Gil Herrera awarded UNM Lobo Award

Story by Mollie Rappe  Photo by Randy Montoya

Gil Herrera (1000), longtime director of Sandia’s Microsystems Science and Technology Center 1700, has been awarded the University of New Mexico Alumni Association’s Lobo Award, which recognizes a UNM alumnus who has given outstanding personal service to the university or whose career achievements reflect credit on the university.

Sandia, ASU collaborate on algae computational modeling, look for early warnings of predators in algae ponds

Work part of a broader framework for funding energy-related science, technology

By Michael Padilla

Sandia and Arizona State University (ASU) have teamed up to further improve computational models of algae growth in outdoor raceway ponds that can predict performance, improve pond design and operation, and discover ways to improve algal yield outdoors.

In addition, Sandia and ASU will further develop spectroradiometric techniques to optically monitor the growth and health of algae pond cultivation in real time and detect early warnings of predators and pathogens in outdoor algal ponds.

The work is part of a newly signed Cooperative Research and Development Agreement (CRADA) between ASU and Sandia to collaborate on algae-based biofuels, solar fuels, concentrating solar technologies, photovoltaics, electric grid modernization, and the energy-water nexus. The umbrella CRADA also covers international applications of the technologies and science and engineering education.

The scope of the CRADA was described in a 2013 memorandum of understanding between Sandia and ASU focusing on collaborations to support science, technology, engineering, and mathematics education.

(Continued on page 3)

Tech park school

A year and a half in the planning, the Technology Leadership High School opened in the Sandia Science & Technology Park. Its 90 students are getting a hands-on, project-based education through the lens of technology—See page 8.

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That's that

Mars is in! In the real world and in the world of imagination, Mars is commanding our attention.
One of the most popular movies of the year, The Martian, looks to be on its way to garnering several Oscar nominations. The novel upon which the movie was based, by Andy Weir, was published in October 2015. As fun and as gripping as the movie was, it was just a story — a believable and well-thought-out story to be sure, and based mostly on hard science but fiction nonetheless.

It's in the realm of non-fiction, otherwise known as reality, that the news out of Mars gets really exciting.

Over the past four decades, an astonishing succession of American spacecraft have orbited, landed, and roved around on the surface of Mars. These remote extensions of ourselves have sent back terabytes of data that have helped us refine and sharpen our understanding of our closest planetary neighbor. And the surprises keep coming.

The latest one to arrive, delivered by NASA’s Reconnaissance Orbiter, is perhaps the biggest news yet: The space agency announced in late September that the Red Planet has flowing water on the surface. The water is not exactly potable; the data suggests it's probably a briny brew of H2O and a family of minerals called perchlorates. But it's water — flowing water at the surface! — and that ups the stakes in the search for life beyond Earth.

We are now beyond the discovery stage of searching for life on Mars. It's time that we need to start getting very specific, with a timeline and budget, to get human beings to the Red Planet, before (dare I say it?) the next decade is out. If there is life there, let's find it. If not, let's inhabit and explore it anyhow. As science fiction writer Ray Bradbury observed and Andy Wier suggested with the very title of his book: Yes, there are Martians and we are not alone.

So much for fiction and non-fiction; how about a bit of Mars fantasy? Seems plausible, doesn't it? We've sent back tons of photos and video, and some of that imagery has set off a rash of do-it-yourself Mars enthusiast projects. After all, with the Ross family living on Mars, what's to stop the rest of us?

Yes, there are Martians. And we are not alone.

One could argue that the modern world began exactly 100 years ago. It was in November 1915 that Albert Einstein laid out the key principles of his General Theory of Relativity. That theory, along with his earlier Special Theory, has probably done more to change our ideas about the nature of reality than any other concept in science.

Because the implications were so profound, people around the world were hungry for a good solid layman’s elucidation of relativity. As such, over the years the theory has been covered in books, magazines, and newspapers. One intrepid “researcher” has found a photo that shows a large range-like creature scurrying across the frame in the background of the photo of a running dog. This same researcher has found tons of other “evidence” of life: fossilized skulls of dinosaurs, alien babies, Elvis Presley, and Jimmy Buffet. The researcher concludes that the mouse on Mars is “probably” an optical illusion. Yeah, “probably.” But come to think of it, given that it’s not certain that it’s a giant rodent in the photo, maybe our first human travelers to Mars ought to get a ship with bigger windows.

We all know that Einstein was one of the smartest people who ever lived. What a lot of people don’t know is that his brilliance was not limited to the field of physics. His wisdom was so highly regarded that he was sought out for his views on almost everything. He was even viewed as a sage in the matter of domestic relations. He once shared his secret for a happy home life: “When we first got married,” Einstein said, “my wife and I made a pact. It was this: In our life together, it was decided I

...would make all of the big decisions and my wife would make all of the little decisions. For 50 years, we have held true to that agreement. I believe that is the reason for the success in our marriage. However, the strange thing is that in 50 years, there hasn't been a single big decision.”

See you next time.

* * *

Jerry Silva (73) ....... Nov. 11
Katherine Montoya (97) ....... Oct. 30
Geraldine Cave (89) ....... Oct. 28
Robert Reed (81) ....... Oct. 24
Frederico Silva (68) ....... Oct. 24
Richard Gonzales (83) ....... Oct. 18
Luis Apodaca (69) ....... Oct. 7
Peggy Poulsen (89) ....... Oct. 5
Richard Tyler (94) ....... Oct. 3
Lorraine Solanos (78) ....... Oct. 4
Emery Romine (99) ....... Oct. 5
Peggy Poulsen (99) ....... Oct. 5
Luiz Apodaca (69) ....... Oct. 7
Charles Heath (67) ....... Oct. 7
Roland Millican (98) ....... Oct. 9
Herman Stenstrom (79) ....... Oct. 17
Francisco Sanchez (88) ....... Oct. 18
Richard Gonzales (83) ....... Oct. 18
Thayne Edmonds (1714) ....... Oct. 24
Robert Reed (81) ....... Oct. 24
Marshall Bierman (76) ....... Oct. 25
Tim Orndorff (95) ....... Oct. 28
Dolores Graning (86) ....... Oct. 29
Katherine Montoya (97) ....... Oct. 30
Howard Austin (97) ....... Oct. 30
G. Mark Anderson (91) ....... Oct. 30
John Marcon Jr. (96) ....... Nov. 2
Kenneth Hortz (72) ....... Nov. 9
Richard Tyler (94) ....... Nov. 11

* * *

A good day for BaDx

Popular Science named Sandia National Laboratories anthrax detector technology one of 100 best innovations of 2015

Popular Science magazine has named the Sandia-developed BaDx anthrax detector as one the year’s top 100 technology innovations. It is one of nine technologies listed in the Security category of the magazine’s annual “Best of What’s New” list.
BaDx, which has been licensed by an Albuquerque-based company that specializes in the design and manufacture of technologies and services for nuclear security and international safeguards, is a handheld device that is simple to use and inexpensive to produce.

Sandia scientists, from left, Jason Harper (8631), Melissa Finley (8621), and Thayne Edwards (1714) show a BaDx anthrax detector.

(Photo by Randy Montoya)

In its description of BaDx on its website, Popular Science editors wrote: “Anthrax, a bacterial disease of grazing animals, can be a deadly terrorist tool. Now Sandia National Laboratories and security-technology company Aquila are making it simple to detect. They’ve produced a credit-card-size lab-on-a-chip that’s akin to a pregnancy test: Inject a sample and wait a few hours for a line to appear. Because the test is portable, samples won’t accumulate in labs — which is a security risk. It will help ranchers around the world detect the disease in their live- stock. Aquila, which is producing the tests in partnership with Sandia, began shipping units earlier this year and plans to adapt the technology for other bacteria like E. coli.”
BaDx needs no battery or electric power or special laboratory equipment. It’s hardy against wide temperature variation and can detect very small numbers of B. anthracis spores. A field technician puts a sample swab into the amplification chamber, which contains selective growth media. The device then uses a lateral flow assay, similar to a common pregnancy test, to detect B. anthracis. Magnetically operated valves allow the sample to advance from stage to stage to complete the testing process. A colored line appears on the device several hours later, if the test is positive for the bacteria.

The technicians can then initiate a chemical process that sterilizes the device, avoiding the risk of positive samples accumulating and potentially spreading infections. BaDx is compact and lightweight, ideal for field use.

A Laboratory Directed Research and Development (LDRD) project in Sandia’s International Biological Threat Reduction Program led to BaDx.

Melissa Finley (8621), a principal investigator of a large team that helped develop the detector. Jason Harper (8631) and Thayne Edwards (1714) developed the microfluidics platform with the patent-pending magnetic valves that move the sample through the testing process. Biontechnologist Bryan Carson, with technologists Jackie Burton and Bryce Rickers (both 8631), developed the selective media and worked on building and testing the device, as well as helping to develop the decontamination strategy. Nanotechnology researchers George Bachand (1132) and Amanda Car- roll-Burton (8631) are working on improved methods for the lateral flow assay. Bill Andt (8625) a researcher in the International Biological Threat Reduction Program, who regularly works in the developing world, provided guidance on device design.
Thayne says the recognition by Popular Science has a special meaning for him.

“As a technician I remember reading Popular Science magazines and being bowled over by science and technology so advanced it often seemed unreal. In a real way though, it helped encourage me to pursue engineering as a study of science. So I was elated to find out that something I helped to create was being recognized in Popular Science’s pool of new developments. It’s the kind of recognition that reminded me of why I love engineering and science.”

In addition to its recognition by Popular Science, BaDx has won a 2015 Technology Innovations Award from Popular Science, an R&D 100 award, and the Federal Laboratory Consortium’s 2015 Award for Excellence in Technology Transfer.
Algae (Continued from page 1)

and mathematicians, or STEM, fields.

This is the first CRADA Sandia has executed with a university in nearly 15 years and is currently the only active umbrella CRADA with an institution of higher education. The algae cultivation modeling and monitoring project is the first two efforts funded under this umbrella CRADA.

Sandia researcher Ron Pate (8026) says Sandia brings distinctive capabilities for physics-based modeling of algal cultivation systems and for remote spectroradiometric monitoring and diagnostics of algae growth and state of health, while ASU has a variety of algal species under cultivation in outdoor ponds in a range of scales in which to take measurements.

“Sandia is excited about the collaboration with ASU,” Ron says. “This agreement allows Sandia to continue modeling and monitoring work that we have been pursuing with ASU since 2013 under the original ATPS (Algal Testbed Public-Private Partnership) project.” Ron is deputy director for ATPS, overseeing Sandia technical tasks under the project.

The ATPS project was established to support the algae research and development community and industry to advance the field and help accelerate progress toward more rapid and successful commercialization of algal-based technologies for fuels and products. ATPS is funded by DOE’s Energy Efficiency and Renewable Energy Bioenergy Technologies Office. ATPS partners include Sandia, ASU, the National Renewable Energy Laboratory, California Polytechnic State University in San Luis Obispo, the Georgia Institute of Technology in Atlanta, and the algae companies BioCellie and Gel-Viola.

Two projects exercise new Sandia/ASU CRADA

The first project under the agreement, Algal Cultivation Growth Dynamic Modeling and Analysis, focuses on Sandia’s further development of a Sandia algae growth model based on the effect of light, temperature, nutrients, pH, and salinity integrated into an open raceway pond hydrodynamic computation fluid dynamics model. The algae growth model has been partially validated using multiple data sets from partners involved in ATPS. Under the CRADA, the modeling will be further refined through improvement of the paddle-driven pond circulation flow and mixing portion of the model based on the application of hydrodynamic measurement data taken from experimental testing with progressively larger scale outdoor ponds operated by ATPS partners.

The second project examines new algae/ASU CRADA

This project offers an additional opportunity to build on ATPS work and advance the field and help accelerate progress toward more rapid and successful commercialization of algal-based technologies for fuels and products. ATPS is funded by DOE’s Energy Efficiency and Renewable Energy Bioenergy Technologies Office. ATPS partners include Sandia, ASU, the National Renewable Energy Laboratory, California Polytechnic State University in San Luis Obispo, the Georgia Institute of Technology in Atlanta, and the algae companies BioCellie and Gel-Viola.

The work is featured in the October issue of Journal of Physical Chemistry Letters in a paper titled, “Time- and Isomer-Resolved Measurements of Sequential Addition of Acetylene to the Propargyl Radical.” Authors of the study include John D. Savee, Talitha M. Selby, Oliver Welz, Craig A. Taatjes, and David L. Osborn (all 8353).

The Sandia team directly measured a reaction sequence in which multiple acetylene molecules (C2H2) react with a propargyl radical (C3H3). In a flame where more fuel is present than is needed, harmful soot can form. Acetylene is a ubiquitous molecule formed in such reaction environments, regardless of the fuel being burned. Many modelers have suggested that reactions of small free radicals with acetylene represent an important pathway to soot formation in these rich flames. However, the exact chemical mechanism — the pathways by which these acetylene molecules form new bonds and rearrange during reaction — had not been measured directly.

Using tunable energy photons from the Advanced Light Source synchrotron at Lawrence Berkeley National Laboratory, the Sandia team discovered the reaction mechanism, and the fact that it changes significantly over the relatively small temperature range of 800-1,000 K.

Surprisingly, the C3H7 reactant intermediate (i.e., a propargyl that has added two acetylene molecules) in this sequence is the stable C3H7 species, a six-membered benzene ring with a −C=C−C=C− substitution, as normally assumed in combustion models. Rather the authors could show through the photoinization spectrum that the intermediate is the tropyl radical, a seven-membered ring. This finding agrees with very recent, independent theoretical predictions of the reaction that adds the second acetylene. Finally, the team discovered that the reaction sequence terminates, after addition of the third acetylene molecule, in a two-membered aromatic compound known as 2C2H, demonstrating a pathway to a polymeric aromatic hydrocarbon that does not pass through a six-membered ring intermediate like benzene or the benzyl radical.

The 12-month project, led by principal investigator Patricia Ghargazoloo (B255) and John McGovern from ASU, will be conducted in two phases. The first phase will study the flow dynamics of turbulence models and control parameters in open raceway ponds, which are currently the most promising outdoor cultivation system approach for cost-effectively growing algae at the large scales required for producing fuels. Such ponds consist of an oval-shaped closed-loop channel — in which the cultivation mixture of water and algae is propelled to flow around the raceway and undergo mixing by a paddlewheel powered by an electric motor. In this phase, ASU will measure the spatial variations in velocity of the flow of algae-water mix in the ponds at various paddlewheel speeds.

The second phase will calibrate the model and verify the appropriate turbulence physics to be accounted for at certain scales of ponds for one paddlewheel speed. After the two phases, a study will be conducted to compare the data with model results at additional paddlewheel speeds.

The second-month project, Algal Predator and Pathogen Signature Verification, looks at exploring and exploiting the various detailed optical signatures that arise when the algae cultivation pond surface is monitored using Sandia’s optical spectroradiometric techniques that can differentiate algae growth and state of health and provide an early warning of the active presence of predators and pathogens in outdoor algae ponds. Jerilyn Timlin (8613) and McGovern are the principal investigators for this project. Tom Reichardt (8128), who pioneered the original technology as part of a Bioscience LDRD project, also serves as technical contributor to the project.

During the first phase of this project, controlled experiments will be conducted in the laboratory with a host-pathogen/predator pair that the team has seen cause problems in the field. The researchers’ goal is to understand the parameters that control culture collapse and identify spectral markers that indicate the presence of the pathogen/predator. The second phase will consist of experiments in the field to determine how well the identified spectral markers predict the presence of the predator or pathogen in the challenges of an outdoor environment.

“Combining the technical work related to algae biofuels, which began under the ATPS project, it is a great opportunity to exercise this new Sandia-ASU CRADA,” Ron says. “However, collaborative work on the other STEM topic areas could also be pursued in the future as funding becomes available and the mutual interest exists at ASU and Sandia.”

By Michael Padilla

Chemists at Sandia’s Combustion Research Facility have discovered a new mechanism leading to soot formation, providing new facts to make models of soot formation more predictive, furthering DOE’s goal of reducing soot formation in practical combustion devices.

“This work is important because it shows how the process of molecular weight growth that eventually leads to large carbon-rich soot precursors is not simply a path through the lowest-energy structures,” says Craig A. Taatjes (8353), a co-author on the paper. “We discovered that the kinetics is more complex than first imagined, and the preferred route may in fact lead through higher energy isomers.”

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And then there was one

The continued adventures of the Sandia start-up mPower

Entrepreneurial life holds both attractions and unknowns for Sandians considering that path. In an effort to shed more light on the realities of starting a high-tech business, the Lab News is following the efforts of the fledgling company mPower to grow its own wings. On Oct. 2, our first installment was titled “Why attempt the entrepreneurial life?” Following is the second installment on the mPower effort, from a perspective of two months later.

By Neal Singer

A meeting of science writers in Boston this past October, an MIT professor described so many companies he had spun-off and papers he had published that he seemed as prolific as a salmon.

A reporter in the audience interjected, “Professor, do you think students would be better served if you started fewer companies and published fewer papers and spent more time teaching?”

The professor replied that the spawned companies were continuations of his teaching, and the students who were staffed by former students who didn’t want to go elsewhere were something new, he said, but rather to continue research they had already begun with him. He put together business plans with them, applied for financial backing, and his former students went entrepreneurizing.

Murat Okandan, a Sandia entrepreneur on leave to support the start-up photovoltaic company mPower,$58,000 entrepreneurship, was interested in the professor’s success in pollinating companies, because start-ups from Sandia are still relatively few.

Murat kidded off a few obvious factors that conceivably helped the professor’s success:

- Newly minted graduates used to working long hours for low pay;
- Great potential promised by a startup, with no alternative to fall back on;
- Money available nearby in the Boston area from “high-tech angels” who prefer start-up companies to be within an hour’s driving time for close supervision.

The environment is quite different in Albuquerque, says Murat.

Sandia entrepreneurs might be characterized as generally more mature, with families to support.

High tech ideas take time to develop and require significant capital outlays. Both factors can generate impatience that is difficult as well.

Gil Herrera (Continued from page 1)

This accolade has been given every year since 1951. The Lobo Award is the most significant Homecoming award. Past recipients include luminaries such as Benito Peruyt, Tony Hillerman, and James Zimmerman. Gil, as well as the Inspirational Young Alumnus Award and Zia Award recipients, were honored at an Alumni Association breakfast Oct. 17 in Albuquerque.

Gil, who is currently serving as the director of the Laboratory for Physical Sciences at the University of Maryland, College Park, “is very strong with us all we all have a vested interest in improving the state of New Mexico and the two most important institutions to that, Sandia and UNM, have roles to play and we’re most effective if we do it together.”

Over the years Gil has been on the External Advisory Board for UNM’s Electrical and Computer Engineering Department, the College of Engineering Advisory Board, and the National Science Board, and he is now the dean of the Engineering School at the University of Maryland. He was the Sandia deputy campus executive for UNM and has been an adjunct professor of electrical and computer engineering.

“Gil Herrera is a shining example of the innovation and creativity that the UNM School of Engineering is known for,” says Joseph Cecchi, dean of the UNM School of Engineering. “Gil has not only passionately served UNM and the school through his dedication, but he has made a significant impact on the nation’s science and research footprint. We’re proud to call him one of our own.”

[murat says]

“Synergic service since ’74

UNM has had a profound impact on Gil’s intellectual development. When he was a freshman at West Mesa High School, Gil participated in a regional science fair held at UNM. During the fair the students were given a tour of a brand-new computer lab, and were taught a bit of programming.

Gil was so intrigued he held onto the account and password and later — illicitly — taught himself to program. About a year later, Gil was caught running a really complex — and illegal — program, and was suspended from school — to calculate 1,000 factorial, after using $2,000 worth of computer time. Upon cajoling Gil’s algorithm, Professor Mueller of the computer engineering department gave Gil his own legitimate pass, provided he never ran his factorial program again. This generous act only fostered Gil’s fascination with computers.

After three semesters at West Point and a football career ended by injury, Gil returned to UNM, where he completed his bachelor’s degree in computer engineering and became quite active outside of the classroom.

Gil honed his leadership skills while expanding the Hispanic Engineering Organization from a small group of the “smartest students at UNM” to a university-recognized group of more than 100 involved in tutoring and career fairs. Also, in association with the chairman of the university’s math department, Gil taught a Saturday morning computer class to minority and underprivileged kids from Albuquerque. This class inspired some of these students to go into STEM, and led to Gil’s first academic presentation at an Institute of Electrical and Electronics Engineers conference.

Gil is a Fellow of the American Association for the Advancement of Science and serves on an advisory board for NASA’s Jet Propulsion Laboratory. Among his many honors, Gil earns the three medals he received from the US Army, including the Commander’s Award for Civilian Service.

These solar cells on a flexible substrate draped over a ballpoint pen are an early Sandia prototype of interest to mPower. An exact replica is currently being tested at the International Space Station.

Not surprisingly, Gil has also proposed to DOE’s new Small Business Voucher program and EERE Sunshot program for projects that would require a cost-match component from mPower and its collaborators.

Will Murat’s hands-on efforts put the young company on increasingly solid ground? Find out next time.

Gil Herrera

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American Society for Nondestructive Testing names Sandia researcher as fellow

By Sue Major Holmes

David Moore (1522), who holds three patents in the field of nondestructive testing (NDT), has been named a fellow of the American Society for Nondestructive Testing (ASNT).

The award recognizes individuals who demonstrate outstanding service in the field of NDT. Those selected must have at least 15 years of professional experience in the field and have been a member of ASNT for 10 continuous years.

According to a Wikipedia entry, “Nondestructive testing is a wide group of analysis techniques used in science and industry to evaluate the properties of a material, component, or system without causing damage. . . . Because NDT does not permanently alter the article being inspected, it is a highly valuable technique that can save both money and time in product evaluation, troubleshooting, and research.”

“I am both honored and humbled,” says David, who has been at Sandia for 22 years. “It is an exciting time to be in this field and my interest in NDT continues to grow as new methods are introduced. I would encourage young engineers to consider becoming a member of the ASNT organization.”

The national selection committee determined David has made significant contributions to the field in testing and evaluation in the areas of engineering, science, education, and research, as well as supporting the society at the local and national levels. He joined the society in 1984 and became a lifetime member in 2013.


ASNT inducted the seven members of the Fellow Class of 2015 at the society’s annual banquet in Salt Lake City in October. The last time a Sandian was recognized as an ASNT fellow was 34 years ago, when Lutz W. Dahlke of Sandia California was inducted.

Sandian honored with inaugural technologist award from American Vacuum Society

By Sue Major Holmes

The American Vacuum Society has honored Sandia technologist Catherine Sobczak (1832) with its inaugural Thin Film Division Distinguished Technologist Award for providing exceptional technical support of thin film research and development.

Catherine will be formally recognized next fall by the society’s Thin Film Division at the society’s 63rd International Symposium & Exhibition in Nashville, Tennessee.

“It’s an honor to receive this award. The people who nominated me are high-level folks in the vacuum technology field. It’s nice to be recognized for all your years of service doing this,” Catherine says.

The award cites her contributions over the course of her career, both at Sandia and earlier at the Phillips Research Site at the Air Force Research Laboratory at Kirtland Air Force Base. She works with thin films, a form of coating used in everything from eyeglasses to microchips.

Manager Deidre Hirschfeld presented her a certificate last month that goes along with the honor, and Catherine says colleagues made sure it would be a surprise. “They told me to dress up because we were all going to get an award for something else,” she says.

Deidre calls Catherine one of the outstanding technologists working in thin film coatings. “She takes the initiative to fully understand any work assigned to her, then uses her knowledge and experience to help develop process improvements,” Deidre says. “This international award recognizes the important contributions of technologists who are working in the background and often overlooked. It is the technologists who do the experiments then collect, organize, and help interpret data while ensuring that equipment is in working order.”

Catherine started her career in thin films at CVI Laser Corporation and was trained in physical vapor deposition by Mark Halliburton, now in Dept. 6560 at Sandia, and former Sandian Eric Jones Jr. Among her mentors at Phillips were the late Chuck Carniglia; David Ritcher and George Luke, both now retired; and Bradley Pond, now with the Jet Propulsion Laboratory in California. Sandia mentors include Ron Goeke, Juan Romero and David Adams (all 1832).

“Everyone I have worked with has been enormously supportive,” she says.

The Thin Film Division, in a call for nominations earlier this year, said, “We are all indebted to the support provided at some point in our careers by outstanding technologists and technicians, and this award is meant to recognize the importance of that role in thin film research and development.”

AVS, founded in 1953, supports networking among government, industrial, academic, and consulting professionals in such disciplines as engineering, chemistry, physics, biology, mathematics, and business through common interests related to the basic science, technology, development and commercialization of materials, interfacing, and processing. It has about 4,500 members worldwide.

NNSA Administrator Gen. Frank Klotz visits Sandia/California

On Nov. 30, Lt. Gen. Frank G. Klotz, USAF (Ret.), under secretary for Nuclear Security and NNSA administrator, visited Sandia/California. Klotz shared NNSA’s priorities and answered questions at an All-Hands meeting, toured the Livermore Valley Open Campus and Combustion Research Facility, and was briefed on the site’s work in nuclear weapons, cybersecurity, and nonproliferation.

In the photo, John Dec (8300) describes Sandia’s extensive, decades-long efforts and accomplishments in combustion research in the Low-Temperature Gasoline Combustion Engine Laboratory.

(Photos by Randy Wong)
STUDENTS, START YOUR ENGINES – More than 200 young engineers from middle schools across the state recently competed in the New Mexico Electric Car Challenge at Albuquerque’s Highland High School.

At the beginning of the school year, the student teams were given a lithium-ion battery, a direct-current motor, and other materials such as a chassis and wheels. Over the next several weeks, the teams designed and built electric cars to race on Nov. 21. Twenty Sandia volunteers helped organize and run the event, now in its ninth year. The full-day event, sponsored by Sandia, Los Alamos National Laboratory, Intel, and PNM, also included a design competition and an optional oral presentation.

Teams from P.R. Leyva Middle School in Carlsbad took first and third place, and the Sixth Grade Academy at Alta Vista Middle School, also in Carlsbad, took second place.

“The challenge introduces a diverse group of students to engineering. They encounter problems, even on race day, and they figure out solutions — just like our engineers,” said Amy Tapia, manager of Community Involvement (3652).
Under typical snowy conditions, messages will be delivered on a first-come basis. Because of space constraints, ads will be printed on a first-come basis.

How to submit classified ads

1. List 10 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 (classads@sandia.gov)
3. Ad(s) are subject to approval. We reserve the right to refuse any ad.
4. Due to the winter shutdown, the deadline to submit a classified ad for the January 8, 2016, issue is 4 p.m. on December 23.

MISCELLANEOUS

SANDIA CLASSIFIED ADS

Due to the winter shutdown, the deadline to submit a classified ad for the January 8, 2016, issue will be Wednesday, December 23, at 4 p.m.

The Sandia email

Be mindful of doors blowing open in windy conditions. Report any urgent facility issues that could lead to a com-

News coverage through local television and Sandia Facebook, facebook.com/SandiaLabs,

Do not overload yourself with hand-carried items while walking. High winds combined with the inability to use your hands and arms to balance make you prone to falling.

Be aware that the wind can cause objects to fly, and it can cause ear, nose, throat, and eye vulnerabilities. You should consider eye protection and respiratory/gas masks to mitigate any air-borne hazards.

Be mindful of droplets being blown open in windy conditions. If it should snow or become icy, be aware of slipping hazards.

Sandia SouthWest, 3 miles south of the airport, offers a variety of services for employees, including service work on fires, freezers, and refrigerators.

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HIGH TECH
Charter school on Sandia’s doorstep gives kids hands-on exposure to science

By Nancy Salem
Photos by Randy Montoya

Katie Wieck hated math in elementary school. Middle school was another story, “I really got good at it and started to like math,” she says. When it came time for high school, Katie heard about a special technology-focused charter school forming in the Sandia Science & Technology Park (SS&TP) and gave it a shot.

She hasn’t regretted the decision. “I wanted something different, and this has been really challenging and fun,” she says. “I’m learning math and science in new ways.”

The Technology Leadership High School, a public charter located in the Sandia tech park, opened in August with 90 students in grade 9. The school will add a grade level each year until it reaches 12th grade.

“We love having high school students engage in our tech park programs,” says Jackie Kerby Moore, manager of Technology & Economic Development Dept. 1933 and executive director of the SS&TP. “These students have already participated in several activities including Entrepreneur Exploration Roundtables and Manufacturing Day tours.”

The school was a year and a half in the planning and is one of three in the Leadership Network, along with Health Leadership and Architecture, Construction and Engineering, or ACE.

Velina Chavez, director of community engagement at Technology Leadership High, says the network shares a philosophy and method of teaching. “We take a different approach to education than traditional schools,” Chavez says. “We offer hands-on, project-based learning that is interdisciplinary.”

KATIE WIECK’S FIRST-TRIMESTER PROJECT at Technology Leadership High led to a student-developed video game. “We’re learning how technology has real-life applications,” Katie says. “It helps us think about careers.”

Chavez says the school was strategically placed in the tech park to be close to Sandia and to technology-based businesses. Sandia donated refurbished laptop computers and other equipment, and Laboratories scientists are working with the classrooms and partner with us,” Chavez says. “We’ll also collaborate with businesses in the park. The students have walking access to companies that are doing scientific work.”

The students recently visited TEAM Technologies, Air Products & Chemicals, and the QC Group on Manufacturing Day sponsored by the New Mexico Manufacturing Extension Partnership in conjunction with the SS&TP program office.

“Every Thursday the students go to places like the La Luz Early Childhood Center, New Mexico School for the Blind and Visually Impaired — also in the Sandia tech park — and the Manzano Mesa Elementary, and the Manzano Mesa Multigenerational Center to provide help and support,” Chavez says. “We take the kids to interact in the community and in professional settings. Students can develop the soft skills they need to be successful going into the workforce,” she says.

As the school moves into its second year next fall, Katie says she’ll be there. “I enjoy the activities and helping people in the community,” she says. “There is so much I want to explore.”

A MATH PROJECT at the tech high school included cake baking. The approach to education is interdisciplinary, pulling subjects like algebra, physics, and language arts into a single, hands-on assignment.

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Students get a problem to solve at the beginning of each trimester and have 12 weeks to investigate and explore it. A final presentation reveals a solution and demonstrates the student’s knowledge. The school’s first trimester project was learning algebra through computer coding, with the final assignment being development of a video game.

Katie’s team of four students came up with Pac Man’s Revenge. “Making the video game has been my favorite thing so far,” she says. “We’re doing algebra in a cool way.”

Chavez says project-based learning gives students the “why” piece of subjects like algebra and physics. “It provides a real-world connection to the concepts they are learning,” she says. “It shows the relevance to their lives.”

Chavez says the school was strategically placed in the tech park to be close to Sandia and to technology-based businesses. Sandia donated refurbished laptop computers and other equipment, and Laboratories scientists are working with teachers on curriculum. “People from the Labs will come to the classrooms and partner with us,” Chavez says. “We’ll also collaborate with businesses in the park. The students have hands-on assignment.

STUDENTS AT TECHNOLOGY LEADERSHIP HIGH work on laptop computers donated by Sandia. “We’ve had a successful launch and solid start,” says Velina Chavez, the school’s director of community engagement. “It has to do with the students who are here. They are dedicated. We know we’re doing good when they show up every day and work hard.” The school is one of three in the Leadership Network, along with Health Leadership and Architecture, Construction and Engineering, or ACE.
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The school has drawn most of its students from the South- east Heights and International District. "Our focus is to engage students who have been disengaged, students who might fall through the cracks at traditional schools," Chavez says. "We know students can succeed, and it's great to see that happen."

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