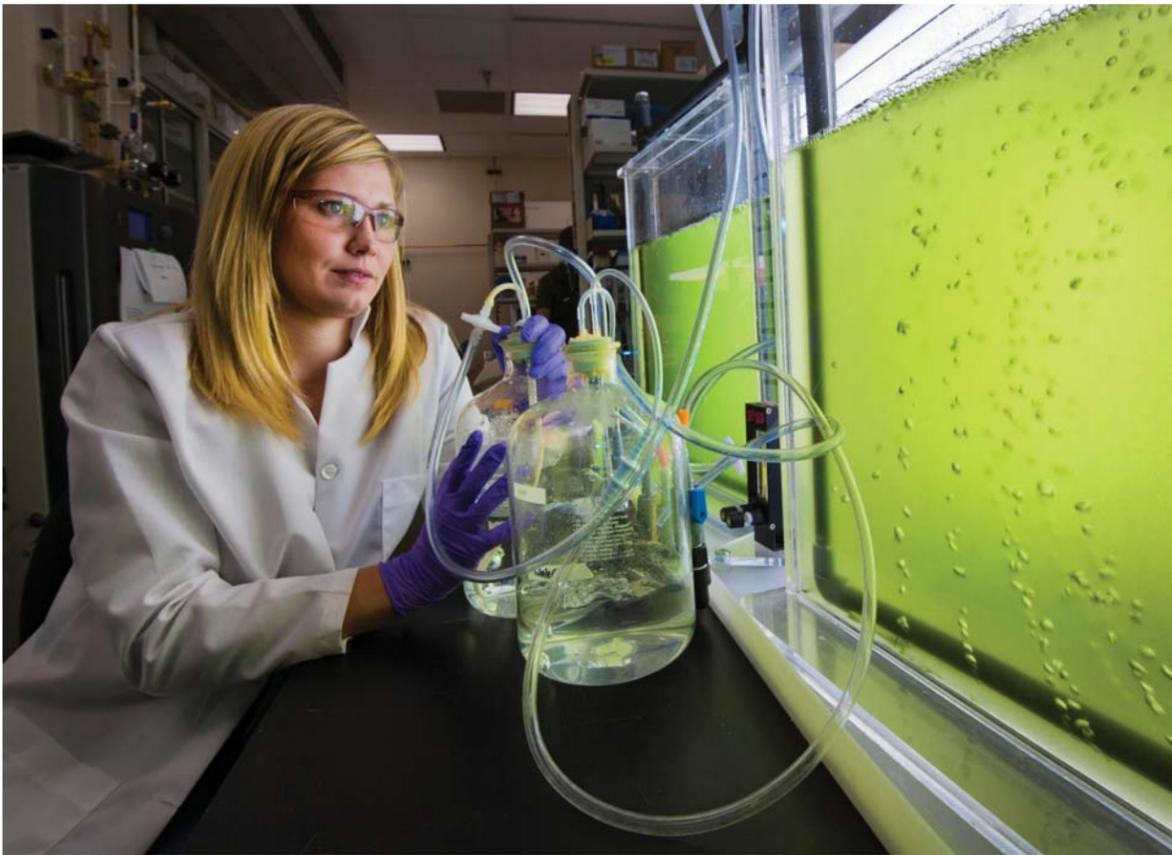


# Hard-to-harvest algae get help from Sandia

By Stephanie Hobby



Inside one of Sandia's labs, thousands of tiny green flecks swirl through a large Plexiglas box, fed by a set of fluorescent tube lights and a steady stream of carbon dioxide bubbling up from the bottom. Nick Wyatt (1512) and Lindsey Gloe (1512) are among the team that's carefully tending the freshwater algae inside, with the goal of transforming some of the planet's simplest life forms into a solution for one of the nation's most complex dilemmas. Each algae cell is actually a tiny oil factory, capable of pumping out nearly half of its weight in fats, which can be refined to help supply some of the nation's oil needs while gobbling up greenhouse gases.

Biofuels derived from algae have the added benefits of not competing with land needed for food production and can also be grown using water not suitable for humans. However, the cost and complexity of harvesting algae is proving to be a substantial barrier to widespread use. A team of Sandia scientists, on a project supported under the Laboratory Directed Research and Development (LDRD) program, is on a mission to find ways around those barriers, and recently published a

*(Continued on page 4)*

GOING REALLY GREEN — Lindsey Gloe (1512) carefully tends to a box of freshwater algae. Researchers in Sandia's biofuels program are identifying new ways to harvest the cells, which has been an obstacle to fuel production.

(Photo by Randy Montoya)



## You've got a friend

Sandia's Military Support Committee extends a far-reaching hand to veterans, Guard and Reserve members and their families. Read about their work on page 8.

# Sandia LabNews

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## NNSA DP Employee of Quarter Sara Pecak credits 'awesome team'



Sara Pecak's staying-connected leadership style has led to her selection as the NNSA Defense Programs Employee of the Quarter for Sandia. The agency recognized her for her work as Product Realization Team lead for the B61-12 firing set.

"I spend a lot of time talking to people, making sure people are talking to each other, that the information is getting around where it needs to be when it needs to be there," she says.

The NNSA award recognizes those who go beyond the call of duty in supporting the mission of Defense Programs. The selection is determined at each site following its own specific criteria.

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Read more about Sara's work in a story on page 4. (Photo by Randy Montoya)

## Designer Colors for radiation detection



CRYSTALS OF A METAL-ORGANIC FRAMEWORK (left) emit light in the blue (middle) when exposed to ionizing radiation. Infiltrating them with an organometallic compound known as a "triplet scavenger" causes the crystals to emit red light as well (right), creating a new way to differentiate fission neutrons from background gamma particles.

By Patti Koning

A team of Sandia researchers is taking a new approach to radiation detection — rather than tweaking existing materials and systems, the team reinvented the wheel, so to speak, starting at the molecular level.

Using metal-organic frameworks (MOFs), Mark Allendorf (8651), Patrick Doty (8131), and Patrick Feng (8131) designed a material that emits light of various colors when it interacts with high-energy particles, thus enabling a new detection method called spectral shape discrimination (SSD).

This is a potentially game-changing development for nonproliferation and homeland security applications that require neutrons to be distinguished from ubiquitous background gamma rays. Current radiation detection methods that rely on liquid scintillation are limited in terms of speed and sensitivity, crucial elements for dynamic scenarios such as border crossings.

"We are approaching the problem from a materials chemistry perspective — designing the ideal material within a physical configuration and energy space to accomplish our goals," Mark says.

He and his team have been working with MOFs, a new class of nanoporous materials, for more than five years (Aug. 29, 2008, *Sandia Lab News*). Early on

*"It's a problem people have been beating their heads against for a long time."*

— Sandia researcher Patrick Doty



## Inside . . .

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## That's that

You've got to hand it to James Cameron. The self-proclaimed "king of the world" has become the first person to make a solo trip to the Challenger Deep, the very deepest part of the Pacific Ocean. His submersible vessel, the *Deepsea Challenger*, carried Cameron almost seven miles down to the bottom of the Marianas Trench. Only two other men have visited this most remote spot on the planet, Jacques Piccard and Don Walsh, who made the trip more than half a century ago in the bathyscaphe *Trieste*, designed by Piccard's father, Auguste.

Cameron's trip was no lark, but the logical culmination of a lifelong avocation. He has reportedly made more than 70 dives in submersible vessels, including more than 30 to the RMS *Titanic* wreck. In a recent interview, he "confessed" that his real motive for making the movie *Titanic* was to find a way for a movie studio to finance his passion for deep-sea exploration.

As a movie buff, I've followed Cameron's work pretty closely for a couple of decades and it has long since been clear to me that at heart he is as much an engineer as he is an artist. It strikes me that his movie projects are really just a way of financing his true loves: science, exploration, and adventure.

Cameron is a modern example of what used to be called a "gentleman scientist." A Wikipedia entry on the subject notes that:

*Self-funding scientists were more common in the days before large-scale government funding was available, from the Renaissance at least until the late 19th century including the Victorian era, especially in England. Many early fellows of the Royal Society in London were gentleman scientists. The position significantly reduced during the 20th century as other forms of science funding increased.*

Obviously, there's a big element of sheer adventure in Cameron's accomplishment, and the thrill of the hunt: Cameron was involved in a friendly "race to the bottom" with fellow mega-rich adventurer Richard Branson, who had also set his sights on the Challenger Deep. Still, that the trip was fun and exciting shouldn't detract from its very real contributions to science. The *Deepsea Challenger* submersible opens up the depths to exploration and discovery in a way that until now has simply not been possible.

And Cameron's accomplishment, much like the manned moon landings, highlights in a huge way how intimate is the connection between science and engineering. Often, before the discovery comes the machine, in this case a machine that enables the human mind to penetrate the impenetrable, that brings light to dark places, and transports the imagination to unimaginable worlds.

\* \* \*

Got an email the other day from a Sandian who wonders what happened to the old telephone service in which, when you dialed "1-2-0" you got a recording giving you the exact time. "When I dial," he writes, "all I get is silence. Is time standing still . . .?" Well, being the enterprising reporter that I am, I called our telephone folks and they said they no longer maintain that service but do recommend an alternative. If you need the exact time, check out <http://tycho.usno.navy.mil/simpletime.html>, a page maintained by the Naval Observatory's Time Service Department.

\* \* \*

Did you see reporter John Fleck's story in the *Albuquerque Journal* last week about the upcoming annular solar eclipse for which Albuquerque is ground zero for the best viewing? As is not uncommon in a Fleck story, I learned something I didn't know: the difference between an annular and a total solar eclipse. In a total eclipse, the solar disc is completely blocked by the moon; all that is visible is the solar corona, the glowing gases that spread out from the sun's surface like a cloud. In an annular eclipse, the moon's apparent diameter is just smaller than the sun's disc. What the viewer (based in an optimal location) sees is a ring of fire, a burnin' ring of fire. Mark your calendars: This eclipse has been thoughtfully scheduled by the Divine Watchmaker to occur on a user-friendly Sunday, May 20, with the partial eclipse beginning around 6:30 and the annularity occurring between 7:33 and 7:37 p.m.

So here we go again, about to experience one of those great, cosmic events that cause all of us to stop whatever we're doing and just . . . watch.

See you next time.

— Bill Murphy (505-845-0845, MS 0165, [wtmurph@sandia.gov](mailto:wtmurph@sandia.gov))

## Generating power with elephant uh, well, you know...

By Stephanie Hobby



The Denver Zoo has turned to the world's largest land mammal as the key contributor to a novel source of alternative energy.

In the photo above, George Pond, vice president for planning and capital projects of the Denver Zoo, encourages Sandra Begay-Campbell (6124), far left, to take a look at the zoo's newest fuel source: elephant dung. US Department of the Interior engineers Winter Jojola-Talbuert and Jennifer Reimann look on while Jennifer Hale (far right) of the Denver Zoo explains the underlying technology. The Denver Zoo's energy initiative, "Poop+Trash= Power" uses a gasification unit to convert 90 percent of the zoo's animal waste and trash to heat and electricity.

The zoo is demonstrating the system with a three-wheeled Tuk Tuk, the vehicle seen in the background, but representatives say the technology is capable of supplying roughly 20 percent of the zoo's energy needs while eliminating 1.5 million pounds of trash that the zoo was sending to the landfill every year. The unit is being demonstrated in other cities as part of an educational effort.

The visit to the Southwest Indian Polytechnic Institute in Albuquerque was coordinated by the US Department of Interior, Office of Indian Energy and Economic Development – Division of Energy and Mineral Development and DOE Tribal Energy Program as an educational opportunity for tribal representatives on alternative community-scale energy generation. Representatives from the pueblos of Jemez, Sandia, Zia, and Zuni along with the Hopi Tribe and staff from Navajo Technical College, Sen. Tom Udall's office and the Bureau of Indian Affairs also attended.

## Sandia Laboratory FCU branch remodel on track

The Wyoming Boulevard and I Street branch of Sandia Laboratory Federal Credit Union, located on Kirtland Air Force Base just west of Bldg. 800, is undergoing an extensive remodel. The project will take the 1969-era



branch to a modern design with member service islands instead of traditional teller windows and offices. Cash dispensers will improve efficiency and enhance security.

The ground-level interior is being rebuilt in stages to allow service to continue for members during the project. The outside ATM will remain open. The current walk-up window will be closed briefly during the last phase of the project, which will include demolition of the current teller line. Completion is expected by mid-July.

SLFCU has eight branches in New Mexico — including one in the Sandia Science & Technology Park — and two branches in Livermore, Calif.

Visit the website at [www.slfcu.org](http://www.slfcu.org).

## Retiree deaths

Arthur R. Eiffert (age 90)	Jan 15
Everett E. Ard (87)	Jan. 18
Thomas F. Jones (86)	Jan. 21
Frederick Schelby (88)	Jan. 26
Walbert Gregory Turk Levy (87)	Jan. 27
Travis A. Allen (87)	Jan. 29
Theodore M. Simmons (66)	Jan. 30
Herman Yazza (68)	Feb. 2
Felix E. Castillo (80)	Feb. 6
Lawrence Hermesmeyer (76)	Feb. 7
Warren E. Taylor (91)	Feb. 24
Robert L. O'Nan (82)	March 5



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<http://www.sandia.gov/LabNews>

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# 15 years of celebrating innovation

By Patti Koning

On Friday, March 9, Division 8000 hosted its 15th annual Intellectual Property and Innovation Celebration (IPIC). As part of Sandia's management of the innovation and intellectual property lifecycle, the annual celebration recognizes inventors of patents, authors of copyrights, contributors to classified intellectual property, license royalty recipients, and special award recipients.

"What is innovation?" asked master of ceremonies Glenn Kubiak, director of Biological and Materials Sciences Center 8600. "In the Sandia context, it's taking ideas and turning them into impact."

The evening was a special opportunity for family and friends to learn more about Sandia and the accomplishments of their loved ones. Several new employees from each center also attended the celebration, establishing a new tradition to help those employees become part of the Sandia community and inspire them to become innovators.

Glenn presented special awards to Tammy Kolda (8966), honored for acceptance into the Association for Computing Machinery 2011 Class of Distinguished Scientists; Chuck Mueller (8362), honored for achieving the Society of Automotive Engineers



SPEAKING AT THE IPIC EVENT, Div. 8000 VP Rick Stulen recalls the EUVL CRADA as an example of innovation.

Fellow grade of membership; Ken Patel (8125), honored for receiving the Society of Lab Automation and Screening 2011 Innovation Award; Susan Rempe (8635), honored for a 2011 R&D 100 Award; Blake Simmons (8630), honored for election to the College of Fellows of the American Institute of Medical and Biological Engineers; and Craig Taatjes (8353), honored as an American Physical Society Fellow.

Glenn and Div. 8000 VP Rick Stulen gave a retrospective on the Extreme Ultraviolet Lithography (EUVL) Cooperative Research and Development Agreement (CRADA), which ran from 1996 to 2001, as an example of where innovation can lead.

"This is quite a remarkable story," said Rick. "The EUVL CRADA was a partnership with the semiconductor industry and is still the largest partnership the labs have ever executed. By the time we were finished, some \$300 million to \$400 million came from the private sector into Sandia, Lawrence Livermore, and Lawrence Berkeley."

## EUVL lessons learned

The idea for EUVL, says Rick, began to germinate in 1984, a full 12 years before the CRADA was created.

"Innovation starts with need," he explained. "In the mid-80s, we became aware of a problem with lithography to pattern chips. The wavelength of the light was rapidly approaching the feature sizes it was intended to print. We had some ideas about using a very short wavelength light to do this."

The first lesson, he said, is to be bold and take on hard challenges. "We had no idea how hard this challenge would be. We were naïve, but you also need to have a mindset that anything is possible," says Rick.

A first-of-its-kind multi-lab team was created: The virtual national laboratory, a model that was later drawn upon for the Joint BioEnergy Institute (JBEI). This experience leads to the second lesson learned — the importance of diverse teams.

"The character of the individuals on that team was remarkable and remarkably different," said Rick. "Seek out and celebrate diversity."

Another lesson learned from the industry partners was to fail early and fail often. "Our industrial partners talked about learning curves, the rapid learning that



MICHAEL FORMAN (8136) and his daughter Mathilde Beckman-Forman look over the patents awarded to Div. 8000.

results from failure," said Rick. "So celebrate your failures because they can teach you a lot."

The last lesson is persistence. The motto for the EUVL CRADA was "on the floor in 2004," but the first machines rolled out this year.

"The final chapter is not yet written, as these instruments are just now coming into commercial production," said Glenn. "Sandia's EUV light source effort started with a study based on Star Wars in 1984, then a foray into photoelectron spectroscopy, then deep X-ray lithography, and then, finally, into this. Sometimes you just can't anticipate where a new innovation will end up, but you have to follow it as best you can."

To end the evening, the focus turned to the guests in attendance for the gift basket raffle. The lucky winners were Theodore Adams, guest of Alex Andregó (1931); Jeremy Beasley, husband of Stephanie Beasley (8529); Martin Farber, brother of Madelynne Farber (11500); Kim Shepodd, wife of Tim Shepodd (8220); and Leilee Weyerhaeuser, guest of Damian Rouson (8351).

Jennifer Benoit, Melissa Betz, and Randy Christman (all 8529) organized the IPIC event.

## Rad detection

(Continued from page 1)

they made a huge discovery — a fluorescent, porous MOF containing stilbene with phenomenal scintillation properties, the first new class of scintillators found in decades.

The scintillation property is only one part of the story. The other part is the porosity, which allows researchers to add other materials and fine-tune the scintillation.

"This provides a completely new dimension for material design. For example, you could shift the wavelength of the scintillation light to a more convenient spectral region, making it easier to detect," says Mark. "MOFs are a chemist's dream, in that they allow you to connect function with structure."

### Scavenging triplets

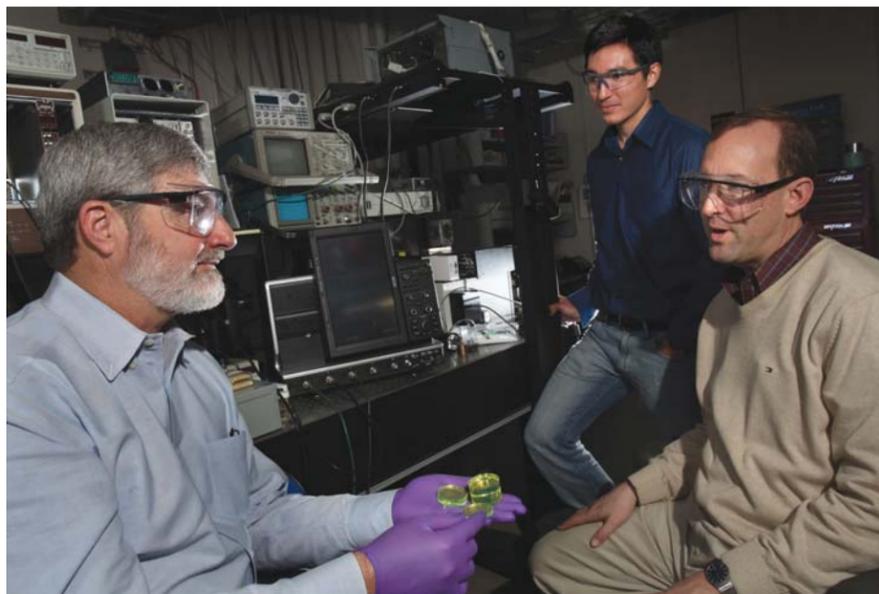
The MOF's nanoporosity triggered a new idea when Doty read about the use of dopants to increase the efficiency of organic LEDs. These dopants, usually compounds containing heavy metals such as iridium, dramatically increase OLED brightness by "scavenging" excited-state energy in the device that was not converted to light. This so-called "triplet" energy actually represents as much as 75 percent of the possible light output.

"It's a problem people have been beating their heads against for a long time," says Doty. These dopants also allow the color of OLED light to be tuned so that it can be shifted into a region more desirable for lighting.

Combining MOFs with OLED dopants led to a second breakthrough. By filling MOF pores with dopants, the team created a material capable of detecting radiation in a new way. "With OLED dopants, it's not just that more light is produced, it's light of another color," Doty says.

"That's how this applies to radiation detection."

The trick is to add just the right amount of dopant so that both the scavenged triplet light and fluorescence from the excited MOF itself are emitted. Then the ratio of the intensities at the two wavelengths is a function of the type of high-energy particle interacting with



RESEARCHERS Patrick Doty, left, Patrick Feng (both 8131), and Mark Allendorf (8651) have created a new type of scintillator using Metal-Organic Framework or plastic scintillator hosts combined with heavy metal dopants, shown in Doty's hand. This material enables detection of neutrons using spectral- or pulse-shape discrimination techniques that could transform radiation detection. (Photo by Dino Vournas)

the material. "That's the critical thing," he says. "SSD allows one particle type to be distinguished from another on the basis of the color of the emitted light."

Calculations suggest the threshold for detecting neutrons produced by fissionable material could be lowered substantially using SSD. Because the ratio of neutrons to gamma rays is so low, on the order of one neutron to 105 gamma rays, the threshold at which current detectors can see neutrons is fairly high.

### A new threshold

In a radiation detector, reducing interference from

## Sandia California News

naturally occurring radiation that might come from anything from bananas to medical isotopes — a person who has recently undergone medical diagnostics could set off a radiation detector — could result in a much lower false alarm rate. It also might allow low-level radioactive materials found in a "dirty bomb" to be detected.

SSD also addresses another radiation detection problem — active interrogation.

"Using an active source to create a signal from special nuclear material is an effective means for detection," says Feng. "Our materials can be tuned for improved timing performance at high rates."

The potential, say the researchers, is huge. By stuffing the heavy metal complex into the MOF, they've created a material that could blow away the gold standard compounds in terms of scintillation light yield.

"In principle, we could quadruple the gold standard," says Mark.

And, because discriminating colors of light is fairly simple, technology based on these materials would be

inexpensive and easy to operate. Current radiation detection methods use time to discriminate between neutrons and gamma rays, requiring complex electronics.

"We also find that doping certain plastics allows SSD as well, which could be an economical solution for wide-area detectors needed for portal monitoring," says Feng.

"Using MOFs as a platform for rational design of new scintillation materials, completely new kinds of detection methods can be envisioned, allowing engineers to determine the optimum radiation detection system for a particular need," says Doty.

## Sandia's NNSA Defense Programs Employee of Quarter honoree says her job is keeping the balls in air

By Sue Major Holmes



SARA PECAK

Sara Pecak (2626) manages her job by moving. She clocks 5,000 to 6,500 steps a day on her pedometer as she goes from place to place at Sandia, meeting with her team and system customer on the B61-12 Life Extension Project (LEP) as well as keeping in contact with her production partners at the Honeywell FM&T Kansas City Plant.

"I spend a lot of time talking to people, making sure people are talking to each other, that the information is getting around where it needs to be when it needs to be there," she says.

Her staying-connected management style led to her selection as the NNSA Defense Programs Employee of the Quarter for Sandia. The agency recognized her for her work as Product Realization Team lead for the B61-12 firing set.

Sara says the partnership with the KCP team has been critical to the team's success. "We each take part in the other's development activities, and this early access has resulted in better, more manufacturable designs and a stronger team," she says.

In addition, Sara says, the customer has "included our feedback and opinions in their assessments and allowed us to work with them, instead of just for them."

### Beyond the call of duty

The NNSA award recognizes those who go beyond the call of duty in supporting the mission of Defense Programs. The selection is determined at each site following its own specific criteria.

Sara gives the credit to her "awesome team."

But her manager, Kate Helean (2626), says Sara is an unassuming person who has done "an amazing job of keeping us moving."

"Every award she gets, every accolade she gets, she puts it back on the team," Kate says. "As her manager, I see that her team succeeds because she's a great leader."

Sara says those she has worked for over the years taught her that people like and appreciate good communication.

### On track, energized, and feeling successful

"If everything is communicated on all levels, everyone feels ownership," Sara says. "There's not unnecessary compartmentalization."

Her team responds well, leaving her to be the juggler who keeps all the balls in the air and who keeps the paperwork, classification, cost, and programmatic issues off the backs of the designers so they can design, she says.

Kate says Sara's skills keep the team on track, energized, and feeling successful despite uncertainties in recent years as the B61 program has gone through various realignments. The B61 has been part of the nation's stockpile since the 1960s, and the LEP came about because a number of the weapon's aging components have needed refurbishing.

"The way Sara runs her team, everyone feels like they have a voice. That diversity of voices and the feeling that everyone is respected carries the team through adversity," Kate says.

Sara learned of the NNSA award when she was copied in on an email from the program office. Kate says the wording of the email wasn't very clear, however, so Sara thought she had only made it to the next round of competition and didn't realize she had won.

Sara says she was "pleasantly shocked" by the award.

Sara, a transplant from Washington, D.C., joined Sandia's firing set area in 2002 after earning a master's degree in electrical engineering from the Rochester Institute of Technology. She worked on the W80 and other advanced development projects before going to work on the B61. She was the technical lead for the previous Product Realization Team lead, and became the lead in late 2010.

"I struck the lottery with her," Kate says. "It's not a job based solely on technical skills, although she has those. She embodies all the qualities of a leader."

## Learning to harvest algae



RESEARCHER NICK WYATT (1512) is conducting experiments to better understand how algae concentration within solution, salt concentration, and pH impact flocculation efficiency. (Photo by Randy Montoya)

(Continued from page 1)

new way to separate the algae from its growth solution in Biotechnology and Bioengineering.

Biofuels have been studied with varying intensity since Henry Ford's day, and algal biofuels have been a growing area of research and development over the past 20-30 years, but profitably extracting the algae from the water where it grows is an ongoing challenge. Harvesting such tiny plants is expensive — filters clog, and centrifuges use nearly as much or more energy than they help generate. Even in the densest growths, algae make up only a small percentage of the solution; currently, one ton of water yields approximately one kilogram of biomass, and even less fuel, so it's not feasible to move tons of a watery algae solution to a processing facility miles away. "Current methods are not economically viable at a large scale," says Anne Grillet (1512). "It's timely and important to do science-based work to better understand flocculation."

Flocculation is the process of separating particles from solution and is commonly used in water treatment plants for sediments and other contaminants. Many factors influence how well it works. Sandia's research is focused on better understanding those fac-

tors as applied to algae, and then getting the cells to clump together and either rise to the top to be skimmed off, or sink to the bottom in cakes.

"The goal is to get the algae to do most of the work in terms of sticking together and separating themselves from water," says John Hewson (1532). "Once you've caused autoflocculation, things get much more economical."

### Attaining new separation efficiencies

Chemical additives can be used to get algae to clump together for easier harvesting, but ideally, the water and chemicals would be reused, so adding chemicals can pose problems in further downstream separations and economics. Sandia scientists recently found an answer to one part of the challenge: By tinkering with the pH of the algae solution and adding a heavier material that attaches itself to algae, they've been able to reach separation efficiencies in excess of 90 percent. Such findings are being used to develop models to determine the best conditions for autoflocculation in various environments and different types of water.

The work published in *Biotechnology and Bioengineering* is important to understand how flocculation efficiency is affected by the concentration of the algae within solution, salt concentration, and pH.

"Algae are being cultivated in water with a variety of

compositions, so you need to be able to answer the questions of whether to add salt or change the pH before you invest in large-scale production," says John. "We're building models to find the optimal conditions for different types of algae and water."

Nick is experimenting with the tiny plants to provide much of the data used for models. To remove algae, researchers first overcome the electrostatic stabilization of the plants within their watery environment. Inside the lab, he adds a sodium hydroxide solution to the translucent algae solution. The solution destabilizes the bonds algae have with the water, and creates a negative charge on the cells' surface. Next, he adds rust-colored ferric chloride, which is positively charged and heavy. It takes only minutes for the iron particles to bind to the algae and sink to the bottom.

### Avoiding downstream problems

While it's an impressive visual and an effective method, there are some challenges with using ferric chloride and other chemicals to drive the algae out of solution. "In a lot of cases, the chemicals you add are expensive, so it doesn't do anything for the economics of the process," Nick says, adding that he and his team are focused on pinpointing the least possible amount of flocculant needed to be effective. "Additionally, you're adding chemicals that eventually have to be taken out, so you may be causing more problems downstream."

One of the attractions of biofuels is that the residual biomass could be used for animal feed, but iron is toxic in large doses, so it would have to be removed. Calcium and magnesium are increasingly attractive options, because they can be absorbed by the food supply in high concentrations without dangerous side effects, and are much cheaper and easier to obtain. So the search for more ideal salts continues.

Surface modeling experts Pat Brady (6910) and Phil Pohl (6231) are helping determine ways to connect the algal surface with the ideal flocculant.

"Modeling allows us to rapidly downselect candidate coagulating agents," says Pat. "There are literally hundreds of potential coagulants one might use, but if we understand how algae surfaces behave, we can quickly identify the ones that should work and then test those in the laboratory." Eventually, Pat says he would like to see the process simplified even further, by growing minerals on the algal surface. Such a solution would be economical and likely trigger autoflocculation through a few units of pH change.

The team is pleased by the results so far and has plans to continue studying cheap and effective ways to harvest these tiny green oil producers. "What's really exciting is that we're at a point with algae where we're seeing big jumps in terms of our progress," John says. "There are some fields where you see a 2 percent improvement and you feel good. Here, we are seeing improvement by a factor of two, so this is very encouraging."



WHERE SHOULD WE GO NEXT? Ear-plug-sized atmospheric samplers with silvery microvalves and solder connectors seemingly hang poised to sample gases relevant to climate and weather. The prototype devices actually rest on a mirror, reflecting the day's Albuquerque weather. (Photo by Randy Montoya)

# Inexpensive, hardy sensors may advance climate studies

*Self-sealing passageways increase data reliability for airborne effluent detection, other applications*

By Neal Singer

Climate models reach varying conclusions because of occasional uncertainties about data. Winds may blow gases toward or away from a sampling site, gas contents at any location may vary by the hour and by the season, and samples collected by containers in the field may evaporate or be corrupted before analysis is performed in a distant laboratory. Compounding the problem are difficulties in widely distributing sensors, which can be heavy, fragile, and (most expensively) require tending by humans.

But a new Sandia-developed miniature sample-collector — about the size of an ear plug that air travelers use to protect against pressure changes — handles all these problems and more.

"We now have an inexpensive tool for collecting pristine vapor samples in the field," says Ron Manginell (1716), lead author on the invited March cover article in the *Review of Scientific Instruments*, the highly cited journal of the American Institute of Physics.

The sensor is inexpensive to fabricate. In operation, it intakes gas in seconds through a tiny hole about the diameter of three human hairs. The sample obtained, the hole is sealed when a tiny, low-energy hotplate melts together its walls. The melt erases the original intake hole — a trick somehow resembling spooky self-sealing passageways that trap adventurers in movie versions about pharaohs' tombs.

## Sample remains pristine

Because the sealed little structure also doesn't outgas internally, its sample remains uncorrupted until analyzed in the laboratory. It's light, hardy, and so simple to operate that it could travel in unmanned aerial vehicles or as unmonitored cargo in atmospheric balloons. It's so inexpensive that the poorest countries could afford to contribute to a global climate collection effort.

Do you want to drive it off the lot now or accept delivery at home, one is tempted to ask.

Mark Ivey (6913) is interested now. He oversees the operation of sounding balloons that carry sensors skyward for DOE at Oliktok Point and Barrow, Alaska. The miniature blimps, able to sample particles around which cloud droplets form, are tethered to winches that reel the soaring balloons back in. Getting the sensors to Barrow — a place no highway visits — then into the air and back to a laboratory in the lower 48, he says, makes weight and size a factor. "Smaller, lighter is a big deal for us," he says.

Ron says his team will submit an atmospheric sampling proposal this spring to NASA for something called "ground-truth measurement." NASA, he says, "has a ton of satellite data, more than they know what to do with," but they need to calibrate their remote instruments with data obtained by sensors on the ground or air that physically sniff the gases reported by satellites.

NASA and NOAA, aware of the need for ground-truth data, have built systems with flask containers and conventional valves that at certain altitudes open flasks and then close them. The problem, says Ron, is that the flasks are big — perhaps half a liter in size — and heavy, and the valves they require may outgas, ruining the measurements.

Outgassing is when the material used for the container releases a gas of its own, contaminating the atmospheric gas trapped in the flask.

## Suitable for balloon and UAV applications

The Sandia system "would have a 100 of these devices in a package that has a macrovalve on top," says Ron. An altimeter sends an electrical pulse that opens the macrovalve on signal to fill the package with air. A small pump builds up pressure, filling the tiny cylinders. "You'd use PC processors that you can put on a circuit board to operate the miniature system," he says.

The balloons would have locators on them. The low weight would make them suitable for balloon and UAV applications. The tiny containers are built of alumina tubing, cheap and more inert than glass.

Hard data collected by the tiny cylinders also could be used to confirm satellite images of airborne industrial effluents, essential for monitoring cap-and-trade deals.

But not all possible uses are in the upper atmosphere. Geoscientists drill boreholes for oil exploration and to gain fundamental understanding of how the earth formed. "It's hard to build a mass spectrometer to go down a 2-inch diameter borehole," says Ron. "We've proposed instead to use our miniature samplers outfitted with microvalves to take samples that can be taken pristinely back to the surface and then examined in a lab."

In medicine, volatile compounds that people and animals emit are indicative of disease states and stress. "Point-of-care medicine, instead of taking a blood sample, could sample a person's breath," says Ron. "Alcohol gives a gross signal but infections have a high volatile content as well." The bacteria that give cows tuberculosis produce a characteristic signature, he says. "It would take a miniature pump the size of the last joint of your thumb to collect a sample. One can perform on-the-spot detection, but also capture a sample in the miniature chamber to send back to the lab for gold-standard tests." Ecoli and anthrax, he says, also have volatile signatures.

## Another tool in the toolbox

The detector could also be used by the military to collect and analyze gasses on the battlefield.

"We've spent a lot of time over the past 15 years doing field analysis for customers: microchemlab work for the military and General Electric, and handheld gas detectors. This is just another tool in the toolbox. But we were pretty happy that this work proved to be broadly cost-effective," Ron says.

The work, featured in the paper "A Materials Investigation of a Phase-Change Micro-Valve for Greenhouse Gas Collection and Other Potential Applications," is one of the across-department efforts that may only be possible at a national lab. It includes the departments of Microsystems-Enabled Detection (Ron Manginell and Matthew Moorman, both 1716), Multiscale Metallurgical S&T (Jerome Rejent, Paul Vianco, and Mark Grazier, all 1831), Advanced Prototyping S&T (Brian Wroblewski, 1832), Materials Characterization (Curtis Mowry, 1822), and Biosensors and Nanomaterials (Komandoor Achyuthan, 1714), all listed as paper authors.

Money for the project came from a late-start Laboratory Directed Research and Development (LDRD) project, says Ron. "We thought we could do a more ubiquitous job of sensing than anything currently available. So we talked with (managers) Wahid Hermina (1710) and Kent Schubert (1718), told them we wanted to build a low-cost sampler that would be a hermetic, non-outgassing chamber. They got us late-start LDRD money and we were able to go forward.

"This is a little different from what we've done in the past. The widespread collection of greenhouse gases has to be extremely cheap. So we collected people on the teams who have done soldering, brazing, thick film metallization on ceramics, scalable to high-volume production. We knew some of the people from previous work and some were just in the building. Some did analytical chemistry to figure out if we were contaminating the sample. Others found the perfect solder mix. Others went over the paper itself."

## A ubiquitous platform

"The vessel is made to capture CO<sub>2</sub> and oxygen," says Curt Mowry. "I made sure the solder didn't contribute any CO<sub>2</sub> to the sample that was collected, because then you have a stinky measurement."

Certainties are good, says Ron, and there are still uncertainties in climate predictions. "The overwhelming majority of the data seems to point to the fact that there's warming, but how do you attribute that: Is it natural variation or manmade influence? Distributions of our capsules would greatly improve the accuracy of field measurements. You'd have a platform that would be ubiquitous, on planes, UAVs, balloons in countries that can't ordinarily afford to do these things. For some poorer nations, it's hard to make those measurements when you're concerned with putting food on the table. But for legislation or policy decisions on, say, cap and trade, it's important to make those measurements accurately."

Despite successful testing of the device, Ron's work, like science, is never finished. "What we need to build next is a normally closed version of the valve that opens when we want it to," he says. A presealed container, obviously, would eliminate another possible source of contamination in transit.

# Sandia technology helping in Fukushima-Daiichi rad cleanup

By Nancy Salem

UOP LLC, a Honeywell company, has renegotiated its license of a Sandia technology being used to remove radioactive material from wastewater at Japan's damaged Fukushima Daiichi nuclear power plant.

The revised license makes UOP the exclusive US manufacturer of crystalline silicotitanate, or CST, a porous framework molecular sieve that can separate highly volatile elements from radioactive wastewater.

"Sandia has a very important and longstanding business relationship with UOP," says Bianca Thayer (1931), who worked on the license renegotiation. "This is an opportunity to grow our partnership with the company."

Sandia chemist Bob Dosch and Texas A&M chemical engineering professor Ray Anthony were leaders of the team that developed CSTs in response to a need for materials to remove radioactive contaminants from wastewater. They found that a certain class of synthetic zeolite is more effective in capturing some radioactive elements, like cesium, than other technologies.

They created CSTs, inorganic, molecularly engineered ion exchangers that can be sized specifically for cesium and other elements. When high-level elements are removed from contaminated water with CSTs, the remaining lower-level radioactive waste can be treated in a more economical and less hazardous way.

UOP worked with Sandia through a Cooperative Research and Development Agreement (CRADA) to produce a commercial-scale manufacturing procedure for the CSTs. "We developed a technology to bind the material into a beaded form so it could be used in ion exchange columns," says Dennis Fennelly, UOP marketing manager.

The company licensed and began commercializing the technology in 1994. It was one of the first licenses issued by Sandia, which was the licensing lead on the CST technology and had begun its tech transfer program just a year earlier.

Mark Rigali (6915) says CST technology was among Sandia's first Laboratory Directed Research and Development (LDRD) commercial product successes. "It was a very early CRADA success as well," he says. "There was program money on our side and there was interest on the commercial side, so the two groups got together and developed the

CSTs as a commercial product."

In 1996, the CST work by Sandia, Texas A&M, and UOP won an R&D 100 award.

UOP, based in Des Plaines, Ill., with locations around the world, is an international supplier and licensor of process technology, catalysts, adsorbents, process plants, and consulting services to the petroleum refining, petrochemical, and gas processing industries. With the Sandia license in hand, UOP developed CST products to remove radioactive ions from liquids such as radioactive waste streams, alkaline tank waste, and spent fuel storage pool water.

The products are part of the UOP ION-SIV™ Selective Media line and were first aimed at government facilities that produce nuclear weapons materials and at commercial nuclear power plants.

"We made some sales to the DOE complex," Fennelly says. "The largest scale was in the Melton Valley demonstration at Oak Ridge."

CSTs came to mind when the Fukushima Daiichi nuclear power plant outside Tokyo was damaged in an earthquake and tsunami in March 2011.

Mark says seawater was pumped in to cool the reactors. The water was contaminated with cesium, a common fission product in reactor fuel, and could not be released back into the ocean. "The Japanese were looking for a way to clean up the water," Mark says. "That's where the CSTs came in."

But it wasn't known if the technology worked in seawater.

DOE called on Sandia chemist Tina Nenoff at the end of March 2011 to test CSTs for removal of cesium in concentrated seawater, due to her extensive experience in both developing and working with CSTs in the 1990s. Tina and colleague Jim Krumhansl, now retired, worked around the clock for 10 days. "There was a sense of urgency," Tina says. "We compared CSTs against commercially available zeolites, mineral zeolites, and some clays. We found that the CSTs outperformed the other materials for cesium removal from seawater under these conditions."

Mark says there are other materials that can capture cesium, "but there's nothing out there that works as well as a CST. It's tough to beat."

UOP, which was in contact with Sandia and doing its

own tests, came to the same conclusion. The company asked to renegotiate its license with Sandia to become the exclusive manufacturer of CSTs. At the same time, UOP also began looking at expanding its water treatment product line to industrial and commercial applications.

"Basically, we're taking a renewed look at water treatment in general, especially in the areas of radionuclide removal and industrial treatment in support of our historical industrial base," Fennelly says. "We have materials that can be useful. We will market them more aggressively."

He says the marketplace is changing, with Fukushima placing renewed emphasis on safety and preparedness.

"There are a number of opportunities to apply the CSTs in gathering cesium. Everything is coming together," Mark says. "CSTs are a material whose time has come."

UOP manufactures CSTs at its plant in Mobile, Ala. Toshiba Corp., Shaw Global Services LLC, and AVANTech Inc. use CSTs in their Simplified Active Water Retrieve and Recovery System (SARRY). The SARRY system has been in operation at Fukushima since last fall and continues to reduce radioactive cesium to nondetectable levels, UOP says. As of early 2012, more than 30 million gallons of contaminated water have been treated to nondetectable levels.

Mark and Fennelly say Sandia and UOP plan to continue their R&D work around other types of radioactive and industrial water treatment materials.

"We are exploring collaborative opportunities with specialty materials and technologies Sandia has developed in the 15 years since we initiated our collaboration with UOP in the mid-90s," Mark says.

The two CST patents are held jointly by Sandia and Texas A&M, which share the licensing royalties, and run through 2013 and 2017. The UOP license will continue until 2017 when the last of the two patents expires, Bianca says.

She says the license with UOP is not just one of Sandia's earliest, but is among a handful from that period that is still in active use. "It's a long-term commercial relationship," she says.

Mark says it was exciting to be part of an effort that addressed a challenge like the Fukushima cleanup. "It's the kind of thing that sends a chill," he says. "Wow. We've helped really make a difference in the world. These are the kinds of successes we want to see with all our intellectual property."

Tina says the CST work had special meaning for her since she came to Sandia 18 years ago to work specifically on these materials. She helped in the development of the CSTs and other novel molecular sieves for defense legacy waste cleanup of tanks at the Hanford Site in Washington.

"It was the reason I came to Sandia," she says. "I'm glad to see 18 years later that the work is still having an impact. I had to pull out my old notebooks. This is a good lesson for students: Take good notes. You may need them years later."



OFFICIALS OF HONEYWELL subsidiary UOP joined Sandia staff at the Labs to finalize the re-negotiation of the company's license of Sandia's crystalline silico-titanate, or CST, technology. The business relationship between Sandia and UOP is one of the Labs' most enduring.



## Gov. Martinez tours Sandia



LATE LAST MONTH, N.M. Gov. Susana Martinez spent three hours touring Sandia facilities and being briefed on a wide range of Labs technologies. The governor, in her first visit to the Labs, was hosted by Sandia President and Laboratories Director Paul Hommert, who welcomed her with a high-level overview of Sandia's missions and capabilities. Stops on the itinerary included Sandia's Pete V. Domenici National Security Innovation Center, where she was briefed on Sandia's unique nuclear weapons mission, and the Microsystems and Engineering Sciences Applications (MESA) facility, which is home to much of the Labs' in-house microsystems fabrication capability. During her visit, Martinez met with a panel of early career Sandians and heard success stories from companies that have benefited from the New Mexico Small Business Assistance Program. In the photo above, during a stop at the International Programs Building in the Sandia Science & Technology Park, Martinez discusses border security technologies as Paul Hommert (to the governor's right) looks on. At left, she checks out an early-version explosives detection portal. (Photos by Randy Montoya)

**Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads**

**MISCELLANEOUS**

CONCENTRATOR, Equipse Sequal, w/3 batteries & remote charger, best over \$2,000. Gray, 265-6211.

iPAD 1, MC496LL, WiFi, 3G, 32 GB, iOS5.1, w/2 cases, USB cable, charger, original box, no scratches, excellent condition, \$400. Weston, 350-7059.

CO-ED SOFTBALL TOURNAMENT, Route 66 Classic, May 5 & 6, contest, prizes and more. Patalonis, 298-7903, patalonis@aol.com.

GARAGE SALE, April 21 & 22, 8 a.m.-2 p.m., 10000 Del Chaparral Ct. NE, tools, appliances, lamp, clothes, bricks, concrete squares. Cronin, 299-6747.

GENERATORS, 2, RV-park approved, w/harness to connect, \$625 ea., \$125 for harness, \$1,300 for all; portable satellite TV antenna, GM-1518, \$625. Kercheval, 505-263-6867.

ADULT LIFT TICKETS, 2, Sipapu, \$44/both. Brewster, 238-4704.

VHS MOVIES, \$1.50 ea.; collector dolls, ask for list. Crosby, 260-1070.

SOFA, Best Home Furnishings, 90-in., beige upholstered w/wood accents, beautiful, brand new, \$695 OBO. Lifke, 301-5604.

TIMESHARE, 1 wk., 2-bdr. EOY or more, Cabo, Vegas, Utah, Tahoe, normally \$12,000, asking \$5,000 OBO. Wiperman, 850-0310.

SERGER, Bernina 2000DCE, overlook & conversion to flatlock, multiple accessories, plus cone threads, \$450. Wells, 292-0179.

DOG GROOMING TABLE, 2' x 3', w/support for lead, folds, \$35; catheters, 6 unopened boxes, female, \$60. Stauffer, 268-8819.

ANTI-GRAVITY LOUNGE CHAIRS, 2, green leaf pattern, like new, \$40; ladies Schwinn, thin tires, \$25. Zamora, 301-9415.

WEDDING DRESS, designer, beautiful, princess-style, Cathedral train, French bustle, fits petite women, worn once, \$250. Cordova, 275-2769.

MODEL RAILROAD, Z scale, Marklin, 3 landscaped powered levels, 3 engines, 26 passenger & freight trains, \$340. Church, 821-0268.

DRYER, electric, old but works well, \$15. Hill, 299-4060.

LASER PRINTER, HP 1200, B&W, 15 ppm, 1200 dpi, w/cartridge, great condition, \$55. Witt, 505-565-0028.

DINETTE TABLE, black, w/4 chairs, good condition, \$50. Escobar, 340-8733.

RV TOW BAR, w/cover & all hook ups, \$400 OBO; tow bar electrical hook up accessories, wiring kit etc. \$190 OBO; metal filing cabinet, \$59 OBO. Garcia, 554-2690.

LEATHER COVERS, Kindle Fire, black w/hand strap, \$15; pink rotating stand, portrait or landscape, \$10. Mukern, 453-1508.

SOUNDPLEX BOX, w/tweeters, 2 10-in., Pioneer speakers, 1000-W max subs, w/400-W, dual amp, \$200. Rankin, 238-9963.

PRECIOUS MOMENTS COLLECTION, beautiful, ~15 pcs., sell as set or individually, email for details. Owens, 839-4286, padillaowens@q.com.

TABLE SAW, Craftsman, 10-in., \$100; belt & disc sander/grinder, Craftsman, \$150. Reed, 268-7484.

CHANDELIER, small, stained glass, & modern blue ceiling fan, call for photos, \$25 ea. OBO. Schoenherr, 920-655-1577.

SAFE, 22"H x 18"W x 15"L, free, you pick up. Benson, 856-1602, donnabenson55@comcast.net.

DOG RUN, 12' L x 7'D x 6'H, PetSafe chain link kennel kit, used only 4 mos., paid \$300, asking \$150. Tadros, 505-908-7473.

STOVE, electric, Magic Chef, white, \$200. de la Fe, 974-8670.

SPANISH LANGUAGE LITERATURE BOOKS, free to someone who promises to read them or give them to student. Elliott, 379-0697.

BOOKCASES, oak entertainment center, dresser, corner desk, couch, loveseat, assorted furniture, \$25-\$75 per pc. TenClay, 294-4942.

SMALL REFRIGERATOR, w/freezer, perfect for dorm, shop, outdoor kitchen, 33"H, originally \$240, asking \$60. Bickel, 822-0951.

WOODEN PALLETS, 3, free; aluminum walker w/2 wheels, \$10. Lunsford, 286-4850.

**How to submit classified ads**  
**DEADLINE: Friday noon before week of publication unless changed by holiday. Submit by one of these methods:**  
 • EMAIL: Michelle Fleming (classads@sandia.gov)  
 • FAX: 844-0645  
 • MAIL: MS 0165 (Dept. 3651)  
 • DELIVER: Bldg. 811 Lobby  
 • INTERNAL WEB: On internal web homepage, click on News Center, then on Lab News link, and then on the very top of Lab News homepage "Submit a Classified Ad." If you have questions, call Michelle at 844-4902. Because of space constraints, ads will be printed on a first-come basis.

- Ad rules
1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
  2. Include organization and full name with the ad submission.
  3. Submit ad in writing. No phone-ins.
  4. Type or print ad legibly; use accepted abbreviations.
  5. One ad per issue.
  6. We will not run the same ad more than twice.
  7. No "for rent" ads except for employees on temporary assignment.
  8. No commercial ads.
  9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
  10. Housing listed for sale is available without regard to race, creed, color, or national origin.
  11. Work Wanted ads limited to student-aged children of employees.
  12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

TYPEWRITER, IBM personal Wheelwriter 2, w/supplies; Sanyo standard cassette transcriber; Norelco microprocessor; Definity 55 cm Fitnessball w/foot pump. Long, 505-294-4591.

**TRANSPORTATION**

'06 FORD F150 XLT, 4x4, AT, 5.4 tri-ton engine, crew cab, gray, 90K miles, \$17,700. Striker, 980-1493.

'03 GMC YUKON SLT, 105K miles, KBB Private Party \$13,633-\$11,833, asking \$10,800. Romero, 505-890-2899.

'02 TOYOTA HIGHLANDER LIMITED, V6, AWD, forest green, beige leather, new tires, 1 owner, 67K miles, excellent condition, \$12,150. Lombana, 505-720-7927.

'06 JEEP WRANGLER, trail rated, 6-cyl., AT, white, black soft top, 3-in. lift, extras, garaged, 75K miles, \$16,500. Carr, 401-2430.

'05 FORD F150, very good condition, call for more info. Chavez, 248-1821, ask for Richard.

'90 MAZDA RX7 CONVERTIBLE, w/hard top, black interior, sheepskin covers, 125K miles, needs work to get running, \$3,500. Berna, 268-2089.

'90 FORD RANGER, long bed, 6-cyl., alarm, 98K miles, looks & drives great, \$4,500. Craig, 453-1615.

'05 FORD F150, 2WD, V8, Super cab, 8-ft. bed, gold, tan interior, garaged, non smoker, 94K miles, \$12,900. Benavidez, 270-4577.

**RECREATIONAL**

'09 KAWASAKI VULCAN 900 CLASSIC, Soft Tail, 1 owner, ~4.8K miles, excellent condition, \$4,900. Barrick, 505-453-1065.

AIRPLANE PARTNERSHIPS, get your private/commercial/instrument ratings & travel economically in your own Mooney. Weeks, 505-310-5254.

WINDSURFING EQUIPMENT: 2 boards, 2 masts, 2 booms, 4 sails, accessories, free, first to take all. Lee, 205-0140.

**REAL ESTATE**

4/5-BDR. CUSTOM HOME, 3,040-sq. ft., 3-car garage, La Cueva district, under \$140/sq. ft., MLS#729318, http://www.virtuallyshow.com/17847, \$424,900. Varro, 505-228-7292.

LAND FOR SALE, Bosque Farms, .97 acre, taxes \$528/yr., \$83,000 OBO. McGrath, 265-7905.

2-BDR. CABIN, loft, 1,100 sq. ft., completely furnished, north of Mora, south of Angel Fire, off Highway 434, \$154,900. Mosey, 822-0296.

4-BDR. CUSTOM HOME, 3 baths, 2,890-sq. ft., 1 story, huge lot, RV gate, high-end remodel, Four Hills, \$369,000. Kelly, 480-540-8900.

3-BDR. HOME, updated, 2 baths, 2-car garage, north UNM area, 15 mins. from KAFB, owner financing, \$315,000. Sais, 505-999-1270.

**WANTED**

DINETTE TABLE, w/cushioned chairs, good/excellent condition. Lucero, 505-440-9893.

VIDEO REWINDER (VCR), working condition. Chorley, 296-1454.

STREET MOTORCYCLE, 200-250 cc, running or minor repairs, need good starter bike. Moore, 505-296-6586.

RECORDS, vinyl, LPs, 45s, albums collecting dust. Sell/give to someone who will appreciate & listen. Levine, 980-7846.

GOOD HOME, gray tabby cats, female, 3 & 9 yrs. old, shots/fixated. Monroy, 620-9284.

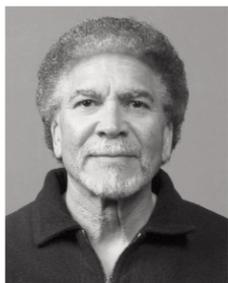
**Recent Retiree**



Laura Santos 20 8529

**Mileposts**

New Mexico photos by Michelle Fleming  
 California photos by Randy Wong



Lacey Learson 40 10261



Bill Hendrick 35 4822



Dan Golling 25 8123



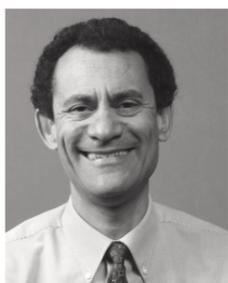
Tracy Walker 25 8949



Joan Harris 20 412



Jennifer Robles 20 8225



Lars Wells 20 5550



Mark Lynam 15 9513

**Lecture at National Museum of Nuclear Science & History**

**'Life in the Atomic City' looks at Los Alamos during the Manhattan Project era**

Authors Sharon Snyder and Toni Michnovicz Gibson will present the story of "Project Y," also known as the Manhattan Project, at the National Museum of Nuclear Science & History on Sunday, April 15. The lecture will take place at 2 p.m. and will feature a question-and-answer session with Manhattan Project veteran Mary Lou Michnovicz.



With the US Congress soon to consider a vote on the creation of a Manhattan Project National Historical Park, the events of 1943-1945 in Los Alamos and the people who developed the bombs that ended World War II are taking their place in US history. Awareness of the place and of the unique group of people, whose average age was only 25, increases each time historic photos are shared and remaining veterans tell their stories.

Snyder is the author of *At Home on the Slopes of Mountains*, a recently published biography of New Mexico poet and author Peggy Pond Church. She has also recently coauthored, with Toni Michnovicz Gibson, *Los Alamos and the Pajarito Plateau*, a title in the Images of America series produced by Arcadia Publishing.

Snyder is a historian interested in northern New Mexico history, focusing particularly on the Los Alamos area. She serves on the board of directors of the Los Alamos Historical Society and is its publications director. In addition

to historical research, she enjoys leading tours to frontier historical sites near Watrous and Las Vegas, N.M., and has recently volunteered with Cornerstones of Santa Fe on a preservation project in Tiptonville, a historic site on the Santa Fe Trail. Snyder earned her bachelor's degree from the University of New Mexico and a master's from New Mexico Tech.

Toni Michnovicz Gibson grew up in Albuquerque as the oldest daughter of Manhattan Project photographer John "Mike" Michnovicz. She archived her father's collection of approximately 1,000 photos and documents and spent hours with him recording his recollections and memories of that time. The result was her first Arcadia book, *Los Alamos 1944-1947*, which her father saw one week before he passed away. She combined this interest with Snyder's knowledge of early Los Alamos days and the two of them collaborated on this new comprehensive look at Los Alamos history.

There is no additional fee, beyond the usual admission fee, to attend the lecture. Admission to the museum is \$8 for adults.

The National Museum of Nuclear Science & History is located at 601 Eubank SE. The Museum is open 9 a.m.-5 p.m., 361 days a year. The museum's website is www.nuclear-museum.org and the phone number is 505-245-2137.

# You've got a friend

## Military Support Committee extends a far-reaching hand



By Nancy Salem

Esther Hernandez is well aware of the sacrifices made by members of the US Armed Services. Her father was a decorated World War II veteran, her uncle went missing in action in that war, her brother is a Vietnam veteran, and her nephew has served two tours of duty in Iraq and one in Afghanistan.

"The military is near and dear to my heart," says Esther, senior manager of Corporate Diversity & Inclusion Dept. 40. "We lead the lives we live because of those men and women. We owe our many privileges to them."

Esther is among a group of Sandians who have taken the Labs' veterans outreach effort a notch higher by forming the Military Support Committee (MSC) to reach out to employees who are active military personnel, veterans, Guardsmen, and Reservists, and to non-military employees who have family or friends deployed.

"We broadened the scope of outreach beyond veterans-only," Esther says. "We wanted a wide-ranging support group to engage all levels of the workforce to foster a military-friendly community."

Mike Hazen, VP of Division 4000, signed on as executive sponsor of the MSC. Mike was a US Air Force colonel in a military career spanning 31 years, culminating as director of Security Forces for the Air Force Space Command. He is Sandia's chief security officer, responsible for the protection of people, resources, and information.

Mike says he is proud to champion the MSC. He says Sandia has about 1,000 employees who have served in some military capacity. "It is critical that we as a laboratory honor their service and ensure that our work environment is welcoming and supportive of these individuals who have given so much," he says. "People first, mission always, and America forever."

Mike kicked off the MSC organizational meeting last fall by inviting a varied mix of people. Esther and six others volunteered to co-chair the committee. "It has worked out beautifully," Esther says. "The individuals who stepped up to be co-chairs are a passionate, dedicated, and incredibly energized team. Our progress is

largely due to their leadership and engagement. We got together in August and worked on the Veterans Day celebration in November. We just jumped in with both feet and made the event happen."

The MSC, which replaces the Veteran's Group or Sandia Armed Forces Employee Networking Group (SAFENet), did strategic planning in January and came up with a long wish-list of activities. Subcommittees were formed on communications, resources, outreach, internal engagement, mentoring, reintegration and advocacy, recruiting, and events.

Cup of Joe was launched in the fall of 2011, a once-a-month breakfast gathering at the Thunderbird Café for vets and active military. "It's our two-way communication tool, from the committee to our Sandia veterans and active-duty employees," says MSC co-chair Jody Thomas (2733). "We talk about topics of interest to the military community, and ways the committee can help."

Organizers started a new tradition: Warrior Welcome, a welcome-back ceremony for Sandians who have returned from deployment and Wounded Warrior Career Program hires. Patricia Salazar, who recently returned to the Labs from deployment in Kosovo, was honored at the February Cup of Joe. "We're trying to provide an atmosphere where Sandia as a whole is appreciating the military service these people have performed," Jody says. "We not only invite veterans, we invite their organizations."

Esther says the MSC wants to find ways to support Sandians who go on assignment and come back. "It's not just a one-sided approach," she says. "We're talking to them and asking what they need to reintegrate back into Sandia. We want them to feel like they are truly coming home and to get them back to speed on anything that might have changed during their absence."

Also recognized at the February Cup of Joe was Cheston Bailon, the first person hired under Sandia's Wounded Warrior Career Program. The program is part of the MSC recruiting subcommittee and offers a variety of Sandia options to combat-wounded veterans.

"The program is designed to take a set of enthusiastic people and give them an opportunity to continue their education, get work skills, have outstanding mentors, and work at Sandia," says Air Force veteran H.E. Walter II (5642), a recruiting subcommittee co-chair and member of the Wounded Warrior working group.



RETIRED US MARINE EUGENE MCPEEK (4236) introduces Patricia Salazar (42361), who returned to Sandia after being deployed in Kosovo, at a Warrior Welcome at the Military Support Committee's Cup of Joe event in February at the Thunderbird Café. (Photo by Randy Montoya)

"The goal is success for each one of them."

The MSC held a holiday gift drive at Christmas, collecting 140 gifts, 52 gift cards, and cash donations for military families in Albuquerque with a deployed parent. And the committee sponsored a visit by Sandians to veterans at the VA hospital, delivering thank-you notes from elementary school students.

"It was heartwarming and heart-wrenching," Esther says. "They were so appreciative of us taking the time. It was very humbling because they are the ones who should be thanked for taking their precious time to defend our country."

Other planned MSC activities include an awards program, website, military appreciation wall, career development support, community involvement, philanthropy, a year-round Blue Star Mothers collection site for the deployed, and a Taking Care of Our Own team to offer cards and other support to families of the deployed. Esther says the committee will work to raise awareness on military issues and promote the Wounded Warrior Career Program. Events are planned for Armed Forces Day, Veterans Day, and Memorial Day.

Esther says the all-volunteer group has been working hard to focus on what the military community needs and to get people engaged. "We want to pull in a big membership and work together to address these important issues," she says. "We want to make life better for people."

### Get involved

The Military Support Committee is looking for people to help with projects in its various subcommittees. If you are interested in lending a hand, please contact any of the MSC co-chairs (see list below).

### Sandians support 10th annual ABEC 'Read to Me' book drive



Community Involvement Dept. 3652, The Office Professionals' Quality Council, and Sandia Laboratory Federal Credit Union teamed up to collect more than 2,500 new and gently used books for the 10th annual Albuquerque Business Education Compact "Read to Me" book drive. Book collection points were located around the Labs and at credit union branch locations, and were picked up by Sandia's mail carriers and Transportation Services staff and delivered to a central collection point. The Read to Me book drive builds a foundation for developing literacy skills. For more about Albuquerque literacy resources, check out the ABEC website at [http://abec.unm.edu/read\\_to\\_me.htm](http://abec.unm.edu/read_to_me.htm). (Photo by Rachel Baros)

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