Sandia pioneers hydrogen economy

Clean coal leads the way to a hydrogen economy for US

Experiments optimizing the combustion of coal

By Will Keener

The path to the hydrogen economy leads through some familiar territory. Although there are many long-term options for providing hydrogen as a future fuel, coal is a leading contender in the near term.

That's the view of Chris Shaddix (8367), principal investigator for clean coal combustion at Sandia's Combustion Research Facility. While some day we may be able to produce hydrogen by breaking up water molecules in association with the high-temperature heat from nuclear power reactors, or through renewable energy technologies, right now the most cost-effective way to produce hydrogen is with coal, Chris says.

AL SALMI examines a test reactor at the CRF. (Photo by Bud Pelletier)

Chris and his colleagues are involved in a number of experiments to optimize the combustion of coal to produce the most energy and the least possible pollution. While traditional coal combustion produces many harmful emissions, modern plants can meet environmental regulations for burning coal cleanly, Chris says. This can be costly to utility companies, but the cost of competing fuels — particularly natural gas — have climbed to the point where burning clean coal is competitive.

Figure in the possible benefits of sequestration of carbon dioxide emissions from the stacks (see *Lab News*, Jan. 20 stories beginning on page 1) and coal looks very promising for generating both electricity and hydrogen to provide a bridge to that future technology. "Utilities are starting to invest in coal," says Chris.

(Continued on page 4)

Rich Diver invents new way to make hydrogen for fuel

Invention splits water into hydrogen and oxygen

By Chris Burroughs

Borrowing from two different research areas that he's pursued over his career, Sandia researcher Rich Diver (6218) has invented a whole new way to make hydrogen to power automobiles and homes.

His invention, the Counter Rotating Ring Receiver Reactor Recuperator (CR5, for short), splits water into hydrogen and oxygen, using a simple, two-step thermochemical process.

RICH DIVER works at an indoor solar furnace. (Photo by Randy Montoya)

The CR5 is a stack of rings made of a reactive ferrite material, consisting of iron oxide mixed with a metal oxide such as cobalt, magnesium, or nickel oxide. Every other ring rotates in opposite directions. Concentrated solar heat is reflected through a small hole onto one side of the stack of rings. The side of the rings in the sunlit area is hot, while the other side is relatively cold. As the rotating rings pass each other in between these regions, the hot rings heat up the cooler rings, and the colder rings cool down the hot rings. This arrangement results in a conservation of heat entering the system, limiting the energy input required from the sunlight.

Steam runs by the rings on the cooler side causing a chemical reaction to take place, allowing the ferrite material to grab oxygen out of the water, leaving the hydrogen. The hydrogen is then pumped out and compressed for use.

A separate chemical reaction that drives off the oxygen occurs where the sunlight directly illuminates the ferrite material at the solar receiving end. This

(Continued on page 5)

Intelligence community postdoctoral fellows conduct key research for Sandia

By Erin Gardner

Sandia has become home to five special postdoctoral fellows, who are part of a program sponsored by the intelligence community (IC) that aims to create informal partnerships between its scientists and engineers and those in centers of expertise in academia and national laboratories.

The Intelligence Community Postdoctoral Research Fellowship was founded by John Phillips, director of the Intelligence Technology Innovation Center (ITIC), in FY2000. "This program seeks to bolster scientific and technical resources of the intelligence community through working with future academic and national laboratory researchers by funding postdoctoral fellows to do research in all areas of science and technology," says Phillips.

The IC Postdoctoral Fellowship Program has grown from just six fellows nationwide in 2000 to 58 in 2005. The program continues to grow, with a goal of reaching 100 fellows nationwide by 2008, according to Tom Kennedy, the program's manager at ITIC.

IC Postdoctoral Fellows serve at universities, national labs, and other research institutions. They must be US citizens; must be associated with an accredited US university, college, or selected national laboratory; and must have completed their PhD by the time of award. The program provides an opportunity for postdoctoral fellows to work for two years with an option for a third, according to Marty Carr (5932), who was involved with the program while on assignment to ITIC recently.

During their term, IC Fellows conduct unclassified research-level science and submit technical papers to peer-reviewed professional journals as well as to the *Journal of Intelligence Community Research and Development* (JICRD), as described on

(Continued on page 5)

Sandia LabNews

Vol. 58, No. 3 February 3, 2006

Sandia National Laboratories

Managed by Lockheed Martin for the National Nuclear Security Administration

MESA's MicroLab ribbon-cutting set for April; move-in is June

BEAUTIFUL VIEWS — MicroLab, one of the main buildings of Sandia's new Microsystems and Engineering Sciences Applications complex, is scheduled to have a formal ribbon-cutting ceremony in April. The building, which has inspiring views of the Manzano Mountains, will house 275 engineers, scientists, and technicians from a variety of Sandia organizations. See Neal Singer's story on **page 6**. (Photo by Bill Doty)

What's what

As usual, this issue of the *Lab News* is chock-full of interesting stuff about our lab community. But to peek ahead a bit, be sure to check the next issue, Feb. 17, and read John Taylor's (303) fascinating invited piece on the history of engineering, in observance of National Engineering Week, Feb. 19-25. Alongside that you'll find Deputy Laboratory Director and Chief Engineer John Stichman's brief companion piece about engineering at Sandia.

John Taylor, who is a nuclear engineer by training, has written three books about New Mexico — *Bloody Valverde: A Civil War Battle on the Rio Grande, February 21, 1862, The Battle of Glorieta Pass* (co-written with Thomas Edrington), and *Dejad a los Ninos Venir a Mi* (Suffer the Little Ones to Come Unto me): *A History of the Parish of Our Lady of Guadalupe in Peralta.* He's as entertaining a writer as he is an accomplished engineer.

If you think of highways, mining, skyscrapers, bridges, gearboxes, electrical circuits, and stuff like that when you think of engineering, you'll be enlightened with John's vignettes about pyramid-builder Imhotep, Roman aqueducts, medieval military engineering, and more.

Don't miss it.

* * *

The query here in the Jan. 6 issue about old buildings brought a few responses.

From Gary Hoe (10864): "The oldest building we still haven't torn down is 849, which was erected in 1948. It's the old steel-skinned lab northwest of 860. Three of the Motor Pool buildings are the same age. Then we have several existing buildings erected in 1949, which includes 800, 804, 808, 835, and 860. . . . So 868 is not our second-oldest building, it's down around #10 at the best."

And Nicholas "Money" Winowich (6955) offered a twist on the question, pointing out, "You could . . . claim 828 is the oldest building at Sandia. It was when it was torn down in 1999, but the monument in front of 810 [the CNSAC Building] that looks like 828 actually is 828, or part of it at least. The two triangular frames and the crane rail beam they support are the actual ones that were part of 828, not copies that look like it. So part of 828 is still standing and that might make it the oldest building at Sandia."

But the authority probably is corporate historian Rebecca Ullrich (4532), who keeps up with such stuff as part of her job, of course, and wrote that of buildings still standing, the dozen oldest appear to be: 804, 800, 808, 605, 849, and 851, all dating from 1949; and 868, 892, 874, 875, 894, and 3210 (Coronado Club), all dating from 1950.

"The list is somewhat soft," she added, "because Facilities tracks the date acquired by Sandia, which usually means when they were ready for occupancy. Facilities' own database shows the dates as a year or two later for most of these structures. But the story is that 804 opened first, followed quickly by 800."

And like any good historian, Rebecca invites replies, noting that she's "anxious to get correct information."

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

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Sandia National Laboratories is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin company, for the US Department of Energy's National Nuclear Security Administration.

Ken Frazier, Editor 505/844-6210
Bill Murphy, Writer. 505/845-0845
Chris Burroughs, Writer. 505/844-0948
Randy Montoya, Photographer 505/844-5605
Nancy Garcia, California site contact. 925/294-2932

Contributors: Janet Carpenter (844-7841), John German (844-5199), Neal Singer (845-7078), Larry Perrine (845-8511), Howard Kercheval (columnist, 844-7842), Will Keener (844-1690), Iris Aboytes (844-2282), Michael Padilla (284-5325), Julie Hall (284-7761), Rod Geer (844-6601), Michael Lanigan (844-2297), and Michelle Fleming (Ads, Milepost photos, 844-4902). Erin Gardner (intern, 284-8432), Darrick Hurst (intern, 844-8009). Dept. 3651 Manager: Chris Miller (844-0587).

Lab News fax 505/844-0645
Classified ads 505/844-4902

Published on alternate Fridays by Media Relations and Communications Dept. 3651, MS 0165

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Feedback

Q: *Assuming that an individual has many years of dedicated service and excellent reviews, what is the Sandia policy regarding the "forced" or "strongly recommended" use of vacation time simply because the staff member is simply "out of work" (through no fault of his own due to project funding cutbacks, cancellation, etc.) even after exhausting every possibility, every contact, source of potential work, matrix options, job posting, etc.? Is there a Sandia center support policy (or corporate P/T number) that could be applied in stressful situations like that until he can get back to being a productive member of the workforce?*

A: In accordance with CPR 300.6.16, "Vacations are scheduled in accordance with employee preference, subject to the needs of the business. To the extent possible, vacations are scheduled to meet personal needs." That said, just as an employee cannot require a manager to approve vacation, a manager should not require an employee to take vacation.

In instances where an employee is out of current work, this is an issue for the employee and manager to proactively address. This situation should not come as a surprise to the employee or manager since both should be aware of the funding status. If a shortfall is encountered, the manager may be required to temporarily or permanently reassign personnel to new projects, or they may charge a center support project as directed by the organization. Due to the nature of work funding, a corporate P/T is not available for this situation as each organization is responsible for managing its budgets accordingly.

I would encourage you to speak with your manager regarding other work that may be available within the center and/or division until work within your department is available. If you choose to use your vacation, that too will help with the organization's budget position over the course of the year. *— BJ Jones (3500)*

Recent Patents

Mark Baumann (6422), Charles Brusseau (6418), David Hannum (6418), and Kevin Linker (6418): Portable Chemical Detection System with Integrated Preconcentrator.

Armin Doerry (5342), Brian Mileshosky (2955), and Douglas Bickel (5354): Tangential Velocity Measurement Using Interferometric MTI Radar.

Richard Pryor (1433) and Nipa Basu: Method of Predicting a Change in an Economy.

James Allen (1769), Michael Sinclair (1824), and Jeffrey Dohner (1712): Microelectromechanical Mirrors and Electrically Programmable Diffraction Gratings based on Two-Stage Actuation.

Ron Renzi (8245): Fluid Injection Microvalve.

Paul Dentinger (8764):Photosensitive Dissolution Inhibitors and Resists Based on Onium Salt Carboxylates.

Katherine Bogart (1126) and Arthur Fischer (1123): Flip-chip Light Emitting Diode with Resonant Optical Microcavity.

Women golfers, here's your chance

The Sandia Women's Golf Association (SWGA) will hold its Annual Membership Drive Wednesday, Feb. 15, at 5:30 p.m. at the Cesar Chavez Community Center, 7505 Kathryn SE.

SWGA is open to all active and retired Sandians and DOE people, their spouses and dependents, active military personnel, active civilian employees at KAFB, and contractors to Sandia, KAFB, and DOE. Contact Linda Daniels at 844-5724 or e-mail to lldanie@sandia.gov.

Take Note

Retiring and not seen in *Lab News* pictures: Susan Stinchcomb (4535), 23 years; Larry Garcia (5935), 28 years; Louis Matthews (4211), 21 years; Chris Saavedra (108431), 30 years; Gary Scriver (1345), 35 years; Vicki Walker (5130), 13 years.

A simple solution helps design complex microfluidic devices

By Nancy Garcia

The µChemLab project began with a problem, how to detect trace explosives with a compact, field-portable device. The device relied upon miniaturizing a standard laboratory technique for separating mixtures of components as they move through a column under an electric field — chromatography. But the hair-thin chromatographic columns, shrunk and coiled onto a microfluidic chip, suffered from a "racetrack" effect at the turns, so that particles being separated on the outside of the curves had farther to travel, which smeared the sharp peaks needed for identification.

Unfortunately, the theory behind this transport problem was too complex to model on supercomputers, but Eric Cummings, a principal investigator during the 10-year development funded through Laboratory Directed Research and Development projects, saw that the velocity aspect could be represented by a simple equation with a few constraints, leading to a theory for ideal electrokinetic flow.

Mathematicians Stuart Griffiths (8700) and Robert Nilson (8764), meanwhile, simulated the transport of chemicals in channels in a six-month

Sandia CaliforniaNews

effort that led to patented turns and bends that minimized dispersion.

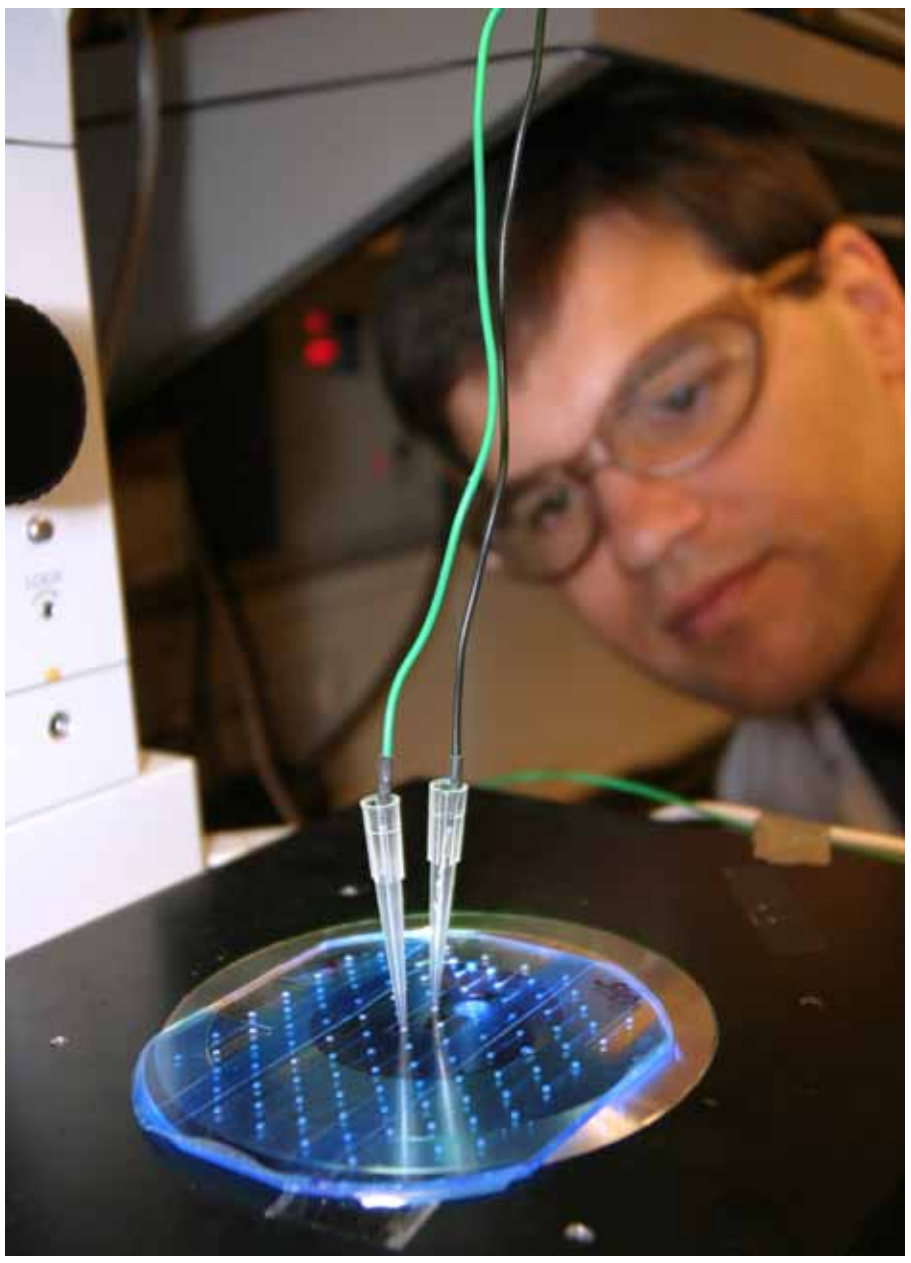
Still, Eric believed optimizing any given case should be shorter. "In the back of my mind it seemed there had to be a general solution that was very simple because the theory behind it was so simple," he says.

He had been trying to verify ideal electrokinesis experimentally. Particles moved differently at boundaries, so the team decided to expand the number of boundaries by creating channels with posts in the middle so they could study behavior there. Posts made the process of moving and sorting particles akin to having racers navigate a forest instead of an open plain — albeit a very small one — since the channels run 50 to 100 microns wide and 5 to 50 microns deep. They also permitted effectively moving particles under an applied voltage that was low enough to not heat and possibly harm the sample.

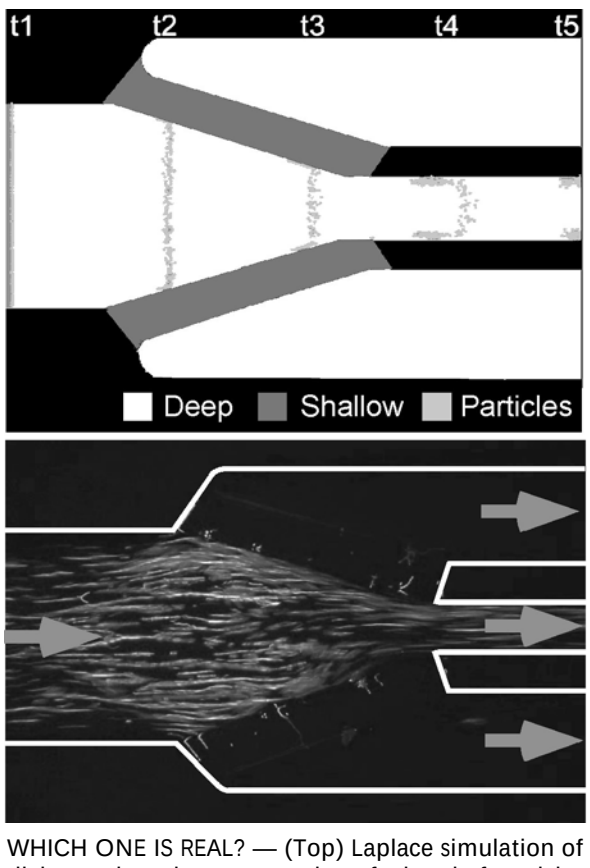
Working with Anup Singh (8321), Eric investigated using fluorescent liposomes to track the progress of particles through the channels. Their conductance made them behave poorly as markers for electrokinetic mobility. They tended to stream along the post arrays in a phenomenon known as dielectrophoresis, particularly if the applied field were at an angle to the array, and to concentrate in regions over time.

That unforeseen development led to the creation of a sorting and trapping technique known as insulating dielectrophoresis, or iDEP (because the posts are made of a material, such as silica or plastic, that is electrically insulating).

Trapping by tilting the array created nonuniform fields. So overall flow would not be affected, they conducted a quick analysis to find conditions needed to keep the fields uniform within the channel regions.



FLOW — A microfluidic chip containing faceted channels is prepared for study on a fluorescence microscope by Andrew Skulan. Fluid is piped through the attached inlet and outlet. (Photo by Bud Pelletier)



WHICH ONE IS REAL? — (Top) Laplace simulation of dielectrophoretic concentration of a band of particles in the central outlet of a pitchfork-shaped channel. (Bottom) Equivalent experimental data. The species being concentrated are bacteria (*B. subtilis*), and the arrows illustrate the direction of fluid flow in the channels. The channels are 50 microns deep in the deep sections and 5 mm deep at the ridges. The inlet channel is 450 microns wide.

The analysis indicated that varying the channel depths by interspersing deeper regions with more shallow "spillways" could not only provide uniform fields on each side of the junction, it also allowed designers to incorporate angles in the shallower regions to turn the flow without causing dispersion. This ability to turn the channels permitted creating networks by using calculations simple enough to perform on a calculator.

This breakthrough, several years after the research started, now offered a general solution to the initial dispersion problem.

Experimental investigations of microfluidic channels containing cross-channel ridges designed using Eric's spatially uniform field approach resulted in two publications in the fall of 2005 in *Analytical Chemistry*. One demonstrated the influence of manufacturing limitations on fluid flow in ideally designed channels and the other demonstrated continuous separation and concentration of bacterial cells. The work was conducted by postdoctoral researchers Andrew Skulan and Louise Barrett in Microfluidics Dept. 8324 under principal investigator Greg Fiechtner.

Eric's approach has also led to other devices. One sorts particles into parallel streams by their volume and conductivity and is referred to as a particle spectrometer.

The team has found it useful to design these microfluidic spectrometers with arrays of ridges patterned through photolithography.

"Once you've paid for one ridge you can have more," Eric says. They call this latest approach a corduroy design methodology.

With it, they have concentrated materials by a factor of 6,000 in 16 seconds, although the upper limit is just a function of how much flow can be pushed through. They have also broadened the concept to concentrate, mix, purify, filter, or sort molecules through perturbing the flow in a variety of ways, besides using an obstacle such as a ridge or valley.

The advantages are that the separations can occur at dramatically higher rates than conventional methods, and they can be based on mechanical or electrical properties not previously exploited by other methods. The speed comes about because separations occur throughout the entire breadth of the microfluidic channel, since they rely on bulk behavior that occurs in a gradient, rather than surface phenomena requiring interaction with a boundary. Theoretically, a large protein might be separated in 10 milliseconds — five orders of magnitude quicker than through conventional chromatography.

A further advantage is that to handle a greater volume, the process could be carried out continuously and in parallel.

The team members believe they are heading toward near-instantaneous separations and manipulations of cells, proteins, and other molecules that can aid research in genetics, proteomics, or sorting and preparation of novel materials; development of medical diagnostic devices; and rapid detection of biological or chemical incidents, among anticipated applications. About such applications Andrew notes, "You can really let your imagination run wild. It's a very simple design, but there is just a wealth of different behaviors we can obtain by varying the conditions we apply."

The researchers were thrilled to take advantage of the anomalous behavior they observed by employing their broad range of expertise to create better devices to support national security and related missions. "I'm like a kid in a candy store," Andrew says.

Clean coal

(Continued from page 1)

Two approaches

Two different approaches to burning coal are now under study. One combines coal with pure oxygen. The second, called gasification, burns coal only partially to create a fuel-gas. The first approach, called oxy-combustion, is driven by concern over emissions of CO_2 and other pollutants. The burning of coal in oxygen is a near-term solution that with current knowledge can produce exhaust streams that are close to pure CO_2, says Chris. Harmful pollutants like nitrogen oxides, sulfur compounds, and mercury are virtually eliminated.

The oxy-combustion approach is favored by companies in Japan, Canada, Germany, and elsewhere where pilot plants are under construction. "Because the US didn't sign the Kyoto accord, companies here are not as interested," says Chris. "They tend to favor gasification technologies, which offer higher efficiency and low pollution formation."

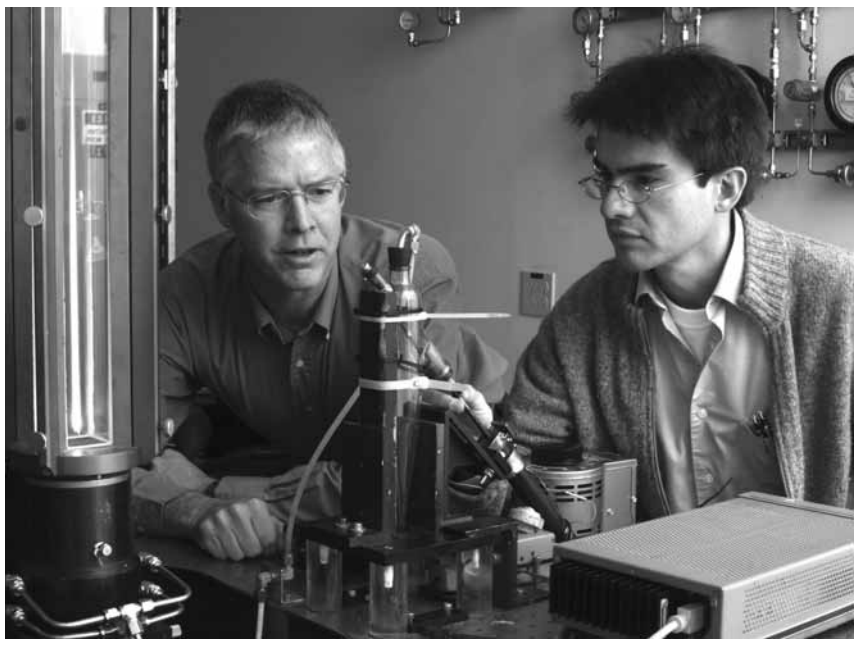
One of these technologies, called steam reformation, combines the coal with steam in a hot environment to produce a "syngas," composed mostly of CO and hydrogen. Once the syngas is produced it can be burned directly in a combustor — such as a turbine — to produce power. Or the syngas can be further reacted with more steam to shift the remaining CO to CO_2 and to produce more hydrogen. The CO_2 can be sequestered and the hydrogen can be used in lots of places: to power a car in an engine or fuel cell, to power a turbine to produce electricity, or to power a turbine to fly an airplane.

DOE has already demonstrated this process in two pilot projects. The next step is for the US to combine coal gasification with hydrogen production and CO_2 sequestration, says Chris. At the same time, several commercial proposals are afoot in the US for private utilities to build these plants without government support.

Working with the National Energy Technology Lab, Morgantown, W. Va., the CRF is focused on understanding the chemistry and physics of coal combustion, using its state-of-the-art diagnostic capabilities and modeling expertise. "We apply computational models of reacting particles to the data to understand why we see the results we see," says Chris.

Alejandro Molina (8367), a Sandia postdoc working with Chris, lights a flat-flame burner plate in the CRF's small-scale lab for coal studies and adjusts the amount of coal particles fed through the burner. A two-foot-tall chimney around the burner protects against disturbances inside the lab and enables researchers to analyze the combustion.

He shows a visitor a bright zone, just above the burner, where initial combustion occurs. A longer vertical track of flame is known as the char oxidation zone. "To optimize coal combustion for carbon sequestration, it is very important to understand how fast it burns and releases energy," Alejandro says. Burning coal with air, which is predominantly (79 per cent) nitrogen, creates the problem of separating CO_2 and nitrogen before sequestration. "If you use pure oxygen instead of air, you get water and CO_2, so you only have to condense the water and you have 100 percent CO_2."



BEST BURN — Chris Shaddix, left, and Alejandro Molina (both 8367) discuss an experiment to determine the best proportion of oxygen and CO_2 for oxy-combustion of coal. Alejando's small-scale experiments have established the groundwork to bring two other larger CRF reactors into the research. (Photo by Bud Pelletier)

One problem with this oxygen approach has been a high flame temperature, he continues, which could rapidly destroy the metal burner materials. One solution is to recycle cooler CO_2 into the burner to cool the flame temperature. "The question is: what is the right proportion of oxygen and CO_2?"

Alejandro has been working on these experiments for about two years in the small-scale lab, but work is now under way to bring two other CRF facilities into the research. A gasification lab will help the researchers study the behavior of coal gas under pressure. And while the small-scale work focused on particle behavior and fundamental-scale measurements, says Chris, a large-scale lab will focus on gas issues within the reactor.

Two new reactors

The gasification lab, expected to be operational by this summer, includes a two-inch tube within a pressure vessel. "Gasification is slower than combustion, so it is done under pressure to increase the reaction rates," Chris explains. The new apparatus is instrumented for laser diagnostics and sample collection and includes electrical heaters to preheat the gases so they flow through a vertical center section where data can be collected.

The third reactor is a two-story flow reactor that will help the team study the oxygen-coal combustion with recycled CO_2. The unit includes a six-inch-diameter reactor tube running downward below a 75-kilowatt thermal heater. Specially designed hardware injects highly refined coal particles into the top of the reactor tube. As the reaction moves down the tube, equipment allows sampling and laser diagnostic testing.

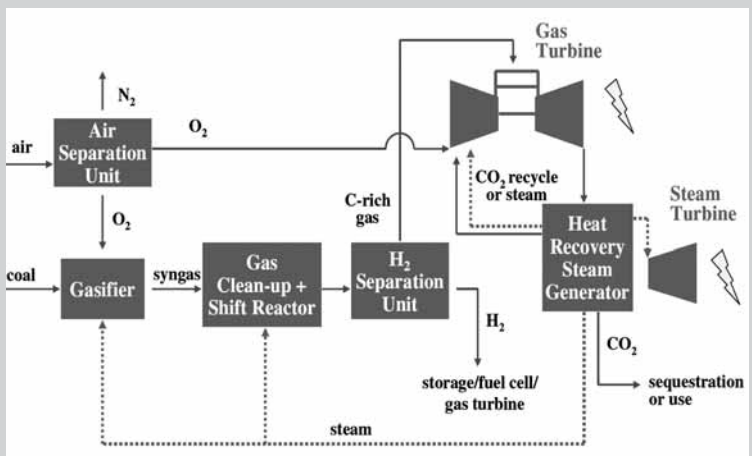
A key effort will be to measure the concentrations of ammonia and hydrogen cyanide, precursors to nitric oxide formation, says Chris. The coal "char" phase of burning can eliminate nitric oxide, creating the possibility that in actual operations more NO is consumed than is produced, leading ultimately to a commercial application. Large-scale tests in this reactor are expected to begin in a few months.

Study takes systems look at gasification

Sandians Chris Shaddix and Andy Lutz (8367) are taking a systems approach to the concept of gasifying coal to produce both hydrogen and energy. This concept, favored by US industry, is also being addressed experimentally at Sandia's Combustion Research Facility in Livermore.

The Laboratory Directed Research and Development project began last year with the development of a model of the key components in the system, says Andy. The concept (see diagram) basically calls for burning coal with oxygen to create a syngas, or fuel gas, that is cleaned of contaminants and then stripped of hydrogen, with the carbon-rich remainder being used to generate power through a turbine .

As experimental results are used to adjust the model, researchers can get a better idea of some of the limitations on the system when hydrogen is extracted. "No one has looked at the operational limits of this type of system yet," says Chris. Data on CO_2 produced from the process will also be valuable to studies in Albuquerque on carbon sequestration. "We will work with them to coordinate the outputs from our model for use in their carbon sequestration modeling," says Andy.

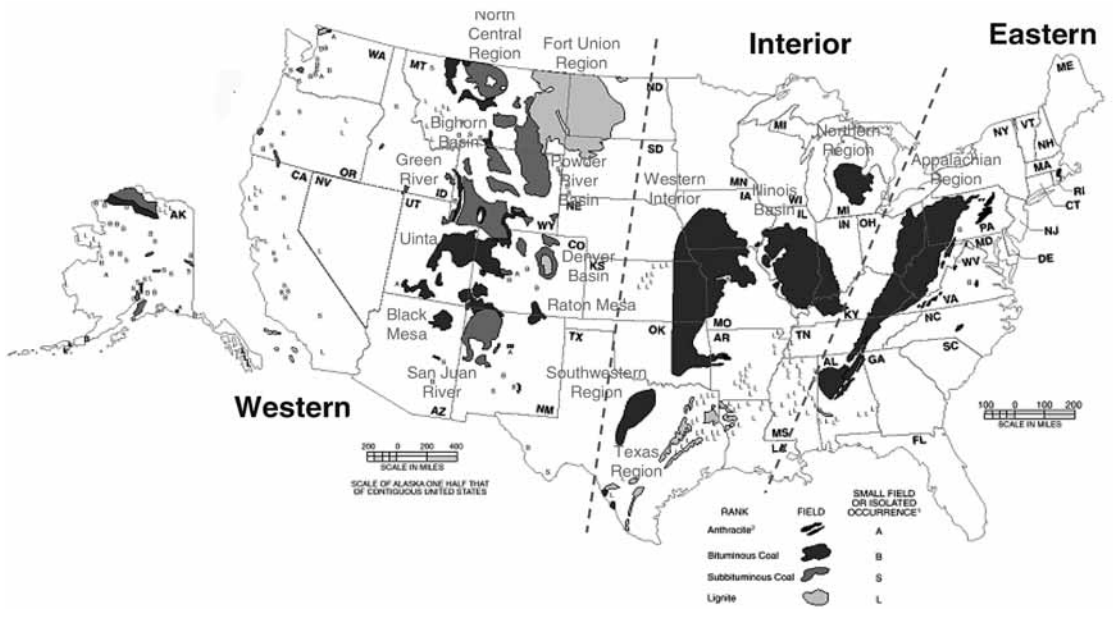


200-year supply of coal

The Western US, Illinois, Appalachia, and Canada make North America a place rich in coal resources. Other American neighbors, especially Colombia and Venezuela, also hold significant reserves of coal. All this makes the coal from the Americas somewhat analogous to the oil reserves of the Middle East.

In 2000, the US produced about 25 percent of the 4,600 metric tons of coal produced worldwide. At the Year 2000 level, total reserve estimates indicate the world has a 200-year supply.

Within the US most coal is transported by rail, with transportation costs comprising up to one-third of the total cost of delivered coal. While there is no reason to expect major cost increases for coal — with proven reserves identified and mining production costs well understood — transportation costs (essentially diesel costs for locomotives) remain a key variable in utility company fuel calculations.



Rich Diver

(Continued from page 1)

is needed to regenerate the rings so they can react with more water during the next cycle.

"This is out-of-the-box thinking," says Rich, principal investigator of the internally funded Laboratory Directed Research and Development (LDRD) project. "We are combining a mechanical engine with a chemical producing device — something not done before to produce hydrogen."

And it's something that probably only Rich could have contrived because of his unique background. He has knowledge of splitting water using high-temperature solar techniques — the theme of his PhD dissertation at the University of Minnesota — and of concentrated solar gained from his 15 years working with Stirling engine solar collector systems at Sandia.

Stirling dishes — named after Robert Stirling who invented them in 1816 — generate electricity by focusing the sun's rays onto a receiver, which transmits the heat energy to an engine. The engine is a sealed system filled with hydrogen, and as the gas heats and cools, its pressure rises and falls. The change in pressure drives the pistons inside the engine, producing mechanical power. The mechanical power in turn drives a generator and makes electricity. The key to a Stirling engine's high efficiency is heat recuperation, analogous to the CR5.

Instead of making electricity like the Stirling systems, Rich's invention will produce hydrogen.

Rich envisions fields of large mirror dish collector systems making hydrogen, which would be stored and sent to stations where hydrogen-electric hybrid vehicles could "fill up."

He and co-collaborator Jim Miller (1815), a chemical engineer, have been testing materials at the University of New Mexico's Advanced Materials Laboratory to determine which will be best for attracting oxygen in the cool stage and releasing it in the hot stage.

"This invention calls for a new type of material," Rich says. "We have to come up with one that is black and absorbs heat from the sun and which has the right oxidation reaction."

Through the tests at the Advanced Materials Laboratory, Rich and Jim have shown that by suspending the ferrite material in zirconia, a refractory oxide that withstands high temperatures, there was a high yield of hydrogen "quickly and repeatedly," even after forming the mixture into complex solid shapes. Without using the zirconia, the ferrite material doesn't hold together well; it essentially forms a slag and stops reacting.

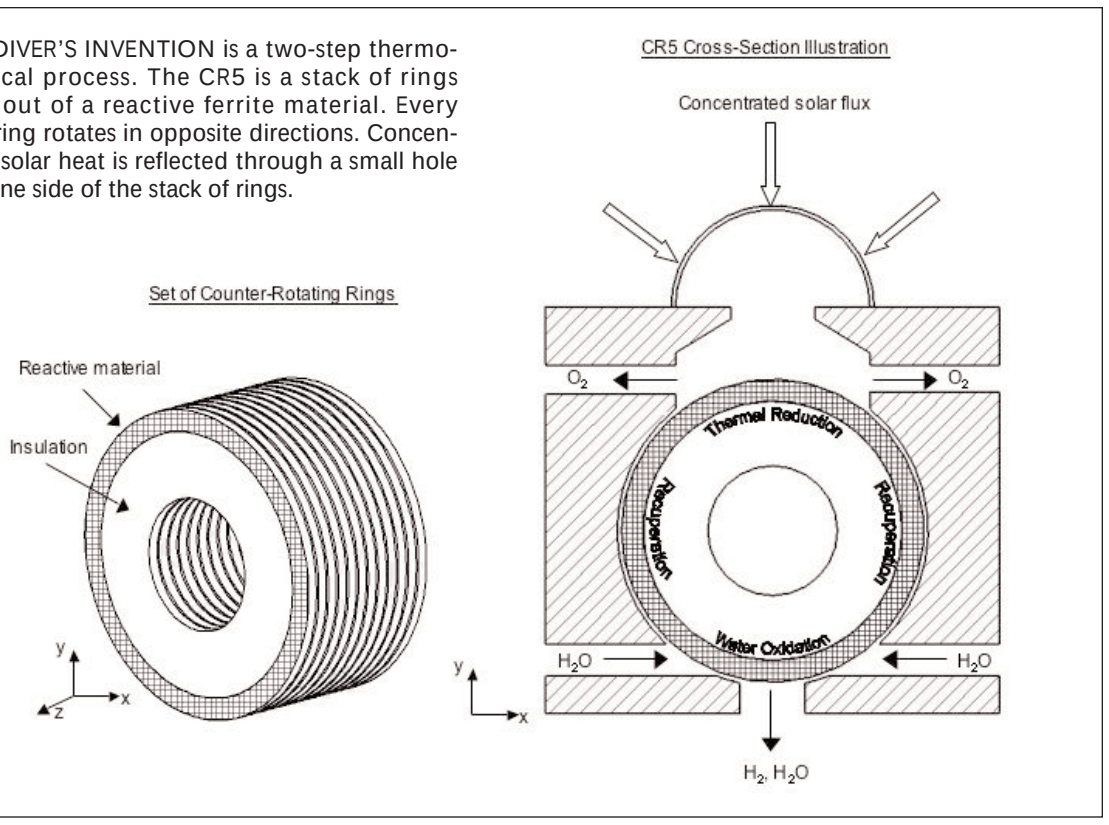
The ferrite/zirconia structures are laid line-by-line using robocasting, a method developed and perfected by other team members that relies on robotics for computer-controlled deposition of materials through a syringe. The materials flow like toothpaste and are deposited in thin sequential layers onto a base to build up complex shapes.

A near-future step will be to build a prototype of the CR5, Rich says. Rather than constructing large dish mirrors to collect the concentrated solar, as is his ultimate goal, the initial tests will be done in an indoor solar furnace (see front-page photo) using a heliostat at the DOE-owned, Sandia-operated National Solar Thermal Test Facility.

Rich says the problem he and Jim are attempting to solve is extremely difficult.

"The water molecule (in the steam) is a tough nut to crack," Rich says. "There is no guaranteed success. But that's the spirit of an LDRD. It allows you to take a chance. I am grateful for this opportunity. We are putting different things together in ways other people haven't thought of before. It's long-term stuff but ultimately can result in a clean alternative to pulling oil out of the ground."

RICH DIVER'S INVENTION is a two-step thermochemical process. The CR5 is a stack of rings made out of a reactive ferrite material. Every other ring rotates in opposite directions. Concentrated solar heat is reflected through a small hole onto one side of the stack of rings.



TEAM MEMBERS: Rich Diver (6218), Jim Miller (1815), Roy Hogan (1516), Mark Allendorf (8324), Nate Siegel (6218), Tim Moss (6218), Barry Boughton (1516), John Stuecker (1815), and Lindsey Evans (1815).

Postdocs

(Continued from page 1)

the program's website, www.icpostdoc.org.

The annual call for proposals for the 2006 IC Postdoctoral Fellowship opened for 45 days beginning this week and can be seen on the website. There are about 30 topical areas in physical sciences, technology, and liberal arts represented in the call. All are unclassified.

Principal investigators (PIs) must be professors or staff members associated with an accredited US university, college, or selected national laboratory. They are responsible for the oversight of the research and serve as the technical mentor to the Fellow. The PI and postdoc also work with an intelligence community adviser who helps them understand the importance of the outcome of their research to the IC mission. "Working with the intelligence community gives the postdocs a first-hand look at how science and technology are important to the national interest," says Marty.

Two requirements placed upon IC Postdoctoral Fellows are that they publish their work in peer-reviewed journals and attend the annual colloquium, held this year April 17-19 in McLean, Va. At the colloquium, first-year fellows give a brief statement or poster session about their current research. Second-year fellows give 30-minute presentations of their research results.

All proposals submitted undergo a rigorous review. Successful proposals are chosen on the strength of their relevance to topics in the annual call and on the qualifications and curriculum vitae (resume, list of publications, strengths) of the PI. The PI may have a certain postdoctoral fellow in mind when the proposal is made, but if not, one year is allowed to fill the position

David Wilson (6634), who was the first Sandia IC postdoc in FY 2000, describes the fellowship as "an educational half-way house; not all education, not all private industry, somewhere in between." David's PI was Rush Robinett (6210).

"IC Postdoctoral Fellows have the opportunity to research fundamental subjects during the fellowship that they could not otherwise spend the necessary time researching if they had just started off as a regular employee."

"IC Postdoctoral Fellows have the opportunity to research fundamental subjects during the fellowship that they could not otherwise spend the necessary time researching if they had just started off as a regular employee," says Calvin Nho (6634), a second-year postdoctoral fellow in robotics at Sandia whose PIs are Jon Salton (6634) and Barry Spletzer (6600). This is why postdoctoral fellows are critical to the departments who hire them, he says.

Neal Hall (1769) is a current IC postdoctoral fellow at Sandia, working on sensor development. Dave Peters (17131) and Bianca Keeler (5712) are former IC postdocs who hired on as fulltime Sandia staff members.

Julia Hsu (1114) was awarded a fellowship in FY 2005, and she recently selected Dana Olsen as her new IC Postdoctoral Fellow in nanotechnology research, but he is not on-site yet.

John Howard (8941) is actively seeking a postdoc for his FY 2005 Fellowship project at Sandia/California on trusted communications.

For more information, see www.icpostdoc.org or contact Marty Carr.

Feedback

Reader has questions about radios

Q: *After working at Sandia for a number of years, I learned a couple of months ago that simple AM/FM radios without tape drives are now not allowed. Is this true? If so, why the change after probably 50 years?*

A: There have been inconsistent and confusing communications on this topic in the past and we welcome the opportunity to provide updated information.

As CPR 400.2.10 states, personally owned electronic devices are typically not allowed; however, simple calculators, hearing aids, vehicle remote-entry key fobs, garage door openers, and receive-only one-way pagers are not typically prohibited or controlled unless local (e.g., facility-specific) restrictions prevail. Past guidance included radios/tape/CD players that do not record in this list of personal electronics that were not prohibited or controlled, unless by local restrictions.

However, with the advent of new capabilities and blending of multiple technologies in personal electronic devices today, the entire topic of the allowability of personal electronics is being reexamined. There are potential issues with some of the newer technologies contained in today's consumer electronics that need to be carefully evaluated for use in our environment. A team consisting of subject matter experts from different disciplines has been formed to evaluate the situation and also to look at possible alternatives to personal radios and tape/CD players (like Internet radio). Until the team's work is completed and clarifications and/or new rules are published, AM/FM radios and simple CD and tape players need not be removed from the workplace unless local restrictions apply.

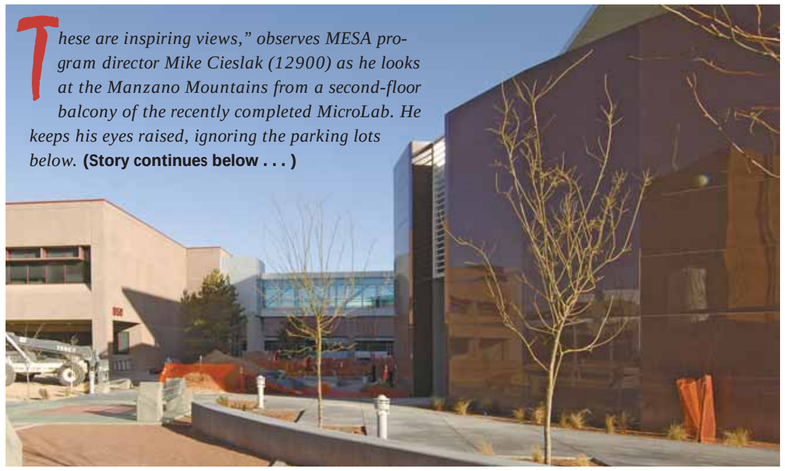
Look for new guidance in early spring.

— Ken Washington (4600)

Coming openings of CINT, MicroLab usher in Sandia's future

MESA's MicroLab design combines imagination, efficiency, security

Ribbon-cutting expected this spring; building expected to open in summer



These are inspiring views," observes MESA program director Mike Cieslak (12900) as he looks at the Manzano Mountains from a second-floor balcony of the recently completed MicroLab. He keeps his eyes raised, ignoring the parking lots below. **(Story continues below . . .)**

FINISHING TOUCHES — Landscaping crews take center stage as MESA facilities begin to come on-line. (Photo by Bill Doty)

The MicroLab is one of the main buildings of Sandia's new Microsystems and Engineering Sciences Applications (MESA) complex, located at the southeast corner of Area 1.

"This is not a trailer with a few test tubes," Mike announces a few moments later, looking at the wide internal corridors, high skylights, and glass walls of the building. "This has a sense of scale."

"You can do good things with concrete, glass, and steel if you think about it," agrees Bill Jenkins (12920), in charge of construction. A formal MicroLab ribbon-cutting is expected to take place in April. The building should be open for occupancy by June.

The building includes chemical, electrical, and laser laboratories, along with an Education and Design Center, and will house 275 engineers, scientists, and technicians from a variety of Sandia organizations.

But the main occupants of MicroLab — one of the most advanced laboratories at Sandia — will be 150 folks from the Compound Semiconductor Research Lab (CSRL). These researchers currently work out of outmoded trailer facilities infamous for a toilet once dropping through the rotting floor of one such structure. Will the researchers be able to handle their posh new surroundings?

"It's just a little more spacious than they have now," says Bill straight-faced. "A little more light, a little more décor."

In fact, the three-story building — and, the entire Microsystems and Engineering Sciences Applications complex — are imaginative combinations of efficiency and security in the service of stimulating better solutions to defense problems.

An observer might notice 300 to 400 boulders, each about three feet tall and set equally deep in the ground, that ring the complex — one a few feet from the next — as "natural" protection against vehicle bombs.

Glass walls let light into MicroLab offices on the south and north sides of the building "because people like to work in natural light," says Bill. The glass is laminated so it will not fragment in the event of an explosion. External louvers on the south side prevent the offices from heating up in summer.

The building also is designed with anticollapse features to protect people if part of the structure is destroyed. "It's post-9/11 construction," Bill says.

Metal staircases with metal risers, railings, and support spindles seem to float in space with no stairwells to enclose them, their visual background either glass windows or concrete walls.

Exposed building materials, says Bill, is a modern architectural style.

There are occasional nods to warmer appearances.

In a two-story, 100-seat conference room, concrete walls rise to ultimately join wood panels that tilt in slightly to travel the last three feet to the ceiling.

In the lobby, a few yards of thin-cut granite sidewalls and flooring convey the warmth of being welcomed to a private home.

Outside the building and across a campus-like quad, the rounded entrance to the Weapons Integration Facility beckons. The building is 75 percent complete and three years ahead of schedule. A side rotunda houses projectors that will generate a high-data environment, beneath sound-isolated conference rooms made more private by one-way glass windows.

"This is where," says Mike, gesturing at the complex and voicing the vision of Sandia President Tom Hunter, "if it's done anywhere, we will reengineer engineering, using our computational capabilities to keep America strong and our nation prosperous."

In Mike's view, MESA is more than buildings but a state of mind that encompasses robotics, PETL (Process and Environmental Technology Laboratory), JCEL (Joint Computational Engineering Laboratory), and computing, in addition to micro and nanotechnologies.

"Twenty to 30 percent of our staff will work here [in the MESA complex]," he says. "We're shifting the center of gravity of Area 1 south and east."

Stories by Neal Singer

CONSTRUCTION NEARLY COMPLETE — The MicroLab, one of the main buildings of MESA, is nearing completion. It has wide internal corridors, high skylights, and glass walls. It includes chemical, electrical, and laser laboratories and will house 275 Sandia engineers, scientists, technologists, and support staff. (Photo by Bill Doty)

Wide-ranging CINT workshop discusses nanodevices for defense, quantum computing, combating cancer

New facilities and Discovery Platforms™ coming online

How integration of various nanotechnologies will impact national security, energy, and health — and how Sandia tools called Discovery Platforms™ will aid that process — was the subject of a wide-ranging workshop sponsored Jan. 12-13 by the Sandia/Los Alamos joint Center for Integrated Nanotechnologies (CINT). CINT is funded by DOE's Office of Basic Energy Sciences.

The workshop, held in Albuquerque and attended by approximately 170 participants from national labs, universities, and private industry, finished with a tour of the nearly completed, ultramodern CINT facilities just west of Eubank Blvd. and north of Kirtland.

On Jan. 12, plenary speaker and experimental physicist Keith Schwab from the National Security Agency proposed that practical quantum computers be developed using integrated nanodevices involving quantifiable amounts of materials.

On Jan. 13, plenary speaker Jim Heath from Caltech discussed nanotechniques that could determine treatments for a wide variety of individual cancers without surgically operating to procure sample tissues. "You need perhaps 2,000 measurements in vitro of genes and proteins to make an informative disease diagnosis of all cancers," he said. "It's a noisy environment and, for doctors, a lot of measurements. But electronically [for a suite of nanodevices], it's not bad at all."

In an introductory talk, CINT chief scientist (and former Sandian) Tom Picraux spoke about the need for a new nanolighting facility that would produce (presumably) LED products that would cause "light bulbs to become something for the museum." (He also mentioned later to the *Lab News* that an effort was being made to involve more New Mexico commercial companies in the Center.)

But the highlight of the show in many eyes was the discussion of CINT Discovery Platforms' inexpensive micro-sized chips with the capability to perform tests or measurements at the nanoscale. These devices will enable researchers affiliated with CINT to do experiments and repeat tests on nanostructured materials under the unvarying conditions necessary to replicate experiments with confidence.

"Last year," Mike Lilly (1123) told his audience, "everything was vague. This year, we're actually processing [platforms at Microelectronics Development Laboratory, a part of MESA]." Mike is one of five team leads for Discovery Platforms currently under development.

Platforms being developed include a microfluidic synthesis platform, where reactions are controlled by applied fields, light, temperature, and flow conditions; a cantilever array platform for testing nanomechanics; an electrical transport and optical spectroscopy platform for fundamental investigations of the optical, electronic, and transport properties of a wide variety of nanomaterials; and a two-dimensional photonic lattice platform to test the optical properties of waveguide structures, thin optical films, and 2-D photonic lattices.

After standardization tests with "a select set of users," Mike said, will come a general dispersal of the product.

Some of the platforms may be available as early as this spring.

A fifth platform in the works will permit researchers to easily plug the platforms into a wide variety of test instruments.

Said a visitor from MIT's Lincoln Labs, "A Discovery Platform is a great idea if it's done right. You have the engineering done for you. Scientists don't need to spend time doing engineering." The visitor, who preferred his name not be used, found the platform discussion "the most interesting part of the meeting."

Said Julie Phillips (1100), "We're interested in seeing the Discovery Platforms propagated among other DOE centers."

Said Murat Okandan (1749), "It is good to see the micro side coming together with the quantum dot, nanomaterials side to produce devices that can do things."

Jerry Simmons (1130) took questions and requests about the platforms from attendees. To those who wanted plans available, Jerry said they were open source. Another suggested a chat room to be associated with each platform. A third suggested lightheartedly that the platform chat room be dubbed a "chatform."

According to CINT program manager Neal Shinn (1131), the platforms were originally intended to be available only to CINT users but may become available to external research sites for a fee.

In a broader view, Neal says more than 250 research proposals were received from the worldwide external science and engineering community during the previous three-year "pre-operational" phase. "The vast majority," he said, "were proposals CINT should have accepted [but because of temporarily limited resources, could not]. More user proposals will be accepted in April when we begin normal operations in our dedicated facilities."

There is no cost for external researchers to use CINT facilities for non-proprietary research, but they must compete for equipment use-time. A simple two-page user proposal sets the ball rolling. January 30 is the first call for 2006 ideas; the deadline is March 15, and applicants will be notified of acceptance or decline of their proposal by May 1. The Center provides no funding for housing or travel.

CINT workshop-goers received tours (this one led by Mike Lilly, at left) of the core CINT facility. Chairs still wrapped in plastic greeted the visitors. (Photo by Neal Singer)

A HIGHLIGHT of the workshop at the Albuquerque Hyatt last month was discussion of CINT Discovery Platforms. Some 170 people attended. (Photo by Neal Singer)

THE CENTER FOR INTEGRATED NANOTECHNOLOGIES, with the distinctive sweep of its Southwest-influenced facade, begins to take shape as one of Sandia's most recognizable new facilities. (Photo by Will Keener)

RADTRAN gives radiation material transportation people free method for analyzing risks, consequences

Ruth Weiner serves as project lead; 200 users worldwide

RAD wastes approach the WIPP site near Carlsbad, N.M.

By Chris Burroughs

In 1986 Sandia launched RADTRAN software to the public, giving the radiation material transportation community a new, free method for assessing risks and consequences.

Today, the code, which is much more powerful and easy to use, has 200 users throughout the world, ranging from companies that transport small medical devices containing radioactive materials to those transporting spent radioactive fuel from nuclear power plants. DOE funds the project, making it free to users.

National and international standard

"This software is the national and international standard for transportation risk assessment and consequence analysis for radioactive materials," says Ruth Weiner (6143), a one-time RADTRAN user and now project lead of the Sandia program. "It calculates potential doses of radiation to the public and transportation workers, both in normal transportation operations and as a result of an accident."

RADTRAN was originally developed in-house in 1976. Between 1977 and 1986 it ran only on Sandia computers and was used only by Sandians. The program was released to the public in 1986, free to organizations around the world that transport radioactive materials. It has gone through several upgrades, with RADTRAN 6.0 expected to launch this year. RADTRAN 5.0 came out in 2002 and was the first downloadable version of the software.

The code combines user-determined demographic, routing, transportation, packaging, materials, and radionuclide data with meteorological and health physics data to calculate expected radiological risks and consequences of transporting radioactive materials. Since its inception, it has been used in most radiological transportation environmental assessments and environmental impact statements.

Users submit an online application, and upon approval, have access to the software. They are e-mailed a user guide to assist them in the downloading process.

"RADTRAN allows users to track potential radiation releases, for example, as a truck carrying radioactive materials travels along a highway," Ruth says. "It calculates doses of radiation coming from a shipment to various populations. Those doses are usually very small."

Data collection began in 1970

RADTRAN does not make statements that shipments are unsafe, Ruth says. It only does calculations.

"We don't think we can tell members of the public that something is safe or not safe," she says. "We give them the data and they can decide for themselves."

If there is an accident, like a truck carrying radioactive materials rolling over, RADTRAN can calculate doses of consequence and risk. It looks at what can happen — the scenario; how likely it is to happen — probability; and what if it happens — the consequence.

"We've been looking at and collecting data since 1970," Ruth says. "There's never been an accident where there has been a release of radioactive material that caused ill health effects. However, there have been releases of radioactive materials."

Recently, a University of Michigan graduate student benchmarked RADTRAN with actual nuclear materials. She checked radiation emissions from three, five, and 10 meters away from the material and found that RADTRAN was slightly conservative in its dose estimates. (The student was one of Ruth's PhD candidates at the University of Michigan, where she is a part-time professor. The student was a summer intern at Sandia in 1998.)

Ruth says radioactive materials have been transported around the US since the 1950s. Most — 90 percent — are for medical and industrial uses. Radioactive packages are transported daily. Most are transported by commercial entities like FedEx. Others are large, well-shielded spent fuel casks going between nuclear power plants and to several DOE facilities in specially built trucks. Transuranic radioactive waste is carried regularly to the Waste Isolation Pilot Plant (WIPP) in Carlsbad in TRUPACT-II containers designed by Sandia.

> *"We don't think we can tell members of the public that something is safe or not safe. We give them the data and they can decide for themselves."*
>
> **Ruth Weiner**

Training the world in RADTRAN

Also, the United States has agreements with other countries to provide them with nuclear power plant fuel. Under the agreements, the countries must return the spent fuel, which is then transported cross-country to locations such as Idaho National Laboratory.

Since Sept. 11, 2001, RADTRAN has been used to determine the consequence of a deliberate radiological attack, something that has never happened.

Ruth and Doug Osborn (6143) give regular training sessions throughout the US on how to use RADTRAN. They even travel to foreign countries to demonstrate the software.

Besides the US, RADTRAN has users in Korea, Taiwan, Japan, India, Bangladesh, and soon South Africa.

Ruth says Sandia programmers initially developed the RADTRAN program. Upgrades have been provided by both Sandians and Sandia contractors. While RADTRAN is written in Fortran, a code that isn't even taught any more, no plans are in the works to change it.

"If we switch code, we may introduce errors," Ruth says. "This is one Sandia product that has stood the test of time."

More information about RADTRAN can be found at https://radtran.sandia.gov.

Ruth Weiner is a former RADTRAN user

Ruth Weiner (6143) first became a RADTRAN user in 1989 when she was a professor of environmental studies at Western Washington University. She joined Sandia in 1995 working on WIPP and became RADTRAN project lead in June 2003.

Working with her is Doug Osborn (6143) who helps users with the software program.

Sandians use vacation to help Katrina victims

By Iris Aboytes

Have you started planning a summer vacation, perhaps a cruise where you can sail surrounded by beautiful blue-green water? Imagine no phone calls, peace and quiet, your own cabin, and no problems to solve. Sounds great!

Now here is an alternative. A team of Sandians is taking vacation and going to southern Mississippi to assist in rebuilding what Hurricane Katrina took down. The trip is planned for March 16-26.

"No particular skills are necessary," says Jeff Porter (5719), team coordinator, "though some construction/home repair experience would be helpful. We will be staying at one of the Presbyterian Disaster Assistance (PDA)-sponsored volunteer villages, much like camping. The majority of the team will be driving to the site. Others may choose to fly to destination cities if willing to pay for some or all of their flight."

This is the third Sandia team trip. The others were made last October and November. In each trip, families were assisted in hard-hit areas, fallen trees were cleared, flood-damged homes were cleaned, and home-rebuilding began for people who cannot afford such work without help.

THIS WAS A SCENE volunteers confronted as they began the flood clean-up and started helping in the rebuilding process.

"There was the Los Alamos fire," says Jeff. "I wanted to help but could not. Then there was 9/11 and I was blown away; there was very little I could do. This time I can help, and help a lot of us will."

The Sandia team has put together a small trailer full of tools that they tow. "Some tools are available on-site, but it is hit-and-miss," says Jeff. "Team members leave nothing to chance. Upon arriving we get work orders from a community agency for needy families. The talents of the group are matched with the needs of the community. The Sandia team specialty is sheet rock and inside trim work. Volunteers can expect to work on rebuilding homes, mostly in the areas of roofing, drywall, flooring, and painting."

VOLUNTEERS — Gail Kaplan, Jeff Porter (5719), Julie Bouchard (6225), Jeff Sproul, Dennis R. Johnson (2550), Patti Valles (4311), and Will Nail. (Trudi Martinez (5521) took the photo.)

Julie Bouchard (6225) has gone on the previous two trips and is planning on going in March. "There is so much to be done. It is almost overwhelming. After the first trip, it was easy coming home, because I knew I would be going back soon." Julie's husband Darryl accompanied her on the second trip and will be going again. "On the November trip, we worked on the homes of several elderly women. They were so grateful for the help. The water damage and resulting mold is too much for a person to handle on their own."

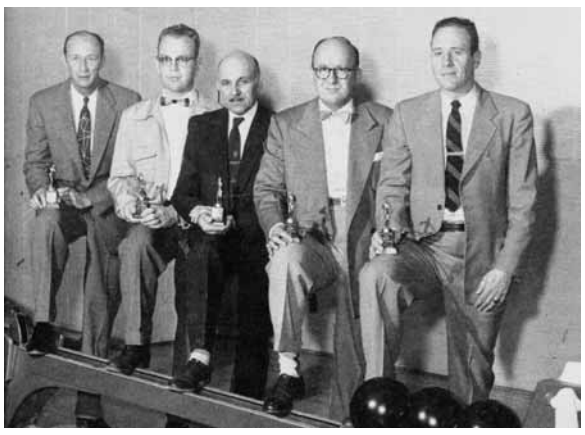
"The environment on-site is not unlike building a Habitat for Humanity home," says Jeff. "Most participants have reported that it is a significant, possibly life-changing experience."

Jeff needs to know by Feb. 16 if you are interested in getting involved in this trip. He says he will accept latecomers.

For more information, go the PDA's website for Katrina relief at www.pcusa.org/katrina/. For more details, you can contact Jeff at 844-9496 at work or 345-4034 at home.

This monthly column highlights Sandia Lab News *items from 50, 40, 30, 20, and 10 years ago, but each column does not necessarily include items from each decade.*

50 years ago . . . Rarely was any Sandia man seen without a necktie in the *Lab News* 50 years ago, and that went for the winners in the 1956 Sandia Bowling Tournament. Five members



WINNING TEAM — The five members of the 1956 Sandia Bowling Tournament were from left, J.F. Donovan, G.W. Mead, J.L. Rowe, R.E. Maxwell, and A. Blain.

of the winning team were depicted at the bowling alley with their trophies and all with coats and ties (see photo). And an examination of the classified ads showed how employees back then could make it on four-digit annual salaries. Among the ads was a '47 Plymouth convertible in "A-1" condition and two extra tires for $200, and a Corrales home with fireplace, fruit trees, cellar, storehouse, and more on 1.5 acres for $8,500.

40 years ago . . . The work of a team of forty-plus Sandia "rocketeers" operating from the Barking Sands Launch Site on Kauai was featured in the Feb. 11, 1966, *Lab News*. The team's work — a series of high-altitude research tests originally scheduled for Jan. 24-29 — had been held up for days by higher than normal jet stream winds, and the poor team members were forced into extended stays. By the *Lab News* deadline for that issue, the team had been able to conduct only three of the planned 20-some tests and therefore continued "suffering" the Hawaiian weather when they could have been back enjoying another Albuquerque winter.

ROCKET PAYLOAD being readied at the "screen room" at Barking Sands in 1966.

30 years ago . . . Then Sandia President Morgan Sparks, in a short State of the Labs interview in the Feb. 6, 1976, issue, said the Labs had added about 400 people — mostly technical staff and many in the energy research area — since the previous summer when layoffs had resulted in employment dipping to about 6,400. Commenting about Sandia's growing energy programs, he said, "It has become clear that the fundamental consideration in the energy field is economic. The technology in our various solar projects has already produced working systems.

NEW CDC 7600 COMPUTER — The new Sandia computer went on-line in Sandia's Computer Center in February 1976. Pictured with the new computer are from left, Lee Hollingsworth, Ron Detry (now VP, Division 4000), and Kelly Montoya.

Our principal job is to so design these systems that the energy produced is less — or a least no more — expensive than that available from conventional sources." Sandia's new CDC 7600 computer and the enhanced capabilities it would eventually provide to the Labs was featured in a center spread in the Feb. 20 issue. Although the 7600 was slated to become part of Sandia's scientific computer network, Sandia experts said it would take about 42 "man-months" to develop software necessary to integrate it.

10 years ago . . . No layoffs — The Feb. 16, 1996, issue announced that Sandia's Voluntary Separation Incentive Program (VSIP) had helped the Labs accomplish a primary goal of its Workforce Realignment Program — to eliminate 327 "impacted" positions throughout the Labs without forced layoffs. A total of 271 positions were eliminated through the VSIP, with the remaining 56 eliminated through internal transfers, normal attrition, and other resolutions.

— Larry Perrine

Mileposts

New Mexico photos by Michelle Fleming
California photos by Bud Pellitier


Meg Luther
35 38151


Gerald Esch
30 4520

Recent Retirees


David Varoz
30 10264


Laurence Lukens
30 2618


Stephen Montgomery
30 2564


Juanita Padilla
30 3523


Tobias Barros
25 4341


Butch Cox
25 230


Corey Knapp
25 12300


Fredrick Trussell
25 12334


Victor Chavez
20 10222


Dennis Croessmann
20 212


Daniel Kral
20 5733


Bruce Long
20 8517

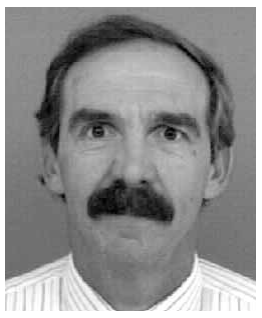

Randy Montoya
20 3651

Manager promotions

New Mexico

Don Glidewell, from PMTS, International Safeguards, Security, and Systems Engineering Dept. 6923, to Manager, Regional Security and Multilateral Affairs Dept. 6924.

Don joined Sandia in 1992 as a project manager in Corporate Construction Program Office Dept. 10824, where he managed congressional line-item construction projects, such as the Neutron Generator Facility and the Center for National Security and Arms Control.


DON GLIDEWELL

In 1997, Don was assigned as a project manager in the International Safeguards, Security, and Systems Engineering Department (6923) where he managed international safeguards work in support of DOE and the International Atomic Energy Agency.

Don has a BS and an MS in industrial engineering from the University of Wisconsin and an MA in management from Webster University.

* * *

Mark Soo Hoo from DMTS, International Physical Protection Program Dept. 6952, to Manager of that same department.

Mark joined Sandia in 1976 and currently works in International Physical Protection Programs, which assists countries by improving the security of their nuclear and radioactive materials.


MARK SOO HOO

Mark works internationally on the physical protection of nuclear and radioactive materials, working closely with the International Atomic Energy Agency (IAEA). He previously worked in the areas of arms control and treaty verification, physical protection of domestic nuclear facilities, and mechanical metallurgy.

During his many years with Sandia, Mark has had several career highlights. In 1987, he worked on the Technical On Site Inspection (TOSI) project and spent six weeks located outside a Soviet missile assembly plant to install equipment to monitor for treaty compliance.

From 2000 through 2003, Mark took a leave of absence from Sandia to work at the IAEA in Vienna, Austria. Here, he worked in the IAEA's Office of Nuclear Security.

Mark has also worked on two additional assignments outside of Albuquerque at DOE Headquarters in 1993 and 2004, as a Sandian providing technical advice on physical protection. He has traveled to nearly 50 countries in connection with his international work.

Mark has a BS from the University of Arizona, an MS from the University of Illinois, and an MBA from New Mexico Highlands University.

* * *

Sally Uebelacker from manager, Ethics and Business Conduct Office Dept. 12410, to Level II Manager, Safeguards and Security Dept. 4230.

Sally joined Sandia in August 2004 and worked in the Ethics and Business Conduct Office.


SALLY UEBELACKER

Sally has significant experience in management, safeguards and security, investigations, and law. Specifically she has more than 24 years experience managing security and law enforcement activities and is a certified Protection Professional through the American Society of Industrial Security as well as a New Mexico licensed attorney.

In her new position as Senior Manager for Dept. 4230, Sally will oversee information security, personnel security, and security training and awareness.

Sally has a BS in sociology from the University of Tulsa, an MS in public administration from the University of Northern Colorado, and a Juris Doctor from the University of New Mexico School of Law.

Feedback

Acronyms make reader I.L.L.

Q: *Can we cut down on the acronyms used on our paycheck stubs? SIP, SIPN, OASDI/EE — where do they even come from? After a serious study, I found that somehow SIP means 401K, but what is SIPN? I also believe that OASDI/EE is Federal Social Security Tax.*

Why can't we just call it Social Security? I am a rather conscientious person when it comes to my paycheck and other money matters so I study the various deductions on my paycheck stub regularly. However, even after working at Sandia for some time, I still have to take a moment to decipher the paycheck stub each time I look at it?

Can these be redesigned to cut down on the acronyms and use more plain English?

A: Sandia's Payroll Department utilizes standard industry nomenclature in describing "Social Security" withholding tax as the Old Age, Survivors, and Disability Insurance (OASDI) tax. The EE after OASDI is identifying that this withholding tax is being paid the employee and not Sandia Corporation, which must match this withholding amount as one of our employer taxes.

SIP is an abbreviation for the Sandia Corporation Savings and Income Plan as opposed to the SSP, the Sandia Corporation Savings and Security Plan. You are eligible for SIP if you are not a union member and you meet other criteria; eligibility for the SSP requires union membership along with other specific criteria.

The "N" designator after either the SIP or SSP abbreviation means NO company match — that is, Sandia will not match at 66-2/3 percent the first 6 percent of your eligible earnings that you authorized to be withheld from your pay. You must be on roll for one year before becoming eligible to receive this benefit.

Your question will result in a review of all the acronyms and abbreviations used to describe the various withholdings and deductions on Sandia's payroll remittance advices to evaluate their practicality and their utility.

I suggest you phone any one of our Payroll professionals or our Payroll Helpline at 844-2848 if you have any further questions regarding this matter. *— Don Devoti (10502)*

Phil and Sylvia Fajardo give the gift of love

By Iris Aboytes

THE FAJARDO FAMILY celebrates Valentine's Day each day of the year. (Photo by Randy Montoya)

Long-stemmed red roses and heart-shaped boxes of chocolates are traditional once-a-year symbols of love and Valentine's Day. At the Phil (2561) and Sylvia Fajardo household, they celebrate Valentine's Day every day surrounded by living symbols of their love, their four adopted children, Matthew, 20, Jonathan, 6, Micah, 3, and Micayla, who turns 2 on Feb. 14.

Sylvia's plan for life always included children, but as luck would have it she had cancer twice by the time she was 15. Phil's plan also included children. Meeting Sylvia at the University of New Mexico, he knew he had met his soul mate. Their love for children shared, they agreed to adopt.

Four years after they were married they adopted Matthew. Sylvia stayed home to care for him and started a daycare for children up to preschool. As Sylvia says, "This was a way to always have one or two babies in the house."

About eight years ago, she was approached by Vonnie Sachse, mother of one of the children she had in her daycare. Vonnie is the director of family-based services for ARCA, a private nonprofit organization founded by parents desiring community-based services for family members with mental retardation and other developmental disabilities. Vonnie asked Sylvia if she and Phil would consider becoming foster parents for some of these medically fragile children.

Sylvia and Phil agreed. The foster children became part of their family. Vacations were taken only if the foster children could go. And Phil and Sylvia were trained to handle various medical situations that might come up. Some of the children had very bleak prognoses. "I was trained in CPR," says Phil. "I never thought I would use it on one of my own children, but I did."

Jonathan moved into the Fajardo home when he was nine months old. His prospects were not good. He was born with myotonic dystrophy, a form of muscular dystrophy. Chances were that he would not make it to 18 months. Once placed in their home Jonathan thrived and became stronger with therapy provided by Alta Mira, an early intervention program.

Jonathan came up for adoption, and there was no doubt they would adopt him. They were told Jonathan would probably never walk; if he did, it would be with the aid of a walker. Before two he learned how to use a walker, and one day while Phil and Sylvia were out, Matthew taught him how to walk. At six years old Jonathan is doing great, running and playing with his sisters.

"I was happy with two children," says Phil. "I love my boys." Then one day Sylvia got a call from Vonnie about another child, a six-week-old baby girl with severe necrotizing entercolitis (NEC), a life-threatening inflammation and infection of the intestines. She also had sepsis, a life-threatening blood infection. She has short bowel syndrome as a result of the NEC. She was expected to die soon but needed a family to love her until she became an angel. Sylvia's heart said yes immediately, but she had to call Phil.

"Why are you asking me?" he answered. "You know you are going to take her home." He knew that Sylvia had probably already agreed to take the baby.

"I was not planning to adopt any more children," says Phil, "but God was telling me, 'Relax, go visit the baby.'" He went to the hospital to see her and was told by the nurses that she was unresponsive, lethargic, and very fragile. He scrubbed for three minutes before he could enter the Newborn Intensive Care Unit to hold her. "When I held her," says Phil, "she opened her big brown eyes and touched my chin and beard with her hand. That instant, she became daddy's girl." After the Fajardos started visiting Micah, she started to improve.

Micah did not become an angel; she became their daughter when she came up for adoption.

Several months after Micah's adoption, they received another call. Micah had a three-month-old sister — would you like to adopt her? "Of course, we would adopt Micayla," was Sylvia's response. Then she called Philip to let him know they had another daughter coming. They have their special little girls, not little girls with special needs.

Both girls receive services from Alta Mira through Project Jericho. One morning a week they meet with a developmental specialist. Micayla is now in preschool, and Micah is at an Albuquerque Public School child find classroom (a classroom for children with learning disabilities).

"All our children are doing well," says Sylvia. "They adore their older brother, and he adores them. To us our kids don't have special needs; they have needs just like other children. With unconditional love, our children have thrived as they fill our house with laughter. We have a perfect family."

"People come up to us and tell us we're saints for doing this," says Phil. "But we're just a normal family raising our kids. We do this because every child needs a home, no matter what their needs are. Our children have given us a lot more than we have given them."

"When I was a young teen," says Sylvia, "I read a book on the DeBolt family, *19 Steps up the Mountain*." The Debolts have six biological children and 14 special needs children who were considered unadoptable. "So, I had more than just a passing thought about doing this," she says. There are 19 steps in the staircase from the first to the second floors in the DeBolt home. The children's goal was to reach the 19th step, showing their ability to overcome their physical handicaps.

"Their story stayed with me through the years," says Sylvia. "It did not glorify fostering or make it sound easy. It told about the joy, and the heartbreak. I knew that given the chance this was what I wanted to do with my life," she says.

Their prayers these days are not only for their children but for Sylvia, who discovered five years ago she had cancer again. She just finished treatment so she can keep on loving their brood. Sylvia would still like to adopt a little boy. Phil says, "My quiver is full. We are very blessed."

"You know what would be nice?" says Sylvia. "If instead of buying flowers or candy this Valentine's Day, you gave a gift of love to a United Way agency in your Valentine's honor."

Agencies that can help

• Family Based Services

A component of ARCA Community Program Services, Family Based Services is a licensed Child Placement Agency initiated in 1978 to provide support, advocacy, and assistance to families, adults, and children with special needs. The Family Based Services team recruits and trains caring families and individuals to provide adoption, foster care, home-based support, and respite services to people with mental retardation and developmental disabilities in family settings.

• Alta Mira

Alta Mira Specialized Family Services, Inc. supports individuals with developmental risks, delays, or disabilities and their families to optimize quality of life.

• Christina Kent Day Nursery

Christina Kent Day Nursery provides high-quality child care, early education, and nutritional services for children from low-income working families.

• Muscular Dystrophy

The Muscular Dystrophy Association is a nonprofit organization that raises money to help people with any of 43 neuromuscular diseases. The organization depends solely on fundraising to raise money for much-needed research as well as to provide vital services to clients, such as the purchase and repair of wheelchairs, clinics, flu shots, and MDA summer camp for "Jerry's Kids."

Feedback

Reader paints — WHAM! — dramatic scenario of lane-striping issue at Eubank gate

Response: Use caution in gate area

Q: *Imagine this: You're driving on a road you've never driven before. A big slow truck is in front of you, so you decide to change lanes to go around it. The lane stripes are normal (dashed), so you signal and start to change lanes. Suddenly, out of nowhere, a 10-foot solid iron gate appears in the center of the lane stripes, and WHAM! You plow into it at 30 mph.*

This could easily happen as you exit the Eubank Gate. The lane stripes are dashed, indicating it is OK to change lanes. They should be solid to let the driver know that it's not safe to change lanes.

A: The lanes are striped to allow traffic to move to the outer lane (when appropriate to do so) to gain access to the businesses east of Eubank. Solid striping would not allow vehicles enough time to change lanes after exiting the gate. Please use caution while in the gate area and continue to use good judgment regarding choosing the lane you drive in depending on your final destination. The speed limit in the gate area is 15 mph.

— Darrell Fong (10322), Chairman, Sandia Traffic Safety Committee