

Sandia security experts help Kazakhstan safely transport, store Soviet-era bomb materials

By Heather Clark



MASSIVE CASKS containing spent nuclear fuel from the Soviet-era reactor at the Caspian Sea port city of Aktau. The casks were shipped from the reactor site to a location in northeast Kazakhstan. (Photo courtesy NNSA)

Subzero temperatures, curious intoxicated onlookers, and the logistics involved in providing security to transport nuclear materials 1,860 miles by train across the Central Asian country of Kazakhstan were just some of the challenges a Sandia team overcame to complete the removal of spent fuel containing 11 tons of highly enriched uranium and 3.3 tons of weapons-grade plutonium from a Soviet-era nuclear breeder reactor.

The successful removal of the materials — enough to make an estimated 775 nuclear weapons — stored in the reactor in the Caspian Sea port of Aktau in western Kazakhstan was a major milestone in Sandia's and the nation's nuclear nonproliferation efforts, says Dave Barber, who worked at the time for the Global Physical Security Program (6811), part of the International Homeland and Nuclear Security Strategic Management Unit.

The last concrete and steel cask was transferred to a long-term storage facility in northeast Kazakhstan on Nov. 18. The trip to transport the casks to their long-term storage facility would be like traveling from Washington, D.C., to Albuquerque through a sparsely populated, moonscape-like steppe.

(Continued on page 6)

Schoolkids nab dognapper in CSI science program

Using techniques made familiar on the popular television crime-solving series, Sandia's CSI science education program teaches students in grades 3-5 about the scientific method. When students from some northern New Mexico schools came to town for the CSI activity, Randy Montoya was there to photograph the visit. See page 12.



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Tailoring biofuels to work with vehicles of today, tomorrow

By Mike Janes

At a Sandia-led workshop late last year, transportation industry experts concluded that research into advanced biofuels and combustion engines needs to be much more closely coupled in order to accelerate the transition to biofuels for the transportation sector.

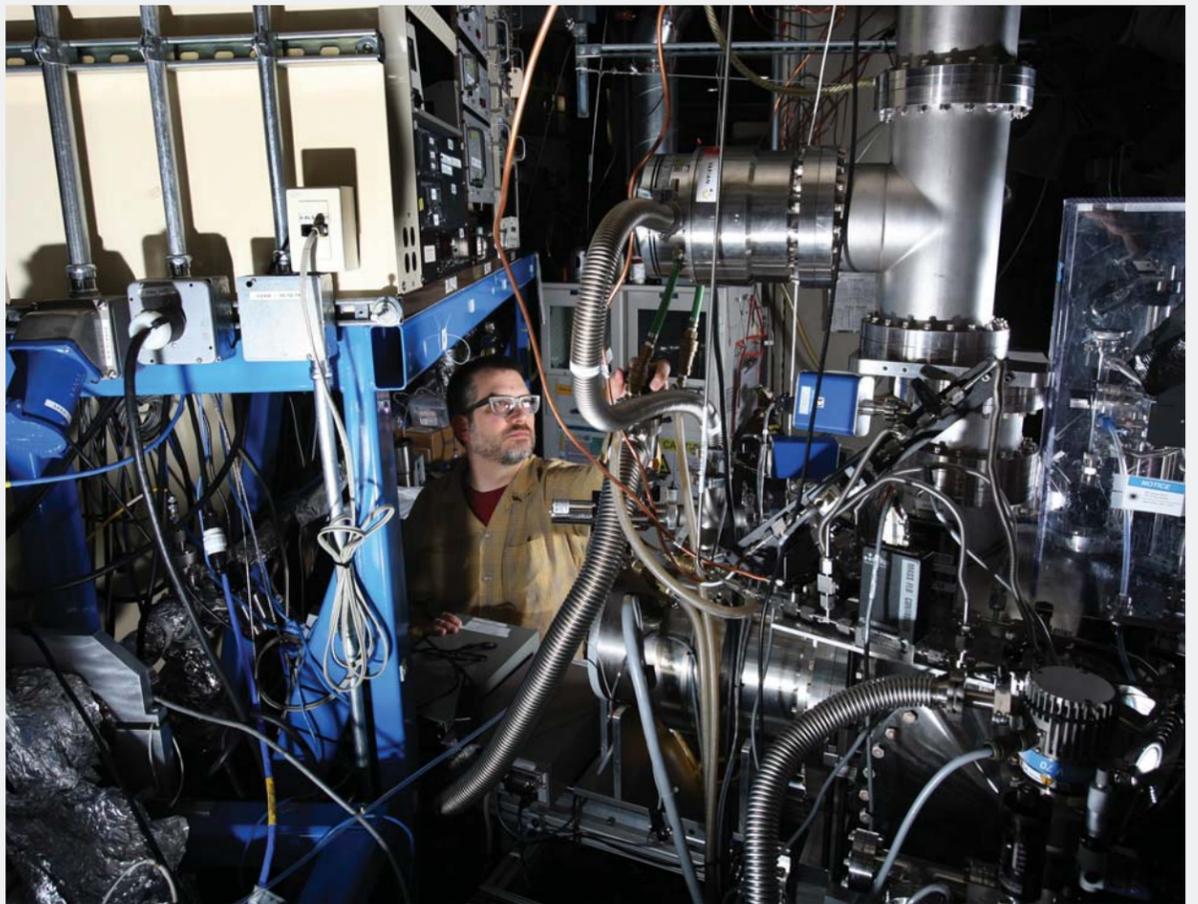
With a Laboratories Directed Research and Development-funded project titled "Tailoring Next-Generation Biofuels and their Combustion in Next-Generation Engines" that assimilates the engine and combustion-chemistry expertise of Craig Taatjes (8353) and John Dec (8300) with that of biochemist Masood Hadi (8634), Sandia is putting its money where its mouth is.

"Everyone knows about the gap that has existed between biofuel developers and producers and engine combustion researchers, but it's been a hard gap to bridge," Craig says. "Sandia, however, is a unique institution, which affords us the opportunity to work side-by-side on this issue."

The issue Craig refers to is the development of a biofuel that will work well in an internal combustion engine.

The biofuels being investigated for this project, Masood says, are produced by a class of fungi known as

(Continued on page 3)



COMBUSTION RESEARCHER Craig Taatjes (8353) adjusts a multiplexed chemical kinetics reactor at the Advanced Light Source at Lawrence Berkeley National Laboratory (LBNL). Sandia's unique machine (which is housed at LBNL) probes individual chemical reactions with isomeric resolution. Experiments on this machine will help examine the fundamental autoignition chemistry of potential new biofuels. (Photo by Dino Vournas)



Sherman McCorkle leaves TVC

Technology Ventures Corp. founding president Sherman McCorkle is leaving the organization after 18 years of creating jobs and growing high-tech businesses. Story on page 5.

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Economic impact

Albuquerque Mayor Richard Berry and Labs Director Paul Hommert were among the speakers at a recent event that detailed Sandia's economic impact in New Mexico. See photo on page 5.

That's that

As the fondly remembered Roseanne Roseannadanna (a.k.a. Gilda Radner) used to say, "It's always something." As if there wasn't enough to worry about, now comes this: You can be "pickpocketed" without the thief ever touching you. Ann Riley in Small Business Utilization Dept. 10222 sent me a news clip from a Memphis TV station that shows this electronic sleight of hand in action. In the clip, a computer security expert uses a radio-frequency identification (RFID) card reader - you can buy one for less than \$100 on eBay - to lift information from a credit card while it's still in your pocket. Turns out those little embedded RFID microchips on a lot of modern credit cards (and IDs? Passports?) - intended to help make shopping transactions easier and faster - are just sitting there in your purse or wallet ripe for the picking.

On the clip, the reporter asks one of the expert's "victims" what he thinks of this new vulnerability. "Well, I don't like it," the guy says. Couldn't have said it better myself. Great brains, right?

Being the duly diligent reporter that I am, I looked this up on snopes.com, which is the go-to site for verifying - or debunking - these kinds of claims. Snopes confirms the basics of the story, but this digital rip-off may not be as easy to pull off as the news report suggests. For one thing, if you have more than one RFID-enabled card in your wallet, the jumbled up electronic signal is basically indecipherable. Also, while first-generation RFID cards transmitted data in plain text, now most cards use an encrypted signal, a tougher nut to crack. According to that news clip, the nonprofit Identity Theft Resource Center claims to never have seen a case of electronic skimming that has led to an identity theft. Well, maybe. But for me, I'm beginning to think those steel-lined wallets you're starting to see advertised in travel magazines might not be such a bad idea.

* * *

Don Noack, one of our corporate ombuds, got an interesting email the other day that he passed along to me. The subject line says: Chinese Dinosaur Plant. The message opens: "I am China dinosaur factory. Hope that you know our product more. Also hope that we can establish long-term cooperative relation." (Please understand that I am not mocking the diction here; the writer is much more adept in English than I am in Chinese. Trust me on this.) The message goes on to explain that the factory offers all kinds of really impressive audio-animatronic, life-sized dinosaurs.

Why, Don wonders, was he getting this email? "Could it possibly be," he muses, "a not-so-subtle message from the Chinese research community - real jokesters, I'll bet - that Sandia may have moved beyond its prime and is heading for a similar fate? Is it a cautionary note we should, indeed, be heeding? Or, should we get one of those dinosaurs for Sandia's front yard because, well, it would look cool?" Gosh, I don't know, but just supposing for a moment: If Sandia really was a dinosaur, what would we be? A Tyrannosaurus rex? Maybe one of those big lumbering seismosauruses (seismosauri)? Or one of those crafty and agile velociraptors, the kind that hunt in packs and keep coming at you? On any given day, I think we've displayed characteristics of all three.

* * *

Don's not the only one who gets weird emails; I get my share, too. As editor of the paper I'm on a lot of distribution lists. Got one the other day from the United Soybean Board. Nothing remarkable about the message. I'm sure it was some sort of good and worthy news. But it called to mind for me one of my favorite Bob & Ray routines. Bob & Ray were a radio comedy team a few decades back that did some very off-the-wall, ahead-of-its time stuff. The routine set up is this: Ray Goulding plays the part of a radio announcer breaking into regular programming. Here's his report:

Here is a supplementary bulletin from the Office of Fluctuation Control, Bureau of Edible Condiments, Soluble and Indigestible Fats and Glutinous Derivatives, Washington, D.C.: Correction of Directive #943456201, issued awhile back concerning the fixed price of groundhog meat. In the directive above named, the quotation on groundhog meat should read "ground hogmeat."

See you next time.

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

Coming Oracle upgrade is super for super users

By Karyn Scott

An upgrade to Sandia's Oracle E-Business Suite designed to work better, faster, and more efficiently, especially for heavy-duty users, will be rolled out this spring.

The Oracle E-Business Suite is a set of several computer applications that integrates Sandia's financial, supply chain, and manufacturing processes. The new version is called Oracle R12, and the pending upgrade is the culmination of two years of preparation by Enterprise Resource Planning Dept. 9542 in collaboration with the functional owners of the applications.

Included in Oracle R12 are more than 1,500 new features with significant new financial functionality, says Tracy Jones, Dept. 9542 manager. "In addition, Oracle R12 includes much of the latest Oracle technology that will provide faster response times, new security features, and new web capability," Tracy says. "The majority of the new features are for the super users of the system, those working in finance and purchasing. The Sandia line users of the Oracle E-Business Suite will see a new look and feel, but will not experience any significant changes in the applications they use."

The biggest effect on Sandia line users will be the application downtime during the upgrade. The Oracle E-Business Suite will not be available from Saturday, May 14, through Tuesday, May 17. The new Oracle R12 will be available starting Wednesday, May 18, for general use.

Prior to the downtime, E-Business Suite processing will be completed for the weekend of Saturday, May 14, as usual, allowing for that data to be available in Reportville (Sandia's financial reporting website).

More than 40 computer applications will be down during the upgrade. An upgrade website with preliminary information will be available in February. This website will list applications that will not be available during the upgrade. Any alternate procedures to be used during the upgrade downtime will also be posted on the website. Additionally, training and training guides will be available for those experiencing major changes to the applications they use on a daily basis. New information will be posted to the website as it becomes available.

For the record

An article in the Jan. 14 *Sandia Lab News* about Amanda Wachtel winning a major Society of Women Engineers award incorrectly stated that she will pursue a master's degree this fall at MIT under Sandia's Critical Skills Masters Program. In fact, Amanda is still weighing her options and has not yet determined which school she will attend.



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Senior Manager of Surety Engineering

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A Designer's Perspective

Tuesday, February 1, 2011

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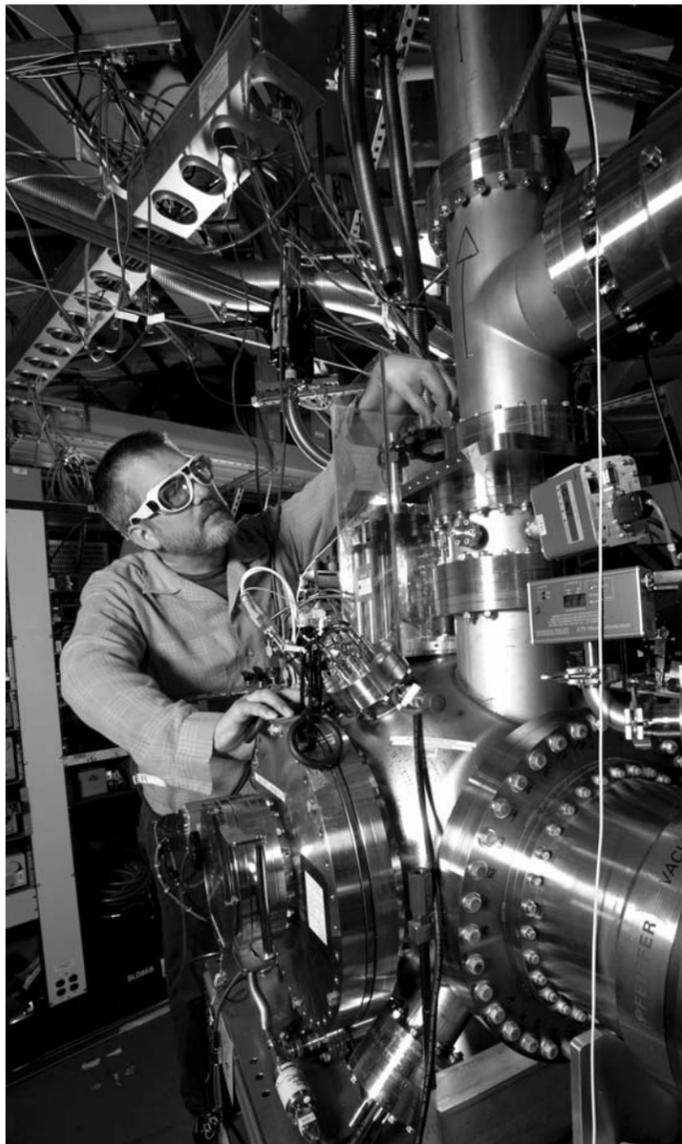


For more information contact Janet Philippsen at (505) 284-3973

Tailoring biofuels

Sandia California News

Photos by Dino Vournas



RESEARCHER Craig Taatjes (8353) tweaks settings on a multiplexed chemical kinetics reactor at the Advanced Light Source at Lawrence Berkeley National Laboratory. The machine is used in combustion research.

(Continued from page 1)

endophytes that live between plant cell walls. Professor Gary Strobel from Montana State University, a collaborator on the project, is an expert in such fungi, some of which have already been used to make chemicals such as Taxol (an anti-cancer drug). The cellular material in plant walls contains molecules that can be converted into hydrocarbon compounds that work well as fuels for internal combustion engines. Some of these are similar to the hydrocarbon compounds found in petroleum-derived fuels.

The beauty of the endophytic fungi, Masood says, is that there is no need for the cost-intensive industrial processes typically required to break down biomass. "These things can turn crystalline cellulosic material directly into fuel-type hydrocarbons without any mechanical breakdown," he points out.

These fungi, in other words, are designed by nature to grow on cellulose and to digest it, forming fuel-type hydrocarbons as a by product of their metabolic processes. Through genetic manipulation, the Sandia team — which includes Eiza Yu (8632) and Mary Tran-Gyamfi (8634) — hopes first to identify these pathways, and then to improve the yield and tailor the molecular structure of the hydrocarbons it produces.

"This is the only organism that has ever been shown to produce such an important combination of fuel substances," says Strobel in a Society for General Microbiology press release, referring to *Ascocoryne sarcoides*, an example of the type of endophytic fungi used in

this project. "The fungus can even make diesel compounds from cellulose."

Finding a fuel-friendly mix

The bioresearch team is using genetic sequencing to catalog the pathways and other molecular biology techniques to understand how changes in feedstock determine the type and amount of hydrocarbons the fungi make, with a long-term goal of engineering greater quantities of the desirable fuel species. Craig and John, meanwhile, are able to experiment with the main compounds produced in the molecular "soup" and give feedback to Masood's team on their ignition chemistry and engine performance. The ideal outcome, John says, is to "dial in" the right feedstocks combined with the right set of genes to produce the preferred blend of compounds to go into an engine.

The first step has been to learn what kinds of compounds the fungus makes naturally on its own. "There is a large spectrum of compounds present, but many of them — octane, for example — are already well understood with regards to their combustion chemistry," Craig says. "Others, we just don't know much about, so we need to do research on their ignition chemistry and how they behave in an engine." He adds that "before the biologists start modifying the fungus, the natural products will already give us specific targets to investigate from a fundamental chemistry point of view."

The team, Craig says, is working with professor William H. Green at the Massachusetts Institute of Technology to develop an ignition chemistry model that can predict the performance of the classes of compounds made by the fungi.

John says the fungus offers good versatility with respect to the variety of fuel-like molecules it provides for possible engine experimentation.

Masood and his colleagues are doing their part to build up the understanding of the distribution of molecules produced by the various fungi, at which point they can genetically

tailor them to produce more of the "right" kinds of compounds that suit the needs of engine combustion. Initially, the team will purchase (from commercial sources) the main compounds produced by the fungus so that chemistry and engine testing can proceed simultaneously with development of the fungus and production techniques.

Eventually, the team anticipates that enough hydrocarbons will be extracted from those produced by the fungus to test in the lab, or even in an engine. "We hope, in the end, to have a biofuel that was developed in conjunction with the development of the combustion model for that biofuel," Craig says.

John, who runs the homogeneous-charge compression ignition (HCCI) lab at Sandia's Combustion



EIZADORA YU (8623) prepares biomass harvested from liquid fungal cultures for nucleic acid analysis. The cultures come from the endophytic fungus *Hypoxylon* sp, which produces compounds potentially used for fuel.

Research Facility (CRF), says experiments on the HCCI platform offer good fundamental information on fuel auto-ignition behavior that can be related to performance in other engine types such as spark-ignition or diesel, as well as to performance in HCCI engines. Advanced HCCI engines are being considered by industry as a more efficient alternative for future automobiles. These engines can operate using a variety of fuels, making HCCI a good starting point for the experimentation and chemical measurements necessary for a project of this type.

Engine, biofuels collaboration a no-brainer

Craig, John, and Masood all say that it makes perfect sense for Sandia to invest in a project that focuses on an engine's interaction with a new biofuel.

"Any fuel that's going to make it in the marketplace is going to have to blend with gasoline," John says. "A new biofuel, whether it comes from the *Ascocoryne* fungus or another source, will be more useful commercially if we have first learned how it will affect combustion processes," Masood adds.

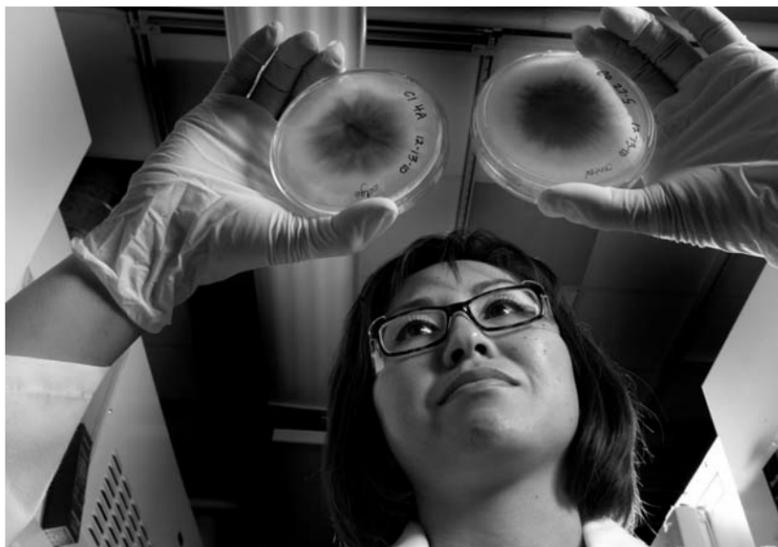
While Craig and John both note that there are a broad range of other technical issues that engine manufacturers must test and worry about in addition to ignition chemistry, the success of this project will prove important as the industry works toward developing biofuels that can displace petroleum in the long term.

Masood says the project is unique to this team for a couple of reasons.

"This is completely out of our comfort zone, but in a good way," he says with a smile. "Although we know how to grow things in the lab and can manipulate DNA, we've never worked with an endophytic fungus before. Plus, working with the combustion experts is new to us."

On the fuel-utilization side, Craig says the usual model would be for Sandia's combustion researchers to learn of a potential new fuel to work with and then to "figure out" whether it was viable for a combustion engine. With this project, he says, the combustion experts are working directly with the biofuels researchers to understand from the start just what will work best as fuel for internal combustion engines, accelerating the pace of alternative fuel development and the associated engine optimization. "We have a rare opportunity to decide for ourselves what the fuel is going to look like and can build our own optimization loop."

"There is a whole new range of potential fuels now with biomass," John says. "These biofuels are going to have to be compatible with existing engines, since you're just not going to get something into the marketplace that requires both a completely new fuel and a new engine. So the new fuels will have to work well with both existing engines and advanced engines like HCCI or low-temperature diesel combustion. Only then will you be able to sell the fuel at the pump and get your new high-efficiency, low-emissions engine into the marketplace."



MARY BAO TRAN-GYAMFI (8634) examines plates of endophytic fungus *Hypoxylon* sp, which produces potential compounds used for fuel.

IT'S AN HONOR

• Stories by Neal Singer

Richard Murphy a 'person to watch' in supercomputing world

Richard (Rich) Murphy (1422) has been identified as a "person to watch," not by the CIA but by the relatively venerable online computing magazine *HPCwire*, which each year names a handful of researchers its editors believe to be doing the world's most interesting work in supercomputing.

Rich is principle investigator for Sandia's X-caliber project, a DARPA-funded high-performance computing effort to radically lower the power usage of computer systems at all scales by 2018.

"If we don't solve the power problem," Rich says, "we'll have to stop building bigger, faster supercomputers, or they'll become resources that cost as much to use as superconducting supercolliders, which will really limit their impact."

Rich also led the launch this year of the newly created Graph500 test, an internationally used benchmark tool that offers an alternative to the Linpack500 in measuring the ability of computers to manipulate large-scale data sets (*Lab News*, Nov. 3, 2010, and Dec. 6, 2010).

"In the past, we designed supercomputers to do physics — that's why FLOPS are so important — but this new kind of test measures memory access and the ability to marshal huge data sets efficiently," he says. "Graph500 is a test for a totally new area." Such areas

can be found, for example, in following the huge number of barrels of oil in transit around the world today in ships, or keeping track of the medical records of every patient in the US.

In a sense, Rich says, the goal is to go from using supercomputers to simulate a hypothesis to building supercomputers capable of generating a hypothesis.

"In the example of medical informatics, we know that genetics plays a role in how certain drugs or courses of treatment work. When moving these things from clinical trials to much larger populations, these techniques could be used to figure out how to personalize



RICH MURPHY

courses of treatment based on genetic or environmental factors. We could use knowledge discovery to figure out in very specific populations how effective a new medicine is, and actually recommend courses of action."

The transition to exascale will be challenging, Rich says. "Unlike the tera-to-petascale transition, we know we can't just scale commodity architectures: the barriers have to do with fundamental physics. Perhaps even more significantly, the tasks we want the computer to achieve are changing. It's not just 3-D physics anymore. This changes the computer's architectural requirements and how we design the system.

"But I think we have to have this capability to maintain our national competitiveness."

To come up with such thoughts, it helps to have had a nerdy childhood. Rich built his first network protocol and programming language in high school, and had an early idea of building a three-dimensional online world with the goal of selling stuff on it — "think Second Life crossed with Amazon before Second Life existed" — but that bubble burst before he could implement it, he says.

He's one of the few people in the 168-year history of Notre Dame to hold four degrees from that institution — a Bachelor of Science in computer science, a Bachelor of Arts in government, and a master's and doctorate, both in computer science and engineering.

Mike Heroux named editor-in-chief of key software journal



MIKE HEROUX

Mike Heroux (1426) has been named editor-in-chief of the Association for Computing Machinery (ACM) journal *Transactions on Mathematical Software*.

The quarterly publication, published by ACM, has been rated among the top 20 journals for its "impact factor" — roughly, the number of times its articles are cited by others. Subjects discussed include the theoretical underpinnings of numeric, symbolic, algebraic, and geometric computing applications in the analysis and construction of algorithms and programs, as well as the interaction of programs and architecture.

Mike has been involved in the development of mathematical software for more than 20 years. He started and leads the Trilinos project, which is the largest single collection of open-source software libraries for scientific computing. He is also an author of a number of other open software efforts such as Tramoto, Mantev, BPKIT, and Aztec.

At Cray Research in the 1990s, he developed algorithms and software for the Cray Scientific Libraries and was involved in development of the Basic Linear Algebra Subprograms (BLAS), de facto standards for linear algebra computations.

In addition to Mike's new tasks at ACM TOMS, he is an associate editor for the Society for Industrial and Applied Mathematics' *Journal of Scientific Computing*.

Tamara Kolda to edit section of key high-performance computing journal

Tamara Kolda (8966) has accepted a section editorship of the Society for Industrial and Applied Mathematics' *Journal on Scientific Computing* [SIAM SISC], overseeing the portion reserved for high-performance computing and software.

"The journal just formed this section due to increased interest in computing," Tammy says. "I was excited to be asked to serve as inaugural editor."

Tammy had served on the journal's editorial board for six years and had strongly suggested formation of the new section.

Sandia researchers now play important roles in the two main academically recognized journals that cover software, she says. These are her journal and the Association for Computing Machinery's (ACM's) *Transactions on Mathematical Software*, where Mike Heroux (1426) will soon be editor-in-chief (see story at left).

"Sandia has a very strong and diverse computing program that meshes with our role in supercomputing," Tammy says.

Tammy's research interests include multilinear algebra and tensor decompositions, data and graph mining, optimization, nonlinear solvers, graph algorithms, cybersecurity, parallel computing, and the design of scientific software. Among her awards is a 2003 Presidential Early Career Award for Scientists and Engineers (PECASE). In 2009, Tamara was recognized with a Sandia Award for Excellence for Laboratory Directed Research & Development for work related to tensor decompositions. Additionally, Tammy was a contributor to the Trilinos project, a suite of numerical software packages and winner of a 2004 R&D 100 award. In addition, she is also an associate editor for *SIAM Journal on Matrix Analysis* and a senior member of the Association for Computing Machinery (ACM).



TAMMY KOLDA



ACM Transactions on
Mathematical Software



DUANE DIMOS

Sandia Engineering Sciences Center 1500 Director Duane Dimos elected Fellow OF AAAS, world's largest scientific association

Duane Dimos, director of Sandia's Engineering Sciences Center 1500, has been elected a fellow of the American Association for the Advancement of Science (AAAS), the world's largest general scientific association.

Fellows are chosen by their peers to be honored for scientific or social efforts to advance science or its applications.

The citation for Duane reads, "For technical contributions to electronic oxide materials and devices, contributions to the materials science and engineering community, and leadership of materials science and engineering organizations."

Duane's technical contributions have come in the areas of high-temperature superconductors, ferroelectrics for non-volatile memories, dielectrics for capacitors, and new direct-write deposition approaches to improve the integration of

materials for advanced packaging.

His contributions to the materials science and engineering community include organizing technical meetings and chairing committees as well as review and journal boards.

Duane served as director of Sandia's Materials Science and Engineering Center for more than four years, and has held leadership roles in the Materials Research Society and American Ceramic Society. He was recognized as a fellow of the American Ceramic Society in 2002.

This year, 503 new fellows will be presented with an official certificate and a gold and blue rosette pin (representing science and engineering, respectively) on Saturday, Feb. 19, 8-10 a.m. at the AAAS Fellows Forum during the 2011 AAAS Annual Meeting in Washington, D.C.

Mayor Berry, Paul Hommert talk about Sandia's economic impact



ALBUQUERQUE MAYOR RICHARD BERRY, right, and Sandia President and Labs Director Paul Hommert were among the speakers at Sandia's annual Economic Impact Summit. The summit highlighted the role Sandia plays in the local economy and community. At the summit, Sandia released the report, *2010 Sandia National Laboratories Economic Impact*

on the State of New Mexico, detailing how more than \$1 billion spent on goods and services and nearly \$1.3 billion spent on salaries and non-contract related payments helped fuel the state's economy in fiscal year 2010.

(Photo by Randy Montoya)

Founding president Sherman McCorkle says farewell to Technology Ventures Corporation after 18 years

By Heather Clark

When Sherman McCorkle took the helm at Technology Ventures Corporation (TVC), there were no private investment firms in New Mexico, so a five-year commitment TVC made to raise \$10 million seemed an impossible goal.

But back in 1993, when TVC was created as part of Martin Marietta's bid to manage Sandia, McCorkle says, "\$10 million was considered an OMG number."

But in two years, TVC reached its goal and by the fifth year, had raised a couple hundred million dollars, McCorkle says.

Eighteen years later, the CEO and president of TVC is stepping down, but he leaves behind a nonprofit charitable foundation funded by Lockheed Martin that has raised \$1.18 billion in equity investment, created more than 13,500 jobs, and helped launch 113 companies during his tenure. And this past fall, the US Commerce Department honored TVC with a \$1 million i6 Challenge award to develop an infrastructure to prepare promising technologies for the market. TVC was one of six technology transfer organizations nationwide to receive the award.

"My 18 years with Lockheed Martin have been very productive years," McCorkle said in a news release announcing his departure this month. "Lockheed Martin has contributed more to job creation in New Mexico than any public corporation going back to statehood."

Looking back, McCorkle says the mid- to late 1990s were the heyday of technology transfer. DOE and Congress focused on it and New Mexico was attracting about one private equity company a month during that time. The good years ended after the dot-com bubble shrank the amount of private



TRANSITIONING — Technology Ventures Corp. CEO and President Sherman McCorkle, right, and TVC program management director and chief financial officer Randy Wilson, who together launched TVC in 1993, have announced that they are leaving the successful nonprofit high-tech business incubator for other opportunities. (Photo by Randy Montoya)

equity available, he says.

Asked about the tech transfer highlights over the years, McCorkle says he never managed to develop the ability to predict which companies would be most successful when would-be entrepreneurs first walked through TVC's doors.

"Of course, Micro-Optical Devices Inc. (MODE), that was acquired by EMCORE, which sits right outside the [Sandia] gate, is the most visible, but it's like asking which one of your nine children is your favorite," McCorkle says.

He also recalled Sandians who left the Labs to start companies, but returned, bringing with them market

knowledge and savvy that has benefited Sandia.

McCorkle leaves his job Jan. 31, but his work will continue to bring him into contact with Sandians. He plans to devote time to the Sandia Science & Technology Park Development Corporation, where he will market land to technology companies that work with Sandia and other tenants on Kirtland Air Force Base. He says he'll focus on companies that work with small satellites.

Jackie Kerby Moore, manager of Technology & Economic Development Dept. 1933 and executive director of the Sandia Science & Technology Park, says McCorkle has been a huge supporter of the Labs' technology transfer efforts over the years and has mentored many Sandians who have left Sandia to start their own businesses.

"Sherman is a visionary and a results-oriented leader; he brings a broad set of leadership skills, which you don't always find in just one person. Inside Sandia and throughout New Mexico, he really inspired a conversation about creating startups and keeping them in New

Mexico," Jackie says. "He's always been a champion and advocate for those people who want to be entrepreneurs and to license Sandia technologies to start their businesses."

McCorkle also will work to build the Albuquerque Regional Economic Alliance and the Barelas Economic Opportunity Center programs, and he will remain vice chairman of the Kirtland Partnership Committee, a private nonprofit corporation that supports Kirtland in Albuquerque.

John Freisinger, TVC's director of business assistance, will become the new CEO and president of TVC after McCorkle's departure.

Sandia security experts help Kazakhstan safely transport, store Soviet-era bomb materials



(Continued from page 1)

The removal of the weapons-grade materials marks the completion of 14 years of work that began in 1996 under then-Sandia Roger Case, now retired. Dave took over the project at the start of its second phase in 2003, making about 45 trips to Kazakhstan to complete the work.

"We're making things safer in the world," Dave says. "Before it was protected, the materials were vulnerable to theft by those who would steal them to build nuclear weapons. This project has secured enough material to make 775 nuclear weapons. That gives us a great feeling and should make people feel much better."

NNSA oversaw the project as part of its Global Threat Reduction Initiative. In addition to Sandia, NNSA's team also included Idaho, Los Alamos, Oak Ridge, and Pacific Northwest national laboratories, the US Defense and State departments, the Nuclear Regulatory Commission, the International Atomic Energy Agency, several contractors, and the United Kingdom, Kazakhstan, and Russia.

Sandia protected the fuel while it was stored at the BN-350 reactor and at a temporary, outdoor concrete storage pad in Aktau; along a journey by train across Kazakhstan to Kurchatov; while it was at another interim storage pad there; and along a truck route to a long-term concrete storage pad in northeast Kazakhstan.

Sandia also conducted vulnerability studies that Dave used to brief Congress, the Pentagon, and members of the National Security Council. Sandia, in conjunction with Albuquerque-based Technology Management Co., also provided extensive travel and international field logistics for the project, Dave says.

"The United States was very worried about this material not being protected well enough and that it could be stolen, so the United States offered to protect it," Dave says. "In the interior, it would be much more difficult for adversaries to try to steal it."

The BN-350 reactor at the Manigstau Atomic Energy Complex, which started operations in 1973, was a Soviet-era fast-breeder reactor used to produce plutonium for the former Soviet Union's weapons program. It also generated steam for electricity, heat, and water desalination to provide drinking water. It was shut down by the Kazakh

government in 1999.

The reactor sits on the eastern shore of the Caspian Sea. The busy port is a point of departure for ships carrying oil from Kazakhstan to Baku, Azerbaijan, where the oil then enters pipelines that take it to Europe.

The fuel rods were placed into canisters and then into 60 100-ton concrete and stainless steel casks. The casks were stored on a pad outside the reactor before being



ALL IN A ROW — The last cask delivered from the BN-350 reactor in Aktau on Nov. 18 stands in place at the long-term storage pad, marking the completion of 14 years of work by Sandia providing security and logistics for the project.

loaded into shipping containers to make the four-day train journey to Kurchatov, where they would be unloaded and placed onto trucks for the trip to their long-term storage facility.

Sandia worked with Kazakhstan's Ministry of Interior troops, providing them with technical advice, communications equipment, and other support, Dave says.

"We talked to them a lot about how they would do a response to any incident that occurred and agreed on how this would be done," Dave says.

To make sure all would go smoothly, Dave was one of three Americans who traveled on the train during a dry run of the journey in December 2009 before they began transferring the spent fuel rods. The trip was to ensure that the security plan worked, that the loading and unloading of

the casks went off without a hitch, and that communications were reliable.

"The physical protection during the transportation was the most difficult part of the project," Dave says.

John Franklin of National Security Studies Dept. 0545 researched options for procuring two rail cars that carried guards on the train, one serving as a backup in case the other was hit. Before the train left, rail crews checked the thousands of miles of tracks for explosives. The trains were given top priority as they crossed the country, Dave says.

At a late-night stop during the dry run, two intoxicated people approached guards and started asking questions about the train. Dave says Kazakh troops were called to the scene, where they arrested the two people.

The incident gave Dave reassurance that the systems Sandia and Kazakhstan had put in place would work.

"It gave us a good feeling that indeed people were actually there, even though we didn't always see them and they didn't want to be seen and attract too much attention," he says. "But it did emphasize that the plan was good and we felt much better about it."

During that four-day train ride, Dave says he looked for changes in the terrain that adversaries could use to attack the trains along the route. He needn't have worried.

"What we found was that one end of Kazakhstan looks much like the other end. It was very flat, no real hills, few trees," he says. "We could count the number of trees."

The real runs started in February, which brought on the next challenge: the weather.

Temperatures dropped to minus 42 Celsius, which was too cold for the cranes that unload casks from train to operate.

"The last thing we would want to do was to have those things drop," he says.

Luckily, the temperature "warmed up" to minus 20 Celsius when the train arrived at its destination, so things could proceed as planned.

The 12 trips from Aktau to Kurchatov and then to the final location went smoothly, Dave says.

"There were no incidents during the hot runs when we had the fuel in there. We count that as a success," he says.

In addition to Dave and John, the Sandia team also included Bruce Varnado (6833), who served as backup for Dave in Kazakhstan, Janine Donnelly and Carrie Wood (both 10668), and Linda Holle (10667).



UNLOADING — Crews worked day and night to ensure the casks made it to their long-term destination.



SAFE STORAGE — Dave Barber, second from left, celebrates with Kazakh and US officials as the last cask is unloaded at its long-term storage pad.



CELEBRATION — Dave Barber, sixth from right, joins Kazakh, US and other officials behind the Kazakh and US flags to celebrate the placement of the final cask of bomb materials at the long-term storage pad.



SECURITY MEASURES — Bruce Varnado (6833), right, also made trips to Kazakhstan to support Sandia's security measures that ensured the safe delivery of nuclear materials from the BN-350 reactor in Aktau to their long-term storage pad.

Postdoc researchers show off results in Sandia Post-Doctoral Technical Showcase

Postdoc researchers from around the Labs gathered Dec. 9 to show off the results of their latest work, part of the 4th annual Sandia Post-Doctoral Technical Showcase.

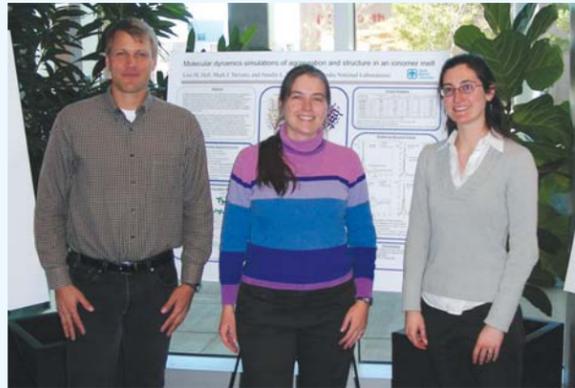
The event was sponsored by the Post-Doctoral Professional Development Program (PD2P). Participants were given the opportunity to share their research, as well as have their posters judged by a panel of managers and experienced Sandia staff. Research topics on display ranged from energy storage and development of biofuels to nanoscale fabrication and studies of viruses. Centers 1100, 1400, 1500, 1700, 1800, 6200, 6600, 6900, 8200, 8300, and 8600 were represented at the event. Participation in the poster session doubled from previous years; 27 percent of Sandia's postdocs participated.

Winners of the poster session were Ryan Davis (8634) and Lisa Hall (1814); runners-up were Summer Ferreira (1114), Matt Lane (1425), and Oscar Negrete (8621).

Ryan Davis and mentor Seema Singh (8634) measured interactions between the osmotic and photo-adaptation pathways of a salt-tolerant microalgae.

"It is very exciting to be able to apply Sandia's unique analytical and engineering capabilities to the unique

multidisciplinary challenges of generating biofuel from algae," Ryan says. "Everywhere I look there are more possibilities for laying the technical framework for a cost-effective and carbon-neutral biofuel industry."



NEW MEXICO POSTER WINNER Lisa Hall (1814, center), flanked by runners-up Matt Lane (1425) and Summer Ferreira (1114). California poster winner was Ryan Davis (8634); the runner-up was Oscar Negrete (8621).

Lisa Hall and mentors Amalie Frischknecht and Mark Stevens (both 1814) studied ionomers, polymers with a small fraction of charged groups, using molecular simulations. These materials have significant advantages over present solid battery electrolytes, except their conductivities are currently too low.

Summer Ferreira, with mentor Tina Nenoff (1114), synthesized uranium oxide nanoparticles using gamma irradiation and studying their sintering behavior using in situ transmission electron microscopy. Their research is aimed at developing nuclear fuel applications.

Matt Lane and mentor Gary Grest (1114) demonstrated that full polymer encapsulation of small (<5 nm) spherical nanoparticles is impossible. Instead, the polymer coating is highly asymmetric due to the high surface curvature. They are exploring whether this asymmetry can be used to create nanoparticle arrays spontaneously by self-assembly.

To better understand viral hemorrhagic disease, Oscar Negrete along with project leader Bryan Carson (8622) sought to identify the mechanisms by which viral proteins modulate the host response during arenavirus infection.

Feedback

Writer fights for lost half-hour of vacation; question about 'Degree Attainment Award'

Q. Prior to the timecard changes, some could charge partial days to vacation, which was 4.5 hours in some cases. As a result, they may have a half-hour remainder in their vacation balance. The new vacation use policy (HR100.4.2) allows vacation charging in only one-hour increments. Therefore, some Sandians have a half-hour of vacation that can never be used. For example, if they charged all remaining vacation now, they will still have a half-hour left that cannot be used because the Timesheet application won't allow it (TRC241). We were not warned prior to the change to make sure our vacation balance was a whole number if we wanted to use our earned benefit. Payroll staff has now mentioned that all those Sandians with partial hours of vacation in their balance have to wait until termination to recover their earned vacation benefit. Why weren't we advised of this side effect of the policy change and why wasn't a workaround established?

A. The former timekeeping system, ETK, was not intended to allow employees to charge half-hour increments. The policy stated that vacation had to be taken in half-day increments, though, so that nine-hour workdays meant 4.5 hours of vacation for a half-day vacation. The ETK system had a period of time where it did allow the half-hour to be entered, which is what appears to have happened in your case, leaving a half-hour balance. Prior to the ETK system being end-of-life, it did properly adjust to not allow the use of half-hour increment charging; but for those who had previously charged that way, it left them with these lingering balances. All nonrepresented, hourly employees are allowed to charge half-hour increments on their vacation, but exempt-level employees are not. So if you are an exempt-level employee, then you are correct that the system cannot accommodate allowing you to charge half-hour vacation increments. The inability to charge in half-hour increments was established during the period when ETK was still in existence, so there would not have been communication on this when we went live with the new system. It is likely that due to the immateriality of the half-hour lingering balances, no communication was sent out when ETK no longer allowed employees to charge in this manner.

— Donna Kao, (10510)

Q. Does Sandia still offer a degree attainment award for graduates who obtain degrees through Sandia's University Programs? The award used to be \$500.

A. The degree attainment award was in place for several years. Due to budget constraints, this award became unavailable through University Programs in April 2007. However, line managers have the option of recognizing degree attainments if they have the budget and are so inclined.

— Charline A. Wells, (3520)

ETHICS IN ACTION: REAL CASES AND OUTCOMES

ETHICS CASE #6

Ethics and Business Conduct Office is proud to continue with its series of **Ethics in Action: Based on Real Cases and Outcomes**. The purpose of this article is to provide an opportunity for employees to learn and better understand our values and policies in action. Many Sandia National Laboratories employees want to know that their management and the Ethics and Business Conduct organization take their concerns seriously and action is taken on reports of unethical business conduct. Ethics in Action will highlight Sandia National Laboratories' Ethics and Corporate Investigations cases, and outline the responsive action taken by the corporation.

CASE ISSUE: PERSONAL RELATIONSHIPS

Background:
Ethics received an anonymous allegation alleging the existence of a personal relationship that inappropriately impacted the organization.

Facts:
An investigation found that:

- A relationship between a member of management and a subordinate employee did exist;
- There was no evidence that the employee received favorable treatment as a result of the relationship;
- There was a perception that the employee received favorable treatment which resulted in others being annoyed and/or troubled by the situation;
- Consistent with policy, the relationship had been reported to upper management; and
- A mitigation plan was in the process of being implemented prior to receipt of the allegation.

Resolution/Discipline:
Based on the facts of the case, the charge that the personal relationship existed was substantiated. However, no disciplinary action was taken because the existence of the relationship had – consistent with policy – been reported and separation of the parties involved was being implemented.

Applicable Policy:
CG100.4.1 Potential violation of Setting the Standard – Code of Ethics and Business Conduct to avoid personal conflicts of interest, and the Employee Handbook regarding manager-subordinate close personal or spouse-like relationships.

Case Issue:
Did such a relationship exist?

Employee deaths

Colleagues remember their friends, co-workers

Dan Holloway was a great storyteller and game player



DAN HOLLOWAY — Dano — was “extremely well-versed technically, while maintaining a certain level of humor and light-heartedness,” recalls colleague David Cunningham.

“He loved to travel and introduced me to vacationing in Belize. Dan was an early guy at work. I’d often stop and chat in his doorway. He’d tell me about his latest exploits on some warm Caribbean island, or about the latest video game or electronics gadget. It was easy to get caught up in his enthusiasm.”

— Richard Wickstrom

Dan Holloway (5531) died on Jan. 6. He was 55 years old and had been at Sandia more than 35 years.

Dan worked in the Space Mission Program area developing software and graphical computer displays for systems such as the Defense Support Program (DSP) and other satellite sensing systems.

“He played a vital role in designing, implementing, and delivering satellites that protect the United States from the proliferation of weapons of mass destruction,” says his manager, John Feddema (5535). “He was not only the go-to person in software architecture and design, visualization, and graphical user interfaces, but he was also an incredible mentor to many of the other staff.”

David Cunningham (5531) and Dan shared a mutual interest in computer graphics and computer visualization. “Everyone knew him as an easygoing, approachable guy,” David says. “He was extremely well-versed technically, while maintaining a certain level of humor and light-heartedness.”

Richard Wickstrom (5572) worked with Dan for about 15 years. “We met while developing satellite ground station software. Our small group reveled in the free and fast exchange of ideas that we collectively hatched and grew. Dan’s were among the best. They were always delivered with light-heartedness and abundant humility. Our group met for marathon design sessions that included hours of brainstorming, inspiration and laughter.

“He loved to travel and introduced me to vacationing in Belize. Dan was an early guy at work. I’d often stop and chat in his doorway. He’d tell me about his latest exploits on some warm Caribbean island, or about the latest video game or electronics gadget. It was easy to get caught up in his enthusiasm.”

“Dano never cared if you were a technician, staff member, manager, or a janitor, he would make time to talk with you,” says Steve Wagner (5536). “He was a huge sports fan who was loyal to his teams, regardless of their records. Dano loved to play sports. You wanted him on your team; you did not want to compete against him.”

Retiree Jerry Van Slambrook says Dan was his dearest friend for more than half his life. “He had a magnetic personality, an infectious laugh, a great sense of humor, and a pure and undying joy of what he did. I know it is a worn-out phrase, but never truer than in this case — his vocation was his avocation.”

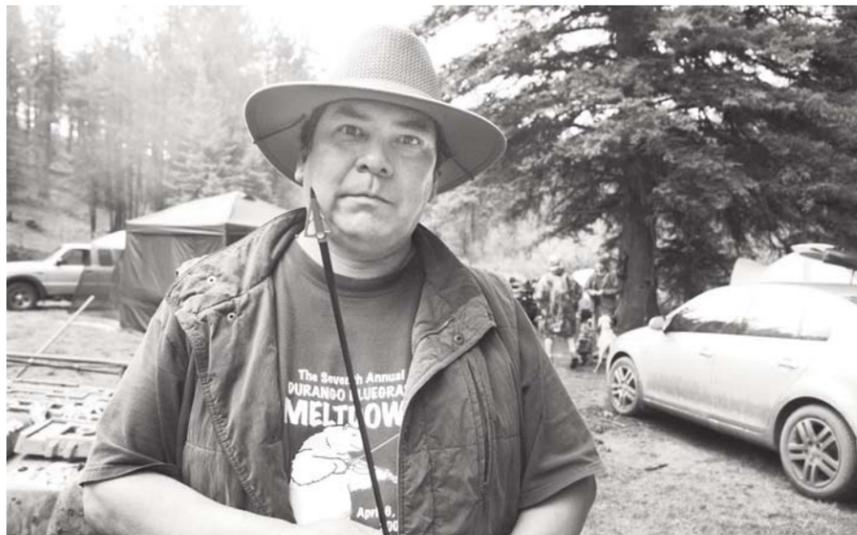
Mike Arms (6132) was on a team with Dan in the outback of Australia. “I always got a kick of hearing Dan tell the story of how we played golf on orange desert sand with green golf balls so they could be seen more easily,” says Mike. “Dan would emphasize how the putting greens were large areas of the sand that had oil poured on them to make them thicker. Before putting, we would rake it smooth. The standing joke became that this golf course with its sand fairways and oiled sand greens, was also equipped with grass traps.”

Jerry feels the presence of Dan even now. “Imagine with me for a moment,” he says, “a satellite orbiting high above, equipped with a sensor looking back at the disk of Earth with the capability of measuring and detecting changes in the luminance of the Earth, producing messages with increases or decreases in the mean value of this measure. On Jan. 6, a detected and measurable but unexplained negative shift of the Earth’s lumens took place somewhere in the vicinity of Albuquerque, N.M.

“The satellite is, of course, imaginary and the measure is just a metaphor, but the dimming of the light on that date, along with the reason for it, is painfully real to all of us, then and now, and will be for a long time.”

— Iris Aboytes

Charles Lauriano liked to go ‘elk camping’



CHARLES LAURIANO was a man who “acquired the reputation as someone who could build or fix anything,” says friend John McKenney.

Charles Lauriano (1643) died on Jan. 13. He was 51 years old and had been at Sandia more than 27 years.

“Charles developed equipment and procedures to fill gas cells and z-pinch targets with a variety of gases at low and high pressures,” says his boss, Michael Cueno (1653). “He helped perform high energy density physics experiments in inertial confinement fusion and radiation science at the Z facility utilizing this equipment. These experiments were at the leading edge of what is possible in laboratory science. Charles was a critical part of establishing these new capabilities on the refurbished Z when it became operational in 2007-2008. Charles also assisted in the development of advanced target-fill capabilities that involve filling targets with cryogenic fluids. He performed this work on the Saturn and Z pulsed power generators.

“One time we were putting together a building for a friend who was just starting a business. . . .

Early in the morning, Charles disappeared without a word.

We all wondered where he was going, but continued to work.

A short time later, Charles reappeared with a large new toolbox filled with all of the specialty tools we were wishing for .

. . . He didn’t say a word. He didn’t ask for thanks. That is what I will always remember about Charles.”

— Anthony Chavez

“Charles also spent about five years on target fabrication for z-pinch experiments. He built and maintained vacuum thin-film deposition systems, vacuum ovens, and other equipment.”

John McKenney (1643) says, “Charles acquired the reputation as someone who could build or fix anything.”

“Charles was a great friend, who stood by you, no matter what,” says Anthony Chavez (4843). “One time we were putting together a building for a friend who was just starting a business. We all brought our tools and skills, but while we were adequately supplied in talent, we were lacking in the tool category. Early in the morning, Charles disappeared without a word. We all wondered where he was going, but continued to work. A short time later, Charles reappeared with a large new toolbox filled with all of the specialty tools we were wishing for.

“He had left to go buy all of the tools that would help make the job easier. He didn’t say a word. He didn’t ask for thanks. He simply got back to work. That is what I will always remember about Charles.”

Sport shooting was one of Charles’ favorite hobbies. “He loved the outdoors,” Keegan Shelton (1643) says. “On one of our camping trips he taught us how to shoot a compound bow. He was a natural at entertaining people while teaching them.”

“I knew Charles ever since being hired at Sandia almost 20 years ago,” Ricardo De La Rosa (4843) says. “He was very outgoing and had a great sense of humor. Recently I took him to check out a model home of a house I am building. ‘Rick, this is my room,’ he said. I agreed. This room was staged in pink; it was a girl’s room. We laughed. That was two Sundays ago.”

Eric Burns (1741) and Charles were friends for 20 years. “We started working together in the early ‘90s and remained friends even after we took jobs in different organizations,” Eric says. “Some of Charles’ hobbies included bow hunting or as he called it elk camping. He liked to ride four-wheelers. He enjoyed throwing darts, and I believe he was once a state champion. He liked golf, photography, and was an accomplished wood worker.

“Charles was always willing to pitch in and would be one of the first to show up with tools in hand if someone needed help. We were lucky to call Charles our friend.”

— Iris Aboytes

Recent Retirees

New Mexico photos by Michelle Fleming



Victor Baca
35 2554



James Beasley
35 2957



Michael DeWitte
35 3650



Robert Watson
29 11500

Retirement

Retiring and not seen in the *Lab News* pictures: Louann Grady (5528), 34 years.



Mileposts

New Mexico photos by Michelle Fleming



David Marks
35 5932



Mark Montavon
35 5424



Stephen Montgomery
35 1524



Juanita Padilla
35 3520



Alicia Cloer
30 10685



Jeffrey Everett
30 500



Teresa Jordan-Culler
30 5422



Corey Knapp
30 2000



Shirley Ann Mayer
30 10648



Dennis Clingan
25 2617



Dennis Croessmann
25 1910



Mark Dickinson
25 514



Michael Gilbert
25 5403



Ronald Hoskie
25 4842



Timothy Mitchell
25 10221



Randy Montoya
25 3601



Michael Morrow
25 5918



Anthony Wagner
25 5525



Sharon Deland
20 6831



Vincent Hietala
20 1717

Configuration management graduates bring order to product lifecycle issues

After a three-week immersive course that included classroom study and hands-on workshops, 26 Sandians have earned certification as configuration management professionals (CMI is the certification designation). The course was offered by the Institute of Configuration Management (ICM) and sponsored by the University of Tennessee and National American University.

Configuration management is a discipline that aims to maintain consistency among requirements, the product, and all of its documentation as hundreds of changes are made during a product's development lifecycle. One change may impact any number of items and documents and there may be many changes in process at once. The challenge is to keep everything synchronized for the entire backlog of changes. For large, robust projects, synchronization becomes dauntingly complex.

CM capability has long been a requirement in the Sandia management and operating contract and many key Sandia customers have either an implicit or explicit expectation that Sandia apply CM principles and practices in its work.

In many potentially high-risk projects, and because of customer requirements or expectations, a robust CM

program is deployed routinely.

"Implementing a standard CM process for end-user and lab-wide benefit will mitigate risk, provide reliable, repeatable, predictable results, and reduce costs. For the individual, a well-implemented CM process saves time by ensuring that clear, concise, and valid requirements are documented and released," says Thomas Henderson



SIMONE STOWE, Frank Vigil, and Grant Kiba (left to right) discussing configuration management principles during one of many workshops during the three-week course.

about implementing CM at Sandia. Thomas is co-champion with Barbara LaGree of the Sandia CM community of practice.

The 26 Sandia graduates are: Ashley Amparan Pena (2994), Traci Brooks (9535), Timothy Buteau (6623), Crystal Carasco-Ruiz (2626), Richard Chavez-Hatton (2996), Joe Hanosh (2995), Carissima Heise (10659),

Magdalena Heise (5732), Ann Hodges (5212), Jennifer Jones (2997), Grant Kiba (8241), Laney Kidd (9336), Aaron Machado (8243), Marlo Maxson (5212), Gordon Roubik (5403), Ruth Roybal (9514), Chris Russell (2997), Jeff Salk (2994), Gary Shoemaker (2994), Simone Stowe (2997), Jeff Taylor (2997), James Tristan Thompson (5212), Frank Vigil (2994), Dan Vortolomei (2992), Leanne Whittemore (9512), and Jimmie Wolf (9336).

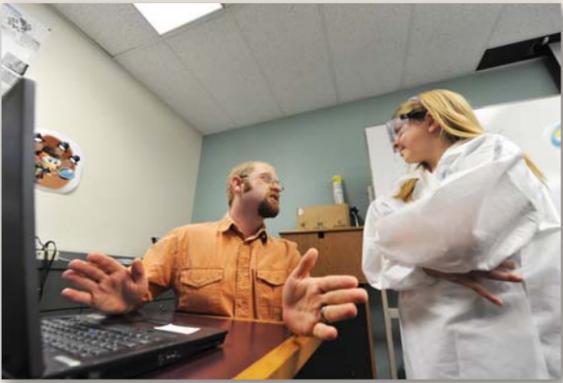
Immediately following the three-week CMI course, ICM conducted a three-day Boot Camp for Managers course. The aim of the course was to provide managers and interested members of staff with a baseline of knowledge and awareness about configuration management theory and practice so that they have a better sense of how to tap into the skills developed by the newly graduated configuration management professionals. The managers completing the boot camp were: Tim Berg (9336), Fran Current (2996), Matt Donnelly (2993), Paul Helmick (1385), Thomas Henderson (2995), Tony Hernandez (2998), Barbara LaGree (5210), Dean Manning (5403), Tim Meeks (2994), Ed Saucier (9535), Abe Sego (2997), John Shaw (9711), Jody Smith (2624), and David Wheeler (1382).

Other members of the workforce completing the boot camp were:

Leslie Cantrell (2614), Seferino Crollett (5358), Karen Current (2737), Doug Hodge (2996), Christine Northrop (10615), Eleni Otto (2614), and senior administrator Ray Shaum (10660).

Based on the positive responses received in the course evaluation, another CMI certification class at Sandia is being scheduled for late spring.

Configuration management education is sponsored by the Sandia CM community of practice. For more information on CM education or the CM community of practice, contact Thomas Henderson (2995), Barbara Lagree (5210), or Richard Graham (2992).



Kids solve mystery of missing dog ... and learn about science along the way

It was an exciting day: Schoolkids from Chimayo and Cordova in northern New Mexico had ridden the bus all the way to Albuquerque for a chemistry magic show. Lo and behold, just as the show was really hitting high gear, the Chemistry Magic Dog was stolen. The show was stopped and the kids were taught how to use crime scene investigation (CSI) techniques to solve the mystery of the missing canine.

Tim Boyle and Bernadette Hernandez-Sanchez (both 1815) developed the CSI: Dognapping workshop to inspire 3rd through 5th graders to view themselves as "junior scientists" even before they enter middle school, where career decisions are often made. The workshop is also designed to give kids hands-on experience in fundamental concepts from the sciences — chemistry, mathematics, materials, and engineering — that support nanoscience/microsystems initiatives. The fun CSI approach also affords kids a chance to interact with working scientists and engineers in a positive environment.

And oh, the kids solved the mystery and found the missing dog.



Photos by Randy Montoya

