

Smart heat pipe makes for way-cool laptops

Hot laps could become so 20th century; device cools laptops, making possible smaller circuits, faster computers

By Neal Singer

Laptops make laps hot, as users of mobile lightweight computers quickly learn, and things could get worse: upcoming chips may produce 100 watts per square centimeter — the heat generated by a light bulb — creating the effect of an unpleasantly localized dry sauna.

Current chip emanations are in the 50 watts/cm² range.

More technically, increased heat generation is one of the great problems facing engineers trying to downsize circuit size or stack chips one above the other to increase mobile computing intelligence. Heat greater than 100 watts/cm² can

“Industry won’t even see the difference. We’ll just replace the heat sink with a heat pipe.”

melt circuits.

“NASA researchers, as well as those working in military and consumer applications, are all bumping up against a thermal barrier,” says Sandia researcher Mike Rightley (1745), who thinks he knows how to bypass it.

His group’s newly patented version of a passively “smart” heat transfer mechanism uses small

amounts of vaporized liquid sealed in tiny flat pipes to move heat to the side edge of the computer, where air fins or a tiny fan can dissipate the unwanted energy into air or even, in colder climates, into hand warmers, rather than undesirably into fabric and the flesh beneath.

“Because the new flat heat pipe design exactly duplicates in external form the less ‘intelligent’ heat transfer mechanism already in place, no internal redesign — a bugaboo for computer makers — is needed,” says Mike. “Industry won’t even see the difference. We’ll just replace the heat sink with a heat pipe.”

The method is being licensed to a start-up

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Sandia retiree celebrates vintage years



GRAPE EXPECTATIONS — Sandia retiree Henry Street shows off some of the Riesling grapes he grows at his award-winning Ponderosa Winery, tucked into a valley in the Jemez Mountains. For more about Henry’s vineyards and his life after Sandia, read Iris Aboytes’ story — accompanied by Randy Montoya’s photos — beginning on page 6. (Photo by Randy Montoya)



Dick Spalding talks about his marvelous all-sky camera

Dick Spalding wanted to figure out an affordable way to be able to watch the whole sky for astronomical phenomena 24/7. Read how he does it in Bill Murphy’s story on page 5.

Sandia’s Salinas code shares Gordon Bell computing award

By Neal Singer

Making it to the finals of this year’s Gordon Bell Awards was a great achievement for the creators of Sandia’s supercomputer program Salinas. Only 38 entries worldwide had been deemed acceptable for judging by a committee led by Caltech’s Thomas Sterling, and not only had Salinas been accepted but by Nov. 20 only five competitors to the Sandia-led program remained. Naturally, the Sandia team wanted to go all the way. Final judgment would be announced that day in the Baltimore Convention Center as the grand

The Salinas program is capable of solving 100 million equations simultaneously. Compare this with solving for three unknowns in high school math class.

finale to Supercomputing 2002.

The contest, as Mike McGlaun (9140) characterized it, was “the Superbowl of supercomputing.”

The Salinas program had tested out tops at 1.16 teraflops/sec. The practical, widely used program simulates the stresses on aircraft carriers and buildings, as well as on reentry vehicles and certain aspects of the nuclear stockpile. It was the first fully ASCI program to be a Gordon Bell Award contender. And, as team member Manoj Bhardwaj (9100) pointed out, the program’s speed was proportional — 22 to 25 percent — to that of the machine it ran on, which had been ASCI White. Run Salinas on a faster computer, he said, and it was possible the workhouse program would run still faster.

Still, its four Japanese competitors on the Earth Simulator — far and away the world’s fastest computer — had run simulation programs of 29.5, 26.58, 16.4, and 14.9 Tflops/second, and these were actual simulations, respectively, of planetesimals in the region between Uranus and Neptune, global atmospheric conditions, turbulence, and 3D fluid modeling with direct rele-

(Continued on next page)

Researchers prepare to get a fix on microbes that trap carbon from air

By Nancy Garcia

The sky isn’t exactly falling, but burning fossil fuel certainly has pumped enough greenhouse gases into the air to auger changes in global climate if concentrations climb higher.

For that reason, DOE is funding a suite of programs at the national laboratories, including one

led from Sandia, that include an examination of the ways microbes remove carbon from the atmosphere. The Genomes-to-Life projects, announced recently (see July 26 *Lab News*), include this \$1.1 million, three-year effort to gain a better fundamental understanding that can improve predictions of climate change.

Computations will be a key component of the effort, says principal investigator Grant Heffelfinger (1802), involving both computer modeling and analysis of experimental data.

The winning proposal examines the role of so-called “molecular machines” that remove carbon from the atmosphere over oceans. The carbon-fixing systems are found in marine cyanobacteria, a type of blue-green algae particularly common among plankton floating on the surface of nutrient-poor regions of the ocean, such as the Sargasso Sea or equatorial areas.

“It’s one of the most abundant organisms on

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What's What

Margaret Carroll (3127) notified us a couple of weeks ago (*Sandia Daily News*, Nov. 18) that she's retiring. Her announcement gave several of us around the "newsroom" a laugh, recalling an e-mail exchange she had with a fellow Sandian.

About 2-1/2 years ago, Margaret got a serious inquiry about some safety issue, in which a Sandian named John had referred to her as "a safety puke at Sandia." Margaret answered the inquiry politely and professionally, then added, tongue firmly in cheek: "John, I'm not just a 'safety puke.' I am THE CHIEF safety puke!" (This & That, *Lab News*, June 2, 2000)

* * *

If your circle of friends or colleagues includes a substantial proportion of smart alecks, don't ever ask them for advice — especially on a slow day. I did exactly that recently, innocently seeking a recommendation for chimney sweeps. It turns out that Neal Singer of our group (12640) used to be a chimney sweep (he's also published a newspaper for Native Americans and owned a restaurant, among other things, in past lives). The news — for at least some of us — that Neal has been a chimney sweep moved Paula Schoeneman (12650) to write, "Oh, no! Now all I can picture is Neal flying over roofs of houses with Mary Poppins!"

Hmmmm. . .

The most imaginative suggestion came from Mike Lanigan (12640): "What has always worked real well for me in cleaning out my chimney is just to catch my neighbor's big tomcat, tie a rope on his tail, and lower him down the flue. He fights all the way down, and with those sharp claws, manages to scratch off quite a bit of creosote buildup. . . . (It's) quite inexpensive. Be sure to wear gloves and a long-sleeve shirt."

I think he was kidding me.

* * *

Paul Gourley (1141) responded to a recent NB in the *Sandia Daily News*, quoting Scott Adams: "The creator of the universe works in mysterious ways. But he uses a base ten counting system and likes round numbers."

"Interesting remark," Paul wrote, "but I would say the opposite — he likes irrational numbers like pi (3.14159) and e (2.71828), and rarely uses cartesian geometry (viz. human anatomy), preferring fractal geometry (e.g. trees and plants), often with non-integral exponents. At least this is what I observe when I study natural phenomena."

Hmmmm. . . I hope he's kidding, too.

* * *

Finally, the holiday season is sneaking up on us, and if you haven't already, please consider giving a few bucks to Sandia's annual Shoes for Kids drive. If you're reading this, you're almost certainly employed (whether you're working might be another matter!), and likely earning a decent living. Think about sharing a fraction of it with kids whose parents might not be working, and buy a pair of shoes for a kid. Two pairs, or more, would be even better.

You might even consider giving a group donation in lieu of exchanging gifts within your organization. Our PR group has been doing that for a couple of years, and it's definitely a good feeling.

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

Gordon Bell

(Continued from page 1)

vance to nuclear fusion.

The sixth competitor, the University of Illinois at Urbana-Champaign, made no speed claims but had achieved biomolecular simulations using thousands of processors — the "in" thing for today's times.

So things looked pretty bleak for the Salinas nine that day. (They were, in addition to Manoj, (all in Center 9100) Kendall Pierson, Garth Reese (team leader who began the code), Tim Walsh, David Day, Ken Alvin, and James Peery (who managed development of the code before migrating to Los Alamos National Laboratory), collaborating with Charbel Farhat and Michel Lesoinne, both of the University of Colorado.

Light beams from a purple and a violet floodlight heightened the tension by casting lines of color on the folds of the black curtain behind Sterling as, on the stage of the convention's huge ballroom, he began his final approach to naming the winners of the award.

There was no visible nervousness among the Sandians in the audience as Sterling characterized the contest as having "a watershed year" and said, "In any other year, any of the finalists would have won the first-place award."

But when the announcements had been all made and the tension lifted, three Japanese contestants (minus the planetesimal entry) and the University of Illinois were on first and second base, with Sandia hugging third. All had won in different categories. Sandia was listed as "special award."

A first for 'true engineering code'

Said Center for Engineering Sciences Center Director Tom Bickel (9100), "This is the first time a true engineering code has won the Gordon Bell award."

"Salinas is the first full-featured production application with an ASCI pedigree," said Mike Vahle (9900). "Its performance and efficiency on the ASCI platforms is impressive."

Tom praised the other winning entries but compared Sandia's Salinas entry to the Japanese programs as "the difference between doing one step in the solution very fast versus solving the entire problem" — that is, the Sandia program was far more extensive. "Salinas is already having impact on Sandia's nuclear weapon mission."

Kendall estimated the number of lines of code in Salinas at 140,000, while each Japanese code was perhaps 15,000.

Salinas — a massively parallel structural dynamics code — simulates the response of a structure under various loads and also predicts the natural frequencies of a structure under varying stress.

Said Manoj, "This tool can help aid the designer in creating real-world structures that don't fail under the environments in which they must live." Most commercial codes can't do that; if they do, they take days, he said. The Salinas program is capable of solving 100 million equations simultaneously. Compare this, he suggests, with solving for three unknowns in high school math class.

The \$5,000 prize money provided by Gordon Bell was split evenly between the five winners. Bell is a still-active scientist, currently at Microsoft, who, as his web site puts it, "has long evangelized for scalable processors."

Tom says he intends to put the money in the ASCI program account and use it to make plaques and provide small awards for each member of the winning team.

This is the third time Sandia has won the Gordon Bell award. Sandia first won the award in 1988. Winners were Sandians Robert Benner, John Gustafson, and Gary Montry for achieving unprecedented speedups in parallel processing. The amount Gordon provided at that time, he said in a communication to the *Lab News*, was \$2,500. A team led by David Womble won the award in 1994 for an algorithm that aided oil exploration in pockets deep underground. Other members of that team were David Greenberg, Stephen Wheat, Robert Benner (all Sandians), Marc Ingber of the University of New Mexico, and Greg Henry and Satya Gupta of Intel.

In 1998, Sandian Mark Sears took second prize with Ken Stanley of UC Berkeley and Greg Henry of Intel.



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LOCKHEED MARTIN



Sandians win American Institute of Chemical Engineers competition

Marcus Martin and Aidan Thompson, both of Computational Materials and Molecular Biology Dept. 9235, won the viscosity competition of the first Industrial Fluid Properties Simulation Challenge sponsored by the American Institute of Chemical Engineers (AIChE). They were honored Nov. 3 as part of the organization's annual meeting.

The competition was established last year by the Computational Molecular Science and Engineering Forum, a division of the AIChE, to obtain an in-depth and objective assessment of the industry's abilities in the prediction of physical properties for industrially challenging fluids.

Marcus and Aidan obtained viscosity predictions for the chemical mixtures n-nonane/isopropanol using the Sandia computer programs Towhee and LAMMPS on four nodes of the Cplant cluster.

"We're pleased with the outcome," Aidan says. "It didn't require a lot of time and was fairly routine. For a lot of places, this is not routine."

Marcus says he was surprised they won in the viscosity category. They initially entered in the liquid density category and decided at the last minute to also enter in the viscosity category.

"We used standard methods and force fields yet still got better answers than groups that tuned their simulations to the particular problems in the contest," Marcus adds.



Congratulations

To Laurie McCabe and Dan (2331) McCarthy, married in Las Vegas, Nev., Nov. 2.

Carbon trap

(Continued from page 1)

the planet," says Tony Martino (8130), who is principal investigator on the project along with Brian Palenik, a professor at the University of California, San Diego who is affiliated with the Scripps Institution of Oceanography. Evolving some 4 billion years ago, this simple unicellular creature launched our oxygen atmosphere by being the first living thing to pull carbon from the air. With photosynthesis, it uses the energy of sunlight to build atmospheric carbon into sugar molecules, releasing oxygen (from atmospheric CO₂) in the process.

Plankton and photosynthesis

In the ocean, cyanobacteria account for nearly half of the photosynthesis carried out by plankton. Since oceans are where 40 percent of photosynthesis occurs worldwide, Tony said, this lowly bacteria is "a major player in global climate change."

Unlike plants that carry out photosynthesis in chloroplasts (rodlike units whose sunlight-capturing pigment confers color to leaves in spring and summer), the bacteria contain simple protein shells full of enzyme. The enzymes in these "carboxysome" structures catalyze chemical reactions in which carbon atoms are joined into loops or chains of sugars or starches.

Although carboxysomes were first identified in the 1970s, much remains unclear about them — whether they house more than one enzyme, how they take in carbon, and when a particular synthetic approach is favored (since the known enzyme has dual activity).

"These organisms are not well understood at all," says Todd Lane (8130), a microbial expert on this and related projects. "To improve computer models of the global carbon cycle, we need to understand the biology of these organisms in the marine environment."

Previous models assumed there was a purely chemical process involved in the carbon cycle. But plankton that are energized by sunlight form a "biological pump" by "fixing" carbon from air into cell structures and then sinking to the ocean bottom upon death. Besides cyanobacteria, that process also occurs in marine diatoms. Slightly more complex than bacteria, these single-cell



MOLECULAR MACHINE SPECIALISTS — Tony Martino, standing, and Todd Lane, seated, are conducting research with blue-green algae in an experimental program funded by DOE's Genomes-to-Life project that will integrate a number of computational techniques across multiple labs. (Photo by Bud Pelletier)

Sandia California News

organisms have a lacey armature that makes them heavy enough upon death to very reliably sink to form an ocean-floor sediment. (Such sediments are where fossil fuels have been generated over eons from decayed organic matter.)

Iron is critical limiting factor

As a research assistant professor at Princeton University, Todd studied a marine diatom that demonstrated the first known biological use of a trace toxic metal, cadmium. Several trace metals act as nutrients to help the organism carry out photosynthesis. Zinc is one trace metal that influences the rate of photosynthesis. But iron, Todd says, is the critical limiting factor.

"It can kind of gasp along without zinc, but without iron, it's going nowhere. If you dump a lot of iron overboard, you can see a blue-green phytoplankton bloom."

The DOE project funding the carbon-sequestration research focused on delineating the sequence of subunits spelling out the genetic code for a closely related diatom to the one Todd studied, *Thalassiosira pseudonana*. Todd recently

returned from helping the DOE's Joint Genome Institute to annotate their draft sequence of roughly 9,000 genes.

The bacterium, by contrast, possesses just 3,500-odd genes and can be grown on solid agar medium so that colonies of clones (which appear as small dots on the surface of the nutrient gel) can be lifted out and grown for study.

Todd has a friend who lives near the beach in San Francisco collect seawater for growing these microorganisms in the lab. He adds nutrients and incubates them in a lighted cabinet warmed to a toasty 23 degrees C (about as warm as a warm spring day).

Molecular machines

The experimental group is focusing on three main "molecular machines" within the bacteria — the carboxysome, trans-membrane protein complexes that actively transport nutrients and carbon across the protective membrane (called "ABC transporters" for adenosine triphosphate binding cassettes), and machinery that relays signals from the external environment inside the cell, histidine-kinase response regulators.

The chief interest in the last two is the interaction of those molecular machines. (Their genes are near each other, so their production may be triggered together when the genes are switched on.) The physical relationship of molecular machines can be studied through new chemical analysis tools using mass spectrometry to reveal which proteins are present in complexes.

The scientists also plan to create entire arrays of tell-tale messenger RNA molecules that appear when genes are turned on, carrying instructions for making a unique protein based on the genetic code sequence.

Overall, Todd says, the three-year project will focus on applying "high-throughput" analysis to the molecular biology of these systems.

The team will be aided by a large computational effort aimed at acquiring, managing, and analyzing the vast array of genetic information to come forth.

In addition to Scripps, collaborating institutions include Oak Ridge National Laboratory and the National Institute for Genome Research in Santa Fe. Sandians teaming on the project include Diana Roe (8130), Dave Haaland (1812), Steve Plimpton (9212), Danny Rintoul (9212), and Jean-Loup Faulon (9212).

Sandia to host first on-site master's program in national security

Developing new leaders is a goal of a unique advanced-education program that is placing graduate-level courses at the Sandia/California site for the first time.

Beginning Jan. 6, 15 or more students are expected to begin taking courses on-site in the National Security and Public Safety Program offered by the University of New Haven, which has campuses in New England and Sacramento.

"We're offering unique courses to produce the next generation of leaders in the intelligence community," said Tom Johnson, dean of the School of Public Safety & Professional Studies.

The private university's graduate school focuses on offering career-oriented credentials and continuing education for mid-career professionals to respond to changes in the work environment.

The Sandia-based program is "so timely with what is going on in the world," says Sheryl Stewart (8522), who has worked for the last year to bring the program here. "Only 35 universities offer any national security-type programs."

The course of study, with evening, weekend, and some online classes, leads to three possible diplomas: a Masters of Science degree in National Security and Public Policy, a Masters of Science degree with a concentration in Information Protection and Security, or a professional certificate in National Security.

In the first trimester, from Jan. 6 through April 5, three core and three elective courses will be offered on Monday, Tuesday, and Wednesday evening. (A fourth course on military tribunals will be offered in March, and an online elective is also slated for the first trimester.)

Students apply to the University of New Haven to be admitted to the graduate school. Requirements include a completed baccalaureate degree from an accredited institution with a "B" average. To attend at the Sandia site, students must also be US citizens. The program is open to the public as well as laboratory employees. A clearance is not required; classes will be held in training rooms located in the Redwood Center. Sheryl encourages interested Sandians to complete their applications by Dec. 1 to ensure processing time before classes start in January.

Applicants and potential students say they see the program as both intrinsically interesting and a potential enhancement to their future work activities. Dee Dee Dicker (8516) received her bachelor's almost two years ago in manage-

ment information systems (MIS). Among the first applicants to the Sandia-based program, she sees a partial tie-in to her work in handling increased security concerns regarding hazardous and radiological waste. She also was excited to potentially expand her career opportunities.

Todd Howe (8945), who also received a bachelor's degree in MIS, sees a tie between his interest in a concentration in information protection and his current assignment in computer support, as well as a potential preparation for moving within Sandia. "I'd rather be part of the big picture," he says. "I'm not so concerned with having a degree at the end as to learning something that I can apply."

Sandians pursuing a work-related degree can apply for the special degree program benefit through Education & Training (contact Ta'Rhonda Mayberry at tbmaybe@sandia.gov or 294-3142). By taking a full-time load of nine semester hours and working 20 hours a week, successful applicants receive their full salary and benefits and have tuition covered. Or, Sandians who take one or two classes can seek tuition assistance, for which they are reimbursed for up to \$6,000 annually. (The University of New Haven program runs \$475 per credit hour, and requires 36 credit hours to complete the master's degree.)

In addition to expanding educational experiences, the conveniently located courses were approved by Sandia management to help staff members gain a broader perspective of the national security context in which we carry out our mission, Sheryl says.

Classes will be taught by a diverse team of professors, instructors, and experienced professionals addressing national security from many perspectives. Sandians who are among the faculty for the upcoming program include researchers Fred Cohen, John Howard, and Gary Blair of Information Security Dept. 8910.

Applications are available online at www.newhaven.edu. Information is available from Sheryl Stewart, (800) 472-6342, extension 4-2428, slstewa@sandia.gov; or University of New Haven Dean Tom Johnson, Ph.D., (916) 962-3136 or (203) 932-7260, tjohnson@newhaven.edu; or Colleen Johnson, University of New Haven's Director of California Enrollment Management, (800) 664-9368 Pin 00, crjohn@attglobal.net. — Nancy Garcia

Cool laptops

(Continued from page 1)

company "that has a very interested large customer in the laptop market," says Mike. A paper describing the work has been accepted for publication by *Microelectronics Journal*.

"We thought one application would be for a wearable computer for the military," says Mike. A box 6 x 1.5 x 4 inches could contain microprocessors, wireless Web cards, information from planes, AWACS information, and weather information on a hard disk with graphics capability and peripherals. "But using a fan to cool a field device will never work because of mud and muck and water. It's a perfect opportunity for heat pipe, to put the heat out to fins so the computer cools naturally."

In the heatpipe loop, heat from the chip changes liquid — in this case, methanol — to vapor. The vapor yields up its heat at a pre-selected site, changes back to liquid, and wicks back to its starting point to collect more heat.

Currently, typical laptops are cooled by a fan that merely blows the heat downward across a solid copper (formerly aluminum, when chips were cooler) plate that acts as a heat sink; thus, hot laps. The heat is spread rather than moved to a particular location. Such air-cooled spreading, says Mike, will work — however uncomfortably — until the hundred-degree range is exceeded. Then liquid cooling is essential.

"Formerly, thermal management solutions have been back-end issues," says Mike.

"It's clear now that the smaller we go, the

The wick in the Sandia heat pipe is made of finely etched lines about as deep as fingerprints. These guide methanol between several locations and an arbitrary end point.

more that cooling engineers need to be involved early in product design."

Powerful fans are electronically noisy

More circuits installed per unit area improve capability but reduce reliability, since increased heat increases the possibility of circuit failure; the problems are multiplied when chips are stacked one atop the next.

Currently, microprocessors in desktop computers have to be situated adjacent to a heat sink several inches high and wide, with attendant fan close by. This design problem creates enormous difficulties for designers interested in stacking chips for greater computational capacity yet reducing overall computer size. A further difficulty for the military is that powerful fans are electronically noisy and give away the location of the user.

A heat pipe can move heat from point A to point B without any direct geometrical relation between the points. This means that heat can be displaced to any desirable location, and a much smaller, quieter fan or even silent cooling fins can be used to dissipate heat.

The wick in the Sandia heat pipe is made of finely etched lines about as deep as fingerprints. These guide methanol between several locations and an arbitrary end point. The structure, which works by capillary action like a kerosene wick, consists of a ring of copper used to separate two plates of copper. Sixty-micron-tall curving, porous copper lines (slightly less thick than the diameter of a human hair), made with photolithographic techniques, allow material wicking directionally along the surface to defy gravity.

"An isotropic method [that sends out heat in all directions] doesn't work because it only cools the first heat source; you need anisotropic capability to cool all sources of heat directionally," says Mike. "We use laws of fluid mechanics to derive the optimum wick path to each heat source." The curvilinear guides can be patterned to go around holes drilled through the plate necessary to package it within the computer.

The computer program was developed by Chris Tigges (1742) and the device was modeled by Rick Givler (9114).

Paul Smith (1321), Chris, and Mike formulated the idea at a meeting two years earlier. Charlie Robino (1833) "figured out how to perform the microscale hermetic welding of the device," says Mike, who also expressed appreciation for technologists JJ Mulhall (1745), Mark Reece (1833), and Cathy Nowlen (1745).

The program is part of the Defense Advanced Research Project Agency's HERETIC program (Heat Removal by Thermal Integrated Circuits), a joint project of Sandia's with the Georgia Institute of Technology.

Sandia's Mentor Protégé Program begins second year

Sandia has begun the second year of its Mentor Protégé Program, which assists small businesses (protégés) wanting to improve their business practices and procedures to become more effective suppliers to large organizations.

The program teams mentors, protégés, and business service advisors. They represent a variety of industries from New Mexico, Colorado, and Texas.

Mentors are Sandia employees or regional small or large suppliers to Sandia with a good performance record. New mentors this year include Sandians Phil Rivera (10261) and Karl Ricker (12336); Michelle Gurule, CEW; Frank Thome, Team Specialties; Mary McDaniel, Orion International; Randy Burge, Pro Active Tools; Pete Harrod, L&M Technologies; Matthew Ennis, Argus Insights.

New protégés this year include Longmont Plastics & Machining (Colorado); Reytek Corp.; Geophysical Solutions, Inc.; Palomino Refinishing & Fiberglass; The Water Lady; Network Architects; Summit Technical, Inc.; Deep Web Technologies; Kinetic Improvement Inc.

Business service advisors provide topic-specific support as required by the teams. Among the advisors agreeing to participate in the program again this year are Sandians Nora Armijo (10205) and Ken Holley (3531) plus people from REDW, Richmond Corporate Services, Southwest Public Affairs, and The Aspen Group.

Program improvements this year include the addition of a second-year option for teams wanting more time to achieve their objectives. Four of the six first-year teams opted to sign on for another year. They include Mark Retter (2612) of Sandia and his protégé TMC Design Corp. of Las Cruces (Leroy Gomez and Jose Serna) and David Stafford (10256) of Sandia and his protégé Advanced Clinical Engineering of Bloomfield (Phil Armenta).

The teams will meet at least monthly and will attend two summits to network and to learn more about subjects related to their growth.

Pace VanDevender elected a AAAS Fellow

Pace VanDevender, Director of the Executive Staff (12100), has been elected a Fellow of the American Association for the Advancement of Science (AAAS).

Pace was selected for the honor for his "leadership in directing the planning and construction of the Pulsed Power Facility at Sandia, which has pioneered new ground in fusion technology."

Each year the AAAS Council elects a select group whose "efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished."

Pace will receive a certificate and rosette Feb. 15 during the association's annual meeting, this year in Denver.

Recent Patents

Lothar Bieg (14184): Multi-Axis Planar Slide (MAP-Slide) System.

Armin Doerry (2344) and Bertice Tise: Correction of I/Q Channel Errors Without Calibration.

Ted Gold on 21st century warfare



DEFENSE SCIENCE BOARD member and former Sandian Ted Gold spoke to an audience of Sandians at the Steve Schiff Auditorium last week, sharing his insights on the nature of the war against terrorism.

(Photo by Randy Montoya)

Dick Spalding's all-sky-all-the-time camera setup

By Bill Murphy

A paper published in the Nov. 21 issue of the journal *Nature* makes a compelling case that multimegaton-sized asteroid and comet impacts with Earth aren't as common as had previously been thought.

The paper by University of Western Ontario meteor expert Peter Brown and four coauthors including Sandian Dick Spalding (5740) presents data indicating that impacts of the scale of the 10-megaton Tunguska event in Siberia in 1908 occur on average just once every 1,000 years. Previous best estimates put the frequency at closer to 200 to 300 years.

The new estimate is based on a sophisticated analysis of data from DoD and DOE satellites that monitor the planet for unusually brilliant flashes of light — flashes that might be signatures of a rogue nuclear test.

Dick Spalding's involvement in the paper is based in part on his work as one of Sandia's resident experts on the satellite data cited in the study, but his interest in the field goes beyond that. The lights in the nighttime sky have long fascinated him, and he's convinced that if he were just able to watch the skies more closely, more completely, he'd see important phenomena that have never been credibly documented before.

In his quest not to miss a thing, he conceived of a way to watch the entire sky — the whole sky — all at once, all the time, 24/7.

Through his work with proliferation-monitoring systems, Dick knew that satellites not infrequently saw large inexplicable flashes of light, flashes that weren't necessarily being recorded from the ground. (It was this kind of data that formed the basis of the *Nature* paper).

Dick figured that if he could get "ground truth" — a simultaneous recording of an event from the ground and from a satellite — the resulting data could tell a lot more about the phenomenon than could satellite data alone.

The satellite typically records just the flash; a ground-based recorder — or better, a series of ground-based stations — could record direction, velocity, and trajectory data. That's the kind of information that could help a researcher figure out where in the solar system a fireball's object might have originated.

Pure science and ground truth

"A lot is known about the regular meteor showers, the Leonids, the Perseids," Dick says. "Less is known about the sporadics — the occasional fireballs that don't show up here on any predictable schedule. It seems that the larger [fireball] events fall into the 'sporadics' category. Few systems out there capture this kind of [trajectory/velocity] data on sporadics; certainly, none of the imaging satellites do."

Dick's interest in this was pure science — to know more than we do now about our cosmos. Additionally, "ground truth" can help analysts better understand and interpret the data collected by space-based imaging and sensor technology.

During the mid-1990s, there seemed to be a spate of fireball/meteor activity; Dick recalls an especially bright fireball in Colorado Springs that a private citizen caught on videotape in a most peculiar way.

"This was unusual," Dick says, "in that the individual just happened to have a security camera mounted under the eaves, pointing down toward his car in the driveway in front of his house. The fireball's reflection in the car's windshield was captured on videotape. We decided a domed mirror would do the job better. We even initially experimented with chrome hubcaps!"

There were similar large fireball events



DICK SKYWATCHER — Dick Spalding with a mirror from one of his all-sky camera systems. *Lab News* photographer Randy Montoya is reflected in the center of the mirror as he takes this shot.

around the same time, notably the Oct. 9 El Paso and Dec. 9 Greenland fireballs, both in 1997.

"Although these large events were being seen by satellite, they weren't being recorded from the ground, so we weren't getting the kind of data that could tell us about their orbits. We began to realize that what we really needed to do was watch the whole sky — all the time."

But how to do that? There were all-sky cameras available, but they were expensive dedicated high-end setups. Their cost made widespread deployment unfeasible — and widespread deployment was central to the vision of real-time monitoring of as much of the sky as possible.

Off-the-shelf equipment

Being a Sandian, Dick is nothing if not resourceful: "Using a hemispheric security mirror and off-the-shelf video equipment — a black-and-white video camera and some VCRs — we were able to put together a prototype system; it was a cheap system, but it got the job done."

The setup was simple: aim the mirror at the sky, point the camera at the mirror, program the three VCRs to begin recording at eight-hour intervals and get 24-hour coverage.

Dick placed one of the first-generation all-sky cameras on the roof of Bldg. 890 and began looking for places to set up some others. Canada, it turns out, is a center of meteor science, probably because the ancient Canadian Shield geologic formation — one of the oldest surface features on the planet — contains a lot of meteorite impact craters. As a result, there is a concentration of meteor professionals in Canada. Dick was able to enlist a couple of his northern colleagues to take on the job of hosting all-sky camera systems.

Sandia researcher Mark Boslough (9216) learned about Dick's all-sky camera concept and thought it added a valuable dimension to an LDRD project he was involved in to study so-called near-Earth objects, those little-understood fellow travelers whose orbits intersect Earth's own track. Mark was one-half of the celebrated Boslough-Crawford team that did the computer model that predicted with startling accuracy the observable effects of the Shoemaker-Levy comet during its descent into Jupiter in 1994.

Genesis of sporadics not always clear

Mark says satellite data were indicating a lot of meteor events in the upper atmosphere, but adds that "there are a lot of these events whose genesis isn't completely clear. We were relying on serendipity, and that was kind of frustrating. We needed to get more systematic."

With better data, Mark knew, it would be possible not only to learn more about where fireballs originate, it might help pinpoint where they

end up. In other words, with trajectory data, you have a lot better chance of pinpointing where to look for meteorites, whose composition can also tell a lot about the origin of the fireball — and perhaps even of the solar system itself.

Big-name events

Mark remembered the famous Peekskill Fireball event. (Meteor researchers recall and refer to major events by name, the way a hurricane scientist might recall Camille or Agnes.)

The Peekskill event happened on a Friday night in October 1992, first appearing in the sky over West Virginia. Most high schools play their football games on Friday nights; there were plenty of parents and coaches with camcorders in the stands that night to capture the action on the playing fields. When the fireball streaked overhead, 16 different video cameras from West Virginia to Peekskill captured

some part of the flight on tape. The data gave researchers enough information to calculate the original orbit of the fireball. One large piece smashed into the trunk of a 1981 Chevy Malibu in Peekskill, N.Y.

Mark saw right away that Dick's all-sky camera concept offered a way to replicate the Peekskill-level coverage on a full-time basis. He brought Dick into the LDRD, under the title "Collection and Data Synthesis of Atmospheric Explosion Ground Truth for Global Monitoring Systems."

With LDRD support, Dick was able to extend the network of cameras. There are now operating systems at Vancouver Island, Seattle, Edmonton, Calgary, Regina, Albuquerque, Los Alamos, Las Cruces, and El Paso.

The pieces of Dick's concept, then, were beginning to come together. Obviously, the network would need to be extended and the sky coverage expanded. More important, a way would have to be found to streamline the monitoring process. In its original bare-bones configuration, the all-sky camera recorded everything on videotape. Someone then had to scan the tape every day to look for the bright flashes that might indicate an atmospheric event. After a while, that task could be a big-time demotivator, even for a volunteer camera "owner" committed to the mission.

Joe's thesis project

Enter Joe Chavez (5733), a Sandian who was going for his CS masters at New Mexico Tech. Solving Dick's all-sky camera monitoring challenge offered a perfect thesis project. Joe conceived of and designed a low-cost computer-based system that tied into the all-sky camera rig. Joe's system included hardware and software that together could automatically detect, recognize, and save to a file the bright flashes and tracks in the sky that merited further investigation. The software saves the interesting parts as movie files.

"Each morning, as we scan through the collection of movies recorded throughout the night, Joe says, "we can usually easily tell if we have recorded a meteor or (more likely) just an airplane taking off from the airport."

As components get better — and more available — Dick hopes to see the all-sky network expand. In his most optimistic and imaginative moments, he envisions an all-sky meteor-watching network similar to the network of amateur weather stations that together provide comprehensive coverage of the US, all of their data available via the World Wide Web.

In the meantime, even though, as the *Nature* paper suggests, the big Tunguska-scale events may happen only once in a thousand years, Dick will be scanning the skies, watching.

A little ol' winemaker shares his little piece of heaven

By Iris Aboytes

Nestled on the southern slopes of the majestic Jemez Mountains in a quaint little valley is the beautiful Ponderosa Valley Vineyard & Winery. The little valley with its captivating magnificence captures even a vagabond visitor.

Located 30 minutes west of Bernalillo and nine miles north of San Ysidro on New Mexico Highway 290, it seems another world. "This is a different world. You are in the middle of a vineyard," says retired Sandian Henry Street, owner of the vineyard. In 1976 Henry and his wife Mary purchased three acres in the valley as a camping retreat. They soon discovered the numerous small vineyards in the valley. The families who owned these vineyards still remembered their strong family tradition of grape-growing and winemaking. The seed had been planted for the Streets to establish their own vineyard.

Henry took a course on grape-growing, and his love for winemaking was born. On the advice of Jim Concanon, a California winemaker, Henry and Mary were encouraged to try Rieslings. Cuttings from Jim's vineyard in the Livermore Valley were planted in the Ponderosa Vineyard. When these proved successful, additional cuttings were obtained from Wente's Monterey Peninsula Vineyards to expand the Streets' Riesling vineyard. The vineyards expanded to more than six acres.

Ponderosa Valley Winery was established in 1993, but it was only open on the weekends. Mary retired early in 1994 to run the winery full time. Says Henry, "This could have never happened without Mary. I worked for about six months longer after she retired. Mary had taken bookkeeping classes, so she is in charge of the winery business side of things, as well as running the tasting room. We are truly partners, and she is my number one supporter."

Henry worked as an engineer in the Battery Department at Sandia for 20 years. He retired in 1994 after 30 years of service. He learned his winemaking skills taking classes at UC Davis. "At Sandia when you took classes, you were

(Continued on next page)



RETIRED SANDIAN Henry Street and his wife Mary sit on the porch at the Ponderosa Valley Vineyard & Winery, which they own.



Photos by Randy Montoya



WINE PICKING at the winery. The wine starts here.



(Continued from preceding page)

exposed to a lot of material in a short period of time, and were expected to learn to use it," says Henry. "Taking wine-making classes at the University of California-Davis is the same thing. The winemaking classes are intense; they expose you to a lot of material in a short time. You then take that knowledge back to the winery and work through the process."

"While working at Sandia, quality was always an issue, and it is the same in the wine business," says Henry. "When I came into the wine business I wondered how I could measure quality. Taste is such a nebulous thing. I thought if we could just get to the point where every wine could at least win a bronze medal in some competition, then that wine would have been judged free of flaws, and that could then be our measure of quality."

During the last six years, Ponderosa Winery has won more awards at the New Mexico State Fair than any other winery in New Mexico, and during the last two years each wine has won at least a bronze medal in competition. "Our selling point is our quality," says Henry.

Henry has taken 12 winemaking classes in the last 10 years. He is convinced that continuing to take classes at Davis to keep up with the evolution of the wine business is why the quality of his wines continues to improve.

Ponderosa Valley Winery is the largest grower of Riesling grapes in New Mexico, producing roughly 20 tons a year. Pinot Noir is grown in smaller quantities. The winery produces approximately 3,500 cases a year. While Ponderosa Winery is well known for both its estate-grown Riesling and Pinot Noir, it also produces numerous other wines with grapes grown elsewhere in New Mexico. For a complete listing of Henry and Mary's wines and history of their winery see their website at www.ponderosawinery.com.

Henry is not the only retired Sandian with a winery. Jim Fish owns Anasazi Fields Winery in Placitas, and Keith Johnstone owns Corrales Valley Winery. Henry, Jim, and Keith, along with the owner of Black Mesa Winery, together own a wine bottling line. They put this bottling line in a trailer; they can then take it to their different wineries to bottle their various wines.

Thoughts of going to a winery do not usually include children. To this winery, you are encouraged to bring the family. You are welcomed to this little piece of heaven by three friendly dogs, Moses, Molly, and Baby, and two lovable geese, Max and Myrna. The little ol' cherry-cheeked, white-bearded winemaker Henry himself appears with a warm smile on his face. Instantly he makes you feel at home.

Asked how he compares working on his vineyard to Sandia, Henry says, "I enjoyed the challenges at Sandia, the people, the job. It was all good — but this is better. I am truly blessed — many times over."



THE PONDEROSA VALLEY VINEYARD AND WINERY is nestled on the southern slopes of the majestic Jemez Mountains in a quaint valley.



GRAPE CRUSHING at the winery.



HENRY STREET with his dog in the wine barrel room.

89 Sandians move into Distinguished, Senior ranks

Divisions announce DMTS, DMLS, DTNG, DASA, Sr. Scientist/Engineer, and Sr. Administrator appointments

Sandia's distinguished employees: think of them as the Labs' primary competitive edge. It's a true badge of honor and accomplishment to be able to add before your title: *distinguished* member of technical staff, of laboratory staff, technologist, or administrative staff assistant.

Sandia's special appointments — 89 individuals are so honored this year — represent employees from all areas of the Labs' operations: Senior Scientist/Engineers, Distinguished Members of Technical Staff, Distinguished Members of Laboratory Staff, Distinguished Technologists, and Distinguished Administrative Staff Associates.

According to Corporate Process requirement documents, "Placement in the Distinguished Level signifies a promotion to the highest level of the Technical Staff, Laboratory Staff, Technologist, or Administrative Staff Associate Ladder. This level is different from the other levels in that it is subject to a 10 percent population limitation to preserve the distinction of the level."

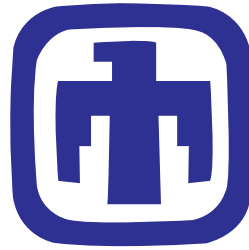
During a new era of intensive recruitment — Sandia is in the midst of a program to hire as many as 500 new employees each year for the next several years — one of the Labs' key "total rewards" incentives has been the quality

of the folks who work here. The individuals pictured here represent the world-class quality of the Labs workforce at its best.

Employees selected for the new levels have been recognized with a special plaque and a non-base salary award, in addition to this special mention in the *Lab News*.

The Distinguished and Senior levels are part and parcel of the Integrated Job Structure (IJS) goal of providing multiple career paths for employees. The IJS's dual-track structure — management and staff — makes it possible for employees to advance in salary, prestige, and recognition without following a management track.

As has been its tradition for many years, the *Lab News* presents photographs of Sandians who have received special appointments this year.



Not pictured:

Tommy Barreras, 2992, DTNG; Douglas Bammann, 8726, DMTS; James Hutchins, 8941, DMTS; Kevin McCarty, 8721, DMTS; Kevin Schroder, 8120, DMTS; Scott Ferko, DTNG, 8111; Christopher Madigan, 12111, DMLS

Bill Aldrich DTNG 15414	Rob Allen DMTS 8112	Douglas Ammerman DMTS 6141	Jerry Anderson DTNG 5851	Alan Armentrout DMTS 3551	Albert Baca DMTS 1742	James Bailey DMTS 1677
Bill Ballard Sr. Sci/Engineer 8730	Diane Barton DMTS 9216	James Berg DTNG 8241	Mark Biggs Sr. Administrator 10310	Robert Boney DMTS 14401	Laurence Brush DMTS 6822	Carla Busick DMTS 2564
Sandra L. Chavez DMTS 2951	Jacqueline Chen DMTS 8351	Weng Chow DMTS 1123	Doug Clark DMTS 2115	Michael Coltrin DMTS 1123	Arlin Cooper Sr. Sci/Engineer 6252	Paul Cunningham DTNG 14184
Raymond Decker DTNG 2541	Dean Dobranich DMTS 9116	Tammy Eldred DASA 9103	Barbara Esch DMLS 6001	James Foesch DTNG 2561	Barbara Funkhouser DMTS 6531	Reeta Garber DMLS 9904
Arthur Grimley III DMTS 12111	Charles Grosso DMLS 12830	Harry Gullett DMTS 10861	David Hammond DTNG 5735	David Hawn DTNG 14405	Thomas Heine DTNG 5941	Martin Heinstein DMTS 9142



Jim Hipp
DMTS 6533



Elizabeth Holm
DMTS 1834



Kevin Horn
DMTS 15343



Deborah Kill
DMTS 2662



Dave Klassen
DMLS 12300



Lyle Kruse
DMTS 2565



Al Lang
DMTS 5713



Jeff Lenberg
DMTS 5911



Sharon Mackel
DMLS 9800



Rose Marie Marra
DASA 3131



Randy Mayes
DMTS 9125



John McGurn
DTNG 1644



Keith Meredith
DMTS 14405



Bill Mertens
DMTS 9523



Margaret Montoya
DMLS 3110



Sheila Nelson
DASA 6501



Robert Nilson
DMTS 8728



Gary Nordyke
DMTS 2950



Deborah Nunez
DMLS 3341



John Olsen
DMTS 5324



John Parmeter
DMTS 5848



Renae Perrine
DMLS 6000



Dave Peterson
DMTS 1738



Jimmy Potter
DTNG 1636



Larry Rahn
Sr. Sci/Engineer 8531



Charles Robino
DMTS 1833



David Robinson
DMTS 6413



Jon Rogers
DMTS 9813



Adrian Romero
DTNG 14405



Terri Jordan Roseth
DMLS 10260



Emmett Sandoval
DTNG 5734



Marty Shaneyfelt
DMTS 1762



Gladys Shaw
DASA 1323



Greg Shelmidine
DTNG 1835



Stewart Silling
DMTS 9232



Rebecca Spires
DMLS 10310



Judy Sturtevant
DMTS 9326



Maher Tadros
Sr. Sci/Engineer 16000



Sheldon Tieszen
DMTS 9132



Pam Tyler
DMLS 10508



Allen Vawter
DMTS 1742



Coleen Walton
DASA 3521



Norman Warpinski
Sr. Sci/Engineer 6116



Louis Weichman
DMTS 2612



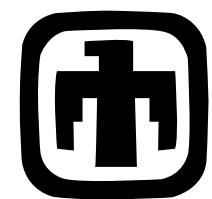
Kurt Wessendorf
DMTS 1732



Albert Widman
DTNG 3112



Charles Yagow
DTNG 2992



Mileposts

New Mexico photos by Iris Aboytes



Charles Miller
25 5713



Michael Spitz
25 10852



Michael Hanna
20 5010



John Henfling
20 9112



Laverne Romesberg
30 5323



Neil Davie
25 9134



David Dell
25 5911



Paul Merillat
25 9500



Bobby Strait
25 3520



James Walker
25 5852



Peggy Dubois
20 12830



Gloria Gallegos
20 14404



Joseph Henfling
20 6211



Anthony McDonald
20 1141



Mark Diltz
15 1735



Kevin Zavadil
15 1832



Recent Retirees



Sandra Barnes
33 3000



John Hancock
17 12333



Gordon Scott
26 2565



William Chambers
35 5852



Norman DeMeza
35 14100



Paul Lemke
35 14100

Management promotions

California

Russell Miller from Manager, B83 System Engineering Dept. 8221, to Deputy Director, Stockpile Assessment and Support Program Dept. 2820.

Russ's Sandia career since he joined the Labs in 1976 has for the most part been in the nuclear weapons program. Russ was initially assigned to the W84 warhead development program. Subsequently, he was an electrical engineer on the W87 and W89 Programs. He was promoted to manager of the W89 Electrical Systems Division in 1989. In the 1990s, Russ managed the W62 and W87 Stockpile Systems, and until recently, the B83 modern strategic bomb.

He has an MS in electrical engineering from San Jose State University.

Paul Yoon, from PMTS, Telemetry Systems Engineering Dept. 8233, to Manager, JTA Sensor Systems Engineering Dept. 8235.

Paul joined Sandia in 1988 as a member of the Special Projects Division, where he designed data acquisition systems. He moved on to the Electronic Subsystem Dept. in 1991 and worked on various surety-related projects. In 1995, he began working in telemetry, first as a circuit designer, then as project lead on the SWPP Telemetry Project, then the W80 Developmental Telemetry Project.

Paul has a BS and an MS in electrical engineering, both from Stanford University.

New Mexico

Patricia Gingrich, from Deputy Director to Director of Systems Assessment and Research Center 5900.

Patricia was a systems engineer for AT&T Bell Laboratories Computer Systems Division before joining Sandia in 1990 as a manager in the Government Systems Division. During the past seven years she served as

Deputy, the intelligence program increased threefold and expanded to include most of Sandia's key technologies, microelectronics, robotics, highly reliable complex systems, and WMD all-source analysis.

Patricia received her BS degree from Penn State University in 1970 and her MS from Hunter College, the City University of New York, in 1973. She was sponsored by Bell Laboratories for her MBA from New York University, received in 1985.



PATRICIA GINGRICH

Al Lopez from PMTS to Manager of Kauai Test Facility and Remote Range Interfaces Dept. 15419.

Al joined Sandia in 1974, working initially in the nuclear safeguards programs, then enhanced oil recovery programs and, later on, the satellite programs. In 1991, he became the Test Director for rocket launch operations conducted at the Kauai Test Facility.

Al has a BS in electrical engineering from New Mexico State University and an MS in engineering from Purdue University.

Basil Hassan from PMTS, Aerosciences and Compressible Fluid Mechanics Dept. 9115, to Manager, Aerosciences and Compressible Fluid Mechanics Dept. 9115.

Basil joined the Labs in 1993. His work has been in research, development, and analysis of aerodynamics and aerothermodynamics of advanced flight systems using computational methods. Basil has a BS, an MS, and a PhD in aerospace engineering, all from North Carolina State University.



BASIL HASSAN



RUSS MILLER



PAUL YOON

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

MISCELLANEOUS

MOVING BOXES, all sizes, china packs w/packing paper, wardrobe boxes, free. Szydlowski, 332-8018, ask for Marilyn.

SOUTHWEST AIRLINE TICKET, Rapid Reward, valid through 4/9/03, drink coupons included, \$300. Young, 821-9852, ask for Mary.

DINING SET, 9-pc., \$550; 5-pc. bedroom, \$550; 3-pc. wall unit, \$500; desk, \$300; sleeper sofa, \$350. Lawson, 828-0455.

VW ROOF CARRIER, '98 Passat, newer, \$100; ski/snowboard rack to fit carrier, \$80. Ambabo, 266-2383.

GRACO BASSINET, \$75; wind-up swing, \$35; baby clothes: onesies, sleepers, etc., 4 mos. new, size 0-6 mo., \$.50 ea. Bogdan, 332-3179.

BASKETBALL SEASON TICKETS, UNM men's, 2 chairbacks, reasonably priced. Foster, 293-5051.

FURNITURE: 6-pc. living room set, wood dining table, w/4 rolling chairs, \$700 for all; organ, \$150. Pasco, 232-2025, ask for Johnny.

MULTI-WOOD WORKING MACHINE, w/jointer, Shopsmith, some extras, 15 yrs. old, little used, good condition, \$500. Bernard, 281-4462.

DINING TABLE, w/2 leaves & 4 chairs, \$200; living room chair, \$150; chain saw, \$75; electric chain saw blade sharpener, \$50. Gluvna, 884-5251.

TWIN COMFORTER SET, spring colors, \$50 OBO; twin toddler comforter set, vehicle print, \$40 OBO; Casio keyboard, 6 mos. old, \$75 OBO. Seager, 298-5219.

DOGGIE GATE, SUV, \$30; Schlage security system, self-install, \$40; Perry Mason paperbacks, \$10; tire chains, 15-in. & 16-in. wheels, \$10. Shepherd, 828-9743.

REFRIGERATOR, Roper, 2 yrs. old, ice maker, excellent condition, \$400. Salazar, 275-9671.

X-C SKIS, women's, 2 pr., 195cm bindings, 3-pin & toe bar, \$25 & \$50; poles, 130cm, \$5/pr.; boots, hi-top, size 9, \$5. Lambert, 768-5955.

SHOP SERVICE MANUALS: '83 & '89 S15, \$10 truck, Blazer series; '90 Mercury; '66, '67 & '74 Ford "T" Birds, \$50 ea. Wright, 281-6652.

TODDLER TOYS: Little Tykes rocking horse, \$20; Playskool trike, \$12; Today's Kids toddler desk, \$10, all good condition. Twyeffort, 281-0149.

ELECTRIC LAWNMOWER, Black & Decker, 50-ft. cord, mulch attachment, \$50. Reed, 821-7782.

ELECTRIC LAWN EDGER/STRING TRIMMER, Toro, 12-in self-feed, \$15; Home & Garden sprayer, 1.5 gal., polyethylene pump sprayer, in box, \$10. Dwyer, 271-1328.

HAWAII VACATION, timeshare, 2 blocks from beach, anytime, \$750. Varoz, 831-6093.

HP PRINTER, Deskjet 693C, 512 KB, built-in RAM, prints on all types of media, excellent condition, \$50. Anderson, 897-2772.

HALL TABLE, antique marble top, tiled accents, 36" x 19", \$125; antique Singer sewing machine cabinet, \$70. Locher, 266-2021.

POOL TABLE, 8-ft. Brunswick, w/individual pockets, ball set, bridge, & 3 sticks, \$1,000 OBO. Miller, 332-4845.

CLIMBING EQUIPMENT, adult/child harnesses, rope, belay device, handholds for home gym, unused/barely used, call for price. Dotson, 450-1889.

CHRISTMAS TREE, 7-1/2-ft. glacier pine, over 2,000 tips, used twice, \$75 OBO. Hubbard, 293-2819.

STRAWBERRY FINCH, female, w/cage; Florida Fancy finch, female, w/cage, \$25 ea. Bonville, 294-6715.

PIANO, 88 keys, w/music, \$850; china cabinet, large, \$300; chest of drawers, w/mirrors, \$150. Barnett, 281-9056.

MOVING BOXES, \$1 ea.; dwarf fruit trees, 9, \$5 ea. Webb, 828-2271.

DINING ROOM TABLE, large, antique, w/1 leaf, 6 chairs, as is, \$90 OBO. James, 232-0456.

COMPUTER STUFF: Jazz Drive, \$65; NIC, \$10; AGP video, \$10; USB hubs, OS (98/98SE/ME/XP), \$25 and up. Cocain, 281-2282.

VIDEOTAPE, "Yoga, a Home Practice Session with John Friend," \$20. Sorenson, 298-1593, ask for Mary.

HOLIDAY DRESSES, new, various lengths, sizes 8 & 10. Morales, 821-5417.

WOMEN'S SKIS, Volkl Vectris, 20/20, 170cm, Salomon S708 bindings, like new condition, paid \$765, asking \$300. Schneider, 899-0106.

MOPEL, Batavus; rotary lawn mower, old; new windows, 3'8" x 6'; 2 small HWHs; 8-in. flex duct; thermal storage rods. Talbert, 298-9036.

BAR STOOLS, 3, solid oak, \$25 ea.; computer desk/file drawer, \$50; 2-shelf bookcase, \$25. Stiles, 275-2941.

QUEEN-SIZE BED, dresser, mirror, nightstand, armoire (Thomasville), walnut, \$800 OBO. Nienow, 332-8338.

LUMINARIA SALE, support Highland High School softball, \$6/doz.. Thomas, 262-0171.

BABY GRAND, beautiful, walnut, totally refurbished, excellent condition, tuned regularly, \$1,650. Smith, 881-6451.

AIR MATTRESS BED, Select Comfort, extra-long twin, w/digital control, foundation, frame, headboard, 5 yrs. old, \$250 OBO. Duncan, 858-1570.

DRUM SET, 4-pc., 3 cymbals, including high hat, crash & rise, good condition, \$300. Kottenstette, 797-7496.

RV BATTERIES, new, Interstate gell-type, never used, paid \$155, asking \$90. Moore, 884-5047, ask for Jim.

OAK TABLE, round, w/4 chairs, \$150; teak veneer table, 8-ft., w/6 chairs & 2 leaves, \$100; tan loveseat, \$50 OBO on all. Brown, 323-1391.

BABY BED, turns into youth bed, matching dresser, w/5 drawers, \$200 OBO. Detmer, 897-4145.

REFRIGERATOR, GE frost-free, circa 1989, handyman special, compressor needs work/rebuild, you pick up & haul, free. Campbell, 281-0744.

BARN SHED, 7' x 8', sturdy, available in mid December, delivery possible at additional cost, \$500. Gutierrez, 239-7059.

BOAT TRAILER, small, '67 Sears model, good condition, \$200 OBO. Grasser, 828-9051.

SOFA, w/oversized chair & ottoman, 1 yr. old, must sell, \$600 OBO. Baca, 319-8371.

GITAR AMP, Crate 40W, dual-channel, w/reverb, chorus & foot switch, like new, \$120. Carson, 858-1460.

FIVE-STAR WHEELS, 4, '00 Ford Expedition, factory, excellent, w/center caps, lug nuts, \$450. Kernaghan, 298-9511.

ELECTRIC RANGE, Kenmore, burners & oven work great, clock, almond, good condition, \$50. Thornberg, 869-0421.

DOUBLE BED, solid mahogany, beautiful, footboard, \$175; walnut nightstands, 2, \$125; computer desk, \$40. Malcomb, 294-6975.

ENTERTAINMENT BOOKS, support Shandiin Child Development Center, can deliver on-site to Sandians, can pre-wrap for gifts, \$35 ea. Giersch, 845-5013.

PIANO, oak veneer, free if you can take it; Kenmore washer, excellent, \$50; wood bunkbeds, \$30. Corey/Wilbur, 299-9314.

RADIAL ARM SAW, 10-in., Sears, old but good condition, w/some accessories, base w/2 drawers, \$150. Hertel, 345-0188.

DIRECT TV RECEIVERS, 2, w/original H cards, Mod#DR102RW, Hughes Mod#HIRD-B1 remote, but no card, \$50 ea. Greene, 463-3260.

SOUTHWEST RAPID REWARDS, expires 10/24/03, drink coupons included, \$300. Adrian, 463-0069.

35MM SLR CAMERA, Canon, 2 interchangeable lens, \$350; Toshiba 4.2 megapixel digital camera, 40 MB RAM, \$375. Hale, 298-1545.

UTILITY TABLE, extra-heavy-duty, 96" x 30", woodgrain laminate top, steel frame, w/folding steel legs, \$45. Barnard, 856-1952.

JVC CD PLAYER, \$50; 26-in. slick & knobby bicycle tires, new, \$3 ea.; wooden snowshoes, w/bindings, \$50; camp table, \$10. Linn, 271-0336.

SOUTHWEST AIRLINE TICKET, Rapid Rewards, roundtrip, valid through 11/5/03, transferable, \$300. Widmer, 296-6911.

BEDROOM SET: king-size, light walnut, w/drawers under bed, bookcase, headboard, armoire, chest of drawers, w/mirror, \$1,500. Serna, 363-1675, ask for Andrew.

FURNITURE: bedroom set, 6-drawer chest, highboy chest, 2 nightstands, dark pine finish, \$500 OBO. Babb, 865-6843.

PALOMINO GELDING, registered AGHA Foundation, 8 yrs. old, very gentle, easy to catch, 15 hands, works w/cattle, trailers, \$2,500. Arana, 228-4134.

BANDSAW, Sears floor model, 1-hp, adjustable table, 0-45", 110-V extra blades, excellent condition. Rizkalla, 286-9278.

UTILITY TRAILER, 5' x 7', 2-in. sides, great for landscaping, construction, hauling junk, \$425 OBO; 12-string Yamaha guitar, \$275 OBO. Newman, 266-6928.

QUEEN-SIZE SLEEPER SOFA, 84-in., earth tone colors; brass table lamp; floor tray lamp, dark wood, all very good condition. Tafoya, 255-7675.

SAFE, Diebold, fireproof, on wheels, great condition, large, heavy, strong; Schwinn 10-spd., great condition. Moya, 286-0754.

YARD SALE, Dec. 6 & 7, 8-12, 1555 Donette NE, Tramway west/Indian School, right/Eastridge, left/Donette, living/bedroom furniture etc. Vandevender, 822-9295.

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.

LANDSCAPING BARK, 6 trash bags, fill your thin spots, you haul, free. Dreike, 299-6670.

CRAFT FAIR, Saturday, Dec. 7, La Cueva High School, 9-4, 200 crafters, food, Wyoming/Alameda. Ekman, 296-3758.

ELECTRIC WASHER & DRYER, Maytag, white, works great, paid \$1,500, asking \$300 for both. Bear, 881-7128.

SINGLE-SIZE WATERBED, includes headboard w/mirror, frame, heater, liner sheets, \$50. Sherman, 292-3297.

LOVESEAT, Thayer Coggin, contemporary blue upholstery, \$300. Jennings, 878-0828.

CRIB, \$80; Little Tykes workshop & extras, \$40; Cozy Coupe & gas pump, \$35; Habitrail modules. Heald, 281-7885.

CHRISTMAS TREE, 9-ft., \$50; electric dryer, works, \$50; Litesped (Unicoi) off-road bicycle frame, \$700. Raether, 298-7156, ask for Fred.

WOOD-BURNING STOVES, 2, large, Franklin-type, both in excellent condition, \$300 ea. Carson, 281-5115.

HANDMADE CHRISTMAS LUMINARIAS, Boy Scout Troup 395 fundraiser, deliver Dec. 7 or 14, \$5/doz., \$12/3 doz. Warren, 828-3649, ask for Diane, mingfling@aol.com.

CANTERBURY CRAFT FAIR, 425 University NE, 12/7, 9-5, 12/8, 11-2, crafts, baked goods, food booth, free musical performance on Sat. Flores, 247-2515.

STEREO TV, Sony, 27-in., VCR shelf, oak veneer cabinet, \$350; leather recliner, beige, hardly used, \$300 OBO. Schuster, 828-3415.

TRANSPORTATION

'98 HONDA, 3.0L V6, power package, new battery & windshield, 53K miles, \$13,000 OBO. Werner, 323-7228.

'90 DODGE DYNASTY LE, 4-dr., 1 owner, white, Infinity sound, new upholstery, transmission, alternator, excellent maintenance, \$1,500. Plut, 298-3060.

'91 FORD EXPLORER, Eddie Bauer, 4WD, flip-up roof, power seat, Michelins, 109K miles, \$5,000 OBO. Hulebak, 286-0445.

'95 DODGE CONVERSION VAN, chrome wheels, TV, video player, trailer hitch, 86K miles, excellent condition, \$7,500. Rembold, 281-3469.

'92 JEEP CHEROKEE LAREDO, 4WD, AT, PW, PL, AC, CD, red w/gray, alarm, 152K miles, \$2,350. Tharp, 792-0790.

'98 FORD CONTOUR GL, 4-cyl., 4-dr., AC, AT, PW, PL, PS, AM/FM/cassette, ABS, 34K miles, bids accepted through 12/6/02, right to refuse, sold as is. SLFCU, 237-7386, 7254, 7386.

'79 CORVETTE, body & frame, no drive train/suspension, body clean, \$2,500 OBO. Golden, 823-9737.

'01 CHEVROLET SUBURBAN LS, 4WD, AT, 29.5K miles, excellent condition, \$31,000. Burkinshaw, 237-7416, after 5 p.m. call 833-5183.

'90 CHEVY BLAZER S10, needs work, 105K miles, \$1,300. Hopkins, 286-3031.

'88 FORD F250, 3/4-ton, long bed, 351ci, 5-spd., 2WD, 2-in. lift, 33-in. tires, 81K miles, looks good, runs well, \$2,500. Hamburg, 857-9662.

'91 JEEP CHEROKEE, 4WD, ABS, 1 owner, new tires, hitch, excellent condition, runs great, \$3,500. Azevedo, 898-7700.

'94 CHEVY ASTRO VAN, V6, all power, excellent condition, 78K miles, \$5,300 OBO. Vernon, 892-6571.

'99 DODGE RAM, 4x4, club cab, gray cloth, 360ci, AT, bed liner, good condition, warranty available, 92K miles, \$12,400. Turner, 345-1086.

'92 NISSAN MAXIMA SE, all power, pearl white, sunroof, luxury accessories, very good condition, \$4,400. Hickerson, 281-2329.

'92 BUICK, V6, 4-dr., white, new brakes, excellent condition, \$2,750 OBO. Marchi, 299-5049.

'95 SATURN SCI COUPE, sunroof, AM/FM/CD, alarm, newer tires, 74K miles. McDuffie, 363-3337 or 888-5458.

'96 CHEVY Z71, 4x4, ext. cab, loaded, 5.7 eng., nice, 61K gold, 84K miles, 2nd owner, \$12,500 OBO. Garcia, 244-3247.

'92 JAGUAR XJS, fully loaded, white w/tan interior, 64K miles, must see, \$11,900. Morales, 856-1560, ask for David.

'89 GMC SIERRA SLX2500, 4-spd., V8, 5.7L, posi-traction, 2WD, 1 owner, AC, PS, PB, new clutch, excellent condition. Maynard, 865-1288.

'99 FORD CONTOUR LX, 4-cyl, AT, AC, PS, PB, PL, PW, PM, cruise, tilt, air bags, AM/FM/cassette, super clean, like new, 97.5K miles, \$4,750. Ruiz, 890-0982.

'90 CADDY, with only 80K miles, excellent condition, below Blue Book. Larsen, 292-7896.

'90 TOYOTA 4-RUNNER, 4x4, V6, standard (new clutch), loaded (PW, PL, factory tint), very nice, \$5,700. Roddick-Dunbar, 286-0000.

'99 OLDSMOBILE INTRIGUE, loaded, w/spoiler, excellent condition, 45K miles. Zizka, 821-6930.

'98 DODGE RAM 1500, big tires, AM/FM/cassette, maintenance records, good condition, 93K miles, must see, \$8,900. Wells, 228-1059.

'02 ACURA RSX TYPE S, 6-spd., loaded w/extras, leather, mint condition, below 6K miles. Laskar, 856-7806.

'87 HONDA ACCORD DX, 2-dr., hatch, 4-cyl., AT, AC, PS, PW, cruise, 1 owner, new CD player/speakers, 123K miles, \$1,900 OBO. Washburn, 766-7671.

'00 FORD EXPEDITION, Eddie Bauer, 4WD, 1 owner, w/service records, excellent condition, Nov. NADA, \$25,525. Martin, 869-1212.

'92 TOYOTA TERCEL, 4-spd., AC, white, 184K miles, looks/runs great, good student car, \$800. Goy, 323-4315.

'73 JEEP CJ-5, rebuilt 304, 4-spd., new transmission, soft top & full cage, \$5,800 OBO. Dickenman, 994-3451.

'79 VOLKSWAGEN SUPERBETTEL, convertible, triple white, new top & factory fresh GEX 1600cc engine, runs great. Roberts, 321-4039.

'93 FORD ESCORT WAGON, 4-dr., 5-spd., AC, CD, roof rack, teal w/tan interior, reliable. Schwartz, 856-0836.

'00 FORD RANGER XLT, 4x4, ext. cab, PL, PW, PM, bed cap, 49K miles, \$14,900 OBO. Weishuhn, 281-6980.

'95 VOLVO 850 GLT, AT, CD changer, spoiler, sunroof, excellent condition, 93K miles, retail \$10,530, asking \$9,500. Green, 254-0600.

'97 DODGE INTREPID ES, PW, aluminum alloy wheels, 166K miles, needs work, \$1,500. Baca, 299-8691.

'96 BUICK CENTURY, 4-dr., 6-cyl., 1 owner, all records, clean, Blue Book \$5,600, asking \$4,500 OBO. Simpson, 898-8792.

'94 DODGE CARAVAN, AT, AC, CC, AM/FM/cassette, tilt steering, built-in child seats, luggage rack, new tires, clean, \$2,350 OBO. Barba, 293-4722.

'01 HONDA CIVIC LX, 5-spd., power everything, excellent condition, 26K highway miles, need to sell, \$12,500 OBO. Sanchez, 720-9078.

'86 FORD F150, 4x4, long bed, ext. cab, AT, 351 V8, white w/camper shell, \$3,500. Luken, 286-6482.

'00 HONDA CIVIC Si, excellent condition, under warranty, 20K miles, \$8,000 in extras, a real beauty, \$15,000. de la Fe, 271-6694.

'97 MITSUBISHI DIAMANTE LS, gold, w/tan leather, sunroof, all power, very nice, must sell, \$9,950 OBO. Lopez, 831-0777.

'90 VOLVO 740 SEDAN, charcoal gray, excellent mechanical condition, \$6,500. German, 281-1719.

'95 DODGE INTREPID ES, AT, FWD, power everything, leather, alarm, sliding roof, trip computer, multi-CD, \$4,000. Erwin, 379-3103.

'92 TOYOTA TERCEL, 109K miles, fair condition, great first car, \$990. Heise, 280-5339.

'01 TOYOTA COROLLA CE, 1.8L, 5-spd., 4-dr., PS, PB, AC, heavy-duty starter, battery, defroster, like-new, 18.8K miles, \$9,600. Brenkosh, 830-9106.

RECREATIONAL

BIKES: adult mountain or touring, almost new, \$65 ea. or \$115 both; 2-bike adult rack, \$55. Cooper, 888-0967.

'76 CHEVY HI-TOP CAMPER VAN, sink, closet, toilet, furnace, ice box, 350 V8, 1-ton, 117K miles, \$2,200 OBO. Garcia, 299-1488.

MOUNTAIN BIKE, Mongoose IBOC comp, w/Deore LX equipment, 21-in. frame, in good shape, \$100. Cline, 922-8656.

BICYCLE, Schwinn, 26-in, step-thru frame, 10-spd., unused, \$110. Caffey, 296-1942.

WHITEWATER KAYAK, 2002 Dagger GTX model, never in water, \$1,150 new, will sell for \$950. Patrick, 265-4569.

'94 ROCKWOOD MOTORHOME, 34-ft., great condition, lots of extras, \$11,000. Argo, 865-9305.

WHITEWATER KAYAK, Dagger RPM, brand new, never used, see at www.dagger.com, \$500. Moyer, 828-9214.

GO-PED, Bigfoot motorized scooter, gas powered, clutch, disc brake, seat, off-road tires, fold-down, like new, \$650. Kaiser, 828-1660.

REAL ESTATE

DOWNTOWN VICTORIAN ADOBE, greenhouse, gardens, back rental house, detached studio, excellent condition, priced to sell. Helfrich, 247-2950.

4-BDR. HOME, 2 baths, manufactured home on permanent foundation, w/5 wooded acres, tape & texture. Pierce, 286-0847.

2-BDR. CONDO, 1-1/2 baths, 2-story, 1,141 sq. ft., NW excellent condition, \$86,900. Lahusen, 792-0990.

3-BDR. HOME, 2 baths, beautiful adobe, patio, brick floors, 3 FP, den, dining, 2-car garage, great NE location. Michael, 296-1029.

WANTED

NEW MEMBERS, Stockbusters Investment Club, meet monthly, Coronado Club, get ready for bull market. Saavedra, 864-9626.

GOOD HOME, black Lab mix, 5 yrs. old, needs loving home, great w/other dogs/kids, great watch dog, spayed, needs shots, can email photo. Chavez, 323-9343.

HOUSEMATE, responsible, nonsmoker, house located near I-40/Unser/Ladera, \$540/mo. includes 1/2 utilities. Barnes/Avila, 836-7812.

DRUM SET, for aspiring musician; 150-160 snowboard, w/bindings, & possibly size 10 boots. Stromberg, 828-0892.

WINDOW TINTING, need recommendation for a quality automotive window tinting shop. Bankim, 284-9877, tejani@alum.rpi.edu.

VW BEETLE ENGINE, 1500cc - 2100cc, any condition, will pay cash. Horton, 615-2320.

DIRT BIKE, Enduro motorcycle, street legal. Plummer, 823-1619.

Lost and Found

LOST — Gray and white cat, long hair, in Bellehaven area of NE Heights. Last seen on Nov. 18. Murphy, 294-1778.

Holiday schedule change

The Dec. 13 *Lab News* will be published on our normal schedule and will be the last issue of the year. The first issue of 2003 will be the Jan. 10 issue, with a deadline for classified ads of noon, Friday, Jan. 3.



WHERE THE ANTELOPE ROAM — This photo from the Tonopah Test Range in Nevada, taken by Jim Galli (15421) during a spring snowstorm, was this year's top prize-winner in Sandia's Environmental Report Photo Contest. Now a new contest is under way, with dinner certificates and other prizes offered for your best scenic, wildlife shot, or photo of ongoing work on environmental projects at Albuquerque, Tonopah, or Kauai. For more information, contact Stephanie Salinas (3121) at 845-7711. Deadline is Jan. 15, 2003.

Mail center employee Suzanne Visor puts brush and dye to silk to create colorful paintings, scarves, shawls

By Chris Burroughs

The first time Suzanne Visor (10268) put a brush and dye to silk, she was hooked. Painting on silk was the medium she had searched for.

"I taught art for many years in public and BIA schools. I'd been a weaver and printer, but nothing was like painting on silk," she says.

Suzanne, who works in Sandia's mail center handling external mail, says her artwork has

been her key to an exciting and balanced life.

She started painting on silk about ten years ago after her brother died of AIDS. He told her to use her inheritance to take an exciting trip. She traveled to Kenya where she joined a safari. The experience prompted her to start doing activities she'd always wanted to do but had been hesitant to try. Painting on silk was one of those risk-taking activities.

Today her silk paintings, scarves, and shawls sell for anywhere from \$50 to \$500. She exhibits in the juried Southwest Art Festival in Albuquerque and the New Mexico Arts and Crafts Fair and has her work in galleries in New Mexico and Colorado, including Mariposa Gallery, Tapestry Gallery in Madrid, Kristin's in Santa Fe, and West Southwest in Denver. She teaches painting at Village Wools, Sage Ways, and in her home studio.

To paint, Suzanne starts with an exquisite piece of white silk prepared by Chinese women working in a cottage industry. She buys the silk from a firm in California. She stretches the silk on a frame and draws the design with resist, which keeps the dyes between the lines. Then she paints using brilliant water-diluted dyes.

"It's not so much painting," she says. "It's more like flooding. I put the brush on the silk and the dyes flow up to the resist lines."

Silk, she says, is very unforgiving. "Mistakes cannot be removed. I must change the mistake into an additional part of the design to save it. And plenty of pieces end up in the scrap bag!"

She particularly enjoys painting dynamic, natural forms, flower motifs, and modified tribal designs using brilliant colors.

After she finishes painting she steams the silk for several hours to set the dyes, washes out excess dye, and presses the fabric.

Suzanne says she has always been an artist — drawing before she was walking.

"I drew on the backs of advertisements and in the margins of

my mother's books," she says. "Or I would create wonderful cakes and other confections in my sandbox with damp sand and pastel-colored stones from the stream."

As the oldest of five children with parents of modest means and growing up on a farm in western Pennsylvania, she was encouraged to seek an art education degree at a nearby state college — do the practical thing and become a teacher.

"I got my degree but then ran away from home and ended up in California," she says. "I backtracked to New Mexico, taught, did case work on the reservations, was a writer-consultant and public information officer, a wife and mother."

But all the steps and turns Suzanne took led her back to where her heart was — creating art.



SUZANNE VISOR paints a colorful design on silk in her home studio. She says she particularly enjoys painting dynamic, natural forms, flower motifs, and modified tribal designs using brilliant colors. (Photo by Randy Montoya)

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Read aloud, feed a mind, ten minutes a day and be amazed how well they fly off to school.

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For information, contact Pam Catanach at 284-5211