MERCURY ON THE MOVE — David Sanchez (2541) and Jay Hendricks from the National Institute of Standards and Technology examine a mercury manometer prior to its transport from Sandia to NIST in Gaithersburg, Md. (Photo by Randy Montoya)

Mercury manometer moves from Sandia to NIST

Transfer latest example of mutually beneficial collaboration between two organizations

By Michael Padilla

After more than three and a half years of discussion, paperwork, and careful planning, a manometer containing 200 pounds of mercury in a 500-pound vessel was recently moved from Sandia to the National Institute of Standards and Technology (NIST) in Gaithersburg, Md.

The mercury manometer or ultrasonic interferometer manometer (UIM), created to make extremely accurate pressure measurements, had been housed at Sandia's Primary Standards Laboratory since 1989 but had never been used.

NIST originally provided the instrument to Sandia, a near-twin of an instrument at NIST's Gaithersburg facility, to have a redundant capability at a different site. Since it wasn't being used at Sandia, NIST expressed an interest in getting it back.

Sandia's decision to return the manometer to NIST is just the latest in a long history of cooperation between the two organizations. Over the years, Sandia and NIST have exchanged equipment to assist each other in their respective missions, and the two organizations have collaborated routinely on a wide range of calibration and standards-related issues (see "Sandia has close relationship with NIST" on page 4).

Over the years, Sandia and NIST have exchanged equipment to assist each other in their respective missions, and the two organizations have collaborated routinely on a wide range of calibration and standards-related issues.

David Sanchez (2541) says the primary reasons why the manometer had not been in use are cost, lack of staff resources, and ES&H concerns. In particular, David says, the instrument's 200 pounds of mercury — a toxic substance that requires special handling — pose a standing safety concern. Since Sandia had no plans to use the instrument, David says, it made sense to return it to NIST where it could be put to use.

"We attempted to bring the instrument on line several times over the years," David says. "But the system was too labor-intensive for Sandia to absorb the cost."

(Continued on page 4)

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Sandia National Laboratories

Hydrogen workshop highlights growth, diversity of projects, future opportunities in transportation arena

Small molecule — hydrogen — is a big player in Sandia's transportation energy future

By Mike Janes

"Our robust hydrogen program is a classic example of how Sandia has taken an expertise grown over the years for the nuclear weapons program and used that capability to serve the nation in the transportation arena. That new work has, in turn, further strengthened our expertise for all our mission areas, including nuclear weapons."

* * *

Spoken by Rion Causey (8758) near the close of the two-day gathering, those words succinctly captured the essence of the Hydrogen Energy Research Workshop at Sandia/California May 8-9.

Some 75 researchers from Sandia/New Mexico and Sandia/California came together for the workshop, which included a series of panel discussions and presentations on topics such as hydrogen storage, polymer electrolyte membrane (or PEM) fuel cells, safety, production, nuclear hydrogen, and utilization in combustion engines.

In his opening overview, Sandia hydrogen program manager Jay Keller (8367) paid tribute to the researchers over the years who helped establish the Labs' expertise in hydrogen through its defense and

(Continued on page 3)

Affects only those hired after 2008

Retirement benefit changes for future employees echo recent national trends

The Sandia Board of Directors' recent decision to begin offering nonrepresented staff hired or rehired after Dec. 31, 2008, an enhanced defined contribution benefit plan rather than a defined benefit pension upon their retirement is right in sync with current-day employer trends.

CHANGE @ SANDIA

In fact, there's plenty of evidence to illustrate just how unremarkable such a change by a large employer like Sandia really is.

For example, research shows defined benefit pensions — Sandia's Retirement Income Plan (RIP) is an example — reached the height of their popularity in the late 1970s. More than 60 percent of American workers had one.

Last summer, the Employee Benefit Research Institute echoed this by reporting that since 1980 "significant changes have occurred in the kind of employment-based retirement plan that workers

(Continued on page 4)

Rattlesnake watch

This spring has been a busy year for rattlesnakes at many Sandia sites and for the Labs' biologists, whose many duties during this hectic season include snake removal. See the story on **page 5.**

Inside . . .

Student MEMS designs

Microelectromechanical systems (MEMS) designs by students from the University of Oklahoma and University of Illinois were chosen as winners in Sandia's fourth annual University Alliance Design Competition. See the story on **page 5.**

What's what

Over the past year or so, the *Lab News* has employed a new policy, one that hasn't brought us joy but has given us a great deal of satisfaction. Whenever there is a death among our on-roll employee population, we now publish a full obituary/memorial, something we didn't do in the past. (Previously, the *Lab News* noted employee deaths with a brief item mentioning the barest details: age, date of death, years at Sandia, organization number, and surviving family members.)

Our intention in publishing a fuller obituary has been to give colleagues at Sandia a chance to offer their own thoughts about a deceased friend, someone with whom they may well have spent more waking hours than members of their own family.

When we get word of an employee death here at the *Lab News*, we certainly feel an immediate sense of loss. We can only imagine what it must be like to lose a friend with whom you've shared the years, accomplishing great things together.

In recent issues, we've published obituaries for Anthony R. "Tony" Montoya and Ron Van Theemsche, both of whom died far too young — they were in their early 50s — of heart attacks. After Tony's death, his wife Linda sent a note to Labs Director Tom Hunter thanking him for the letter of condolence he had sent to her. In her note to Tom, Linda said she was deeply moved by the phenomenal outpouring of support and expressions of concern from coworkers. "Every Sandian I spoke with had the kindest, most heartwarming stories about Tony," Linda wrote.

Linda asked Tom to arrange for the *Lab News* to publish a special note of appreciation from her to the entire Sandia community. We are happy to do so. Here it is:

> *Words cannot express how touched and moved we were by the love, friendship, kindness, support, and generosity you gave us during this very difficult time. Tony was truly a happy man who enjoyed working with you all. His love of softball and golf was enriched as he coached the Sandia team and golfed with many of you. We're sure Tony is in the heavens above, introducing himself to everyone, smiling, telling jokes, and making up nicknames for those he is meeting. Live life to the fullest, with respect and dignity, and carry on as you know Tony would want.*
>
> *Thank you so very much. Linda Montoya and Family*

* * *

Did you see the live webcast of Labs Deputy Director Al Romig talking about change at Sandia? If you haven't seen it, you ought to check it out (on Sandia's internal web only) at http://ln.sandia.gov/Romig-May-2008/. In the video, Al does a good job of placing a lot of recent and pending changes at Sandia in the context of changing times, changing customer expectations, and changing marketplace realities. Al also takes note of the medium, saying "I think there's tremendous significance in the vehicle [i.e., the live webcast]." There is, indeed.

The live webcast represents a real breakthrough for Sandia's video streaming team and the realization of some goals they've been working toward for some time now. There were, understandably, some technical glitches, but those will be ironed out and the process will only get better and better.

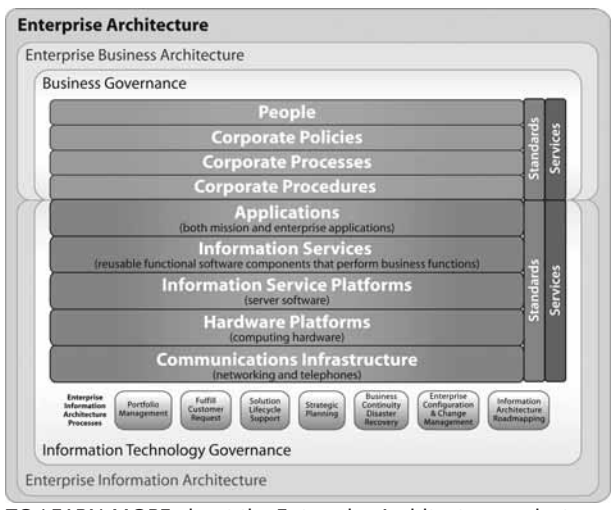
There will be a lot more in the *Lab News* over the next few months about change at Sandia. And based on the success of the first-ever live webcast — more than 1,000 Sandia computers were logged in at the time, making it the largest "live" all-hands meeting ever at the Labs — it's my guess that we'll be seeing other Sandia leaders talking about change-related issues in real-time video, too. See you next time.

— Bill Murphy (505-845-0845, MS0165, wtmurph@sandia.gov)

Enterprise Architecture project aligns IT with Labs' mission work

By Phyllis Teague (9343)

When you think of architecture, you probably envision Prague or Chicago, and not Sandia's networks, applications, servers, and information technology (IT) processes. Yet that kind of architecture is the focus of an effort to transform the entire IT implementation at Sandia and how IT providers support Sandia's business. And considering that IT underpins virtually every mission activity at Sandia, this effort could vastly reduce IT costs.



TO LEARN MORE about the Enterprise Architecture project, go to the EA website at http://ea.sandia.gov.

The Enterprise Architecture (EA) project addresses both the business and IT sides of Sandia. On the business side, teams across the Labs are defining and clarifying business processes in the CPR redesign effort. On the IT side, Barry Hess (9610), deputy CIO and Chief Information Architect, and the EA team are streamlining, consolidating, and simplifying the IT environment. Together, these activities aim to tightly integrate Sandia's IT functions and technologies and, more importantly, align IT with Sandia's business needs.

"This effort will define the IT environment and what we want the future to be," says Barry. "We'll know where we are and know our vision, and we're planning our path to get there."

Understanding changes, risks

Understanding changes, their risks, and their effects is crucial to protecting the IT environment and providing the best infrastructure by which Sandia can accomplish its mission. This multifaceted EA project currently is concentrating on two major areas to help accomplish that: (1) developing IT governance processes; and (2) identifying and funding efforts to transform Sandia's IT infrastructure.

IT governance processes address how Sandia will deliver IT and how the Labs will manage change to the IT environment. For example, one helps match customers who have IT needs with IT providers. An automated implementation of the Fulfill Customer Request process, which will go live this month, serves as an IT catalog of services plus a "brokering" function that puts customers in touch with the IT providers best suited to meet their IT needs.

Another process that will be automated this summer is the Architecture Decision Process. Its aim is to control how IT technologies having Sandia-wide effects are introduced to the IT environment. It dovetails with the Fulfill Customer Request process.

The project also focuses on transforming Sandia's IT infrastructure, but what does "transforming" mean? It means consolidating Sandia's servers to eliminate as many of them as possible. It means optimizing mission and enterprise applications to eliminate duplicates (such as the dozens of tracking systems found around the Labs). It means optimizing applications to take advantage of "information services"— reusable software components that sit between applications and server software and remove many dependencies on specific types and versions of server software. It means standardizing and improving the telecommunications infrastructure.

Because this project focuses on how IT supports Sandia's mission, everyday computer users probably won't see much of the transformation project going on. What they are likely to see, however, is faster, more efficient enterprise and mission applications and faster, cheaper IT services. IT service providers will also benefit from a less complex IT environment: They'll be connected easier and faster to people requesting IT services, and a documented IT environment will help identify and fix problem areas more quickly.

"If this is done right," says Barry, "Sandia's capability to be agile in IT will increase and we can react to changes quicker and cheaper." And more important, Sandia's IT providers can move from focusing most of their effort on maintenance to focusing most on innovation.

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Hydrogen

(Continued from page 1)

nuclear programs.

Jay also made clear that the Labs' current, transportation-focused hydrogen portfolio is diverse and growing. The program will bring in roughly $20 million in FY08, more than half of which comes from DOE's Office of Energy Efficiency and Renewable Energy (EERE). In 1994, Sandia's hydrogen work was funded by EERE to the tune of just $200,000.

DOE's Offices of Science, Fossil Energy, and Nuclear Energy currently fund about $4.5 million of work, while industry-funded projects (mostly led by US automotive companies, particularly General Motors) total around $2.5 million.

Regarding the hydrogen program's diversity of work, Jay cites the breadth of Sandia's engagement and partnerships with the external hydrogen community, which includes international collaborators, industry partners, and various funding agencies and government offices. Sandia's work, he says, supports DOE's goal of promoting global collaboration and expansion of hydrogen energy R&D worldwide.

EERE-funded projects at Sandia include those in hydrogen embrittlement, storage, production, systems modeling, and safety, codes, and standards. Programs in hydrogen production via coal gasification and nuclear hydrogen production are housed in non-EERE programs, while industry partners such as General Motors are actively partnering with Sandia on hydrogen storage projects and other programs.

Though Sandia's Laboratories Directed Research and Development investments in hydrogen have decreased in recent years, Jay says that's perfectly understandable since it illustrates how earlier investments by the Labs' Energy, Resources, and Nonproliferation (ERN) Strategic Management Unit (SMU) paid off and led to funded work.

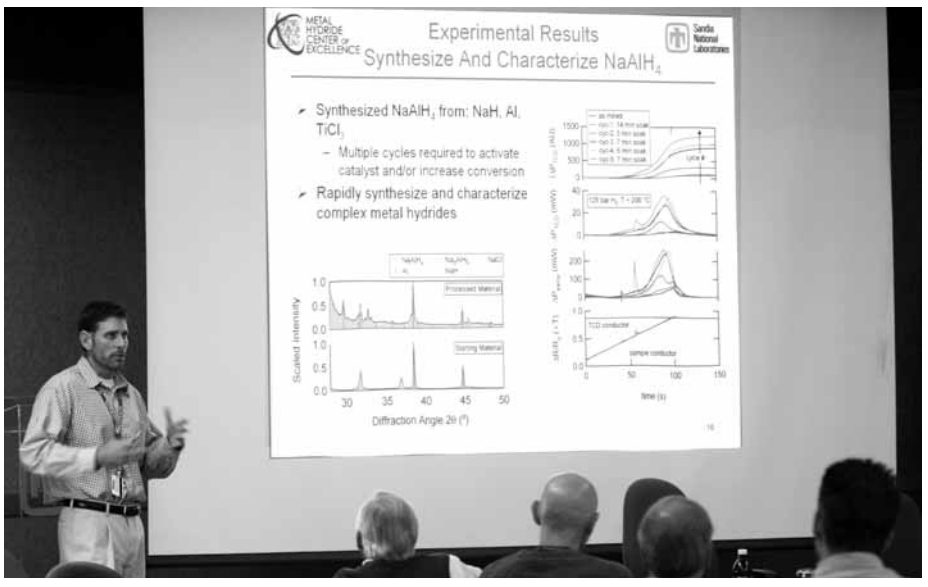
Avoiding stovepipes

John Kelly, senior manager of Advanced Nuclear Energy Programs (6770), says hydrogen is an area of interest for himself and managers such as Don Hardesty (8360) and Art Pontau (8750).

"It's good to expose both sites to what's going on and come up with new ideas and better ways to do things," says John. "That's what happens when you get the right people together. Just like at DOE, our programs can get stovepiped. This is an opportunity to break down those barriers and get the big picture. By sharing what we are doing, we also learn about activities at other labs and by other partners."

At the workshop, "there was some real value in learning the overall landscape of Sandia activities in hydrogen research and gaining an understanding of where the opportunities might lie," says Jerry Simmons (1120). As manager of the Semiconductor and Optical Sciences group, much of his work is funded by DOE's Office of Science.

Jerry says that, like the hydrogen program, he shares the common goal of trying to bring the Office of Science together with EERE.



AT THE HYDROGEN WORKSHOP, chemical engineer Tony McDaniel (8367) shares his work on a high-throughput screening (HiTS) approach to materials discovery that aims to screen a very large space of catalysts and complex metal hydrides efficiently using combinatorial methods.

"EERE tends to be focused on work that is short-term, more milestone-focused," he says. "The Office of Science looks at a much longer range, 10 years out or more. We need to focus on both."

"This workshop has given us the impetus to consider application space we might not have thought of before," says Tony McDaniel (8367). "I didn't know anything about the nuclear work on hydrogen. It's really a fascinating challenge, especially in terms of materials."

Sandia, industry forge ahead

Though Sandia's hydrogen program remains healthy and should get healthier, Jay says its immediate future will depend somewhat on the direction the next administration and Congress take on climate change policy.

"I'm hopeful and optimistic that government leaders will continue to focus on the ways we power our society, and will work with Sandia and others on making hydrogen part of the answer," he says.

Industry support appears to be strong. At a keynote address at the National Hydrogen Association's annual conference in April, GM executive Larry Burns — a previous visitor to Sandia — called on the energy industry and governments to step up and help automakers make volume production of fuel cell-electric vehicles a reality by opening more hydrogen fueling stations.

"The automobile industry has reached a critical juncture in our journey to realize the full potential of hydrogen fuel cell-electric vehicles," said Burns. "While we have made impressive progress, we have now reached a point where the energy industry and governments must pick up their pace so we can continue to advance in a timely manner."

Federal spending on hydrogen research has grown steadily over the past five years, and Sandia's program has grown in lockstep with the government. Currently, Sandia continues to actively respond to federal calls, both lab-only requests-for-proposals as well as opportunities that involve industry partnerships.

Regardless of the political winds, Sandia's hydrogen activities are aligned perfectly with the Labs' future, says Don, particularly the transportation and energy "big idea" that is emerging out of the ERN SMU, (*Lab News*, April 11, 2008). Given Sandia's existing partnerships in industry, academia, and government, hydrogen could be a key piece of a national energy initiative, with the Labs playing an important role.

Sandia CaliforniaNews

Visit by USCAR delegation exemplifies auto industry's ongoing confidence in, reliance on CRF research

By Mike Janes

As longtime partners with Sandia's Combustion Research Facility (CRF), the United States Council for Automotive Research (USCAR) should, by now, be well familiar with the Labs' capabilities in a wide variety of transportation-related research and development activities. But a recent visit by USCAR directors — the first such visit to Sandia/California by top-level USCAR executives in its 16-year relationship with the Labs — was still an eye-opening experience and spoke volumes about Sandia's commitment to ongoing partnerships with key transportation industry groups.

USCAR Executive Director Don Walkowicz and nearly a dozen USCAR directors and executives visited the CRF on April 24, spending a full day on lab tours and engaged in research presentations. Participating guests included representatives from each of the Big Three US automakers, including William Peirce (director, Technology Collaboration, General Motors), John Sakioka (director, Technical and Business Strategy Office, Ford Motor Company), and Scott Freeman (manager, Business and Policy Strategy, Chrysler LLC).

Patrick Davis, DOE's director of the FreedomCAR and Fuel Partnership, was also in attendance and helped to arrange the visit.

SANDIA'S JOHN DEC briefs USCAR visitors on Sandia's work in the Homogeneous Charge Compression Ignition (HCCI) laboratory. (Photo by Daniel Strong)

"As Sandia continues to develop innovative constructs for a larger and more expanded effort in energy — especially as it relates to transportation and the complex mix of alternative, nonpetroleum fuels — visits like this are extremely valuable," says Don Hardesty (8360), senior manager for combustion and industrial technologies. "They give us the opportunity to demonstrate the breadth of our program, and at the same time lay out the forward-looking component of our vision."

Don says the purpose of the visit was to review, at a deep technical and programmatic level, all the work taking place at the California site in support of DOE's Vehicle Technologies and Hydrogen programs and the USCAR partnership. Those activities primarily involve the advanced engine combustion program based in Dept. 8362, and the hydrogen research work conducted in support of DOE's Hydrogen Fuel Cells and Infrastructure Technologies program (within the Office of Energy Efficiency and Renewable Energy, or EERE). Sandia's funds-in work in support of the automotive industry and fuel companies, including current projects with General Motors, was also touched on.

In addition to broader overviews, the USCAR directors toured the CRF engines labs that feature research on homogeneous charge compression ignition (HCCI), large-eddy simulation modeling, low-temperature diesel combustion, and hydrogen combustion. The group also visited other Center 8300 and 8700 facilities. The USCAR delegation learned about the Sandia-led Metal Hydrides Center of Excellence and the Hydrogen Safety, Codes, and Standards research activities while also visiting the 8300 and 8700 labs devoted to this work.

Sandia's vision with transportation and alternative energy, Don notes, is not simply to continue to do good work for current customers, but involves complementing what goes on in industry.

"The USCAR visitors now have a good appreciation for how we work in tandem with industry, which by design is a key piece of the DOE and USCAR plan for moving forward in advanced transportation systems and fuels."

The visitors, Don says, were highly complimentary of the work going on in the engines and hydrogen labs. "More than one of them called Sandia 'the best of the labs we've visited thus far,'" he says. "We were also very pleased to hear several comments on the tidiness and the cleanliness of the laboratories, and on our obvious attention to safety."

USCAR, says Don, is committed this year and next to visiting all the national laboratories that partner with the council and with DOE on its Vehicle Technologies and Hydrogen programs. Later this year or early in 2009, the group is expected to visit Sandia/New Mexico's battery abuse testing program, another key piece of the USCAR/DOE partnership.

Manometer

(Continued from page 1)

He notes that at NIST a full-time PhD staff member and technical assistants are needed to run and maintain the UIM. Sandia was never able to devote that level of resources to its instrument.

There were a couple of options in removing the manometer from Sandia's inventory. One was to get the proper permission to dispose of it. This would have cost more than $90,000 in disposal costs, not including a $25,000 decontamination fee that Sandia would have had to pay. Another option was to return the device to NIST, which turned out to be economically the most beneficial option.

"We were able to avoid the costs of disposal by transferring ownership to NIST," says Jim. "They will actually use the instrument to provide certification of standards on a national scale."

Jay Hendricks, a physical chemist and low-pressure manometry project leader at NIST, was instrumental in moving the manometer from Sandia to NIST. He says NIST has one mercury manometer (160 kPa UIM) currently in service as the national pressure standard covering the pressure range of 1 Pa to 160 kPa (1.6 atmospheres of pressure).

"NIST will recondition, test, and eventually put the recovered Sandia UIM into service," he says.

The Sandia UIM is slightly different from the NIST UIM. The transducer disks mounted at the bottom of the columns of mercury in the instrument are made of quartz instead of beryllium, Hendricks says.

"This difference may be important to the performance of the standard, because ultrasound diffracts differently in quartz than it does in beryllium," he says. "Having the Sandia UIM will enable NIST to replace its beryllium transducer disk UIM with the improved quartz disk UIM."

The UIM is a "primary standard" because it is based upon units that are regarded as dimensionally independent. The NIST UIM is essential to its customers because it is how the US realizes the International System of Units (SI) standard for pressure, the pascal (Pa).

Other national laboratories, including Sandia, government agencies such as NASA, and industrial customers send gauges to NIST to be calibrated against the NIST 160 kPa UIM. The 160 kPa UIM has the benefit of having the very lowest possible uncertainties for an important pressure range of 1 Pa to 160 kPa.

The NIST 160 kPa UIM is one of the lowest uncertainty pressure measurement devices in the world, Hendricks says.

"Having this capability means that NIST can ensure the highest quality calibration service for our customers," he says.

David says that even though the entire process to move the manometer from Sandia to NIST took quite a while to complete, one thing he observed was that Sandians definitely know their jobs in the property, shipping/receiving, hazardous waste, ES&H, and industrial hygiene departments.

Labs has close relationship with NIST

Sandia has a long-standing working relationship with the National Institute of Standards and Technology (NIST). In the 1960s, Sandia developed the first primary leak standards in response to demands from the Atomic Energy Commission for precision measurement of leaks. This technology was transferred to NIST.

Sandia also teamed with NIST to develop leak comparison calibration methods. More recently, Sandia transferred ownership of a highly accurate coordinate measuring machine (CMM) to NIST. This CMM was nearly identical to one NIST owns, providing redundancy. In exchange, NIST provided funding for Sandia to procure a new state-of-the-art CMM to replace it. Also, NIST recently transferred its pulse high-voltage standard to Sandia. There is very little demand for these calibrations outside the nuclear weapons complex.

Sandia has had a long and mutually beneficial relationship with the NIST lab in Boulder, Colo. While the lab is the primary standard bearer for the US, Sandia has primary responsibility for implementing traceable calibration programs for the NNSA lab complex. The two organizations have worked together over the years on methods of establishing new standards, new ways of verifying measurement accuracy, and other such collaborations. One other major area of collaboration is in maintaining the ability to cross-calibrate measurements many times, meaning that both organizations retain such capabilities. Each organization also works with the other to keep old equipment operational because of the unique function the equipment performs.

Sandia sends items to NIST to be calibrated. From time to time Sandia sends unneeded items to NIST. In turn, NIST has sent items to Sandia to meet current Sandia needs.

Collaborations include:

• Bob Graham (2542) works with a NIST colleague to teach a timer/stopwatch calibration tutorial.

• David Sanchez (2541) works with NIST colleagues on a committee for intrinsic standards in pressure calibration, and worked with a NIST group to transfer an accurate pressure system that no longer meets Sandia needs.

• Hy Tran (2541) serves on a committee on dimensional metrology at NIST.

Pension plan changes

(Continued from page 1)

participate in: Defined benefit (so-called "traditional" pension) plans have declined . . . while defined contribution (401(k)-type) plans have grown."

So, it could be argued that Sandia is, in a way, a Johnny-come-lately to the enhanced defined contribution game.

A May 23, 2008, letter from Labs Director Tom Hunter to all employees explained that over the past two years, "Sandia has been actively engaged in discussions with the National Nuclear Security Administration (NNSA) regarding various benefit options for Sandia."

His letter continued:

"Under the new retirement strategy, current employees will continue to participate in the Retirement Income Plan. The Retirement Income Plan is a defined benefit pension plan that provides for a monthly retirement benefit based on earnings, years of credited service, and age.

"New employees hired after Dec. 31, 2008 . . . will participate in an enhanced defined contribution plan. Under this plan, new employees will receive an automatic, service-based company contribution through Sandia's Savings and Income Plan. The service-based contributions will be in addition to the current company matching contributions available to all eligible employees through the Savings and Income Plan."

The schedule for service-based contributions:

• Less than 15 years of service: company contributions equal to 6 percent of eligible earnings.

• 15 or more years of service: company contributions equal to 7 percent of eligible earnings.

The new retirement strategy also affects retiree health care benefits for post-Dec. 31, 2008, nonrepresented new and rehired employees. They will have access to Sandia's retiree health care providers if they meet age and service requirements at retirement, but they will be required to pay the full cost of that coverage. Current employees will continue to receive a Sandia cost subsidy for retirement medical coverage based on years of service.

"NNSA's agreement to support Sandia's benefit strategy recognizes the need to manage benefit costs effectively while retaining important elements of our benefit plans for current and future employees," Tom also wrote in his letter.

"These changes are also consistent with plans already in place at other NNSA labs," he added.

Mayor Martin Chavez proclaims May 28 as Sandia Science & Technology Park Day

SS&TP DAY — SS&TP staff were honored after Albuquerque Mayor Martin Chávez proclaimed May 28 as Sandia Science & Technology Park Day. They included, from left, Paula Schoeneman, office manager; Carl Becker, project engineer; Mayor Chávez; Jackie Kerby Moore, executive director; Kaycee Northington, summer intern; and Jim Clinch, program leader.

Citing Sandia Science and Technology Park (SS&TP) as a pivotal point when Albuquerque made a real commitment to technology-based economic development, Mayor Martin Chávez proclaimed May 28 as SS&TP Day.

Chávez made the announcement on the park's 10th anniversary during a press conference where he honored Jackie Kerby Moore and the park's staff.

"The success of the park is a tribute to the great public-private partnership that started 10 years ago and continues to this day," says Jackie. "We could not have done any of this work without our partners and especially without the assistance and support from the city. We really appreciate this honor and accept it for all of our partners and everyone who has been involved in the development of the SS&TP."

The proclamation says the park is an economic driver generating growth and prosperity for the residents of Albuquerque and New Mexico. It also says the park leverages the assets of the Labs to create, expand, and recruit businesses to the city.

The proclamation says SS&TP represents a public-private partnership including the city, Sandia, Technology Ventures Corp., Albuquerque Public Schools, New Mexico State Land Office, and BUILD New Mexico, all of which work together to develop the park for the benefit of the community.

SS&TP employs more than 2,100 people in high-paying, technology-based jobs and has created more than 4,000 additional indirect jobs for the community. Currently the 27 companies at the park represent a $300 million investment in the city.

Chavez said the SS&TP has truly become one of the "crown jewels" of Albuquerque's future economy.

Jackie thanked all the partners involved with the development of the park including Sandia, Technology Ventures Corp., the three major landowners, and the City of Albuquerque.

— Michael Padilla

Sandia News Briefs

ALOC recommends Myanmar cyclone donation website

Now that the government of Myanmar (Burma) is permitting access to foreign aid organizations, Sandia's Asian Leadership and Outreach Committee (ALOC) recommends going to http://www.interaction.org/burma if you'd like to donate. The site lists appropriate charities if you'd like to help with relief in the aftermath of the catastrophic cyclone that struck Myanmar. ALOC Chair Tammy Strickland (5763) says the charities listed on that site adhere to high standards of transparency. Another charity, the Buddhist Tzu-Chi Foundation, has people working in the stricken areas. She says if you send a check to one of those charities, write "Myanmar Cyclone 2008" in the memo line. Questions to Tammy at 505-844-3403 or tsstric@sandia.gov.

Sandia-led University Alliance Design Competition announces this year's winners for innovative MEMS designs

Student teams from Oklahoma, Illinois take first-place awards

By Neal Singer

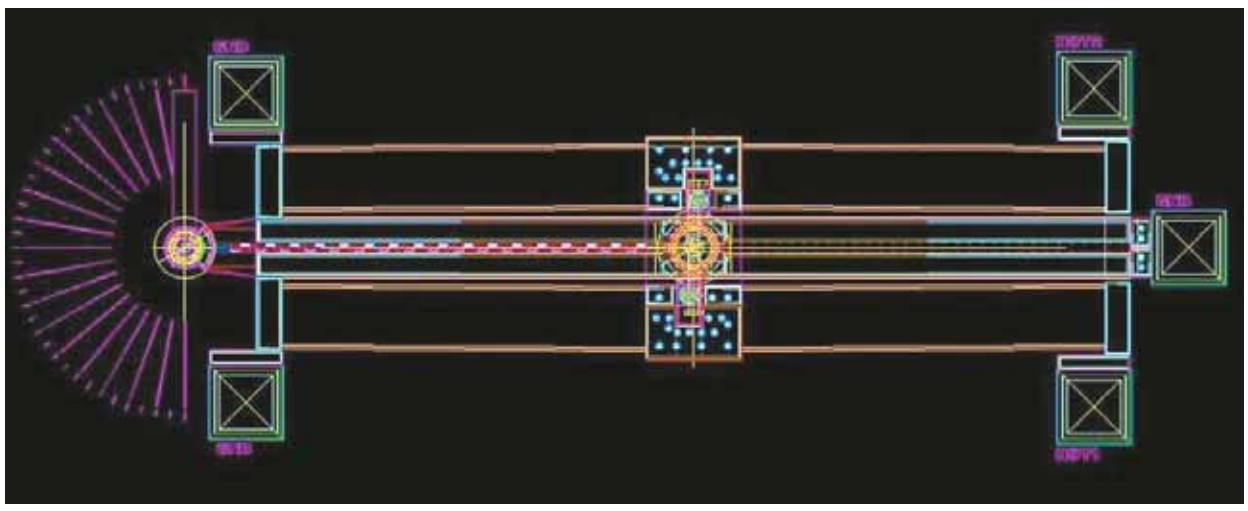
Another major student contest in the microworld ended with microelectromechanical systems (MEMS) designs from the University of Oklahoma and University of Illinois chosen as winners in Sandia's fourth annual University Alliance Design Competition.

The University of Oklahoma, under the leadership of faculty advisor Harold Stalford, won the "Novel Design" category for a mechanical micromuscle powered by thermal actuators that allow a mechanical arm to operate with nanoscale functionality above, to the side of, and in the plane of its operating chip.

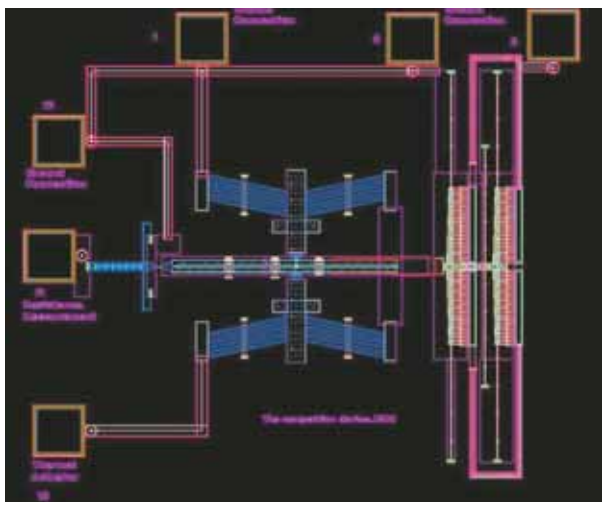
The potential applications of the microrobotic arm include microsurgical operations and assembly of 3-D MEMS devices.

The device's thermal actuators require less voltage than similar devices (usually not capable of such precise movement) that rely upon electrostatic actuators.

To demonstrate their functionality, the newly designed components were placed as a tool on the operating platform designed last year at the university.



THIS MEMS DEVICE from the University of Oklahoma won in the "Novel Design" category in Sandia's fourth annual University Alliance Design Competition. The design is for a mechanical micromuscle powered by thermal actuators. As part of the competition, the student designs will be fabricated at Sandia, with parts emerging from the fab by mid-September.



THE STUDENT TEAM from the University of Illinois at Urbana-Champaign won in the "Characterization, Reliability, and Nanoscale Phenomenon" category for this design of a MEMS platform able to perform creep and stress relaxation tests on polymeric, metallic, and biological nanofibers.

The student team from the University of Illinois at Urbana-Champaign, under the leadership of Professor Ioannis Chasiotis, won in the "Characterization, Reliability, and Nanoscale Phenomenon" category by creating a design for the first MEMS platform able to perform creep and stress relaxation tests on polymeric, metallic, and biological nanofibers.

The components are designed to test time-dependent behavior at even submicroNewton force levels on polymeric and biological nanofibers, and to report in "real time"— that is, as the changes occur.

Thermal grips mounted on a comb-drive actuator generate a predetermined amount of sample deformation, adding to the device's accuracy.

First-place winners (student lead and sponsoring professor) in both categories were invited to visit Sandia to present their design to Sandia's review team, meet with MEMS experts, and tour Sandia's MEMS facilities. All other participants were welcome to attend the awards ceremony and present their design, pending Sandia technical approval.

Participation in the alliance now stands at 20 schools, up from 17 a year ago. This year, five schools entered seven designs in the contest. An incentive for universities to join the Alliance is that all contest participants can actually see their workable designs made flesh (or at least, silicon) in Sandia's MEMS production facilities, where "a special design competition reticle is set aside for just this purpose," says Mark Platzbecker, technical team lead in Sandia's MEMS Core Technologies Dept. 1749-1.

Fabrication of the student designs is expected to start by June 15, with parts emerging from the fab by Sept. 15, he says.

Another plus this year included utilization of the new MESA facilities in Bldg. 858EL, says Mark. "This greatly increased the collaborative nature of the Sandia and university interactions. We were able for the first time to create high-end interactive digital discussions and reviews."

For more information regarding the contest, or to learn how an educational institution can become a member of the University Alliance, contact Stephanie Johnson at srjohns@sandia.gov.

Further information can be found at www.mems.sandia.gov/ua/contest.html.

Construction, seasonal changes bring rattlesnakes

Biologists race to remove rattlesnakes, calm fears of anxious Sandians

A WESTERN DIAMONDBACK rattlesnake catches some rays near a populated Sandia facility in Tech Area 3.

By Stephanie Holinka

Spring brings new life and greater activity into our high-desert spaces. This has been a busy year for rattlesnakes and for Sandia's biologists, whose many duties during this hectic season include snake removal.

Snake calls take priority over other responsibilities, so an increase in calls often sends biologists scrambling to answer them promptly. "We've had as many as seven to 10 calls per day," says Sandia Biologist Stephanie Salinas (4131).

The increased construction activity at many Sandia sites has prompted some normally shy snakes out of hiding, sending them searching for a new napping spot. Spring is also mating season, which brings about its own increase in activity.

In the colder months, snakes hibernate underground, says Stephanie.

Snakes emerge in the spring once temperatures rise above 60 degrees outside. On warm days, they are most active at night, but will seek a change of scenery if the temperature becomes less favorable for them.

In an effort to regulate their body temperature, Stephanie says, snakes typically look for sunny locations during the earlier, cooler portions of the day and cooler, shaded locations in the heat of the day.

Snakes typically look for sunny locations during the earlier, cooler portions of the day and cooler, shaded locations in the heat of the day.

Many Sandians have met up with local snakes. Such encounters can be frightening for surprised Sandians but so far, no Sandian has been injured during a snake encounter this year, in part because snakes are generally docile if left undisturbed.

Three types of snakes are most commonly found at Sandia/New Mexico: the bull (or gopher) snake, the Western diamondback rattlesnake, and the Western rattlesnake. Other types of snakes are native to this area, but most others do not venture anywhere near populated areas.

Though most calls specify encounters with rattlesnakes, says Stephanie, most of those snakes have actually turned out to be bull snakes, which are not venomous but can be more aggressive than rattlesnakes.

Regardless of the type of snake, biologists trained in snake removal will collect the snake using a hook-ended "snake stick" and deposit the snake in a 5-gallon paint bucket for easy transport to a remote area. Sandia generally has a no-kill policy for snakes.

Snakes serve an important role in the environment, Stephanie says. "Snakes are a beneficial predator and help control rodent and small mammal populations. They typically do not attack humans, though they will strike if they feel threatened."

The calls have been down a bit this week, so Stephanie hopes that the snakes near activity areas have moved on to quieter surroundings.

Sidestep the snakes

A rattlesnake bite, though extremely rare, can pose a serious health concern to people.

- **Watch your hands and feet** — Never place any part of your body, especially your hands and feet, into an area that you cannot see easily into.
- **Use caution when entering dark, tight spaces** — Rattlesnakes might be sleeping in dark, tight spaces that are created between pieces of equipment and in tall grass areas.
- **Store and dispose of food properly** — Food attracts foraging small mammals, which attract rattlesnakes.
- **Don't run over snakes while driving** — Snakes outside of the technical areas don't pose a hazard *and* they help control rodent and small mammal populations.

To report a snake sighting in your area, contact Stephanie Salinas at 845-7711. In California, call 294-3724.

Mileposts

New Mexico photos by Michelle Fleming


Dale Berg
40 6333


Bob Gregory
30 5534


Gary Randall
30 5578


Louise Weston
30 12335


Mark Anderson
25 5916


George Davidson
25 5521

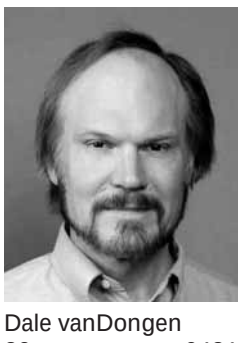

Marlene Elizabeth Uribe
25 2122


Gary Cable
20 5713


Debra King
20 2712


Anna Nusbaum
20 9535


Kay Rivers
20 8944


Dale vanDongen
20 6431


Frank Villareal
20 2027


Brian Bray
15 5433


Cynthia Cordova
15 1521


Chris Forsythe
15 6341


Daniel Gallegos
15 2623


Barry Goldstein
15 6783


Clifford Ho
15 6311

50 years ago . . . A blast yield meter, no bigger than a portable radio, has been developed by Howard Sander of the Physical Sciences department to automatically establish the yield of nuclear weapons. The meter, which will cost less than $100 to mass produce, is expected to replace trailers full of expensive equipment that were previously needed to obtain such data. The heart of the meter is a sensitive pressure transducer that operates electrical contacts when exposed to pressure changes as slight as one one-hundredth of a pound per square inch. **Sandia Corporation's wind tunnel is speeding up** with the times. New advances in rocket and missile design have created a need for greater wind speeds in the tunnel to perfect supersonic aerodynamic shapes. Supersonic nozzle blocks installed in the tunnel, along with a second air storage tank outside, will push the air through the tunnel at speeds ranging from one and one-half to two and one-half times the speed of sound.


BLAST YIELD METER, held by its inventor Howard Sander, indicates yields of nuclear weapons detonated.

40 years ago . . . Data recording, monitoring and control functions of the vibration and acoustic facilities in Area III are now centralized in a new computer-like center in recently constructed Bldg. 6650. The control center concentrates test operations in one location and provides for more efficient use of equipment and personnel. Previously, each of the facilities had its own remote control and data recording installation. **The largest charge ever detonated in Coyote Test Field** — 30,500 pounds of conventional high explosives — was exploded June 13 as part of a continuing Sandia effort in the AEC's Plowshare program. Plowshare involves investigation and development of peaceful uses of nuclear explosives. The HE charge, buried at a depth of 48 feet, created a crater about 30 feet deep and 105 feet in diameter. The blast tossed 144,000 cubic feet of earth (weighing about 7,250 tons) out of the crater. The purpose of the underground blast was to pinpoint the factors that relate size of the charge and depth of burial to close-in and distant air-blast pressures.


SUPERSONIC NOZZLE BLOCK being prepared for installation by Cecil Tolbert of the Experimental Aerodynamics Division.


NEW CONTROL CENTER for acoustic and vibration test facilities in Area III. From left are John Otts, test operations supervisor; George Lemmon, facility designer; and Ken Bauhs, responsible for data systems design.


DETONATION of the buried charge in Coyote Canyon Test Field. At left is Virgil Harris, field test project engineer, with L. J. Vortman, scientific advisor for the project.


MORE THAN 7,200 tons of earth was tossed out of this 105-foot-diameter crater created by the detonation of a buried charge of 30,500 pounds of high explosives.

30 years ago . . . Sandia breaks ground June 29 for a $10 million Combustion Research Facility in Livermore. Designed to foster major advances in understanding of combustion phenomena, the DOE-sponsored facility will be a national center of combustion studies for researchers from industry, universities, and government laboratories. **Studies are now under way at Sandia** to determine what might happen in the highly unlikely event that the spinning steel hub of a large steam turbine in a nuclear power plant were to fail. From a safety standpoint, could pieces of a failed hub exit the turbine with enough energy to breech the reinforced concrete walls that protect reactor and other safety-related components?

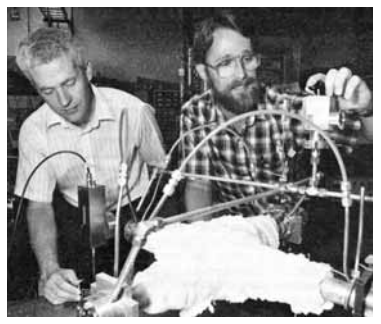

CARS FOR COMBUSTION — Coherent anti-Stokes Raman spectroscopy (CARS), demonstrated here by Larry Rahn of Applied Physics Division.


THE ELECTRICAL CONNECTIONS being checked on a segment of a turbine hub before the first sled test.

20 years ago . . . Sandia implements a new smoking policy that, in essence, prohibits smoking in all buildings and facilities except where it's specifically permitted. It's the reverse of the current policy, which allows smoking in all areas except where it's prohibited. And it's a step forward toward the goal of an eventual "smoke-free workplace." Smoking will be allowed only in areas with "Smoking Permitted" signs. An employee with an "individually enclosed" office — floor-to-ceiling walls and a door — may designate it a Smoking Permitted area by posting a sign. Employees sharing an office or workspace "are to come to a mutual agreement concerning smoking or no smoking."


AN ENDANGERED

A new Vacuum Ultraviolet Light Source has been developed that generates tunable, high-efficient, coherent ultraviolet radiation at a wavelength of 130 nm. It is tunable from 120 to 140 nm. Most important, it's nearly a thousand-fold more efficient than previous light sources operating in this part of the spectrum. The device has generated a world record amount of energy at this wavelength — 1.1 millijoules. Such sources are needed for laser chemistry, materials processing medicine, and fundamental areas such as spectroscopy.


NEW LASER-LIKE LIGHT SOURCE developed by Arlee Smith, left, and Joe Alford, is nearly a thousand times more efficient than previous light sources operating in the ultraviolet portion of the electromagnetic spectrum.

10 years ago . . . Sandia representatives signed a $5.76 million cooperative research and development agreement (CRADA) with California-based Numotech, Inc., a company that conducts research about wounds and designs new treatments. The CRADA engages Sandia researchers in developing inexpensive sensors and light-weight pumps to simplify operation of Numotech's unique oxygen-bath technique for healing wounds, pressure sores, and pressure ulcers — quickly, and with reduced scarring.

Getting into shape used to be so matter-of-fact . . . when the yard went on forever

By Iris Aboytes

"Today everything that a mother eats will have no calories," said a priest at Sunday mass on Mother's Day.

It was music to my ears. Ah, if that were true, what would I do? Eat a big bag of Ruffles potato chips? Eat more than a quarter cup of cashews. I know, I know, a Lotaburger with cheese and green chile.

The recent article in the *Lab News (Lab News,* May 23*)* on stress and the *Sandia Daily News* articles inviting Sandians to Health, Benefits, and Employees Services (HBE) health fairs got me thinking.

When I was growing up my mother would tell us kids that we needed fuel only to reach our destination. "Imagine a car," she would say. "Once the gas tank is full, the rest spills over and can cause trouble. Your bodies are more intricate than a car. Imagine the damage that can be caused to your motor." "What is she talking about?" I asked myself. Did your mom talk in metaphors?

The message makes more sense now that it did then. We all know how mothers sometimes make more sense than we give them credit for. It just takes us a while to figure it out.

I grew up on a farm with my brothers and sisters. We all had daily chores. We fed hay to cattle and horses using a pitchfork. I was the oldest and at that time the tallest, (don't go there) so I had to launch the pitchfork full of hay over the fence.

One of my least favorite chores was making sure all the chickens were in the chicken coop in the evening. There would always be one stubborn hen. She had other ideas. She wanted to party. She did not realize she had a curfew.

Every summer we had this beautiful garden with many rows of green chile, tomatoes, cantaloupe, and many mouth-watering vegetables. Planting was easy. It was keeping the garden free of weeds that was a killer. Hoes are not made to be powered by human hands. When we asked mom why we did not have a rototiller, she would say, "I don't have any money to buy one. Besides I have lots of rototillers, and they are free." It was not what we wanted to hear. Walking back home it was hard to straighten our backs. I tell my mom that is what stunted my growth. She just laughs.

My brother and I would race to see who would finish their row the fastest. Ouch! What were we thinking? That just meant more calluses. It was all well worth it. When the vegetables began to ripen, it was a culinary delight. We would brag that we had the best-tasting tomatoes, cucumbers, and chile. Our produce was certainly better than any of our neighbors'. The watermelons, cantaloupes, and honeydews were to die for. The taste would fill your every sense as you enjoyed each bite.

We did have time to play, so to speak. I loved to chase grasshoppers, clip their wings, and feed them to the chickens. Gross, huh? I loved how they crunched. I was mean. I also loved to feed the pigs cucumbers and corn. The way they chewed made everything sound so good, kind of the way a child chews an apple in early fall.

That was a few years ago. Ok, it was more than a few, but it seems like yesterday.

Today I have a wonderful job. I get to tell stories. Unfortunately I sit all day, except for an occasional break. Do you see anything wrong with this picture? I don't. I would rather do this than weed gardens and chase persnickety hens. I *do* wish getting and keeping in shape was just as matter-of-fact as it was then at that place, at that time.

How can we all get back to that place? We are fortunate to have HBE professionals at Sandia to help get us there. We just need to ask them for help.

I've got an idea. My mom still has a farm. Would you like to come and help me catch grasshoppers? Better yet, let's make a day of weeding her garden.

No? Well, I guess I will see you at the gym or perhaps out walking. Don't forget to watch out for that persnickety hen. Better yet, let's enlist HBE at http://www-irn.sandia.gov/hr/health_wellness.htm.

COMING SOON

Health, Benefits, and Employees Services has acquired a new tool to decrease the barriers for employees to access health care and information. This ihealth portal will set up a fully integrated web-based physician-patient communication service that has been proven to effectively engage patients in better managing their health. This comprehensive service can be used by all stakeholders in health care: patients, their doctors, hospitals and health systems, health plans, employers, allied professionals, and caregivers.

Health and benefits professionals have recently held a series of HBE Health Days. Their next HBE day will be held at the Safety Fair on June 5.

Join HBE and other healthy vendors for a look at some recent and historical diet and fitness fads, gimmicks, and gadgets that bombard Americans.

• View some infomercial products as well as effective alternatives.

• Become enlightened about weight loss by comparing the history of dieting with current evidence-based research.

• Check out some of the snacks that are supposedly healthy, and taste some alternatives that are truly nutritious.

• Learn proven methods for stress management and achieve a lifestyle approach to your overall health.

Find out what health resources are available to you as a Sandian and a New Mexican. Free blood pressure, body fat percentage, and gift certificates for additional services will be available. No enrollment is necessary.

Stress myths examples by Ronnie Nijmeh, author of ***Stress Busters***

• If I exercise and eat right, my stress will go away.

We always recommend a healthy lifestyle, and regular exercise and a proper diet can go a long way in helping to curtail the symptoms of stress, but unfortunately it is not the only solution. To treat stress you need to treat the root cause of stress — this means learning how to deal with what makes you stressed and your reaction to stressful situations.

• I feel fine, so I'm not stressed!

An absence of symptoms does not mean an absence of stress. Many adults aren't very good at reading the signs our bodies send us. We'll often chalk up a sore neck or tight back muscles to having "slept the wrong way" or a headache as the result of staring at a computer screen all day. Listen to your body's early warning signs, and don't just assume these little signals are not stress related. It's a sign that you need to start managing your stress levels now.

• Stress is fabulous. It keeps me thin.

If you need stress to keep your weight down, perhaps you should reconsider your health regime. We agree that "positive stress" — excitement or a sense of anticipation — can be a great tool in life. However, negative stress, the type that keeps us on edge and interferes with our desire to eat, is never healthy.

Through Junior Achievement of New Mexico, Inc. students learn about their community

By Iris Aboytes

A donut shop — yes, a donut shop — was the perfect vehicle for Terri Lovato (4220) to use to teach third graders about business and the Albuquerque community. Terri volunteered through Junior Achievement of New Mexico, Inc.

Junior Achievement of New Mexico is the state's largest organization dedicated to educating students in grades K-12 about entrepreneurship, work readiness, and financial literacy through hands-on programs. In partnership with business and educators, Junior Achievement brings the real world to students, opening their minds to their potential.

Terri taught five classes at Carlos Rey Elementary School on Albuquerque's West Side. She began with paper donuts and paper money. She worked at getting "money" in the students' hands. Do they buy something or do they save it? Each session introduced more details on the business and the community.

Terri talked about the mayor and how taxes paid by the donut shop pay for city employees such as police officers and firefighters.

Working in the donut shop allowed the children to learn about both unit and assembly-line production, quality control, and defects. A "fire" put an end to the shop. Police and firefighters were called to help. Using a fun, yet realistic learning approach, Terri aimed to make an impact on students through her unique teaching style.

Hispanic and Native American initiatives were recently introduced. The focus is on providing the core Junior Achievement curriculum, culturally relevant lesson enhancements, and Hispanic and Native American role models to teach the programs.

Miquelita Rogo (3332) has volunteered at Pajarito Elementary, also on the West Side. "There is a lack of role models," she says. "With education and early intervention, young children can grow and be productive and successful adults."

Marie Brown (3512) serves on Junior Achievement's Native American advisory council. "Both parents and children benefit and learn together while stimulating financial discussions," says Marie.

Junior Achievement volunteers do not have to be experts in business or education. For more information on Junior Achievement or to get involved call 344-0861 or office@newmexicoja.org.

Terri's class began with paper donuts, but when the five-week session was over, she brought the students certificates of accomplishment and real, sink-your-teeth-into donuts. She also gave each student a brand-new New Mexico quarter, a symbol of getting money in your hand.

"They are such sponges," says Terri. "As I am wishing them well in their continued schooling, a little boy comes up to me and gives me his cell phone number so that I can call him. I was blown away. I plan to volunteer again next year."