Sandia researchers study methods for removing arsenic from drinking water to help meet new EPA standards

Ceremony in Anthony, N.M., marks start of research project with southern New Mexico utility

Over the next several months a team of Sandia researchers led by Malcolm Siegel (6118) will be studying different methods of arsenic removal at the Desert Sands Mutual Domestic Water Consumers Association (MDWCA) in Anthony in southern New Mexico.

A ceremony marking the start of the project was held Aug. 26 at the utility's main well site. On hand were representatives from Sandia, Sen. Pete Domenici's office, the New Mexico state legislature, and the water utility.

The arsenic research is sponsored by the Arsenic Water Technology Partnership. The partnership is a consortium of Sandia, the Awwa Research Foundation (AwwaRF), and WERC, a consortium for environmental education and technology development. Domenici secured the funding for the project through DOE as chairman of the Senate Energy and Water Development Appropriations Subcommittee.

MOU signing

At the Aug. 26 ceremony Sandia and the MDWCA signed a memorandum of understanding (MOU) to begin the research.

By Chris Burroughs

ARSENIC REMOVAL RESEARCH — Sandia researcher Alicia Aragon checks out arsenic removal tubing and equipment similar to what is being used in an Anthony, N.M., well test site. The research team, led by Malcolm Siegel, is seeking ways to develop cost-effective water treatment technologies. (Photo by Randy Montoya)

Disintegrating asteroid's dust monitored for first time; Sandia optical sensors contributed

Meteoroid dust particles larger than thought, could affect weather

By Neal Singer

The object — a little less than 10 meters across — entered Earth's atmosphere on Sept. 3, 2004, traveling at 13 kilometers per second.

The space-based infrared sensors of the US Department of Defense detected it at an altitude of 75 kilometers, descending off the coast of Antarctica.

DOE visible-light sensors built by Sandia noticed the intruder when it became a fireball — thus identifying itself as an asteroid — at approximately 56 kilometers above Earth.

Five infrasound stations, built to detect nuclear explosions anywhere in the world, registered its acoustic waves; these were analyzed by researchers at Los Alamos National Laboratory.

NASA's multispectral polar orbiting sensor imaged the debris cloud formed by the disintegrating space rock.

It was one of the largest meteoroids to have entered the Earth's atmosphere in the past decade. Later analysis showed that its original solar orbit is similar to that of near-Earth asteroids of a particular family, the Aten group.

Some 7.5 hours after the initial observation, a cloud of anomalous material was detected in the upper stratosphere over Davis Station in Antarctica by ground-based lidar.

These were the first direct measurements ever made of such meteoritic "smoke."

"We noticed something unusual in the data," says Andrew Klekociuk, a research scientist at the Australian Antarctic Division. "We'd never seen anything like this before, [a cloud that] sits vertically and things blow through it. It had a wispy nature, with thin layers separated by a few kilometers. Clouds are more consistent and last longer. This one blew through in about an hour."

There was certainly something unusual about the cloud. It was too high for ordinary water-bearing clouds (32 kilometers instead of 20 km) and too warm to consist of known manmade pollutants (55 degrees warmer than the highest).

By Chris Burroughs

Center 8700 new director Bob Carling returns to materials roots

Eight individuals, 14 teams earn Defense Awards of Excellence

Interns gain some real-world experience at Student Symposium

Exercise physiologist answers questions on back injuries

(Continued on page 4)

(Continued on page 5)
What's what

I don't know if this is a good habit or a bad habit, but I think most of us have it: We all have a drawer where we collect "stuff." You know: paper clips, rubber bands, thumb tacks, landscapers’ business cards, unconsumed shopping lists, take-out menus, Wal-Mart receipts, etc., etc. You know — the detritus of the day.

The immutability of having such a drawer is probably defined somewhere as "Somebody’s" Law (you know, like Murphy’s Law) and there’s probably "somebody else’s" corollary that says whatever you’re looking for won’t be in that drawer, no matter how big the drawer is or how much stuff is in it. And that applies to "stuff" drawers at work as well as at home. For example, a recent lunchtime search for a plastic knife turned up nothing. In the drawers of the two kitchenette areas in our building, there’s enough salt to preserve a day’s catch of cod, enough pepper to send the entire lab population into a sneezing fit, and a collection of plastic forks and spoons from every fast-food place this side of the Pecos. There’s sugar and all of its artificial sweetener cousins, tattered paper napkins, a dull can opener or two, and lots of other "stuff." But no knives.

Maybe I’m missing something, but if these things are bought in equal quantities, why don’t we run out of forks and/or spoons before knives? Probably “yet somebody else’s” corollary.

The Lab News provides a lot of service to readers. It keeps up with promotions and retirements and milestones, research developments, births, reorganizations, and other events that make up life at Sandia. As the last issue before this one was being put together, someone noted also the service provided by the classified ads.

A couple starting with nothing else could set up a household by shopping the ads, it was pointed out. You can find furniture, appliances, cars, property, houses, tools — a little of everything. And what prompted that observation?

The last issue even included a couple of wedding dresses.

Our group OAA Michelle Fleming, who cleverly brought in a little three-drawer keeper for plastic flatware (didn’t work for the knives, obviously, see above), equally cleverly hung a pair of fuzzy dice in our group cart to differentiate it from the unadorned carts of less imaginative groups.

That hasn’t worked either, so far. Both cart and fuzzy dice remain missing. If you know anything about this, call Michelle at 844-4902. She wants the cart back. Probably the fuzzy dice, too.

And on the origin of the word “golf,” Laurie Bergeron (5924) e-mailed “the real skinny from the British Golf Museum.”

“The medieval Dutch word ‘kolf’ or ‘kolve’ meant ‘club.’ It is believed that word passed to the Scots, whose old Scots dialect transformed the word into ‘golve,’ ‘gowl’ or ‘gouf.’

“By the 16th century, the word “golf” had emerged.”

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

Lab News Reader Service

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Feedback

Readers ask questions about ticketing parking violators, Spot awards, Sandia-designated ID numbers.

Q: Has anything changed regarding the ticketing of parking violators? Last I read, a new policy to ticket drivers is in the works. I quote from previous feedback response, "However, we are working with the Protective Force to come up with a ticketing process that has teeth" so that tickets can be enforced and we can minimize the abuse that is currently taking place. We are in the final stages of completing this process.

A: As stated in the last Feedback concerning this matter, we are in the process of getting the document signed off by upper management. The schedule for implementation of the program is as follows: 1) Sept. 1 — implementation of a data-gathering and burn-in phase, 2) Oct. 1 — Full follow-up of the parking situation.

Q: Is Spot, as in Spot award, an acronym for something? How did the word become associated with a nonbase award? You'd think it would be called Individual Performance Award (IPA) or something with a significant meaning.

A: As a manager developing partnerships with industry, he would explain to auto industry representatives the niche of a national lab, in which teams of disparate talents pull together to work the hardest problems to benefit the nation. Bob was also the first national laboratory researcher on to an automaker, spending 10 months at Ford's Scientific Research Lab in Dearborn, Mich., in 1994-95.

"PNGV was an exciting, challenging program," Bob recalls. Equally enjoyable was a reception he and his wife Sue, a teacher at Marilyn Avenue School in Livermore, attended at then-Vice President Al Gore's house along with about 50 other guests who were honored for contributions to PNGV.

More recently as the 8350 senior manager, Bob's primary responsibility has been the BES-funded chemical sciences and visitor program at the CRF as well as programs to promote sensing work in 8300. The chemical sciences program is viewed as world-class with several new discoveries recently making the pages of Science. One of the Center's 8350 research areas that emerged during his tenure, and has shown great promise, is the growing effort to develop fiber lasers. Currently funded as a Laboratory Directed Research and Development Grand Challenge, Bob predicts this will become an enabling technology.

Q: I heard that Sandia is now transitioning from using social security numbers to using Sandia-designated identification numbers for its employees, which will definitely assist in protecting employees' personal information. On Sandia's directory, the identification number for each employee is listed. Will this number be our new employee ID number? If so why is it listed on the directory for public display, especially if there's a possibility that third-party administrators are eventually going to use this number? I believe that only the employee and those with a business need should know an employee's ID number.

A: You are correct in that your new Sandia ID can be viewed on the top right-hand corner of your directory page. The Sandia ID is not and should not be considered confidential and access to them will not be controlled any more than it would be for your name. There is a policy in the works that the Sandia ID number may never be used for access to something requiring controls without a secondary authentication key of some sort. Think of the Sandia ID as you would your computer User ID. The computer User ID is open to all and used, as a part of the e-mail address, but a password is required for access. We would expect that all systems and third party administrators would use the Sandia ID and require authentication. For the reasons above we will not consider a constraint of need to know placed on Sandia IDs. We purposely do not want to create an ID that if obtained by itself could compromise access.

Q: I work second shift and although there are four clearly marked '2nd shift' parking spaces in the lot I work in, there are always unauthorized vehicles parked in the spaces. I leave copies of our parking policy on the windshields of these vehicles, but the same people are back again and again with no regard to rules or fairness. When will the new parking policy take effect?

A: As stated in the last Feedback concerning this matter, we are in the process of getting the document signed off by upper management. The schedule for implementation of the program is as follows: 1) Sept. 1 — implementation of a data-gathering and burn-in phase, 2) Oct. 1 — Full follow-up of the parking situation. We are in the final stages of completing this process.
**Asteroid**

*(Continued from page 1)*

Micron-sized meteoroid dust could be a factor in climate simulations because meteoroids entering Earth’s atmosphere are extremely reduced by the fireball caused by the friction of their passage. The solid mass reduced by this friction can be as much as 90 to 99 percent of the original asteroid.

Peter Brown at the University of Western Ontario, initially contacted by Klekociuk, helped analyze the data and did theoretical modeling. He points out that climate modellers might have to extrapolate from this one event to its larger implications.

“Our observations suggest that [meteoroids] entering Earth’s atmosphere could play a more important role in climate than previously recognized,” write Klekociuk and other researchers, including Sandia’s Dick Spalding (5740), in a paper published last week in the journal Nature (Aug. 25 issue).

Klekociuk, along with researchers from the University of Western Ontario, the Aerospace Corp., LANL, and Sandia, had found evidence that dust from the asteroid turned into a cloud as it descended through Earth’s atmosphere. The cloud could scatter sunlight, cause local cooling, and play a major role in cloud formation.

They say they do not yet understand the outcome of this cloud and its long-term impact, but that it is a factor in climate simulations because meteoroid dust could be a factor in climate simulations because meteoroids entering Earth’s atmosphere are extremely reduced by the fireball caused by the friction of their passage. The solid mass reduced by this friction can be as much as 90 to 99 percent of the original asteroid.

**Violence**

*(Continued from page 1)*

The Sandia sensors’ primary function is to observe nuclear explosions anywhere on Earth. Their evolution to include meteor fireball observations came when Dick Spalding recognized that ground-based processing of data might be modified to record the relatively slower flashes.

**Help numbers to call**

During operational hours, to report emergencies regarding threatening or violent behavior at work, dial 911. During nonoperational hours, employees should call 311. In Livingston, call 911 for emergencies and 924-2300 for nonemergencies.

The new policy goes farther than just saying that workplace violence is not tolerated at the Labs. It explains in simple terms prohibited conduct, ways to report threats, and helps managers and employees know when they should turn to Human Resources, Employee and Labor Relations, Emergency Management, and others for help.

Lockheed Martin only recently began requiring its companies to put in place workplace violence policies in light of the terrible 2003 tragedy at its Meridian, Ga., plant where a Lockheed Martin worker shot and killed five people and wounded eight others before killing himself.

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A troubled employee is described in the first course, “Managing Troubled Employees.” It is anticipated for release later this year. Also later this year, online workplace violence training will be required for the general employee population.

“Managing Troubled Employees” takes 30 to 60 minutes to complete and offers managers information about how to identify a troubled employee, what to do when you recognize one, and where to turn for help.

Longer research papers being prepared from the same data for other journals are expected to discuss possible negative effects on the planet’s ozone layer, says Pack.
Sandia task force to study ways ocean and wastewater can be desalinized in California

Sandia researchers, together with fellow members of the Joint Water Reuse and Desalination Task Force, in coming months will be studying the best ways for how ocean water, subsurface brines, and wastewater can be desalinized and made potable.

The California Department of Water Resources recently granted Sandia and its task force partners $1 million for the study. The task force—which consists of Sandia, the WaterReuse Foundation, the Bureau of Reclamation, and the American Water Works Association Research Foundation—matched the award for a total of $2 million. Each member has to contribute $250,000 to the project.

“Over the next six months we will decide on the type of research we will do in the California effort,” says Pat Brady (6118), who heads up the project for Sandia.

Among possible topics to be studied will be alternatives for waste water—extremely salty water—after the desalination process. The waste could be dumped into the ocean, put in ponds for evaporation, or injected into the subsurface.

Pat notes that California is growing rapidly and may have limited choices about where to obtain future water supplies.

They may have to come from the ocean or municipal wastewater,” he says.

Sen. Pete Domenici, R-N.M., who secured more than $4 million for desalination efforts for Sandia as chairman of the Senate Energy and Water Development Appropriations Subcommittee, says this type of research could be the “long-term solution to our nation’s and New Mexico’s water problems.”

“This award for research is an excellent step in the right direction,” he says. “California shares many of our state’s water problems, so technology developed under this award will be of benefit to everyone.”

— Chris Burroughs

Arsenic

(Continued from page 1)

Pargas, president.

“The Desert Sands project will supplement a full-scale demonstration by the US EPA (Environmental Protection Agency) for evaluation of a removal technology that uses granular iron oxide to filter arsenic from water,” Malcolm says. “As water is pumped through the system, arsenic sticks to the iron oxide. The Desert Sands MDWCA wants Sandia to compare the performance of the iron oxide material they are currently using to other adsorptive media. We should be able to give them some practical advice based on what we learn.”

Best absorptive material

The Sandia field team includes lead engineer Malvinda Aragon and field technicians Randy Everett and William Holub (all 6118). Malvinda anticipates they will test between eight and 12 different arsenic removal systems at the Anthony site. “We’ll be looking at which material best absorbs arsenic to compare how often the adsorptive media needs to be changed,” she says.

The treatment system, including plastic columns filled with adsorptive material and monitoring equipment, was built at Sandia and was recently relocated to the Desert Sands utility.

Desert Sands serves a population of 1,535 from two wells in a rural community along the New Mexico-Texas state line, north of El Paso. It has a new water treatment plant built by Severn Trent Corp. that uses the iron oxide treatment method.

The Anthony research is a follow-up to work in Socorro, N.M., where the Sandia team tested five arsenic removal technologies at a geothermal spring. The pilot test in Socorro compared five innovative technologies. These treatment processes were chosen from more than 20 candidate technologies that were reviewed by teams of technical experts at Arsenic Treatment Technology Vendor Forums organized by Sandia and held at the 2003 and 2004 New Mexico Environmental Health Conferences.

Congressional support and design of the Arsenic Water Technology Partnership was developed under Domenic’s leadership to help small communities comply with the new EPA drinking water standard for arsenic. This new regulation, which goes into effect in January 2006, reduces the maximum contaminant level (MCL) from 50 micrograms per liter (µg/L) to 10 µg/L, and is intended to reduce the incidence of bladder and lung cancers caused by exposure to arsenic.

Arsenic levels high in west

Levels of naturally occurring arsenic in the southwestern US often exceed the new MCL. The new compliance requirements will affect small communities that lack the appropriate treatment infrastructure and funding to reduce arsenic to newly required levels.

Malcolm says the goals of the program are to “develop, demonstrate, and disseminate information about cost-effective water treatment technologies in order to help Native Americans and small communities in the Southwest and other parts of the country comply with the new EPA standard.”

Besides the Socorro and Desert Sands experiments, additional demonstrations, based on technologies reviewed at vendor forums and developed by DOE labs or in laboratory studies managed by AwwaRF, are also being considered in consultation with the New Mexico Environment Department, the EPA, the Indian Health Service, the Navajo Nation EPA, and the Interstate Technology Regulatory Council.

WERC, a consortium of research institutions in New Mexico, will evaluate the economic feasibility of the technologies, work on technology transfer activities, and conduct educational outreach.

Whether a current proposal to phase in stricter arsenic requirements over years takes hold or not, there will still be a need to help communities modify systems to perform better, Malcolm says. Scientists are also beginning to look at other contaminants that may be regulated in the future.

“We need to stay ahead of the curve so communities can invest in proven systems that will address multiple contaminants,” he says.

Arsenic removal team

Sandia’s arsenic research team includes Tom Hinkkebein, Malcolm Siegel, Malvinda Aragon, Randy Everett, William Holub Jr., Alicia Aragon, Brian Deyer, Justin Marbury, Michelle Shedd, Emily Wright, Sandhya Rajan (all 6118), Carolyn Kirby (6116), Paul McConnell (6143), Jerome Wright (6135), Phil Pohl (6116), Hongting Zhao (6874), and students Nik Rad (6118), Melody Nocon, Andres Sanchez (6118), Katherine Cook, David Stromberg (6118), and Jannelle Penisten (6143).
Eight individuals, 14 teams NNSA Defense Programs Awards of Excellence

David Beidler
David Beidler is being recognized for leadership in support, development, and test of quality assurance systems inMETM Radiological Measurements and Analysis. He is a member of the LM-36 Radiological Measurements System team. With a direct focus on quality and safety, David has been instrumental in ensuring that the system is thoroughly tested and that the results are accurately analyzed. His contributions have helped to improve the quality of the system and ensure its reliability in real-world applications.

Jerome Capp
Jerome Capp is being recognized for leadership and contributions to the National Nuclear Security Administration (NNSA) Defense Programs. He has served as the manager of the W87 Neutron Generator Probabilistic Qualification (PQ) Team, where he has demonstrated exceptional leadership and technical expertise. His contributions have been instrumental in advancing the field of nuclear material characterization and analysis.

Louise Cheever
Louise Cheever is being recognized for her leadership and contributions to the Neutron Generator Kaizen Weld Team. She has been instrumental in implementing kaizen principles and lean manufacturing techniques to improve the efficiency and effectiveness of the team's work. Her leadership has resulted in significant improvements in productivity and quality.

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CINT facilities enhanced by thousand-year-old Chaco culture decorative style, nearing completion

By Neal Singer

A two-story-high, 450-foot-long wall surfaced with flatted-chopped rock evocative of Chaco Canyon has been erected north of the Kirtland Eubank Gate and west of Eubank Blvd. The curved, two-foot-thick wall cuts across the three laboratory wings of the new core facility of the Center for Integrated Nanotechnologies.

The wall's function is not structural but to serve as a reminder rooted in New Mexico's history.

"We're trying to create a working environment that is attractive to the brightest scientists [from everywhere]," says Sandia project manager Bill Hendrick (10824) of the architectural enhancement, as well as other features in the new structure, funded by the DOE Office of Science.

An imitation of the walls of Chaco Canyon structures built nearly a thousand years ago, the curved wall (for reasons of cost, built internally of steel) gives the core building a distinctly different look from other buildings in the building complex.
Jaime Moya to receive Hispanic Engineer National Achievement Award at October conference

By Iris Aboytes

“Imagine your first day in kindergarten and you speak no English. Jaime Moya, senior manager of ES&H Planning & Assurance (10330), does not have to imagine it. He lived through it. "I recall my mother dropping me off, sitting me at my desk, and quickly escaping the classroom," says Jaime of that day many years ago. "I then remember hearing all this jabbering going on around me and having no clue what anyone was saying."

Jaime was recently named recipient of a 2005 Award for Professional Achievement from the Hispanic Engineer National Achievement Awards Corporation. The award will be presented at the 2005 HENAAC Conference in October in Anaheim, Calif.

Jaime’s love of science first became evident in his chemistry class in high school. He attended a summer program at the University of Oklahoma. "I was extremely excited," says Jaime. "I am sure that my parents were equally excited, but they were also financially burdened."

Jaime’s parents are immigrants from Chihuahua, Mexico. His mother, Rosa, came from Santa Eulalia, a mining community. To the south in Chihuahua is the cosmopolitan town of Hidalgo Del Parral, where his father Luis was born. Jaime was raised in El Paso. His father was a high-speed photographer at White Sands Missile Range.

When it was time for Jaime to go to college, it was his grandfather who paid for the first semester. Jaime was awarded numerous scholarships to help offset tuition. He received his bachelor’s degree in mechanical engineering from New Mexico State University and came to work at Sandia. Here he was selected to participate in its graduate studies program, so Jaime went to the University of California at Berkeley and earned his master’s degree.

Jaime says he got his mechanical skills from his father. One of his recollections of his father’s studies program, so Jaime went to the University of California at Berkeley and earned his master’s degree.

Jaime says he got his mechanical skills from his father. One of his recollections of his father’s genius is his ability to fix anything and also his knowledge of transmissions. He built the tools that he needed — a transmission jack, a support structure for the transmission, and gear alignment tools. Then he proceeded to fix the car.

"My mom kind of gave us our souls," says Jaime. "She instilled in my brother, sister, and me the virtue of family and caring for each other."

Jaime and his wife Elizabeth have four children: Monica, Marisa, Daniela, and Jaime. He and his wife work closely with their children to nurture a love for technology, science, and engineering. Both Jaime and Elizabeth are long-time school volunteers and enthusiastic supporters of their children’s activities.

At Sandia, Jaime personally recruits and encourages Sandia staff to participate in community projects such as university student mentorship programs, local and state science fairs, and the MANOS program. In addition, he chairs Sandia’s Hispanic Leadership Outreach Committee.

Jaime is currently responsible for developing and leading a corporate-wide initiative to achieve “Best-in-Class” Environmental Safety and Health (ES&H) within a decade. "I vividly recall that first day in kindergarten,“ says Jaime, “seeing my mother peer through the window. I can imagine the anxiety racing through her, wondering if I would survive the day. That day prepared me for the rest of my life. It was indeed my first challenge.”

MESA’s WIF

(Continued from preceding page)

blending we experienced successfully at the experimental facility."

MESA TOP 1 and 2 are, in effect, sociological experiments currently taking place in San- dia’s Research Park to gauge the effectiveness and creativity that result from mixing people from different line organizations to form a more interactive workplace.

"Most innovation comes from putting disparate ideas together," says David. "We’re putting together people who have reason to interact but haven’t, because they work on a campus a mile square. It’s a way to keep innovation going."

The arrangement honors Tom Hunter’s vision of using science and visualization to change the way engineering is done at Sandia, he says.

Innovative is the right word to describe the novel approach used to determine who will occupy the WIF. Center program director Mike Cieslak says that senior managers were each encouraged to be king for a day (“KFAD,” he jokes), instead of each being an advocate for their center.

"They got to be Mike Cieslak, Don Cook (former MESA program director), or David Plummer for a day, and ask what the mission is and how to solve it," says David. "Then we combined and distilled all those disparate inputs to arrive at theme areas we’re going to have."

The main themes of WIF are expected to be microsystems-enabled guidance systems; environmental, future weapon architectures, and wireless systems.

Jaime Moya was recently named recipient of a 2005 Award for Professional Achievement from the Hispanic Engineer National Achievement Awards Corporation. The award will be presented at the 2005 HENAAC Conference in October in Anaheim, Calif. Jim Bechdel (3654) designed the nomination booklet cover.

MESA’s Weapons Integration Facility (WIF) is seen under construction in an aerial photo. It is one-third completed.

Feedback

Q: I am rather concerned after attending several department, center, and division meetings about the strong emphasis on reducing the number of work-related injuries, especially slips, trips, and falls. I fully support all ES&H initiatives to reduce or eliminate . . . injuries, but the message was we MUST lower the number to zero. I fear that this message may be interpreted by people to NOT report slips, trips, and falls, thereby keeping the numbers of reported injuries low. How can we prevent this from happening? I think the emphasis must be that we care about the people that work here and want to keep them safe. If they should slip or trip, we want them to report it and make sure they are examined. By reporting incidents it also has the potential of protecting others in an unsafe condition exits.

If a person is injured at work, the injury itself is enough of a painful reminder to stay safe. The injured person doesn’t need an additional reprimand. We should never fear reporting an injury, incident, or occurrence.

A: The intent is not to invoke a culture that fosters nonreporting of accidents and injuries. Reporting is the right, ethical thing to do. We intend to raise the awareness of all members of the workforce and to illustrate that management is committed to providing a safe work environment. We report the number of incidents as a mechanism to heighten awareness of the workforce about the issues associated with slips, trips, and falls. We also have provided advice to empower employees to prevent risk behaviors that could lead to slipping, tripping, and falling as recently reported in Lab News articles.

— Kathleen McCaughey (6300)
Interns gained real-world experience at the annual Student Symposium

Many presented research they conducted over the summer

By Erin Gardner and Elizabeth Malone

Students wrapped up the summer Aug. 2 by presenting their work as Sandia interns at the annual Student Internship Programs (SIP) Symposium. SIP holds the symposium to offer the real-world experience of turning research into a presentation format, completing the review and approval process, and showing managers and peers a finished product.

"It's nice to be able to show others what I do and to look back and see what I've done in the past few months," says year-round intern Anthony Gonzalez (3555). Held at the Albuquerque Convention Center, the annual symposium is a voluntary, non-competitive event, although managers can require students to participate, says Roberta Rivera (3555), SIP project lead and symposium coordinator.

Students ask scientists and other professionals to provide feedback on their presentation skills and technical merit. Of the 800 attendees from around the country, 214 student interns ranging from high school to graduate school gave oral or poster presentations. Whether they presented or came to observe, students called the symposium fun, educational, and rewarding.

"My presentation on nanolithography relates back to my thesis work," says Teresa Clement (3555), who attended the symposium. "I also see things here in my technical area that I don't get to see every day. I wouldn't get to see this research otherwise."

Five Lockheed Martin interns from around the country were also selected to present at the symposium.

Throughout their preparation, mentors and graduate and postdoctoral students through the National Physical Sciences Consortium, served on the panel and manned a booth in the career fair.

"The symposium is very good experience for students," he says. "It turns them into scientists instead of just people reading about science. Science is about the transmission of knowledge, and you have to tell others of your developments."

Powell provided information about the consortium's fellowships sponsored by Sandia for students pursuing a PhD in science or engineering.

Says Powell, "These students are doing the best possible thing in order to receive a fellowship like ours: research."
3. Often when bending or squatting, knees begin to identify themselves by their audible cracking noises. Is that a sign of injury?

- Popping and snapping within the knee is quite common, and often not a symptom of any particular problem. When the pops or snaps are painless, there is usually no problem. However, there is concern when these sounds are associated with pain.

- Proper lifting techniques usually don’t involve a full squat, so you should not have any knee problems if you are using the correct technique. When lifting heavy objects, the best angle for your knees is 45 to 60 degrees of flexion. Think about sports such as weight-lifting, football, and basketball. They hardly ever are in a full squat, because you don’t have as much power from that position.

4. Most pieces of machinery work as long as they are oiled and each part is properly cared for. The human body being the greatest machine of all, how can we keep our backs in good working order?

- Several things can be done. First, exercise the back. Perform stretching and strengthening exercises at least three times a week. Also, try to change positions every 30 minutes. Static posture contributes to body stiffness, pooling of blood in the extremities, and reduced blood flow. Reduced blood flow to tissues can cause nerve transmission and impingement.

- Nerves are oiled and each part is properly cared for. A strong back contributes to body stiffness, pooling of blood in the extremities, and reduced blood flow.

- When bending or squatting, knees begin to identify themselves by their audible cracking noises. Is that a sign of injury?

- Muscle can atrophy (shrink) if they aren’t used. The muscles in the back can be strengthened by performing exercises for both the upper and lower back. A strong back will help improve posture, work endurance, and athletic performance. One of our fitness specialists can prescribe an exercise program for strengthening the back.

- Follow the instructions and do only those exercises that have been recommended to you.

5. Muscles can be built up, but they can also break down. Can anything be done to build up or strengthen backs?

- When lifting, make sure you have a strong core (trunk) are both key factors in preventing back injuries. Preventive health offers two back classes that cover proper lifting techniques, and we also have certified fitness professionals to prescribe an exercise program for strengthening the core.

- When lifting heavy objects, the best angle for your knees is 45 to 60 degrees of flexion. Think about sports such as weight-lifting, football, and basketball. They hardly ever are in a full squat, because you don’t have as much power from that position.

- Muscles can be built up, but they can also break down. Can anything be done to build up or strengthen backs?

- When bending or squatting, knees begin to identify themselves by their audible cracking noises. Is that a sign of injury?