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

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 maturing 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 2000, 2500, 2600, 2800, 3000, 3100, 3910, 14100, and 154000, 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)

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 Tina Jenkin (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.

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 130 spaces in key locations.

(Continued on page 5)

New construction causes parking woes

Problems should improve somewhat with some quick fixes

By Chris Burroughs

“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)

Materials advance may lead to more powerful, longer-lasting lithium batteries

Hydroponics explored for agriculture as way to prevent water shortages on the high plains

Talking trash: Solid waste can be tricky, risky business for Sandians

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

But while there are the gawkers/revellers. 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 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!”

Had to just ask, hadn’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, hckercr@sandia.gov)

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What’s what

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, coincidently named State of the Labs talks to the community and employees.

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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 helm of the 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 (5330), 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:


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 Mike 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” expo.

Sandia’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.
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 James

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 automatic vehicles, 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 to 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.”

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.

Karl Grant (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 microsystem program, he says, focuses in part on wireless radio detectors and other microsensor systems and devices used for homeland security applications. “One constant need of enhanced sources of power and longevity,” Jim says.

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.

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

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

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Penetrator
(Continued from page 1)

arsenal, he says, “Usually we conduct the flight tests and some- one 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 manufac- turing 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 pro- vide 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 criti- cal design review (CDR) by the program’s Army and Navy sponsors.

“This is a critically important effort for San- dia, the Army, and the Navy to demonstrate our ability to cooperate on a program of mutual inter- est,” said Barry Hannah, US Navy Strategic Pro- grams Reentry Systems Branch Head, the pro- gram’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 Mis- silre 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. Some- times 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 impor- tant 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 Catechin (3121) and Mark Niepinski (3127) discuss radiation measuring equipment with a few of the 2,700 students who participated in this year’s School to World event, held Sat- urday, 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 “Retire- ment 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 Hanrnum, and Charles Rhykerd Jr. (both 5848): Human Portable Preconcentrator System.

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. Surprisingly cheap printer cartridges. Chain letters. The list goes on.

A survey by anti-spam software maker SurfControl Inc. shows 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:

Mail 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 she spikes it.

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

“Sometimes 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.”

“Sometimes we’re 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 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 ofUCE messages relayed through a newsgroup hosted at Lawrence Livermore National Lab. To the Sandia filters trained to accept all mail from the other 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 spammer target the harasser of harassment and crime, such entity 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 comprehensive overviews of all work carried out in the units. The previous interviews were with Bob Egan (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).

“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 Egan). 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 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 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 are going to have to start looking at what we are going to have to do to overwork 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 we ought to 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 is 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 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.

(Photos by Randy Montoya)
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 relatively 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, Jim says, “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 capability. 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 area 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.”

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?”

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 necessarily the case — there are 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, and 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 extrapolations of existing capabilities. By contrast, directed energy has a science fiction sound to it — rays of highly focused energy heat (Continued on page 12)
**HERD HESITATION** — Early efforts by Phil Pohl at wooing cattle to the new grain produced temporary puzzlement among Cyle Sharp’s herd in Estancia.

This is because the bulk of water used in such regions — whether in New Mexico, the American Southwest, the Middle East, or the Pakistan-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 (6604).

"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 drawbacks 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, intercepted Sandia’s Advanced Concepts Group (ACG), charged with detecting future threats to U.S. security.

**ST. ANNE'S OF THE VALLEY No, but a happy scenes here (in photo at right), an Estancia part-time chicken farmer, numeral the increased output of her hens as they attack their latest supply of green, hydroponically grown grain.

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

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Water shortages are high on the ACG’s list of possible instigators of future conflicts between nations in the Middle East, India-Pakistan, and even the U.S. 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 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 back-pack, rather than through more carefully monitored 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 acres-feet of water for every acre of alfalfa. (An acre-feet 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 herd is about 1 acre-feet over the last 10 days, says Phil.

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

A worker at the greenhouse, Anne Kemp, 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 chicken feed.

A no-frills greenhouse 50 by 150 feet should be able to grow forage for 40 head of cattle, says Phil, who asked 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 research Maher Talib (16000), scientists believe that specialized films applied to the greenhouse surfaces can reduce temperatures within the green-houses, and provide plants with exactly the right wavelengths needed for optimum growth. Films that limit transmission to those light frequencies required by photosyn-thesis are already avail-able. Further work is needed to monitor tem-perature, water use, nutrient content, and production.

Scientifically, Phil says, “Sandia is interested in optimizing hydroponic forage forage growth by determining the right kind of radiation greenhouse. We’re also interested in learning the amount of nutritional 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).

“Feed for animals, as well as food for people, grown in enclosed greenhouses can simultane-ously save water and greatly reduce the vulner-ability of these fundamental commodities to terrorist attack, especially when combined with a secure chain of custody from farm to fork.”

**STORY BY NEAL SINGER**

**PHOTOS BY RANDY MONTOYA**

**HEID! THIS STUFF’S NOT HALF BAD!** — The cattle decide to dive in.

**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, herb, 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 food, or buy the forage from independent greenhouse producers much as they currently buy hay.

As for overall start-up costs, “For $4 million, at $25,000 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 commun-ities 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 Schwarzenegger,” 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 simultane-ously save water and greatly reduce the vulner-ability of these fundamental commodities to terrorist attack, especially when combined with a secure chain of custody from farm to fork,” said director Donna Berry (6800) of Environment-mental Security Technology, which oversees Sandia activities associated with agricultural and food safety.

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

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.

But the contest winners were not announced without controversy. The team has worked to ensure that construction projects make use of sustainable design principles as part of basic design requirements and demonstrating a continued commitment to meet an active production schedule.

The team members include James Romero (3125), Donald Larrichio, Jeffery Mike, Andy Jojo (all 10254), and Anastasia Richardson (3124).

In total the contracts have saved Sandia an estimated $72,000. With increasing demand, 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, reducing material, 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 Derrick Jones (all 10862); Florian Lucero (10861), Nick Durand (10826), Roy Hertzweck and Cynthia Figueroa-McInteer (both 10853); Paul Smith (10863), and Wayne Burton (5831).

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The awards are given to permit holders that demonstrate an exceptional level of compliance with the permit requirements, “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.

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.

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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 . . .


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

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Eighteen buildings enter contest, 12 reduce energy use

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

<table>
<thead>
<tr>
<th>Award</th>
<th>Building</th>
<th>% Reduction</th>
<th>1st Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>895</td>
<td>95</td>
<td>26</td>
</tr>
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<td>821</td>
<td>23</td>
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</tr>
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<td>23</td>
</tr>
<tr>
<td>Bronze</td>
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<td>20</td>
</tr>
<tr>
<td>Bronze</td>
<td>811</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

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

Also participated:
- 894, 6858, 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.”
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.

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 accounting purposes, with about 45 percent of Kirtland Air Force Base facilities as well. The waste stream also processes at the facility.

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 “_normals, 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 for leaching 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/esh-manuals/mn471001/19f.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**

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.

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.

Paul and his wife Elizabeth have enjoyed their time in England, especially because 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 home towns 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 Madeski stadium to see Reading play. He has even gained a basic understanding of cricket.

**Emerging threats**

(Continued from page 7)

| 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, left AWE in October. (Photo courtesy AWE Today) |
| — 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. |

**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 DOE 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 air planes [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 DOE 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 DOE requirements, he expects cost savings 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 do have to worry about 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 some 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

**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, 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.

The Atomic Weapons Establishment is at the forefront of the Trident warheads that provide the UK’s nuclear deterrent. The UK 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.

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 the feeling shown by 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.
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 says.

“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.”

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.

“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. (Dominique 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 Gallegos. “I met with Mike and 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 our next 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.

Sandia 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.

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.”

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### 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**
  - 15
  - 14192

- **Delfino Aragon**
  - 15
  - 10843

- **John Ludwigsen**
  - 15
  - 12333

- **Justine McNabb**
  - 15
  - 6532

- **Stephen Parker**
  - 15
  - 10001

- **Sylvia Thomas**
  - 15
  - 15201

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**Get the real story on cyberterrorism**

JORTA Technical Forum presents Bill Neugent on:

**CyberTERRORISM: WE’RE TOAST!**

*This presentation is sponsored by the JORTA 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.*

**Tuesday April 8th**

Sandia National Laboratories
Building 828 (TTC/Steve Schiff Auditorium)
Lecture: 10:00 a.m. - 11:00 a.m.
Reception: 11:00 a.m. - 12:00 p.m. (lobby)

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**Bill Neugent works for MITRE, which is a non-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 intelligence 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 Agents-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 Gilgael, current USAF CIO and former CIO at DoD, wrote, "Exciting and very thought provoking - thoroughly enjoyed the book." In the novel, a computer attack on the nation finds the targeted industries in denial and authorities hamstrings by turf and ego impediments. The country's survival depends on Brett Singer, a cyber vigilante, who needs a rebel force willing to go against the law. Brett becomes the target of both the government and the terrorists, as well as 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 that this is a novel is available at amazon.com and Barnes & Noble.com (in.com). Read more at http://www.bleakstar.com.

One ad per issue.

Because of space constraints, ads will be printed on a first-come, first-served 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 facsimile submissions accepted.
4. Type or print ad legibly; use only black ink.
5.Ad size 8.5x11, portrait. Ad deadline is March 19.
6. No solicitation of orders by phone.
7. No for rent or for sale ads.
8. No photos.
9. No antiques.
10. No used vehicles.
11. No pets.
12. No personal services.
13. No service agency ads.
14. No solicitation of advertising or business; any such ads will be deleted.
15. We reserve the right to reject any ad for any reason.

Deadline: Friday noon before week of publication.

Submit a Classified Ad. If you have questions, call Michelle at 844-4902.

• DELIVER: Bldg. 811 Lobby
• MAIL: MS 0165 (Dept. 12640)

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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. It took her about eight months to earn her pilot’s license. She says it is a real “high” and “very addicting.” “Taking a short trip to Farmington for lunch is not unusual,” she chuckles.

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.坑田空军基地交通法规规定：骑自行车的人必须遵循美国空军、城市和州的法规，在本质上，城市法律允许骑手在最右侧车道行驶，如果他们在非商业区，则允许并排骑行。在商业区，则必须单人骑行。更多关于基于交通法规的信息，访问交通安全委员会的网页www.im.sandia.gov/facilities/esh/traffic.htm。该信息的副本与Sandia自行车通勤者小组一起分发，并将通知他们成员在免赔率下积极参与。在涉及涉及此问题的成员在免赔率下参与。

— Ed Williams (10864)