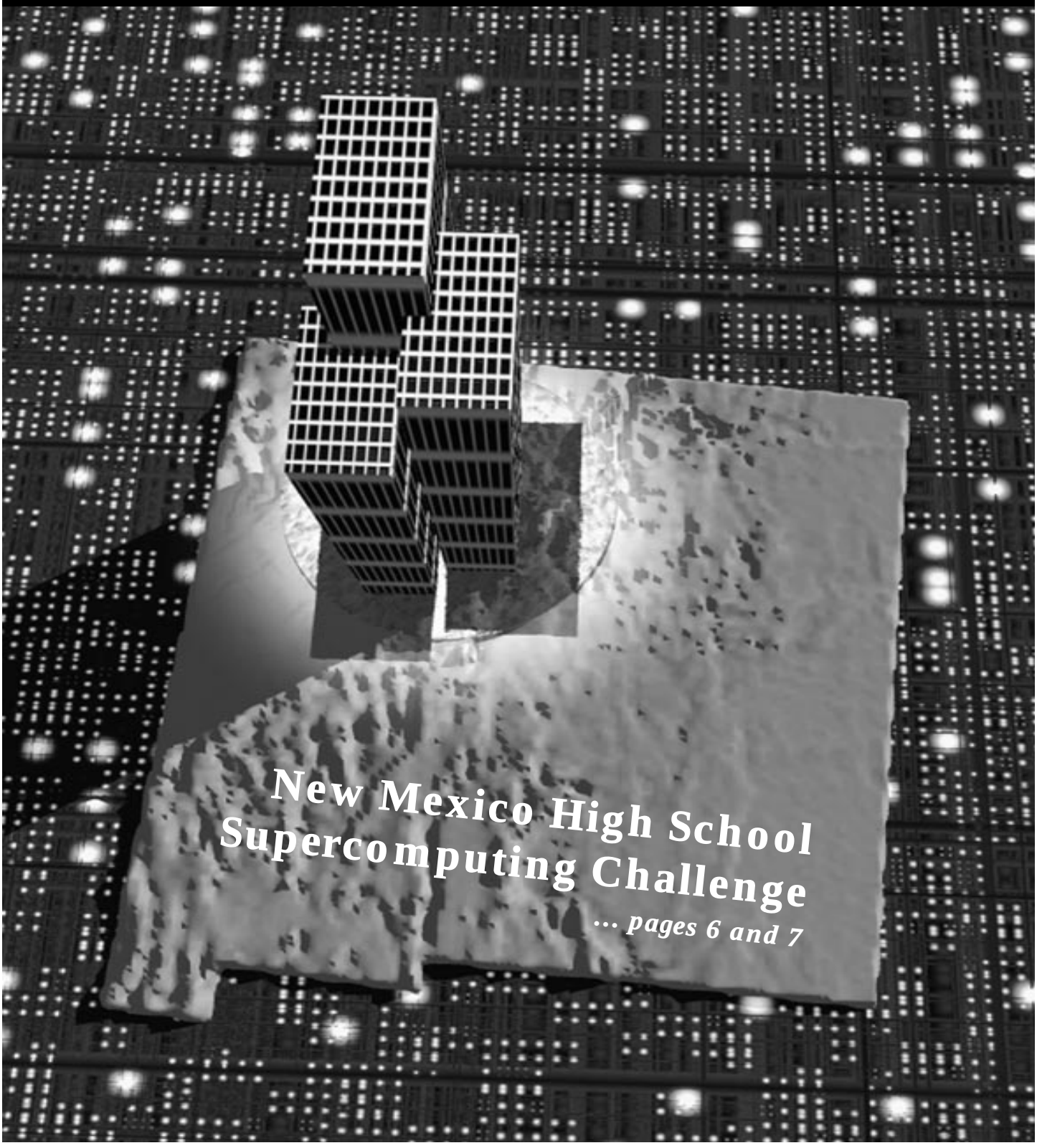
Reflections

Los Alamos National Laboratory Vol. 4, No. 8 • September 1999



New Mexico High School Supercomputing Challenge

... pages 6 and 7

A Department of Energy/University of California Laboratory

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Cover illustration by Ed Vigil

Reflections

Reflections, the Laboratory monthly publication for employees and retirees, is published by the Public Affairs (PA) Office. The staff is located at TA-3, Building 100, and can be reached by e-mail at *newsbulletin@lanl.gov*, by telephone at 7-6103, by fax at 5-5552 or by regular Lab mail at Mail Stop C318. The individual telephone numbers are listed below.

Editor:
Jacqueline Paris-Chitanvis, 5-7779

Managing editor:
Denise Bjarke, 7-6103

Graphic designer:
Edwin Vigil, 5-9205

Photographer:
LeRoy N. Sanchez, 5-5009

Contributing writers:
Meredith Coonley, 5-3982
David Lyons, 5-9198
Ternel N. Martinez, 5-7778
Liz Padilla, 5-9201
Steve Sandoval, 5-9206
John A. Webster, 7-5543

Editorial coordinator:
John A. Webster, 7-5543

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editor's journal

Speaking of win-win situations

With the arrival of September, many students who worked at the Laboratory over the summer find themselves back on college and university campuses across the country. Many Lab employees who served as student mentors are settling back into "post-student" routines, while other employees are gearing up to work closely with high school students in the annual New Mexico High School Supercomputing Challenge.

This computer competition co-sponsored by the Laboratory was unveiled in 1990, the brainchild of former Lab Director Sig Hecker and Tom Thornhill, president of New Mexico Technet Inc. It is a yearlong academic program for high school students that gives them a chance to do original computational science using high-performance computers. The basic idea behind the supercomputing challenge is to generate interest among high school students in computing, science and mathematics and to expose the students and their teachers to supercomputers. (See the article beginning on Page 6.) Numerous students have taken part in the event since its inception and winners have come from throughout the state. The supercomputing challenge has been one of those win-win situations in which the Laboratory and those who serve as mentors get as much out of the competition as the students who participant.

The registration deadline for the competition is mid-September, and the event kicks off in October. More information about the New Mexico High School Supercomputing Challenge is available online at http://www.challenge.nm.org.

And speaking of win-win situations, the Laboratory recently garnered seven R&D 100 Awards for innovative technology, giving it a total of 63 awards won over the past 12 years. The Lab is in the process of getting ready for next year's competition (see the article on pages 4 and 5). For those unfamiliar with the R&D 100 Awards, they are presented each year by "R&D Magazine" for the most significant products, materials, processes, software or systems with commercial promise. The awards program is international in scope and technologies are nominated in open competition.

The Lab's seven winning technologies are spotlighted in this month's issue of "Reflections." They include an acoustic Stirling heat engine; a computer code for predicting dopant density profiles in semiconductor materials; a new approach to process development; a miniaturized X-ray diffraction and X-ray fluorescence instrument; real-time, puncture-detecting, self-healing materials; an atmospheric pressure plasma jet; and a sensor for automatically controlling the combustion process in heavy-duty industrial boilers. This year the Laboratory had the highest win-to-entry ratio ever — seven winners out of 17 entries.

And because all of the technology was noteworthy, the Lab's 17 R&D 100 entries are featured in the September/October issue of "Dateline: Los Alamos." This monthly publication makes available information about Los Alamos advances in science and technology and is distributed to agencies and organizations that fund Lab programs. "Dateline: Los Alamos" is available online at http://www.lanl.gov/worldview/news/dateline/.

Building better futures

by David Lyons

Bridge program participant Jeanette Trujillo receives instruction on forklift operation from Martin Trujillo, no relation, also of Materials Management. *Photo courtesty of Materials Management (BUS-4)*

Everyone complains about his or her job from time to time. Most of us, in fact, take for granted the fact that we have a job to complain about. Imagine, though, what it's like to wake up day after day not having a job, not knowing when you might be able to find another odd job, not sure if you'll be able to pay your bills. This reality seems foreign to many Lab employees, but for thousands of people in Northern New Mexico, these are the daily facts of life.

For many people, welfare, or Temporary Assistance to Needy Families, has become a way of life. Unable to find jobs that support them and their families, they continue to seek federal assistance.

The Laboratory, in cooperation with the state of New Mexico, is working to help end the welfare cycle for some residents of Northern New Mexico. Among those who were on welfare until recently are Sammy Lucero and Jeanette Trujillo. Much has changed, though, for Lucero and Trujillo, thanks to their decision to participate in the Laboratory's Welfare-to-Work program, known as the "Bridge to Employment."

The program, which was the first of its kind in New Mexico, started in July 1997 with nine welfare recipients. The program coordinator of the Laboratory's Welfare-to-Work program, Mary Van Eeckhout of Materials Management (BUS-4), explained that the main goal of the program is to assist welfare recipients with work experience, job search and short-term training needs.

Program participants spend roughly 20 percent of their time in formalized training, focusing on such things as résumé writing and basic computer skills. The remaining 80 percent is spent in on-the-job training in basic entry-level positions, the majority of which are in BUS-4, led by Carol Smith. Additionally, program participants who need help with basic educational skills are enrolled in on-site tutoring.

Lucero was one of the first nine to go through the program. He, along with the other eight participants, successfully completed the program. Currently, he is working in a full-time job and is off welfare. Lucero, like many other welfare recipients in Northern New Mexico, had been warned that his cash assistance would stop as federally mandated welfare reform was implemented. Knowing this, he volunteered to participate in the Laboratory program. Lucero was a bit anxious about his first trip to Los Alamos, but he now commutes daily, 110 miles round-trip from El Rito. He currently works for a Laboratory contractor, delivering mail as a member of Materials Management.

"The [Bridge to Employment] program has been really good. It's helped me a lot," said Lucero.

Unlike Lucero, who is a Bridge Program graduate, Trujillo recently joined the program in April, along with five others. She acknowledged that it has been difficult returning to work after 13 years caring for her children at home, but she said the rewards have been tremendous.

"It's such a good feeling to wake up in the morning, knowing that I'm going to work that day. Now, I'm supporting myself and my kids, and they know that they can do the same someday," said Trujillo.

Her goal is to follow in the footsteps of Lucero — driving a delivery van, either here at the Laboratory or elsewhere. The one place she does not want to be, she explained, is behind a desk.

"I have to be moving. I don't care if it's raining, snowing, whatever. I just love to be out meeting new people all the time," she said.

Trujillo was happy the Bridge program did not try to force the same career path on everyone.

"They asked me my interests and what I wanted to do," she said. The Program works, she continued, because "they aren't trying to make a cat bark." Trujillo currently works as a delivery person, learning the delivery routes that she will soon be driving.

The Bridge to Employment Program continues to grow, based on an additional grant it received from the New Mexico Department of Labor in April. To learn more about the program or about hiring program participants, contact Van Eeckhout at 7-5245 or Smith at 7-4174.

Lab scores again with R&D 100 Awards, Prepares for next year's award process

by John A. Webster

Again this year, the Laboratory earned a significant share of the R&D 100 Awards, which are given annually to 100 innovative technologies with commercial promise, but it's already time to start thinking about next year.

"One of the reasons we did well this year is that we put out the call for nominations and identified potential entries early in the process," said Sue Goff, senior adviser to the Civilian and Industrial Technology (CIT) Program Office and the Laboratory's R&D 100 coordinator.

"This gave us time to prepare good packages to submit," Goff said. "We plan to follow that model this coming year."

The Laboratory received seven R&D 100 Awards this year, the highest number it had received since 1990. The awards, sponsored by "R&D Magazine," recognize strong commercial potential in products, materials or processes developed by the international research community.

The awards are important to the Lab for a number of reasons, said Goff. For one thing, she said, they indicate an institution's ability to produce commercially useful technologies. The Department of Energy, along with other potential funding agencies and sponsors, views the awards as a reflection of the caliber of science at those institutions.

For individual researchers, the award is an honor that brings positive publicity to their work. It also brings a $75,000 award from the Laboratory-Directed Research and Development Program to continue working on the projects.

"It also helps you think about your work differently than you do in publishing a technical paper," Goff said. "You think about the practical value to society of your work, and you think about what you have in terms of its commercial potential."

"The R&D 100 Award also increases the potential of attracting company interest in licensing a particular technology, which can bring in money to the Laboratory and individual researchers," said Jolyn McTeigue, marketing specialist in CIT.

The R&D 100 process at the Lab begins shortly after the annual, R&D Magazine-sponsored banquet in Chicago at which the winners are honored. This year, the banquet is scheduled for Sept. 23.

Last year, the call for nominations went out in late September, and a 22-person technical review committee representing organizations across the Lab was formed a few weeks later to help identify and evaluate projects that might be suitable for nomination.

Goff, joined by lead editor James Russell, lead designer Pete Sandford and editor Brian Fishbine, all of Communications Arts and Services (CIC-1), interviewed researchers and visited project sites during the next few weeks. By Dec. 1, the 17 projects for which nominations were submitted were identified.

"We had time to complete well-prepared packages," said Goff. "We also had time to resolve intellectual property issues, such as the possible need for patents or copyright protection."

The CIC-1 teams began working with researchers on the first drafts of the packages, rather than waiting for the researchers to develop a first draft and then reacting to it. This service also speeded up and improved the process.

"The R&D 100 application process was relatively easy because of the CIC team the Laboratory put together," said one of this year's winners, Greg Swift of Condensed Matter and Thermal Physics (MST-10). "They're tremendously talented and have been helpful to me every time I've entered."

To find out how to get involved in the R&D 100 nomination process, call Goff at 7-7200 or check the Word Wide Web page prepared by CIT at *http://www.lanl.gov/partnerships/RD100/2000.html*.

For the future, Goff hopes to be able to nominate projects for other, similar awards. "We can use the materials prepared for the R&D 100 Awards in other ways," she said. "There are two or three other venues that we are reviewing for submitting these kinds of examples of Los Alamos science.

"And this would be for all the projects submitted by the Lab for the R&D 100 Awards, not just the ones that win. They all embody valuable, innovative technologies."

Award-winning technologies

The Laboratory has won a total of 63 R&D 100 Awards during the past 12 years, more than any other national laboratory during the same period. The following seven Lab technologies received the awards this year.

Acoustic Stirling Heat Engine

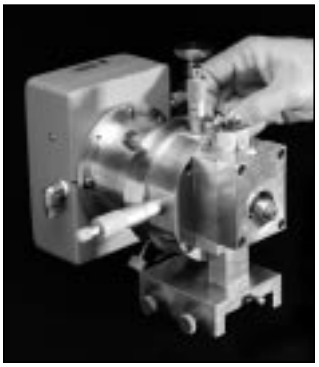
The acoustic Stirling heat engine looks like a long, baseball-bat-shaped resonator with an oval "handle" on one end. It creates energy in the form of sound waves when heat is applied to the compressed helium within the system through a heat exchanger located on the "handle." The process is environmentally friendly and up to 30 percent efficient. Typical internal combustion engines are 25 to 40 percent efficient. Because the device contains no moving parts and is constructed of common materials, it requires little or no maintenance and can be manufactured inexpensively. The project researchers are Scott Backhaus, Greg Swift and Chris Espinoza of Condensed Matter and Thermal Physics (MST-10).

continued on Page 5

continued from Page 4

Atmospheric Pressure Plasma Jet

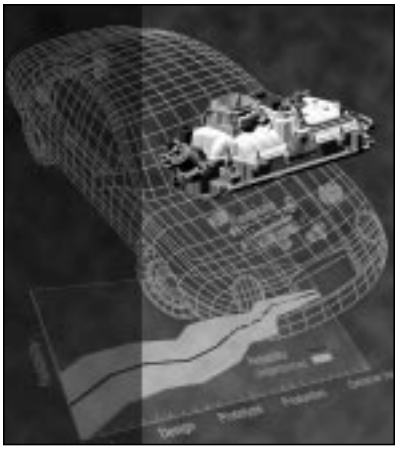
The Atmospheric Pressure Plasma Jet uses electrically charged gas to create a spray that clean, coats, etches or decontaminates. The pressurized jet, usually helium mixed with small amounts of oxygen, flows between electrodes, generating an electrical field that pulls off certain elections to create an ionized gas, or plasma. When the plasma strikes a contaminated surface, it destroys the contaminants, essentially "burning" them at relatively low temperatures without damaging the underlying surface. The technology has many potential applications, including decontaminating objects containing radioactive materials. Submitted by Gary Selwyn of Plasma Physics (P-24), this was a joint entry by the Laboratory; the University of California, Los Angeles; Beta-Squared Inc.; and DuPont Nylon.



CHEMIN: A Miniaturized X-ray Diffraction and X-ray Fluorescence Instrument

CHEMIN is a miniature X-ray diffraction/X-ray fluorescence analysis instrument. Named CHEMIN because it can determine the CHEmistry and MINeralogy of a sample, it can simultaneously characterize elemental composition and mineralogy from small fine-grained or powder samples. The future design calls for an instrument about the size of a soda can. Such a compact instrument could be used to study extraterrestrial mineralogy. On Earth, it could be used in various field applications, such as sampling at remote, dangerous sites or where the soil has been contaminated. David Bish, David Vaniman and Steve Chipera of Geology and Geochemistry (EES-1) submitted CHEMIN as a joint entry by the Laboratory, NASA Ames Research Center and the Jet Propulsion Laboratory.

PREDICT: A New Approach to Process Development



PREDICT (Performance and Reliability Evaluation with Diverse Information Combination and Tracking) is a set of formal, structured techniques for estimating the performance of a product when test data are scarce or unavailable. It works by documenting and exploiting the expert knowledge of a company's designers, engineers and scientists; incorporating uncertainties about expected performance into its calculations; and by combining expert knowledge and uncertainty with existing data. PREDICT was developed for use in estimating the reliability and associated uncertainty of aging nuclear weapons packages. This project, submitted by Mary Meyer, Jane Booker and Tom Bement of Statistics (TSA-1), was a joint entry by the Lab and Delphi Automotive Systems.

Real-Time, Puncture-Detecting, Self-Healing Materials

This technology provides instant detection of punctures or other breaches of personal protective equipment, such as gloves, bodysuits, biohazard suits and boots, and of vessels containing such materials as hazardous waste, chemicals or radiation sources. The flexible product consists of five layers of alternating conducting and insulating materials. A weak electrical current flowing through the conducting layers is connected to a signal alarm device, which is activated by a puncture. One conducting layer is a form of carbon-filled butyl rubber that flows into small cracks and pinhole punctures. Robert Hermes of Polymers and Coatings (MST-7) submitted the technology as a joint entry by the Laboratory and North Hand Protection, Charleston, S.C.

REED-MD: A Computer Code for Predicting Dopant Density Profiles in Semiconductor Materials

REED-MD is a computer code that accurately and efficiently predicts dopant density profiles in ion-implanted semiconductor wafers. The electrical properties of modern semiconductors can be modified by doping, a process that involves burying ions in the semiconductor. Optimizing performance requires controlling the concentration of the implanted ions, which is known as the dopant density profile. REED-MD (Rare-Event-Enhanced Domain, Molecular Dynamics) allows semiconductor manufacturers to produce, in one day, density dopant profiles on a personal computer that rival, or exceed, the quality of profiles produced by industry's current mainstay, an instrument called a secondary ion mass spectrometer. The technology was submitted by Keith Beardmore and Niels Gronbech-Jensen of Condensed Matter and Statistical Physics (T-11).

The Sulfur Resistant Oxymitter 4000

The Sulfur Resistant Oxymitter 4000 is a sensor for automatically controlling the combustion process in heavy-duty industrial boilers, such as those found in power plants, refineries, and pulp and paper mills. The ceramic-based device can replace sensors that often do not survive in corrosive sulfur-rich environments. Because traditional sensors have not worked well in the presence of sulfur, boiler operators have compensated by simply not using oxygen sensors. Without an oxygen sensor (and active combustion control) the boilers burn excess fossil fuel, thereby wasting fuel and creating excess pollution. This was a joint entry by the Lab and Rosemount Analytical Inc. of Orrville, Ohio, submitted by Eric Brosha and Fernando Garzon of Electronic and Electrochemical Materials and Devices (MST-11).

High School Supercomputing Chal

Still introducing students to computer science a

by Steve Sandoval

- A numerical simulation of the vortex on Jupiter.
- The computational study of Euler equation solutions across a two-dimensional Delaunay triangular mesh.
- A computer model of the Mediterranean Sea to determine if global warming could be reduced by dissolving greenhouse-gas carbon dioxide into the sea.

They sound like chapters or problems from an advanced science course or textbook. But they're not. They're actually high school projects done by students competing in the New Mexico High School Supercomputing Challenge.

David Kratzer of Customer Service (CIC-6) and coordinator of the challenge said its goal is to increase knowledge of science and computing, expose students and teachers to computers and applied mathematics, and instill enthusiasm for science in high school students, their families and communities. Any New Mexico high school student in grades 9 through 12 can enter.

Unlike other computing competitions, the New Mexico High School Supercomputing Challenge offers supercomputer access to students at every level of expertise and stresses student activity over work by teachers and coaches, said Kratzer.

But Kratzer also sees the challenge as a recruiting tool that he has used to attract high school students to the Lab. And Lab employees who participated in the challenge said it was this program that got them interested in the Laboratory as a potential employer.

"I've hired several personally," said Kratzer. "One of the judges who is a group leader in the Physics (P) Division was impressed enough that she contacted me to [get in touch with] a student to offer her a job this summer.

"We've had people who mentor teams end up hiring students to work with them."

The Supercomputing Challenge was conceived in 1990 by former Lab Director Sig Hecker and Tom Thornhill, president of New Mexico Technet Inc., a not-for-profit company that in 1985 set up a computer network to link New Mexico's national laboratories, universities, state government and some private companies.

A team from Las Cruces High School took first prize last year in the New Mexico High School Supercomputing Challenge at the Laboratory. The winning project was a complex simulation of how nerve cells interact. Team members, from left to right, Terry Shock, Dustin Byford, Sarah Gladden and Jenny Shock answer questions from a television news reporter. *File photo*

> ***"I realized that the Lab does a lot of really neat computer research, and that's what I wanted to go into."***

Since the challenge started, Kratzer has hired Mike Fisk and Gina Fisk of Network Engineering (CIC-5) and Chris Karr of Customer Service (CIC-6). "I became familiar with them during the course of the challenge year and realized they were very talented students," said Kratzer.

Jeff Hay of CIC-5 participated in the challenge during the 1992-93 school year while attending the Career Enrichment Center, a computer and information technology magnet school in Albuquerque. As a high schooler, Hay teamed with other students on a computational fluid dynamic problem involving wind tunnel modeling.

Hay has worked at the Laboratory since 1997; he does network efficiency testing on the Lab's internal computer network.

His experience in the challenge, Hay said, spurred his interest in the Lab — his father worked for Sandia National Laboratories so he was somewhat familiar with the national laboratory system. "Yes, it did influence me," Hay said. "I realized that the Lab does a lot of really neat computer research, and that's what I wanted to go into."

Said Kratzer, "We use the computer as a tool and more as a computational tool. Having [students] use the tool to solve problems in other disciplines is the objective."

Lecroy Rhyanes of Nuclear Materials Information Management (NMT-3) graduated in May from El Paso Andress High School. Last spring, Rhyanes competed in the supercomputing challenge; his team's project studied sleeping patterns and their effect on shift workers.

Rhyanes' mentor was Joe Watts whom Rhyanes met when Watts ran a teacher resource facility at New Mexico State University. Watts had spoken to Rhyanes' Spanish teacher who had information about the supercomputing challenge. He ended up mentoring Rhyanes and other El Paso Andress students in last year's challenge.

enge approaches its 10th birthday

d the Laboratory

Joe Watts, right, of Nuclear Materials Information Management (NMT-3), reviews the new Nuclear Materials Technology (NMT) Division Diversity Office World Wide Web page built and designed by Lecroy Rhyanes, left, also of NMT-3. Watts mentored Rhyanes in the most recent New Mexico High School Supercomputing Challenge while Rhyanes was a student at El Paso Andress High School and Watts ran a teacher resource center at New Mexico State University in Las Cruces. *Photo by LeRoy N. Sanchez*

"I started thinking about [the supercomputing challenge], and I said, 'This will give me a chance to work with computers' which is what I wanted to do," said Rhyanes.

This summer Rhyanes is working as a World Wide Web page designer for NMT-3. This fall he will study criminal justice at NMSU.

"I knew nothing about Los Alamos at all," Rhyanes said, before joining the challenge.

Watts, a communications coordinator for NMT-3, ran the Teacher Learning Center at NMSU, a program the university started with some funding from NASA. He joined the Laboratory last March.

Watts said NASA was interested in helping teachers help students increase their math, science, engineering and technology skills. The university and NASA hosted a teacher training. That's where Watts met Rhyanes' Spanish teacher.

As luck would have it, Watts said, it was mentioned at a supercomputing challenge meeting that some high school students from Texas should become involved in the challenge. Watts contacted Rhyanes's Spanish teacher and eventually became Rhyanes and his team members' mentor.

"We just wanted to get more people involved; making that initial outreach to Texas was going to happen through Andress," said Watts. "More than anything, I see it as an outreach mechanism," he said of the supercomputing challenge.

> ***"The things that we have to learn in the [supercomputing] challenge have a lot to do with things we do up here in Los Alamos."***

"The challenge goes out everywhere and has a big scope … What happens is that students like Lecroy who are hard workers, intelligent and the cream of the crop wind up impressing those around them.

"From that standpoint, it's just a joy," said Watts. "To me it reaffirms that when you take time and you work with students, it is dually rewarding. They pick up skills. They get to work with top-notch people, with great equipment. The other thing is the people involved get to work with great students."

Hay is sold on the supercomputing challenge as a good science and academic program. Like Kratzer, Hay sees the challenge as a recruiting tool. "It opens a lot of doors for high school students who normally wouldn't have access to the Lab," he said.

Hay has stayed involved in the challenge as a Laboratory mentor of supercomputing challenge students.

Rhyanes also spoke highly of the challenge. "It gives students the chance to learn about computers and meet people … I think it does serve as a recruiting tool," said Rhyanes. "The things that we have to learn in the [supercomputing] challenge have a lot to do with things we do up here in Los Alamos."

The end-of-year awards ceremony, Kratzer added, also helps sell the Laboratory to high school students. "The PR that is part of awards day [allows students] to learn about Los Alamos. It's no longer a mystical hilltop," he said.

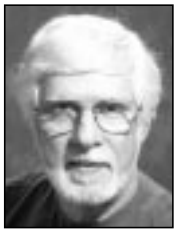
Planning has begun for the 10th annual New Mexico High School Supercomputing Challenge. Teams need to be registered to compete by the middle of September and the kickoff conference, which includes orientation for competing students and teachers, is Oct. 24 through 26 in Glorieta Conference Center. Mark Henne of Pixar Animation Studios and a University of New Mexico graduate will give the keynote address at the conference.

Employees interested in becoming involved in the High School Supercomputing Challenge can write to *consult@mode.lanl.k12.nm.org* by electronic mail, or call Kratzer at 5-4444, ext. 811, or Eric Ovaska of CIC-6 at 5-4761.

More information about the challenge also can be found on the challenge's World Wide Web page at *http://www.challenge.nm.org*.

NIS names two new program managers


Sara Scott


Paul White

Two new program managers have been appointed in the Nonproliferation and International Security (NIS) Division. **Sara Scott** is the new program manager for Nonproliferation and Arms Control Programs, and **Paul White** is the program manager for the newly formed Russian Nonproliferation Program office.

These selections were made jointly by Terry Hawkins, NIS division director, and John Immele, program director for Nuclear Materials Management (NMM) within the Threat Reduction Directorate.

Although the NAC and RN program offices reside in NIS, their activities will support NMM program concerns related to nuclear materials nonproliferation, domestic and international nuclear safeguards programs, and nuclear material disposition.

"Together, these two program offices cover the bilateral and multilateral initiatives for securing and controlling nuclear material, which Los Alamos has helped pioneer in the United States and worldwide," Immele said. "Their importance and the opportunities for new thinking in these areas have grown substantially in the post-Cold War period.'

The RNP office has responsibilities for activities in materials protection, control and accounting, the initiative for proliferation prevention and the nuclear cities initiative.

The NAC program office provides nonproliferation technologies and technical support to facilitate worldwide control of critical weapons information and materials. The office also conducts efforts in support of weapons treaties and agreements.

Lab Fellows named

Five researchers — recognized experts in fields ranging from nuclear weapons to fuel cells to particle physics to turbulent flows — were selected this year as Laboratory Fellows, the highest scientific honor the Lab bestows.

The five new fellows are **Aloysius Arko** of Condensed Matter and Thermal Physics (MST-10), **Shiyi Chen** of the Center for Nonlinear Studies (CNLS), **Shimshon Gottesfeld** of Electronic and Electrochemical Materials and Devices (MST-11), **Steve Lamoreaux** of Neutron Science and Technology (P-23) and **Robert Weaver** of Thermonuclear Applications (XTA).

Laboratory Fellows are appointed by the director in recognition of sustained outstanding contributions and exceptional promise for continued professional achievement. They are expected to continue to play an important scientific or technical role in the Laboratory and to contribute in significant ways to Lab programs and initiatives. No more than 2 percent of the Lab's technical staff members may be fellows at one time.

Pacheco to serve on SFED board of directors


Chuck Pacheco

Laboratory employee **Charles "Chuck" Pacheco** has been named to a two-year term on the board of directors of Santa Fe Economic Development Inc.

Santa Fe Economic Development Inc. is a not-for-profit organization that promotes small business development in Santa Fe. The board of directors oversees SFED's two-person staff and meets monthly.

Pacheco is a community outreach manager for Santa Fe in the Community Relations (CRO) Office. He manages the Lab's Santa Fe Outreach Center located on Old Pecos Trail.

In July 2000, Pacheco also will become chairman of the board of directors of the Santa Fe County Chamber of Commerce, which promotes economic development in Santa Fe and Santa Fe County.

He has worked for the Laboratory 16 years. Before joining CRO in 1997, he was a senior staffing representative in Staffing (HR-5).

Pacheco earned a degree in Latin American Studies from University of New Mexico and a master's degrees in business administration, also from UNM.

He also sits on the board of directors of Santa Fe Partners in Education, which promotes education programs in the public schools and the Santa Fe Rotary Club.

Lab team honored by intelligence agency

A Laboratory team has received a prestigious award — the Seal Medallion — from the National Intelligence Council, recognizing work done to support the intelligence community in analyzing foreign nuclear activities.

The team members are **Albert Charmatz**, **Allen Riley**, **Gerald Stickfaden** and **Rod Schultz**, all of Weapon Design Technologies (NIS-9), **Thomas Kunkle** of Geoanalysis (EES-5), **Thomas Weaver** of Geophysics (EES-3), **Charles Miller** of Nuclear and Radiochemistry (CST-11) and **Michael MacInnes** of Thermonuclear Applications (X-TA).

They were honored for their performance in support of the Joint Atomic Energy Intelligence Committee for the May 1998 nuclear tests in India and Pakistan. Their technical analyses helped the U. S. government more accurately gauge the implications of the test activities and formulate its position in response to the tests.

August employee service anniversaries

35 years
James Hoffer, MST-10
George Lawrence, APT-TPO
Leroy Wampler, ESA-WE

30 years
Juan Baldonado, NIS-1
Ronald Holmes, NMT-8
Sylvia Naranjo, BUS-1
Samuel Serrano, BUS-4
Gerry Wood, ESH-5

25 years
Ronald Bobbett, CIC-7
James Busse, CST-1
T. Michael Cannon, CIC-3
Kandy Frame, ESA-TSE
Mary Louise Garcia, X-NH
T.E. Gene Gould, EES-15
Flavio Gurule, CIC-18
Michael Hall, LANSCE-6
Willard Hemsing, DX-3
Sharon Hurdle, NIS-7
Abram Jacobson, NIS-1
Marshall Maez, ESH-14
Ralph Menikoff, T-14
John Moses, P-21
Ronald Nelson, LANSCE-12
Michael Nicolini, F-6
Jacob Perea, DX-DO
Douglas Pippin, LANSCE-SNS
Amos Romero, NIS-5
Oscar Sander, LANSCE-2
D.W. Sandoval-Tidwell, BUS-4
Rita Sandoval CIC-18
Rodney Schultz, NIS-9
Robert Sze, CST-6
Joe Trujillo, ESA-FM-ESH
William Varnum, X-PA
Stella Vigil, ESH-5
Geoffrey West, T-8
George Zyvoloski, EES-5

20 years
Richard Bolton, NIS-6
Thomas Bowles, P-23
Kirk Christensen, DX-3
Dianna Duerre, BUS-5
Patricia Fasel, CIC-3
Stephen Foltyn, MST-STC
Sam Garcia, CIC-4
Sammy Garcia, CST-9
Lorraine Garvey, BUS-2
Alan Glasser, T-15
David Hanson, T-12
Lorelei Johnson, ESA-WMM
Bryan Kashiwa, T-3
Lon-Chang Liu, T-2
Donna Maestas, CIC-10
Antonio Martinez, ESA-WMM
James McNeese, NMT-2
Brown Rogers Jr., X-NH
Mark Trujillo, HR-7
Sandra Valdez, CIC-9
Lloyd Young, LANSCE-1

15 years
Andrew Andrews, TSA-9
Richard Benson, CIT-ES
Steven Booth, TSA-DO
Richard Byers, CIC-1
Jackson Carter, CIC-14
William Clodius, NIS-2
S. Gottesfeld, MST-11
Kevin Graham, MST-10
Ronald Haggart, MST-10
Jean Harris, CIC-1
Mark Hinrichs, F-4
Michael Kang, DX-6
Charles Lebeda, X-TA
William Lacey, TSA-3
Kim Lloyd, ESA-WMM
Tobias Lovato, PM-4
Brian McVey, X-CM
James Morgeson, TSA-DO
Timothy Murphy, NIS-RD
Steven Ortiz, ESA-WMM
Dennis Paisley, P-24
Alan Picklesimer, X-NH
C. Elaine Roybal, DIR
Elizabeth Salazar, BUS-2
Rose Sanchez, DX-5
Richard Schamaun, ESA-WMM
Bud Shultz, CIC-2
Timothy Stone, NMT-7
E.M.D. Symbalisty, EES-8
Sandra Trujillo, ESH-1
Pat Unkefer, CST-4
Anne Valverde, ALDNW
V. Velarde-Bird, BUS-5
Robert Whitaker, NIS-4
William Woodruff, CST-4

10 years
Michael Alexander, ESH-18
Josephine Arellano, CRO
Kenneth Calahan, TSA-DOD
Mark Chavez, DX-8
Kathy Chilcoat, ESA-WE
T.J. Fitzgerald, NIS-1
David Fry, ESA-MT
Carl Gable, EES-5
Frank Garcia, ESA-WE
George Guthrie, EES-1
Marie Harper, CIC-14
Anna Hayes-Sterbenz, T-2
Larry Herrera, BUS-4
Rudy Herrera, BUS-4
Harry Kopp, ESH-19
James Lake, ESA-MT
Diane Lamkin, HR-7
Joe Lujan, DX-4
Robert Montoya Jr., ESA-WMM
Matthew Naranjo, ESA-WMM
Monica Ortiz, BUS-5
Angela Padilla, BUS-7
Joe Rael, DX-5
Jeffrey Robison, DX-5
Nelson Vigil, BUS-4
Charles Wood, P-21

5 years
Kurt Anast, EM-ET
Erika Arendt, ISEC
Scott Bardenhagen, ESA-EA
Vicki Barnett, BUS-DO
Stephanie Boone, EM-ET
John Bremer, CIC-7
Curtis Canada, CIC-ACL
Julie Crook, ISEC
Amy Curtis, BUS-8
Walter Ferrell, ESH-3
Michael Granito, BUS-1
Elizabeth Hunke, T-3
Chastity Kolar, NMT-4
Keith Lindsay, NIS-9
Larry Noble, LANSCE-FM
M.E. Pansoy-Hjelvik, NMT-9
Patricia Pierotti, HR-7
Kathleen Pratt, CIC-14
Keri Ramsey, NIS-3
Geraldine Rodriguez, ESH-19
Theresa Romero-Ayala, CIC-ACL
Judy Sanchez, NMT-7
Nancy Sattelberger, CST-DO
Gary Selwyn, P-24
Dustie Stephens, ESH-19
Bruce Takala, LANSCE-3
James Tencate, EES-4
Cynthia Trujillo, TSA-4
Brenda Varoz, HR-7
J. Ann Verblaauw, HR-5
Stephanie Vigil, TSA-11
Max Wheeler, LANSCE-FM
Yuntian Zhu, MST-STC

In Memoriam

Louisa Lujan-Pacheco

Laboratory employee Louisa Lujan-Pacheco died July 25. She was 31. Pacheco received a master's degree in English with an emphasis on technical and professional communication in 1995 from New Mexico State University in Las Cruces. She came to work for the Lab in 1993 with the Graduate Research Assistant Program (GRA) in the former Communication Resources (IS-1) group. At the time of her death, she was working with Communication Arts and Services (CIC-1).

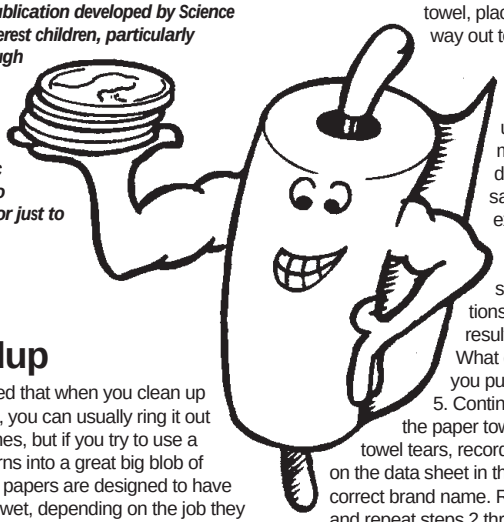
Vickie M. Sealy

Laboratory employee Vickie M. Sealy, a resident of Santa Fe, died June 8 after a sudden illness. She was 42. She began working for the Lab in 1975 as a secretary with the former Field Testing Division Office (J-DO) and worked for the Laboratory for 24 years. At the time of her death, Sealy worked as a computer technician in Hydrodynamic Applications (DX - 3).

Timothy Joe Wehner

Laboratory employee Timothy Joe Wehner of Los Alamos died July 2 while hiking in the Jemez Mountains. Wehner was born in Saginaw, Mich., in 1948. He graduated from Saginaw High School in 1968 and enlisted in the Navy in 1971. He received an associate's degree in instrumentation engineering from the University of New Mexico. Wehner came to work for the Lab in 1977 as a mechanical technician while working with the former group Phermex (M-2). This work involved hydrodynamic experiments in weapons development. At the time of his death he was an electromechanical technician for Space Engineering (NIS-4).

"Science at Home" is a publication developed by Science Education (STB-SE) to interest children, particularly those in grades four through eight, in science through hands-on activities. We are reprinting experiments from the book, along with other scientific activities, for employees to share with their families, or just to enjoy themselves.



The Great Money Holdup

Have you ever noticed that when you clean up a spill with a paper towel, you can usually ring it out and use it a couple of times, but if you try to use a piece of toilet paper, it turns into a great big blob of mush? Different types of papers are designed to have different strengths when wet, depending on the job they are supposed to do. Toilet paper is specifically designed to fall apart when it gets wet so it won't block the pipe when it is flushed down the drain. Paper towels, on the other hand, are made to clean up spills and scrub dirty surfaces. Even though both of these types of paper are made from the same basic raw materials, the way they are put together, or their structure, gives them very different properties.

Paper companies are always boasting about how strong their product is versus a competitor's. Ultimately, the strength of any object, including a paper towel, is directly related to its structure. All matter (the scientific word for "stuff") has a structure. In this experiment, you will discover how the structure of a paper towel gives it strength. In the process, you will do a little consumer science and discover which brand of paper towel stands up to the pressure of competition best. To test strength, you will see which brand of paper towel holds the most pennies. Don't take the results of the competition lightly, though. The stronger the paper towel, the more times you can use it and the less it costs you in the long run.

The stuff you'll need

Three different brands of paper towels (four sheets from each roll); a pen; 1 cup of water; large mixing bowl; magnifier; tape; tablespoon; $3 worth of pennies; and a data sheet

For this experiment, if you do not have $3 worth of pennies, you may use other coins or metal washers.

Here's the plan

1. Write the brand name along the edge of each sheet of paper towel. Carefully examine each brand of towel with the magnifier and write your observations on the data sheet. Note things like the texture, the size of the fibers within the paper, and their shape. Are all brands made out of the same materials or can you see different types of fibers? Compare the way the fibers join together. Based on your observations, predict which paper towel will be the strongest.

2. Tape one sheet of paper towel securely over the mouth of the mixing bowl. Make sure you stretch it tightly, but be careful not to tear it. If it does tear, replace it with a fresh sheet (diagram 1).

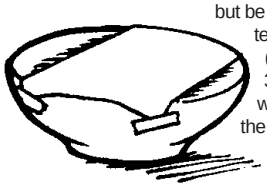


diagram 1

3. Spread two tablespoons of water evenly over the surface of the towel. How many pennies do you think each towel will hold before it breaks? Write your predictions down on the data sheet.

4. Starting at the center of the wet paper towel, place five pennies working your way out to the edges. Make sure to spread the pennies out Don't stack the pennies until you run out of room. If you are using coins other than pennies, make sure that you place them down on the paper towel in the same order for each trial. For example, all the quarters first, then nickels, then dimes, etc. This keeps the conditions the same for each test. If the conditions change from trial to trial, the results may not be accurate. What changes do you see each time you put coins on the towel?

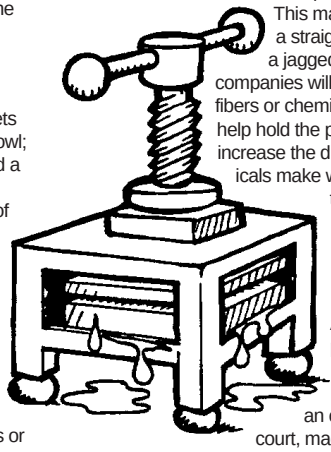
5. Continue placing pennies on the paper towel until it tears. Once the towel tears, record the number of pennies on the data sheet in the box under the correct brand name. Remove the torn sheet and repeat steps 2 through 5 with each brand of paper towel.

Remember, when spreading the water and placing the coins on the towel, you should do it exactly the same way for each trial.

6. Which paper towel held the most pennies? How did the results compare with your prediction? Can you come to any conclusions about the pattern of the fibers and the strength of the different towels? Rub the wet part of the different paper towels between your fingers. How do they compare? Do they feel sticky or smooth? What does this tell you about their composition-what they are made of?

Wrap-up

The manufacturers of different brands of paper towels use different materials and processes to make their towels stronger. In general, the fibers are quite long and they join in an overlapping pattern. Most paper towels are made up of several layers or plies, which overlap in different directions. This makes it hard to rip them in a straight line, so they tear with a jagged edge. Many paper companies will add different types of fibers or chemical bonding agents to help hold the paper together and increase the dry strength. These chemicals make wet paper towels sometimes feel sticky.



What's going on here?

As best we can tell, paper making goes back to the year 105 AD in China where Ts'ai Lun, an official of the imperial court, made the first parchment from a combination of mulberry wood, old fish nets, and an assortment of rags. While paper making today is highly mechanized, the actual process is quite simple and has changed little over the last 1,800 years. Essentially, fibrous material is mixed with water and beaten into a fine pulp called a slurry. The slurry is then spread across a screen and a second screen is placed on top. The two screens are then pressed tightly together, and all the water is squeezed out leaving only the fibers behind. As the material dries, the individual atoms within the fibers begin to link or bond together.

Many factors control the ultimate strength of a piece of paper, and it's the exact mix of these variables that paper companies keep secret when they've finally perfected their paper formula. When manufacturing paper, they must constantly test things like the length of individual fibers, the strength of those fibers, the exact chemical make-up of the additives, such as glue, and the structure of how the fibers are bonded together. All that, just to make a simple paper towel!

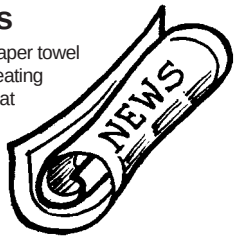
Where does this happen in real life?

One of the strongest types of paper is the stuff that the government uses to print money. That's right, the good old dollar bill is made not only to withstand a spin and fluff in the washer and dryer, but also constant folding, crumpling, counting, and handling by literally thousands of people. If you look at a dollar bill under a microscope, you will see all sorts of fibers running through to strengthen it. The exact formula for making paper for money is one of the government's most closely guarded secrets.

Another place where you can see how the structure of matter directly affects its strength is in wood products. Boards cut from a single tree are strong, but compared to plywood, they are much more likely to crack and split. Plywood is made by taking several thin pieces of wood and bonding them together so that the grain of alternating layers runs in a different direction. Like two-ply paper towel, plywood is much more durable and less likely to break apart than regular woods.

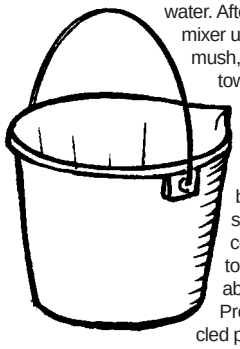
One of the nice things about paper fibers is that even after they are used in one piece of paper, they can be reused several times before they finally fall apart. Today, much of the raw material used in things like paper towels, napkins, and toilet tissue comes from old paper that has been recycled. Discarded items such as newspaper, grocery bags, milk cartons, and computer paper are collected, cleaned, and made into pulp. The pulp is then used to make newsprint, cardboard, tissue, and writing paper. You can help the process by separating your own paper waste for recycling and by buying paper products that contain recycled fibers.

Now try this



To see how much wetting a paper towel affects its overall strength, try repeating your experiment with one towel that has been soaked in water for 1 minute and another that is perfectly dry. One word of warning. For the dry towel experiment, you might want to get more than $3 in pennies.

Try making your own recycled parchment using old newsprint. You'll need a couple of old window screens, an old towel, a small pail, an old rolling pin, and a hand mixer or whisk. Get permission before using the kitchen utensils. They will get newsprint ink on them. Start by tearing the newspaper into little tiny pieces and soaking them for about half hour in a pail of warm water. After soaking, beat them with the mixer until the paper turns into a thick mush, like rice pudding. Lay the towel on a table top and put one of the screens on top of it. Spread some of the pulp on the screen and cover with the second screen. Gently roll back and forth across the top screen until all the water has come out. Carefully remove the top screen, let the paper dry for about one hour, and peel it off. Presto! You have created recycled parchment.



This month in history

September

1513 — Vasco Núñez de Balboa becomes the first European to see the Pacific Ocean

1758 — Charles Messier observes the Crab Nebula and begins his star catalog

1841 — An attack on New Mexico by a band of soldiers from the Republic of Texas is thwarted

1939 — The first paper to deal with black holes is published in Physical Review

1941 — Enrico Fermi proposes the idea of triggering a thermonuclear reaction by an explosive chain reaction of uranium-235

1945 — The British Mission at the Laboratory hosts a "Birth of the Atomic Era" party with steak and kidney pie, trifle and toasts to the Grand Alliance

1960 — The first atomic aircraft carrier, the USS Enterprise, is launched

1966 — Vice President Hubert Humphrey visits the Laboratory

1980 — The first issue of Los Alamos Science is published

1984 — The Wellness Center sponsors its first-ever Walking Month

1992 — The United States conducts its last underground nuclear weapons test before a moratorium begins

1995 — Under the lab-to-lab agreement, U.S. and Russian experts demonstrate a new system to account for and control nuclear materials

Syndicated material

Removed at the request of the syndicate

spotlight

HELP after Hurricane Mitch

Jeanette Lyman

by Ternel N. Martinez

Helping victims of natural disasters can give a person a different perspective on life. Just ask Jeanette Lyman, an undergraduate research assistant in Integrated Geosciences (EES-13).

Lyman, an engineering geology student, is part of Help ELiminate Poverty (HELP) Honduras, a group of about 15 Brigham Young University students and faculty and other community members from Provo, Utah, dedicated to helping victims of Hurricane Mitch in the impoverished Central American country.

When Hurricane Mitch finished unleashing its fury of 200-mph winds and subsequent torrential rains on Honduras in October 1998, whole communities were gone. More than 5,650 people were confirmed dead (and that figure is conservative), with an additional 8,050 missing and about 11,760 injured. Overall, approximately 1.9 million Hondurans were affected in some way, with about 500,000 people left homeless.

HELP Honduras workers divided into small groups and went to different regions in Honduras. Lyman and two others went to Cholucteca, the hottest region, where for the next three-and-a-half weeks they worked 12-hour days, six days a week performing various duties.

They stayed at the home of a local family, paying $7 each for shelter and $14 each for food per week. They drank bottled drinking water; for cooking, bathing and other functions, they used water pumped from the nearby mountains into a type of holding tank located outside the house, she said.

Lyman's main role in Honduras was to establish microcredit banks, with the help of the Foundation for International Community Assistance, or FINCA. Microcredit is an economy-building banking system in which small capital loans are given to the self-employed poor, mainly women who typically work out of their homes, to help them increase their incomes and lift their families out of poverty.

"The women sell items such as tortillas, drinks, snacks, make-up, clothes and fruit," Lyman explained. "We organized them into small peer groups, with each member receiving four-month loans from FINCA in the amount of about $150. If they paid their loans on time, they would receive bigger loans during the next cycle." Lyman and her colleagues created three such microcredit banks during their stay.

Lyman also visited five refugee camps, helping give out school supplies, clothes and other necessities. In addition, in one camp she helped keep track of those families who actually lived in temporary housing units while permanent ones made of cedar block were being built adjacent to them.

"The temporary homes' floors were made of cement only one inch thick and couldn't keep out the monsoon rain," she said. As a result, disease was a constant threat. "I had even heard that about four children had died from disease in one of those refugee camps," she said.

Though she and her colleagues were immunized against Hepatitis A and B and typhoid, Lyman and one other still suffered mild illnesses. But they didn't seek medical attention. "I didn't know what I had, and I didn't want to know, either," she mused. The third colleague, however, lay bedridden for several days before finally seeing a village doctor, said Lyman.

But throughout all the misery and destruction she saw — in some communities, new homes were built on top of those that were buried under mud — Lyman found most of the Hondurans amazingly upbeat in spirit. "All of the people there were very friendly, relaxed and grateful for our assistance," said Lyman.

She hopes to return to Honduras some time next spring to perform more service work. "We hope to help Hondurans fund their own banks using the money we're raising so they won't have to rely so much on FINCA."

For more information on HELP Honduras, contact Lyman at *jl53@email.byu.edu* by electronic mail. Information on FINCA is available online at *http://www.villagebanking.org/*.

Jeanette Lyman, right, blows bubbles with some of the Honduran children at one of the refugee camps she visited as a member of HELP Honduras. This camp housed about 60 families, with an average of about three children per family. Lyman also managed to squeeze in time to play soccer with the children, perform magic tricks and engage in other fun things during her visit. *Photo courtesy of Lyman*

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