like London, where they have been regulars at Wimbledon for the tennis. Their hometown of Albuquerque in New Mexico is a lot more remote.

Paul is looking forward to catching up with his favourite sports, American football and basketball, though during his stay in England he has grown to like English football. Manchester United is his favourite team though he is an occasional visitor to the Madejski stadium to see Reading play. He has even gained a basic understanding of cricket.

Paul describes his time at AWE as a great experience where he has made a lot of good friends. His abiding memory is the warmth and depth of feeling shown by Britain towards Americans in the aftermath of the 9/11 terrorist attacks, which he felt was truly phenomenal.

This won't be the last we see of Paul, however, as he plans to return to AWE on business and frequent visits to the UK on holiday.

AWE has full responsibility for UK's nuclear warheads

The Atomic Weapons Establishment (AWE) is responsible for the entire life cycle of the United Kingdom's nuclear warheads — from initial research and design, through production and in-service support, decommissioning, and disposal.

It is managed under a Government-owned/contractor-operated arrangement, whereby the British Ministry of Defence retains ownership of the AWE sites and facilities but a private company is responsible for operations.

Lockheed Martin joined forces with British Nuclear Fuels and a British management company, Serco, to form an equal partnership company — AWE Management Ltd — to bid for the AWE management contract. Having won the contract in April 2000 AWE Management Ltd became the owners of the operating company, AWE plc.

AWE plc employs the 3,500 AWE workforce, holds the nuclear site operating licences, and is responsible for the delivery and maintenance of the United Kingdom's nuclear warhead stockpile.

Paul Hommert is one of four Lockheed men assigned to AWE plc.

In the few weeks before Paul's departure, the Ministry of Defence announced that the 10-year management contract was to be extended to a 25-year term. The value of the contract is now £5.3 billion ($8.4 billion). It covers the entire life cycle of the Trident warheads that provide the UK's nuclear deterrent.

Paul and several other Lockheed Martin men played a significant role in achieving the contract extension, which was a clear signal from the United Kingdom Ministry of Defence that it had confidence in AWE plc's ability to operate AWE safely and securely and on the basis of a sound science and technology programme.

Emerging threats

(Continued from page 7)

or light) with a wide range of military applications. Late last year, for example, a directed energy-based weapon, the Tactical High Energy Laser, or THEL, shot down artillery shells in flight tests at White Sands. It accomplished this unprecedented feat, says Jim, by fusing the front end of the shells, detonating the round in flight. The same technology has also been used to successfully shoot down Cold War-era Russian tactical missiles, Jim adds.

"There's a lot of interesting stuff going on in that area," he says. "I would suggest to you that as time goes on you'll see directed energy getting a little bit more play. You can just sense that this stuff is getting more and more practical, more and more militarized in terms of its size, its weight, its cost, its effectiveness.

"This is a difficult area to talk about [because of sensitivity issues], except for what the DoD will release publicly. But we are involved with both the laser business and the microwave business, and we're growing in some other areas as well."

Between black powder and nukes

Most laymen assume that conventional explosives are a thoroughly developed, fully mature technology, without much room left for innovation. Jim paints a different picture.

"We just got a program from DARPA called ISOMER," he says. "In it, we're looking at a new class of explosives. There's a big gap between old-fashioned black powder and a nuclear weapon. And there hasn't been a lot of fundamental work related to these new classes of energetic materials that could be helpful to the military. Isomers is an example of that new class of materials. We really think there is a big opportunity there. If we do well with this DARPA activity, if we find some new things, that could be really significant for the Labs. But it's still pretty new stuff; it's risky enough that it *ought* to be a DARPA program. That's the nature of what they do."

Making things smaller

The idea of taking large things and making them smaller has been a trend in military systems for years, Jim notes. And Sandia, in its microsystems work — and ultimately in its emerging nanotechnology capability — is at the forefront of the trend.

"Let me give you an example," Jim says. "When we started off putting our synthetic aperture radar system on a Predator UAV, the SAR package with its processor and all its components weighed maybe 120 to 140 pounds. We're now looking at microsystem-based designs with the same performance that weigh maybe 20 pounds."

That weight reduction is vital, Jim says, because costs are directly related to weight.

"Just like your cell phone and everything else, the smaller you make it, the cheaper you can get it to be. We've built unattended ground sensors; these things were six feet tall. Well, now people are talking about making them small enough and cheap enough to be able to scatter them like dust. So, yes, microsystems, miniaturization, nanotechnology — those things are happening. In fact, we [in the Emerging Threats SBU] expect to be a big user in MESA when it comes on board."

Advanced computational capabilities a 'discriminator' for Sandia

Sandia's advanced computational capabilities is a "discriminator" — it's one major element that sets us apart — in comparison to other organizations, VP Jim Tegnelia believes, but adds that DoD is still somewhat behind DOE in taking full advantage of computational modeling and simulation in the R&D cycle.

Says Jim, "DOE is much more comfortable in many circumstances with using simulations rather than physical tests. The Department of Defense still believes you need to take airplanes [for example] and shoot them full of holes to understand how they're gonna react rather than being able to model all of that. And I think the DoD is behind DOE in trusting simulations as an indicator of performance and also a guide as to where you should test and where you don't need to test. . . . I believe we're making inroads in that area."

While Jim foresees a time in the not-distant future when modeling and simulation play a more significant role in developing hardware for DoD requirements, he sees other uses as well. As an innovative new use of computational capabilities, Jim points to work being done in Computational Initiatives Dept. 15311.

"These folks are simulating how a million people would react to a terrorist situation, an attack on the homeland; they're modeling the physiological, emotional responses. So you're not talking now about a how missile reacts structurally, but how a group of people are going to react in a crisis situation. This idea of modeling cognitive processes. . . this is really exciting stuff. It's a brand new area, with its own nickname — aug-cog, for augmented cognition. This whole business of the human interaction with computers is a big research topic for the next couple of years." — *Bill Murphy*

Critical skills program providing 'jump start' into the future for some APS students

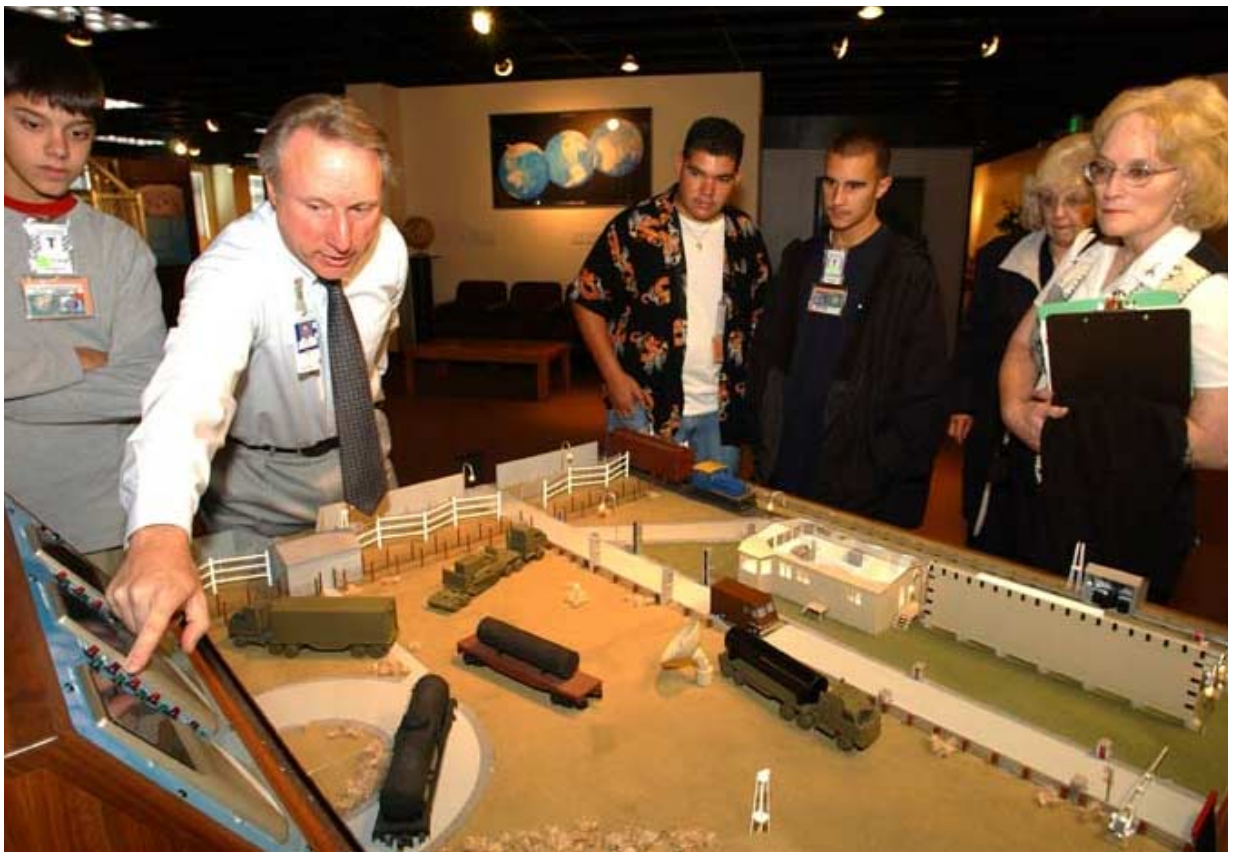
By Will Keener

It's Wednesday morning first period at Albuquerque High School and interesting things are happening at the school's Academy of Advanced Technology. Math and science things. In some cases, one-on-one work is under way with tutors and students. In other parts of the large combination lab, storage room, and office space, tutors are offering mini-lectures addressing specific mathematical or scientific concepts.

These Wednesday morning tutoring sessions may best exemplify the concept of small learning communities, an idea championed by Albuquerque Public Schools (APS) and supported by Sandia, the University of New Mexico (UNM), Albuquerque's Technical-Vocational Institute (T-VI), and a number of businesses and other interested groups. The program at Albuquerque High is expected to triple next year, emphasizing the need for school partners to take an active role.

About two-thirds, or roughly 100, of the Academy's current students are eligible for tutoring, says Mike Stanton, the science teacher who directs the program. About 50 are now showing up. Among the tutors are several Sandians, he reports. Tutors are given results of special diagnostic testing conducted as a part of the Academy process and then develop lessons to help the students in areas of deficiency.

"The kids are starting to understand that they won't be able to really participate in the technical pathways they like if they're behind in English, or reading, or math."



GEORGE BALDWIN of International Security Initiatives Dept. 5324 discusses a portal monitoring system with students at the International Programs Building. This was one of several tours offered late last year for students and faculty from Albuquerque High School. Tours, job shadowing opportunities, and mentoring are some of the ways Sandia is helping Albuquerque High with its newly developing Academy of Advanced Technology.
(Photo by Randy Montoya)

"We could use more tutors, and the more we have the more we can put to use in a realistic way," Stanton says. "The interventions are helping our students get better grades, while meeting with people who help them think about careers."

Offering a national model

The Albuquerque High academy program is the second high school partner for Sandia and is providing a model for other organizations nationally, says Amy Tapia of Corporate Outreach Dept. 12650. Amy helped establish the Albuquerque High partnership with Dominique Foley Wilson of Recruiting and Student Programs Dept. 3554. (Dominque helped start the Advanced Technology Academy at West Mesa High School about five years ago.) Amy and Dominique heard Stanton outline his ideas for a small community learning center program and helped him with a Join-A-School partnership.

The program, partially funded with DOE Defense Programs (DP) Critical Skills Development Program monies, takes aim at a number of goals, including providing technically competent students ready to step into technologist development programs at Sandia and other DP complex facilities. Making use of a national study, Sandia has identified Information Technologies, Photonics, and Advanced Manufacturing programs as areas where future demand for employees will be high.

Managers like Sandia's Phil Gallegos (Electronic Fabrication Dept. 14112) have expressed concerns about the technician pipeline for his organization as attrition and other factors impact the workforce. "I knew I could do an internal program, but I was concerned about where I would get qualified students," says Phil. "T-VI couldn't provide us with enough students. We realized we needed kids with math and science skills coming right out of high school. We identified West Mesa as a first target high school."

Educational options

Using curriculum development specialists to make the best use of existing courses and to incorporate needed math and science skills, the existing academies offer a powerful package of courses and hands-on experience. But they don't limit students to the technician pathway. Students will gain skills that will take them on to four-year colleges, two-year programs such as those at T-VI, or into apprenticeship opportunities.

The Albuquerque High program involves a series of strategic steps combined with its curriculum, Stanton explains. Some students can gain access to T-VI and UNM courses during their high school years. Through targeted presentations, all academy students learn about pathways to specific job goals. Tours at a number of sites, including Sandia, and one-day "job shadowing" experiences are also planned. Sandians are helping with tours, job shadowing, and the "pathway" presentations this year, in addition to stepping in as Wednesday-morning tutors.

At the business end of the effort, Sandia's Pat Milligan (12650) and representatives from other partner organizations have also helped Stanton with planning and organizational aspects of the academy.

Albuquerque High has about 2,000 students and reflects the multi-ethnic mix typifying many New Mexico high schools, Stanton says. In starting the academy, he and his colleagues decided on a strategy to open the program to a broad section of students. "We wanted something not just for the gifted group of students but for our mid-range students to offer extra opportunities for them to change their lives," he says.

'The best day of my life'

Albuquerque High School teacher Mike Stanton, APS director for Schools-to-Careers Tom Savage, and then-superintendent Brad Allison were discussing how to better prepare local students for the workplace on a television call-in show. An excited student from Albuquerque High School called to tell them about the day he just spent at Sandia. Working with Phil Gallegos (Manager, Electronic Fabrication Dept. 14112) in the machine shop at Sandia helped the student make up his mind to stay in school, he told the educators. "It was the best day of my life," he said.

"That pretty well summarizes the impact Sandia has had on the life of our kids," Mike says. Job shadowing continues to be a major thrust of education programs at places like Albuquerque High School's Academy of Advanced Technology.

Counseling for success

"Some of the kids are starting to understand that they won't be able to really participate in the technical pathways they like if they're behind in English, or reading, or math. We are counseling the kids in need of tutoring and urging their parents by phone calls and letters to help get them to the Wednesday morning sessions," Stanton says.

This year the academy includes about 150 sophomores. Next year, the program will gear up to reach as many as 400 in grades 10-12.

Albuquerque High received a Department of Education grant to design and implement the academy as a result of a bill authored by Sen. Jeff Bingaman, D-N.M., and supported by the state's congressional delegation. The goal of the legislation was to create more intimate environments where students can better learn the skills necessary to pursue careers and educational goals beyond high school.

"We are trying to tie together a curriculum of English, math, and science," Stanton says. His team has developed a sustainable "package" of courses for academy students, leading to a solid core of knowledge in math and science. The small learning center concept is proving that if students go through math and science together for four years with the same teachers, there is a much better chance for success, he says.

Phil is happy with the results of the West Mesa program, where he is hiring 15 or so students each year, and expects the Albuquerque High program to help out as students begin to work through it. "These students understand what we do and what our requirements are," says Phil.

The Albuquerque High program is off to a good start, Stanton believes. He has placed "two very good students" in internships in Sandia's advanced manufacturing group, and others have applied to various Sandia student programs. More than 150 students have qualified to take T-VI courses within the past year. "We're hoping in the next few years we'll have more skilled students for the pipeline to Sandia careers. Our students are getting a jump start on their future."

Mileposts

Photos by Michelle Fleming

Ellis Heustess
40 5934

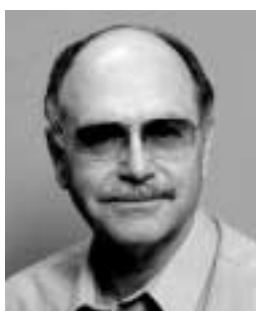
Steven Arroyo
25 9329

John Eisenberger
25 10862

Gwendolyn Germany
25 3553

Eloy Marquez
25 5734

Thomas Mehlhorn
25 1674



Keith Miller
25 9125

Ernest Salas
25 10265

Steven Barnhart
20 2561

Janet Carpenter
20 12640

Bruce Criel
20 10520

Ken Frazier
20 12640

Floyd Gentry
20 12336

Douglas Gibbs
20 5734

Richard Lucero
20 5323

Bruce Malm
20 6531

Roger Moore
20 14192

Delfino Aragon
15 10843

John Ludwigsen
15 12333

Justine McNabb
15 6532

Stephen Parker
15 10001

Sylvia Thomas
15 15201

Technical Forum lecture, April 8, 10 a.m., Schiff Auditorium

Get the real story on cyberterrorism

IORTA Technical Forum presents Bill Neugent on:

CyberTERRORISM: WE'RE TOAST!

Computer security--talk about your oxymorons. We're the most technologically advanced nation in the world, and the most vulnerable. We're sitting ducks. Against the threat of professionals, our society is about as safe as beach cottages on a sand bar. That's according to Chicken Little. Hear more hype and also the real story. Learn who's to blame. Savor the panaceas and comfort pillows being applied. Finally, hear revealed for the first time the amazingly simple solution to the problem.

Tuesday April 8th
Sandia National Laboratories
Building 825 (TTC/Steve Schiff Auditorium)
Lecture: 10:00 a.m. - 11:00 a.m.
Reception: 11:00 a.m. - 12:00 p.m. (lobby)

This presentation is sponsored by the IORTA Program as one in a series of its Technical Forum lectures. It is open to all KAFB personnel interested in this topic. No Sandia badge is required.

Bill Neugent works for MITRE, which is a not-for-profit organization chartered to work in the public interest. At MITRE, Bill is the Chief Engineer for over 200 cybersecurity experts who advise the federal government. He has developed cybersecurity strategies for a number of government agencies and was a primary architect of the Defense-in-Depth strategy that has been implemented throughout the U.S. military. He drafted the first cybersecurity strategy for the overall inteligence community. Twenty-five years ago, he created and taught a graduate course in cybersecurity at The American University, one of the first such courses in the country. More recently, he organized and hosted two major National Security Agency-sponsored conferences on countering insider threats.

Bill is also a novelist. His book about cyberterrorism was recently published by Writers Club Press and has gained favorable reviews from top insiders. John Gilligan, current USAF CIO and former CIO at DOE wrote, "Exciting and very thought provoking. I thoroughly enjoyed the book." In the novel, a computer attack on the nation finds the targeted industries in denial and authorities hamstrung by turf and legal impediments. The country's survival depends on Brent Singleton, cyber vigilante, who heads a rebel force willing to go against the law. Brent becomes the target of both the government and the terrorists, and finds an unexpected ally in a beautiful FBI computer-crime investigator. The book tells the remarkable story of America's cyber vulnerabilities and shows that the most frightening attacks are those that strike from within, with No Outward Sign. The novel by that name is available at amazon.com and Barnes & Noble.com (bn.com). Read more at http://www.talecatcher.com.

Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads

MISCELLANEOUS

BABY CRIB, oak, w/locking railing, mattress; Precious Moments bedding: bumper pad, sheets, skirt, wall hangings. Torres, 325-9342.

RACING JOGGING STROLLER, 3-wheeled, ultra-lightweight, w/brakes, no awning, $100 OBO. Tabor, 294-8596.

KITCHEN CABINET, antique Hoosier-style, w/sifter, porcelainized iron countertop, $375. Ewen, 836-3563.

BEDROOM SET, 4-pc., Broyhill, great condition, new mattress & box spring. Pape, 869-7200, ask for Kathy.

SLR CAMERA KIT, Fuji S1 digital, w/Nikon lens, flash, 340MB memory, filter, hood, rechargeable batteries, bag, $2,080. Dybwad, 296-9047.

ELECTRIC DRYER, Kenmore 110, $75; GE washer, $100; GE electric stove, $60. Gonzales, 296-8006.

TRAILER TIRES, mounted, extra 15 in. 6-hole wheels, new/near new, ST225R/75-15. Parrish, 299-2043.

SOFA & LOVESEAT, off white, w/blue & mauve accents, excellent condition, $200. Sedillo, 797-7301.

EXERCISER, rider machine, paid $300 new, asking $100. Sedillo, 255-0669.

WOOD STOVE, iron, 32"W x 16"D x 31"H, $75 OBO. Riley, 869-2119.

CUSTOM CAR COVER, Infiniti Q45, $75; leather car bra, '90-'93 Q45; $50 or $100 for both. James, 293-1061.

TIRES, 4, Michelin P24570R16, great for SUV, 25% tread, $40 OBO. Shields, 286-5917.

COMPUTER, Leading Edge DC-3010E; Epson LX810 printer; IPM 515-100 monitor, $150 all; Jenson XCD-920 CD player, $50. Crosby, 260-1070.

COMPUTERS: 1 Dell, 1 Compaq, Win98, WinNT, w/monitor, keyboard & mouse, $150 ea. Herreid, 899-0851.

BASS, Austin "J Fender"style, green, w/gig bag, $144; 25W Ibanez amp, $88. Bailey, 281-3265.

REFRIGERATOR, GE, 22 cu. ft., white, side-by-side, ice maker/dispenser in door, excellent condition, $300. Lunt, 271-0741.

HOME GYM, works arms, legs, stomach etc., sacrifice for $500. Sandoval, 866-6991.

DINING ROOM HUTCH, pine/oak, 2-pc., lots of storage, excellent condition, $200. Woods, 323-4464.

TWIN MATTRESS, Sealy Posture Premier, pillow-top, low-profile box spring & frame, used 4 wks., cost $700, asking $350. Espander, 286-8728.

CROSS-COUNTRY SKI BOOTS, men's size 10, women's size 8-1/2, excellent condition, $20/pair. Cooper, 281-0950.

BACKPACKING STOVES, Coleman Peak 1 & Primus; large pet warmer w/temperature control, $10 ea. Shapnek, 281-5913.

ENTERTAINMENT CENTER, solid oak, lots of storage, locking video drawer, sliding TV doors, mint condition, pictures available, $450 OBO. Johnson, 250-3205.

UMBRELLA COCKATOO, 4-yr.-old female, beautiful, lovable. Experienced bird keeper requested, $750. Patteson, 836-0140, ask for Sarah Rae.

REFRIGERATOR, '96 Kenmore side-by-side, $300; triple oak hutch, Oak Reflections, excellent condition, $600. Charles, 275-2090.

DVD PLAYER, Progressive Scan, component outputs, built-in 5.1 decoder, plays DVD/CD/CD-RW/MP3/JPEG, $55. Hales, 298-1545.

SOUTHWEST AIRLINE TICKET, 1 roundtrip, expires 1/3/04, $300; antique Coke machine, Vendo, w/original bottles, works great, $700. Castillo, 828-9603.

COMPUTER DESK, fits in corner, about 36" each side, free. Kovacic, 256-9867.

SPRINT PCS PHONE, Sanyo 4900, dual band, color display, never used, $75. Tejani, 292-4169.

CONTEMPORARY SOFA, excellent condition, $250; coffee table, solid wood, 2 end tables, $75 ea. Hassan, 822-9544, ask for Basil.

FAMILY ROOM CHAIR, w/wheeled ottoman, Flexsteel brand, forest green upholstery, excellent condition, $300. Dobranich, 298-4547.

OLYMPUS CAMERA, XA model, pocket size, great travel camera, split-image rangefinder, flash, case, manual, $120. Ginn, 286-4425.

BINOCULARS, 15x70, great for terrestrial, astronomy, solar, includes solar filters & bracket for tripod mounting, $70. Campbell, 281-0744.

GARAGE SALE, Twins Club, 50+ families, 7:30 a.m.-2 p.m., Montgomery Church of Christ, Montgomery east of Louisiana. Kane, 291-8576.

TIMESHARE, 2-bdr. condo, w/pool & water access, Corpus Christi, Padre Island, 4/11-4/18, $540/wk. Healer, 298-6967.

INFANT CAR SEATS, Graco, 2, w/2 extra bases, hardly used, $220 new, asking, $40 for all. Giannelli, 867-1122.

POOL, Dough Boy, 16-ft. diameter, 4-ft. deep, no rust, no leaks, sells for $2,000, make offer. Penn, 883-4195.

COMPUTER, Micron 333 MHz, P2-MMX, 4GB HD, 64MB RAM, 40x CD-ROM, Okidata laser printer, monitor, speakers, $200. Shewnack, 266-5901.

LAMPS, 3 Southwest crock-style, 25 inches tall, cream-colored w/light lavender & blue-green, $15 ea. Poulter, 293-4810.

LAWN STRING TRIMMER, Toro, electric, 12-in., excellent condition, $15. Vigil, 271-1328.

WINDOWS XP, $75. Muchow, 299-1813.

DINNETTE SET, w/18-in. leaf, 6 chairs, good condition, $300; girl's bike, 16-in. wheels, good condition, $35. Surbey, 823-2843.

TWIN-SIZE WATERBED, w/underneath storage, frame w/shelves & mirror, good condition, $200. Ramirez, 319-2002.

DAY BED, black metal, w/mattress, excellent condition, $300. Colgan, 344-3776.

BOOKCASE, oak, 3 sections, wall unit, 90"W x 14" D x 77" H, traditional style, $250 OBO. Sinton, 828-9672.

OXY-ACETYLENE CART, built from 1-in.-sq. steel tubing, 16-in tires, 28"W x 18"D x 38"H, fits 7-1/4" tanks, $50 OBO. Mooney, 294-5161.

CP SMALL TENT, in good condition, w/wood stove, $500 or trade. Griego, 268-8892 or 610-7229.

JEWELRY & GEM SHOW, March 21-23, 10 a.m.-6 p.m., School Arts/Flower Bldg., State Fairgrounds. Hlava, 255-5478.

CHILD'S TWIN BED, w/headboard, footboard & mattress, $150; Pioneer stereo, w/turntable, AM/FM radio, cassette player, $125. Greear, 294-5339.

BLACK LAB, purebred, 5-yr.-old male, neutered, loves water, kids, & attention, moving, must sell to good home, $75. Brown, 891-1167.

SOUTHWEST AIRLINE TICKET, transferable, anywhere Southwest flies, valid through July 6, 2003, $270. Mares, 268-0285.

ELECTRIC DRYER, Kenmore, 3 yrs. old, excellent condition. Martinez, 890-3225.

FILE CABINET, 4 drawer, letter-size, gray, set up for suspended folders, good condition, $10. White, 256-3095.

SKI BOOTS, Salomon, Performa 9.0, X-Scream, Shell 28, size US 10, high performance, advanced skiers, retail $625, asking $175. Horton, 883-7504.

COUCH, beige-gray multicolor fabric, w/oak trim, 85", $100; rocking chair, woven wicker seat/back, $25. Van Deusen, 291-8196.

DINING ROOM SET, $80; rocking chair, $50; 2 nightstands, $49; other items from estate sale. Rivera, 266-7225.

PROPANE TANK, 320-gal., w/regulator & 288 gal. of propane, paid $950, asking $750. Yawakie, 294-6855.

WOOD STOVE, Orley, hearth model, (low on floor), cranks out heat, includes Magicheat energy extractor, & some pipe, $350. Zirzow, 281-9896.

FILE CABINET, antique, oak, 4 drawers, excellent condition, $150; Armstrong commercial tile, beige, 225 sq. ft., ¢.40/sq. ft. Filter, 823-1232.

WOOD PLANE, Stanley 45, $140; Gambling chug-a-lug device, $50; snorkeling gear, mask, fins etc., $50; old fishing gear. Shaffer, 256-7601.

COLOR TV, 19-in., w/remote, great condition, $75; pet carrier, medium-size, like new, used once, $20. Lavonya, 937-361-4196.

SOUTHWEST AIRLINE VOUCHER, expires 5/21/03; computer monitors: 17-in., $65, 19-in., $90/$115; internal Zip 100, $65; disks, $5; more. Cocain, 281-2282.

HORSES: 8-yr.-old golden palomino, registered AQHA, gelding, Foundation (Deck), very tame; 2-yr.-old Arabian/Qtr. mix, gelding, 4 mos. professional training. Arana, 228-4134.

MULTI-FAMILY YARD SALE, March 21, 1518 Vassar Dr. NE, teen girls clothing, sizes 5-7, gas grill, good stuff. Jennings, 610-1142.

How to submit classified ads

DEADLINE: Friday noon before week of publication unless changed by holiday. Submit by one of these methods:

- **E-MAIL: Michelle Fleming (classads@sandia. gov)**
- **FAX: 844-0645**
- **MAIL: MS 0165 (Dept. 12640)**
- **DELIVER: Bldg. 811 Lobby**
- **INTERNAL WEB: On Internal Web homepage, click on News Center, then on Lab News frame, and then on the very top of Lab News homepage "Submit a Classified Ad." If you have questions, call Michelle at 844-4902. Because of space constraints, ads will be printed on a first-come basis.**

Ad rules

1. Limit 18 words, including last name and home phone (We will edit longer ads).
2. Include organization and full name with the ad submission.
3. Submit the ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. **One ad per issue.**
6. We will not run the same ad more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active and retired Sandians and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. **We reserve the right not to publish an ad.**

ACOUSTIC ELECTRIC GUITAR, Pakamine, $250; 4-string bass, Sender Precision, Japanese model, $500; Baldwin Hamilton piano, $2,300, all OBO. Julian, 301-7459.

JET SKI TRAILER, single, excellent condition, $300. Sierra, 275-0520.

TRANSPORTATION

'02 NISSAN XTERRA XE, V6, 4x4, 5-spd., transferable extended warranty, 12.4K miles, excellent condition, $19,500. Harris, 298-4756.

'88 MERCEDES BENZ 300E, V6, gray, red leather, 183K miles, very good mechanical condition, $5,800. Bennett, 298-1142.

'97 TOYOTA CAMRY XLE, maroon, just had 90K servicing, leather, original owner, excellent condition, $8,500. Diem, 823-6507.

'00 VOLKSWAGEN JETTA, V6, 5-spd., red, 1 owner, 28K miles, excellent condition, $17,900. Sansone, 296-7945.

'94 MAZDA MIATA, AT, AC, CD, white, w/black top, good body, 58K miles, excellent mechanical condition, $7,200 OBO. Steven, 858-3463.

'98 JETTA GLS, 2.8L V6, 5-spd., loaded, leather, dark green, 51K miles, $12,200 OBO. Crafts, 343-0773.

'96 CHEVY SILVERADO Z71, 350 V8, 4WD, AT, bed liner, matching shell, AM/FM/CD, original owner, 56K miles, below book, $14,250. Dwyer, 271-0741.

'99 MAZDA MIATA, 5-spd., 39K miles, must see to appreciate, at lemon lot now, $11,250. Clem, 271-0754.

'02 CHEVY 2500 HD, 4x4, crew cab, short bed, black, AT, 8100 motor, 8,500 miles, $29,800. Williams, 866-6650.

'99 OLDSMOBILE ALERO GLS, PW, PL, PS, PB, power seats, AC, AM/FM/CD/cassette, gold, tan leather, garaged, 47K miles, $9,900 OBO. Goodson, 286-1267.

'92 MITSUBISHI GALANT, sedan, 4-dr., Sahara brown, 42K miles, excellent condition, $3,300. Ehart, 296-7012.

'01 DAEWOO, excellent condition. Marquez, 864-8245, ask for Linda.

'78 CORVETTE, silver anniversary, L82 engine, new paint, tires, low mileage, T-tops, excellent, $10,000 OBO. Mayer, 286-1460.

'88 HONDA PRELUDE, new tires, runs great, $1,300. Doser, 323-2786.

'99 LAND ROVER DISCOVERY SERIES II, new tires, dark grey, 56K miles, excellent condition, well below book, $19,000. Sweeney, 301-8957.

'92 FORD EXPLORER, 4WD, fully loaded, new transmission, brakes, AC & tires, excellently maintained, $5,900. Adams, 299-6337.

'97 PORSCHE BOXSTER, arctic silver/black, sport suspension, 17-in. wheels, CD, 16.8K miles, $29,500. Thorne, 884-4870.

'90 ACURA INTEGRA LS, 3-dr., 5-spd., 180K miles, mechanically sound, good/fair overall, $1,200 OBO. Madden, 417-9812.

'87 CHEVY HEAVY-DUTY, 3/4-ton, 4WD, shell, 1 owner, CL 2 appraisal, only 37,788 miles, $7,000 firm. Zeuch, 296-4969, 6-8 p.m.

'96 PATHFINDER, 4WD, AT, PS, limited slip, cruise control, sunroof, forest green, original owner, $6,000. Douglas, 281-9843.

'95 DODGE INTREPID ES, AT, FWD, power everything, leather, alarm, sunroof, trip computer, AM/FM/CD/cassette, $3,500. Erwin, 379-3103.

'94 MAZDA B3000, V6, 4x4, work truck, $3,500 OBO. Wrobel, 323-2786.

'95 OLDSMOBILE ROYAL, low mileage, excellent condition, see at KAFB car lot, $6,595 OBO. Martin, 869-1212.

'92 GMC 1/2-TON, 5-spd., long bed, white, 4.3L V6, AC, receiver hitch, new tires, 84K miles, solid work truck, $4,400. Barnes, 281-0500.

'00 FORD EXPEDITION XLT, 5.4L engine, lots of extras, 49K miles, must sacrifice for pick up, must see, $25,000. Zimmerer, 286-0365.

'97 PLYMOUTH VOYAGER RALLYE, V6, driver-side slider, 4 captain's chairs, tinted windows, cruise control, $5,500. Bouchier, 266-0323.

'96 GRAND CARAVAN SE, PW, PL, cruise, dual sliding doors, 63K miles, great condition, $6,500. Mulkern, 296-4050.

'76 TOYOTA FJ40, 4-spd., new muffler & headers, Jacob's ignition, 31x10.5 tires, 92K miles, $4,900. Garcia, 821-7154.

'89 HONDA ACCORD LXI, 2-dr. coupe, AT, AC, PW, sunroof, 1,000 miles on rebuilt engine, clean car, $3,200 OBO. Archuleta, 994-8669.

'02 CADILLAC ESCALADE, V8, leather, DVD, 2 LCD screens, sunroof, 5K miles, garaged, $55,000. Harris, 298-0541.

RECREATIONAL

'98 SHADOW CRUISIER, 11-1/2 ft., Stealth Series 6500, cab-over camper, self-contained, like new, $10,800. Dobias, 856-7841.

'01 TOWLITE, 22 ft., self contained, stove, refrigerator, shower, AC, under warranty, like new. Salazar, 865-6142.

FIBERGLASS DECK BOAT, 24-ft., w/aluminum camper cabin, 150 Johnson, 10-hp troller, $7,500. Meikle, 299-4640.

'89 ALJO 5TH WHEEL TRAVEL TRAILER, fully self-contained, sleeps 6, great condition, $6,500. Turnbull, 842-5130.

KAYAK, '02 Dagger GTX, men's whitewater, never in water, $1,115 new, asking, $800 OBO. Patrick, 265-4569.

ROAD BIKE, Trek 1000, 55cm aluminum frame, $199. Rector, 286-1217.

'84 FLEETWOOD TIOGA ARROW, 23-ft., 70k miles, 6.2L diesel, new batteries, brakes & tires, $3,000 OBO. Kirk, 281-6668.

'76 BETHANY POP-UP TRAILER, sleeps 6, can sit 9, good condition, $1,500 OBO. Galvez, 873-3870.

O'DAY SAILER, 17-ft., fiberglass monohull, 25-ft. mast, extras sails/rigging, Highlander trailer, all excellent condition, $2,400. Schaub, 821-7242.

'01 YAMAHA V-STAR CLASSIC, green, custom pipes, windshield, cover, under 4K miles, very nice, take payoff. McCubbins, 453-1455.

'01 SUSUKI SAVAGE 650, cruiser-style, black, great gas mileage, cover/bags included, 4,400 miles, excellent condition, $2,600. McRoberts, 299-6862.

RECUMBENT "TRIKE," S&B, 12-spd., green, $375. Weishuhn, 281-6980.

TREK BIKE BUGGY, top-of-the-line, seats 2, up to 1,001-lbs., great condition, $250. McKenzie, 604-0224.

REAL ESTATE

4-BDR. HOME, 2,292 sq. ft., newly remodeled, 1/4-acre, 2-car garage, 5 minutes Sandia/KAFB, $177,000. Coryell, 294-7876.

2-BDR. CONDO, 1-1/2 baths, 2-story, 1,141 sq. ft., NW, includes appliances, excellent condition, $82,900. Lahusen, 792-0990.

5-BDR. EAST MOUNTAIN HOME, Tijeras, luxury living on 10 acres, w/opt. 6-stall barn & 3-1/2 acres, beautiful, $399,000. Rowe, 505-259-5386, leave message.

2-BDR. TOWNHOME, 2-1/2 baths, 1,700 sq. ft., great room, den, tile, balconies, excellent condition, NE Heights. Loescher, 299-7921.

3-BDR. HOME, 1-3/4 baths, living room, dining room, den, double garage, 1,854 sq. ft., NE Heights. Looney, 299-5029.

2-BDR. MOBILE HOME, 14' x 70', older model, w/some remodeling, set up in park, $4,500. Srader, 897-5993.

3-BDR. HOME, on 1.8 acres, Peralta, 2,800 sq. ft., separate in-laws quarters, 1,100 sq. ft., immaculate, $299,000. Garrison, 292-8973.

ANGEL FIRE MEMBERSHIP LOT, Chalett III, regular users save $$$$, $500. Kelly, 299-3527.

WANTED

GO-CART, or 90-125cc 4-wheeler for 10-yr.-old boy. De Marquis, 255-4350, ask for Mike.

STUDENT CAR, automatic, price no more than $2,000. Burroughs, 822-9852.

TENT, used or new, 3+ man; hand-operated wheat grinder; camp stove, kerosene preferred. Wilcox, 884-0217.

BABY STUFF, new or used. Otero, 730-0672.

HOUSEMATE, male/female, honest, considerate, share nice home in NE heights, close to Sandia, $350/mo +utilities. Ahr, 298-8787.

GOOSE EGGS, large, for art project, will take whole eggs or empty. Meister, 232-4700.

CAMPING & BACKPACKING GEAR, donations for needy BSA scouts & troops, O.A. Cheyenne Chapter. Mileshosky, 266-5901.

BABYSITTER, for preschool girl, pleasant, non-smoking Ridgecrest home, 1 evening/week, references required. Mills, 256-4110.

PIANO, Fender Rhodes, good condition. Miller, 281-3655.

CAR RACK, Thule, Yakima, or Subaru, for skis, bikes or cargo. Konopka, 299-9059.

HELP WANTED, yard work, high school or college student, Saturdays/Sundays, $8/hr. Vittitoe, 299-9298.

TREADMILL, good condition. Treml, 275-5477.

CALCULATOR, HP 28S, owner's manual & reference manual, mine got lost in office move. Harding, 255-5549.

HOUSEMATE, San Pedro/Constitution, your own entrance, living area, bedroom, bathroom, share kitchen, w/professional couple owners, $375/mo. McDonald, 268-5005.

SHARE-A-RIDE

NORTH VALLEY CAR POOL, Alameda Bridge & south, interested in starting? Frames, 890-4943.

EAST MOUNTAIN VANPOOL, has openings, no need to drive, Frost Rd., N-14, Tijeras. Burns, 281-3922.

Who's that high-flying kid wearing the tiara? 'Oh, it's just Tina Jenkin'

By Iris Aboytes

Her head is in the clouds, but her feet are firmly planted. That describes Sandian Tina Jenkin, a software researcher and developer in Dept. 6544. During the workweek she is using her passion for math in computer simulation models; on weekends she is out living life to the fullest.

Tina inherited her love of flying from her maternal grandmother. She tells the story of her grandfather who loved fishing and hunting. Unfortunately, it was about a day's drive to the areas he enjoyed fishing and hunting. So, he bought an airplane and a "how-to" book. After crashing the first plane, he bought a replacement and some lessons.

For safety measures, her grandmother decided that she should also learn to fly, and fly she did. After attaining her pilot's license, she became a member of the St. Louis Chapter of The Ninety-Nines, the International Organization of Women Pilots, which had Amelia Earhart as its first president (www.ninety-nines.org), and she remained an active member until she died in 2001.

Tina started at Sandia in June 2000 and took her first flying lesson three months later in September. It took her about eight months to earn her license. She says it is a real "high" and "very addicting." "Taking a short trip to Farmington for lunch is not unusual," she chuckles.

TINA IS PARTICULARLY HAPPY when she's in the cockpit of an airplane.

TINA JENKIN loves to fly. She started at Sandia in June 2000 and took her first flying lesson three months later. It took her eight months to earn her pilot's license. (Photos by Randy Montoya)

Due to her grandmother's involvement, Tina is currently an active member and vice-chair of the Albuquerque chapter of The Ninety-Nines and plans to remain a member for life.

Tina's love of life and her "laughter is the best medicine" philosophy make her a fun person to be around. If you see someone wearing a tiara, a wig, or even a pair of wings, it could just be Tina. But chances are if she is wearing something odd, she brought one for you, too. She readily admits that she gets bored easily, so she sets out to make sure that it doesn't happen. Her enthusiasm and energy sometime shake people up. She says she likes to "bring people into my world."

"She has tremendous work ethics, and her customers love her," says her manager, Steven Humphreys. "She is enthusiastic, energetic, and hard-working. She does not take herself too seriously as she spreads her joy around. We are fortunate to have her as part of our Sandia family."

"Sandia is very people-oriented," says Tina. "I'm frequently asked, 'Are you happy with what we're having you do? If not, we can change it.' How many companies will do that for you?"

"Sandia's IT [Information Technology] Team recruited Tina to come to Sandia," says Ed Gullick of Dept. 3554-2. "Now she is a member of our [recruiting] team. With her dynamite personality, she is an excellent Sandia representative."

Besides flying, Tina enjoys hot air ballooning, running, hiking, rollerblading, and skiing. Her energy and her love for the outdoors do not keep her inside often. "Adventure is what keeps you young," she says.

In addition, this past summer, she earned a motorcycle license and is currently shopping for her first motorcycle. "Grandma had a Harley," she says. But, for now she is content with getting a $100 burger or burrito via airplane.

Sixty volunteers officiate at Science Bowl

READY, SET…. Sandia volunteer Thomas Davis of Information Operations Red Team & Assessments Dept. 6512 drills a team from Eldorado High School on the use of their buzzers prior to competition in the 2003 Science Bowl on a recent Saturday. Thomas was one of about 60 volunteers who officiated at the competition among 46 science bowl teams from 19 New Mexico high schools. An Eldorado High School team advanced to competition in the DOE National Science Bowl to be held in Washington, D.C., in May. (Photo by Bill Doty)

Feedback

Q: *The law states that bicyclists are to "ride in single file" to the far right of the roadway. However, I constantly see large groups riding on base, several "abreast" encompassing the entire roadway, forcing the following "law abiding" auto drivers to have to follow at their much slower speed, or use the oncoming traffic lane to get around them. I have never seen a military or Sandia Police Officer stop them, or give them any warnings. Usually these same bike operators proceed to run right through the stop signs too! This is not only inconsiderate, and illegal, but also quite dangerous! Can you try to educate these riders, and if need be, issue them citations?*

A: Thank you, for calling attention to this unsafe activity by a few members of our cycling community. Bicycle riders are required to follow USAF, city, and state regulations; in essence, the city law allows for riders to be in the far right-hand lane and to ride two abreast if they are not in a business district; in a business district they must ride single file. Kirtland Air Force Base traffic regulations require that the bicyclist travel single file. For more information about base traffic regulations, visit the Traffic Safety Committee Homepage at www-irn.sandia.gov/facilities/esh/traffic.htm. The information has been shared with the Sandia Bicycle Commuters group and they will send a reminder to their members to ride safely and legally. In addition we have asked Sandia Security Police and USAF Police to be more vigilant in ticketing illegal bicycle riding. *— Ed Williams (10864)*