Reflections

Los Alamos National Laboratory
Vol. 4, No. 1 • February 1999

... pages 6 and 7

A Department of Energy/University of California Laboratory

Inside this issue ...

Cover illustration by Edwin Vigil

editor's journal

Write on!

Who among us hasn't at one time or another wanted to sit right down and write a letter — especially to a government official, institution or media outlet. I can't recall all the times an issue, action or expressed opinion has moved me to want to jot down my outrage, agreement, thoughts or what have you on a topic and ship them to a senator, CEO or newspaper editor.

Usually, I just settle for composing the letter in my head or out loud. Once it's out of my system, I move on. While doing this may be cathartic, I wonder if I am always taking the best course. Sometimes, the best thing that can happen is public comment or discussion on an issue. Knowing how others feel often can lead us to give more thought to our own feelings and bring to the forefront aspects of an issue we'd never before considered. And knowing the opinions of those they are responsible to can help officials and managers in their decision-making processes. That's why I have been very pleased lately by the number of employees and retirees who are taking advantage of the Letters to the Editor section in the Daily Newsbulletin (found online at http://www.lanl.gov/newsbulletin under Readers Forum) and sharing their thoughts on issues relevant to the Lab.

In recent months, letter writers have weighed in on a variety of Lab-related topics, from pay increases and speed limits on roads near the Lab to employee unions and Lab policies. The letters have been both thoughtful and thought-provoking. Some individuals have noted that it was their agreement or disagreement with previous letters that encouraged them to write.

For the most part, the letters have been civil and have focused on issues, not personalities. When they have ventured from the guidelines of the Letters to the Editor section, which include no personal attacks or libelous statements, the writers have been asked to clean up the letter or have it shelved (see the Letters to the Editor section for the guidelines). Some have questioned our stance on this, and it's very simple. To intelligently express an opinion, you don't have to take pot shots at individuals or institutions you disagree with. And while some commercial newspapers may accept unedited letters to the editor, the Newsbulletin does not. As an employee communications vehicle for a public institution, the Newsbulletin strives to promote civility as well as discussion. We don't censor opinion; we just make sure it's expressed in a constructive manner.

I encourage all employees to share their thoughts on Lab-relevant issues through the Newsbulletin's Letters to the Editor section. And even if you haven't been moved to write yet, log in sometime, browse through current letters or peruse past submissions in the Readers Forum archive; see what's on the minds of your fellow workers.

And in the spirit of open discussion, write on!

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.

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Five staff members elected APS fellows

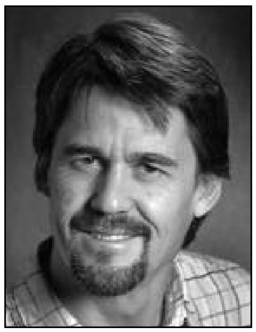
by John A. Webster

Five Laboratory staff members, Joseph Carlson, Chris Hammel, Patrick McGaughey, Robert Robinson and Harvey Rose, have been elected 1998 fellows of the American Physical Society.

APS fellows are recognized for original research, for significant and innovative contributions in the application of physics to science and technology or for significant contributions to the teaching of physics.

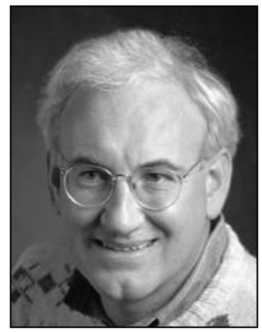
APS fellows are elected after competitive review and recommendation by a fellowship committee in a particular field, additional review by the Fellowship Committee and final approval by the full APS Council. Each year, no more than one-half of 1 percent of the current members are recognized by their peers for election as fellows.

Joseph Carlson



Chris Hammel

Patrick McGaughey



Robert Robinson

Harvey Rose

Joseph Carlson

Joseph Carlson, a theoretical physicist in Medium Energy Physics (T-5), was recognized for developing novel algorithms and applying them to calculations of the structure and response of nuclei of lighter elements such as helium and lithium.

The computationally intensive work has applications in electron scattering and other low-energy reactions including those that produce solar neutrinos.

Carlson came to the Lab as an J. Robert Oppenheimer Fellow in 1986.

Chris Hammel

Chris Hammel of Condensed Matter and Thermal Physics (MST-10) was cited by the APS for his use of nuclear magnetic resonance to study properties of high-temperature superconducting materials at the atomic level. The research revealed the importance of magnetism in materials that become superconducting.

Hammel is a condensed matter physicist who joined the Laboratory in 1986 as a J. Robert Oppenheimer Fellow.

Patrick McGaughey

The APS recognized Patrick McGaughey of Subatomic Physics (P-25) for his contributions to a number of experiments involving subatomic particles.

McGaughey, who has been at the Laboratory for 16 years, was cited for organizing an experiment at Fermilab to measure anti-quarks in atomic nuclei, for helping develop the conceptual design of a particle detector at Brookhaven National Laboratory's Relativistic Heavy Ion Collider and for contributing to the understanding of particles containing charm quarks.

Robert Robinson

Robert Robinson of the Manuel Lujan Jr. Neutron Scattering Center (LANSCE-12) was recognized for pioneering the use of pulsed spallation neutron sources to determine the complex magnetic structure of materials such as uranium intermetallic compounds.

Robinson, who joined the Laboratory as a postdoctoral fellow in 1982 and became a technical staff member in 1985, is also principal investigator for a project to build a unique high-field, high-repetition-rate pulsed magnet at LANSCE in conjunction with the National High Magnetic Field Laboratory.

Harvey Rose

Harvey Rose, a theoretical physicist in Complex Systems (T-13), was cited by the society for his seminal contributions to linear and nonlinear theory of instabilities that occur when coherent laser beams interact with plasma.

The instabilities degrade the coherence of laser beams, adversely affecting the ability to control them. Rose's work is aimed at helping to control these effects.

‘Do you have any idea how far it is to Russia?’

Viatcheslav Novosselov, left, and Viacheslav Berdnikov, both members of the city council of Sarov, Russia, sign the visitors’ log at the Bradbury Science Museum. Photos by LeRoy N. Sanchez

Garry Franklin, right, of the Bradbury Science Museum guides the five Russian visitors and interpreter by the Little Boy display at the museum.

by John A. Webster

Just a few years ago, an official of the former secret city of Sarov, Russia, could not imagine talking about his city’s history to a Russian audience. Two months ago, he found himself doing it in a once-secret U.S. city.

Anatoly Agapov, who led a civic delegation of five Russians from Sarov on an eight-day whirlwind visit of Los Alamos in mid-December, discussed the history and restoration of the monastery at Sarov before a packed house at Fuller Lodge the evening of Dec. 14.

The next day, the Russians got up early to catch an airplane — and possibly some sleep as well.

“Since we had planned such a busy schedule, I told the Russian delegation when they arrived in Los Alamos that it may be tough getting enough sleep,” recalled Irv Lindemuth of Plasma Physics Applications (X-PA). “Viacheslav Berdnikov (a delegation member) assured me that the group was eager to do everything and said: ‘We’ll just sleep on the plane going home.’ ”

The Russian visitors toured the Bradbury Science Museum and were guests at a dinner at the Otowi Cafeteria hosted by the Laboratory. They met with Los Alamos County Council members and business people and toured the Los Alamos Medical Center, several schools in the community and the Los Alamos Historical Museum.

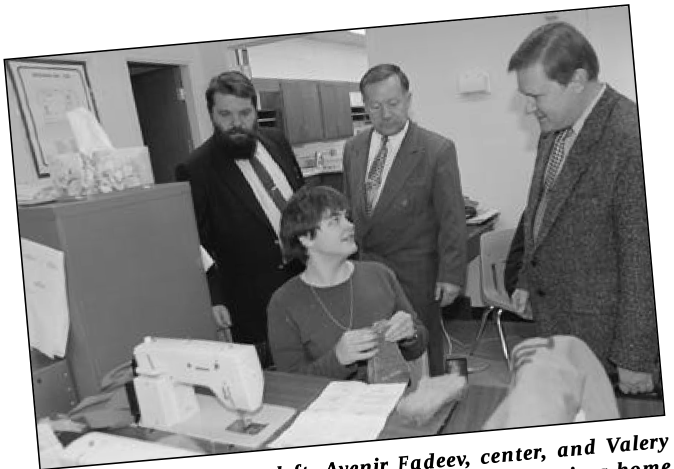
They also found time to check out stores in Los Alamos and Santa Fe. Los Alamos County Council Chairman Lawry Mann, the official host for the visit, said they were looking around a Santa Fe store when they found a Russian hat.

“The price seemed really high,” Mann said, “so they asked the saleslady why. And she replied: ‘Do you have any idea how far it is to Russia?’ ”

Sarov, located about 400 miles east of Moscow and some 7,000 miles east of Santa Fe, is the home of the All-Russian Scientific Research Institute of Experimental Physics, or VNIIEF, which is the Russian equivalent of Los Alamos National Laboratory. And like Los Alamos, it is the place where its country’s first atomic weapons were developed. Sarov and Los Alamos are official Sister Cities.

Agapov, chairman of the Committee on Culture of the Sarov elected council, or Duma, and founder of the Sarov Historical Society, said the Sarov monastery was visited by

*Dr. Victor Zalma, right, an emergency room physician
Los Alamos Medical Center, explains emergency room proc-
dures to the visiting Russians, who are accompanied by Lo
Alamos County Council Chairman Lawry Mann, center wit
glasses, and interpreter Julie Gavrilov. The Russians are, le
to right, Anatoly Agapov, head of the delegation, Aven
Fudeev, Viacheslav Berdnikov and Valery Epifanovsk
behing Mann.*



Viacheslav Berdnikov, left, Avenir Fadeev, center, and Valery Epifanovsky, right, chat with student Laura Barras in a home economics class during their visit to Los Alamos High School.

The monastery at Sarov, part of which is shown here in an artist's drawing, is a large complex that was visited by thousands of pilgrims before it was closed in 1923. Restoration efforts are presently under way under the guidance of the Sarov Historial Society. The bells in the 81-meter-high bell tower, which dominates the local landscape, can be heard for many kilometers. *Drawing provided by Irv Lindemuth.*

thousands of pilgrims before the Soviet era. In the late 18th and early 19th centuries, it was the home of Father Seraphim, who was canonized as a saint in 1903. Icons of St. Seraphim adorn most Russian Orthodox churches in the world, including many in the United States.

"The history is fascinating," Agapov said, speaking through interpreter Julia Gavrilov. "Ten years ago (because of the secrecy imposed by the Soviet government), it was hard to imagine that I would be speaking about the history of our city to a Russian audience, much less to an American one."

The monastery, which was built in 1760, is a large complex that was home to about 400 religious people at its peak. It was closed down in 1923 and many of the buildings were destroyed in subsequent years. In 1946, the Soviet government decided to establish the laboratory to build its first atomic weapons at Sarov, and the buildings from the former monastery became the institute's headquarters.

In recent years, archeologists and other experts have rediscovered an underground labyrinth of cells and passageways used by the monks and the foundations of the cell where St. Seraphim died. In addition, regular church services now are held in a chapel that once housed a grocery store. There is a lot more work to do, however.

"It is a unique and beautiful ensemble," Agapov said. "It is worth reconstruction."

Following the one-hour talk, the Los Alamos Historical Society presented Agapov with two copies of "Los Alamos Place Names," a book recently published by the society, which sponsored the talk. In turn, he presented the Historical Society with a magazine titled "Open City," which is about the weapons center and the city.

In addition to Agapov and Berdnikov, who is the chairman of the Sarov Duma committee on legislation, the visitors were Viatcheslav Novosselov, chairman of the Duma committee on development; Avenir Fadeev, deputy director for personnel and social questions at VNIIEF; and Valery Epifanovsky of the VNIIEF Center for International Relations.

The visit was the second to Los Alamos by a Russian civic delegation from Sarov and continued a series of interactions, scientific and otherwise, between residents of both cities that began with the end of the Cold War in the early 1990s.

During a meeting with representatives of the community and the Laboratory, Agapov presented Mann with a ceramic bell tower as a symbol of his city.

"They were good emissaries for their country," said Mann, reflecting on the visit a week after it ended. "I was just talking with Sarov (by long-distance telephone) this morning, and they have already been on television talking about their trip."

Lindemuth, who has been active in supporting the Los Alamos-Sarov relationship in both the technical and social arenas, said one highlight of the trip for the Russians was going to a concert by western singer Michael Martin Murphy in Los Alamos.

"The Russians had met Murphy in a Los Alamos restaurant just before the concert, and so during the concert Murphy dedicated 'Tumbling Tumbleweeds' to them," Lindemuth said. "They were really pleased and stood up and applauded.

"It was a super visit," he said.

Viacheslav Berdnikov checks out the weights at Los Alamos High School.

Casting call for models

New computer simulation tool will help foundries cast better metal-alloy parts

by Meredith Coonley

The Chinese discovered the art of casting copper, bronze and iron thousands of years ago. Today, scientists at the Laboratory use alloys unimaginable by the ancient metal workers. They also have developed a simulation tool to help foundry workers better understand their casting processes. Such simulation tools, especially those capable of running on a supercomputer, were nonexistent a decade ago.

This new computer simulation tool not only will improve the casting process of alloys used in weapons parts, it will be invaluable to private industries that cast complicated metal parts, such as engine blocks.

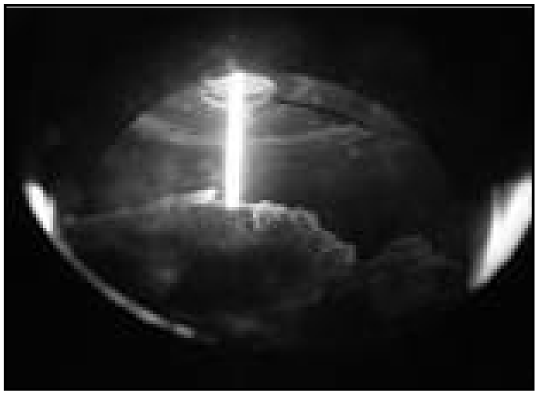
Researchers at the Laboratory for the first time are modeling and simulating the casting process of metal parts and components produced by the Lab foundries. The result is Telluride — a computer tool that models in three dimensions the complex processes involved in casting, including fluid and heat flow, phase changes, solute transports, interface dynamics and material response.

"The potential payoff is enormous," says researcher Doug Kothe, Telluride development team leader. "The use of computer tools in the area of casting simulation is in its infancy, but the potential cost savings for the Laboratory, as well as industry, are huge."

For thousands of years metal casting techniques have been based on a "pour and pray" method — a foundry term for trial and error. Because many complicated physical processes occur during the casting process, the components often contain flaws that cannot be fixed once cast, and the part must be discarded or remelted. Taking the guesswork out of the casting process will result in less wasted time, money and energy.

Unlike casting simulation tools currently available to industry, the Laboratory-developed Telluride code addresses the special needs of the alloys commonly used in Laboratory foundries: uranium and plutonium. These alloys behave much differently from alloys commonly used in industry, such as aluminum. The Laboratory's casting processes also are different from in those of industry fecause they often involve confined work in gloveboxes.

Researchers Doug Kothe, left, and Deniece Korzekwa of the Materials Science and Technology (MST) Division stand in front of a plasma furnace with a cast sphere of depleted uranium and its mold. Kothe is helping develop a computer tool that models and simulates the casting process of alloys used in weapons parts. The Telluride simulation tool also will benefit private industries that cast complex metal parts, such as engine blocks. *Photo by LeRoy N. Sanchez*



A uranium pour as seen through the viewport of a furnace. Mica sheet, which serves as insulation, appears in the foreground. *Photo by John Bass*

"We are ahead of currently available commercial casting simulation tools in our ability to simulate smaller and smaller length scales afforded by the Lab's huge computing platforms," said Kothe. "We can look at material properties as they happen in the casting process. Our goal is to be able to predict what a cast part will look like at the microstructural level."

The microstructural properties of a cast part are responsible for its strength and resilience, and properly controlling these during a pour can minimize defects in the final product.

Telluride metallurgical and software engineers are using the Blue Mountain supercomputer, part of the Department of Energy's Accelerated Strategic Computing Initiative. ASCI is a collaboration by Los Alamos, Lawrence Livermore and Sandia national laboratories to create modeling and simulation capabilities essential for maintaining the safety, reliability and performance of the U.S. nuclear stockpile in the absence of underground testing.

The software is written in Fortran 90 for high-performance computing platforms. Eventually, foundry workers hope to be able to monitor the casting process on a desktop computer and make immediate adjustments to a pour guided by Telluride simulation results. Lab foundries currently are supplying data to Kothe and his colleagues, which they expect to use to validate Telluride on actual cast pieces.

Telluride not only will help minimize "pour and pray" during the actual casting, it will be useful up front in the design process, where it can help design a better mold in a shorter time, thereby reducing mold-machining expenses.

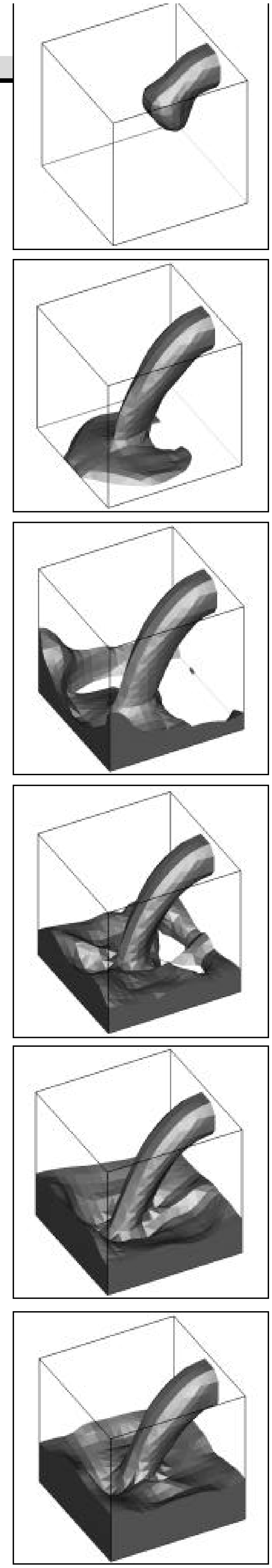
Telluride also could have potential in nonmetal castings, such as plastics. This area is yet untested, because Los Alamos does no plastic injection molding, but is worth exploring by industry, says Kothe. Telluride's free-surface flow problem-solving skills also may be useful predicting wildfire spread, tracking cloud movement and predicting the impact of "rock-splash" problems, such as tsunamis caused by an asteroid's impact on Earth.

The Telluride project was initiated with Laboratory-Directed Research and Development funds. Since 1996, the majority of funding has come from the DOE ASCI Program, with additional funding by a collaborative University of California/Los Alamos research program, CULAR.

Current team members include senior project leader Richard LeSar, project leader Doug Kothe, Bryan Lally, Matt Williams and Deniece Korzekwa, Materials Science and Technology (MST) Division; Kin Lam of the Engineering Sciences and Applications (ESA) Division; Brian Vanderheyden, Mark Schraad, Mike Steinzig and Frank Harlow, Theoretical (T) Division; Dana Knoll, Applied Theoretical and Computational Physics (X) Division; Christoph Beckermann and Jianzheng Guo, University of Iowa; John Turner, Blue Sky Studios, New York, N.Y.; Jeff Durachta, IBM; and Robert Ferrell, Cambridge Power Computing, Ltd.

Other contributors have included Jerry Brock, Mike Hall and Jay Mosso, X Division; Janine Fales, ESA Division; Anand Reddy, Caterpillar Corp.; Roger Rangel, University of California/Irvine; Jean-Pierre Delplanque, Colorado School of Mines; Srinath Viswanathan and Adrian Sabau, Oak Ridge National Laboratory; E. Gerry Puckett, University of California/Davis; Marcus Schmid, University of Munich; Murray Rudman, CSIRO, Australia; and Jong Leng Liow, University of Melbourne, Australia.

Lab researchers are seeking participants from private industry, especially automotive manufacturers, to test an alpha version of Telluride on their industrial casting processes. More information on Telluride is available on the Internet at http://www.lanl.gov/home/Telluride.



Six frames from a Telluride simulation of a top pour in a box mold.

Trewhella elected secretary of Biophysical Society


Jill Trewhella

Jill Trewhella of Bioscience/ Biotechnology (CST-4) has been elected secretary of the Biophysical Society. Her four-year term begins this year.

The Biophysical Society was formed in 1956 to "encourage development and dissemination of knowledge in biophysics." The society today has approximately 5,400 members and is one of the 17 member societies of the Federation of American Societies for Experimental Biology, whose overall membership is 56,000 scientists.

Activities of the Biophysical Society include publishing the Biophysical Journal; holding an annual meeting that attracts approximately 3,000 attendees; conducting public affairs, including advocacy for biological and biomedical research in the United States (in partnership with FASEB); sponsoring awards for scientific achievement and service; and promoting minority scientists in biophysics. Trewhella previously has served on a council for the society and as chair of the Publications Committee.

Enter selected chair of national association


Janie Enter

Janie Enter recently was selected to serve as chair of the National Association for Women in Education's Teaching and Research Committee and on the editorial board for the association's peer-reviewed journal initiatives.

NAWE is a professional organization dedicated to addressing women's issues in higher education, with particular emphasis on the advancement of women educators and students. Enter's appointment as committee chair is for an indefinite time, while her appointment on the editorial board is for four years.

Enter works in Environmental Science and Waste Technology (CST-7) and is a former member of the Laboratory's Women's Diversity Working Group. The five-year Laboratory geologist also mentors female students in the Chemical Science and Technology (CST) Division, in addition to her assigned duties as CST student adviser. She currently is a member of the Integrated Safety Management Grass Roots Safety Mentoring Group, which is involved in developing policies and procedures for integrating ISM Labwide.

She also is involved in the Summer Engineering Program in Environmental Education, a program run by the Waste-management Education and Research Consortium to encourage students to pursue careers in environmental science fields.

Enter holds bachelor's degrees in marine science and geology from the University of Miami in Florida. She also has a master's degree in geology and a doctorate in science education from the University of Georgia.

Houts takes NASA assignment


Mike Houts

Mike Houts, a team leader in Nuclear Systems Design and Analysis (TSA-10), began a two-year assignment at NASA's Marshall Space Flight Center in Huntsville, Ala., on Nov. 2.

Houts is serving as chief of the Space Propulsion Branch within the center's Propulsion Laboratory. His duties include initiating and overseeing research projects related to nuclear space propulsion and other advanced propulsion technologies.

Houts is a nuclear engineer who has been at the Laboratory for seven

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In Memoriam

Dennis Carathers

Lab employee Dennis Carathers of the Engineering Sciences and Applications (ESA) Division died July 30, 1998. He was 47. Carathers came to the Lab in November 1993 and had been facility manager at ESA since 1994. He also was the environment, safety and health coordinator in ESA Division. Carathers graduated magna cum laude from Texas A&M in 1974, and that year was the nuclear engineering student of the year. He worked at Houston Lighting and Power for 10 years and at Pantex for eight years before joining the Laboratory.

Wesley Jones

Los Alamos resident Wesley Jones died Oct. 16, 1998. Jones received his doctorate in chemistry from the University of California, Berkeley, in 1946. He came to work for the Lab in 1943 as a staff member for the former Radio Chemistry and Service Chemistry Analysis (CMB-3) group. Jones retired from the Laboratory but remained a guest scientist.

Delores Aderton Mottaz

Delores Aderton Mottaz died Oct. 24, 1998. She was 72. Mottaz joined the Laboratory in 1972 as a stenographer. In 1973, she worked with the former Photo Physics (J-15) group. Mottaz was honored as a distinguished performer in 1986 for her outstanding work as a group secretary. She left the Lab in 1986 while working with the former Diagnostics Physics (X-5) group. She returned to the Lab and worked until 1995 with the Theoretical (T) Division.

James Phillips

Laboratory Fellow James Phillips died Dec. 1, 1998. He was 79. Phillips came to the Laboratory in 1949 after completing his master's and doctoral degrees in nuclear physics. He became one of the original five staff scientists in the Physics (P) Division. This pioneering team became the first group at the Laboratory to study harnessing the nuclear fusion energy of the hydrogen bomb for peaceful uses. Phillips was a fellow of both the American Association for the Advancement of Science and the American Physical Society. He retired from the Laboratory in 1987.

people

December/January service anniversaries

December

30 years

Leroy Garcia, DX-7
Demetrio Ortega, P-22
Leo Rivera, CIC-18
Glory Yost, ESA-DE

25 years

Malcolm Fowler, CST-11
Ignacio Medina, NIS-4

20 years

Alan Bishop, T-11
Edward Caramana, X-HM
Gloria Cordova, PA
Ernst Christen, ESA-WMM
Priscilla Davis, NMT-8
Joseph Fasel III, TSA-7
Rosenda Gallardo, ESA-WE
Britton Girard, X-CI
Kent Hansen, CIC-4
George Harper, DX-5
Robert Hoffman, CIC-5
Judith Ireland, BUS-2
Wen Ho Lee, X-CI
Victoria Longmire, NMT-4
Felix Martinez, LANSCE-1
Daris Millegan, CIC-4
John Miglio, EM-D&D
Susan Mniszewski, CIC-3
Gene Montoya, CST-7
Donna Peterson, BUS-4
Roy Przeklasa, LANSCE-5
Lawrence Quintana, APT-TPO
Joseph Rieken, CIC-12
Joseph Schwaegel, DX-6
Dolores Trujillo, NMT-1
Henrietta Trujillo, BUS-1
Gloria Vigil, BUS-1

15 years

Diana Armijo, ESA-WMM
A.G. Barker-Wohletz, TSA-10
Susan Bergauer, HR-7
James Chavez, CIC-5
Vonda Dole, NMT-2
Nancy Fullerton, BUS-4
Douglas Hemphill, ESA-WMM
Richard Joseph, APT-PDO
Michael Kaufman, S-4
Jose Manzanares, CIC-5
Nathan Okamoto, P-24
Susie Orr, S-6
Thomas Pretzel, CIC-5
Theresa Romero, BUS-7
Shirley Rutledge, NIS-3
Darryl Sandoval, CIC-5
Roger Shurter, DX-6
Richard Ulibarri, GR
Robert Vigil, NMT-7

10 years

Annette Archuleta, LS-DO
Robert Catherwood, EES-15
Imogene Dison, MST-6
B. Marie Fernandez, ESA-DO
Vincent Fischer, CIC-4
Julie Gallegos, MST-10
Naedin Gallegos, EM-D&D
Rowena Gibson, CST-4
Tommy Martinez, CST-7
James McFarlan, NMT-6
Simon Perez, BUS-7
Therese Quintana, EES-DO
Jo Ann Salazar, BUS-2
Carolynn Scherer, NMT-11
Kurt Sickafus, MST-8
Ralph Stevens, ESA-EA
Richard Wheeler, LANSCE-9
Lorraine Wilson, LC-LEL

5 years

Jack Auflick, TSA-9
David Bradbury, EM-ER
Wendel Brown, NMT-6
Rafael Cordova, LANSCE-5
Gretchen Ellis, ESA-DE
Jeffrey Huling, MST-6
Crystal Johnson, BUS-6
Taylora Koch, S-5
Mary Neu, CST-11
Brenda Newton, BUS-1
Phillip Noll Jr., NMT-1
Thomas Sewell, T-14
William Wood, P-22

January

30 years

Johnny Atencio, ESH-1
Raymond Chavez, LANSCE-2
Alphonse Criscuolo, NIS-6
David Forslund, CIC-ACL
Benedict Ladabour, ESA-DE
Stanford Lyon, T-1
Elmer McCoy, CIC-18
Albert McGirt Jr., P-21
Steven Sylvia, CIC-18
Joseph Weber, ESH-1

25 years

Joel Bennett, ESA-EA
Arthur Chavez, ESH-IMPT
Harold Davis, P-24
Yvonne Ebelacker, BUS-5
David Fresquez, CIC-18
Steven Gitomer, CISA
Concepcion Gomez, DX-1
Robert Heffner, MST-10
Larry Looney, P-22
Fela Sanchez, ESA-WE
LeRoy N. Sanchez, PA
Richard Siebelist, NIS-5
James Stewart, NIS-5

20 years

Michael Algire, ESH-14
James Campbell, BUS-4
Mae Crissman, BUS-2
Tim Gallegos, NMT-13
Steven Girrens, ESA-EA
Kenneth Grady, CIC-5
Jeffrey Hatchell, NMT-7
William Hodges, ESA-WMM
Norman Hunter, ESA-MT
Andrew Jason, LANSCE-1
Thad Knight, TSA-10
Peter Lopez, NMT-5
Alex Marquez Jr., DX-7
Connie Martinez, HR-7
Ronald Martinez, TSA-5
Sandra Martinez, CIC-9
Gloria Montoya-Rivera, CIC-DO
Richard Morgado, NIS-6
George Morgan, P-23
Eddie Rios, NMT-1
Alexine Salazar, TSA-3
Clinton Shonrock, NIS-5
James Sims Jr., ESA-DE
Karla Sofaly, CIC-12
Virginia Strniste, BUS-2
Patricia Sylvester, BUS-5
Pier Tang, X-NH
Joe Tiee, CST-6
Dolores Trujillo, BUS-5

15 years

Kevin Albright, P-21
Naomi Archuleta, CIC-1
Brian Bartram, MST-6
Michael Burns, DX-DO
Margaret Davis, ESH-2
Daniel Everett, NIS-1
Cheryll Faust, ESA-WE
Anthony Gallegos, EES-15
Benny Garcia, NIS-4
Prescilla Garcia, CIC-9
Barbara Haarman, X-TA
David Harris, NW-SS
Claudia Hernandez, CIC-4
David Holt, ESA-MT
John Horne, DX-4
Joseph Jackson, TSA-7
Eugene Kutyreff, NIS-DO
Manuel Lujan, DX-1
Manuel Martinez, ESA-WE
Jim Morel, X-TM
Robin Morel, CIC-3
Terrance Morgan, ESH-17
Connon Odom, DX-7
Teri Ortiz, CIC-1
Charles Pacheco, CRO-1
Bill Palatinus, S-7
Loyd Perdue, BUS-4
Larry Rhodes, P-22
Gloria Salazar, ESA-WE
Robert Sheldon, NMT-9
Martin Sweet, NIS-5
Gloria Zakar, AA-1
Gail Zimmerman, HR-TI
Wojciech Zurek, T-6

10 years

Vera Aguino, NMT-2
Cynthia Blackwell, ESH-IEP
Maureen Cafferty, NIS-4
Karen Edwards, HR-1
David Funk II, DX-2
Manuel Garcia, ESA-DE
Bennie Glover, MST-11
Marilyn Hawley, MST-8
Jeffrey Lewis, DX-4
Kathleen Maestas, QP
Raleigh Michel, NMT-8
Stephen Mortenson, TSA-3
Frank Ortega, X-CM
Kelly Parker, CIC-1
Barbara Partain, NIS-18
Eric Powers, CIC-4
Wayne Punjak, NMT-2
Matthew Roybal, CST-7
Dorothine Ryan, ESH-5
Karon Stine, HR-5
Horton Struve, NIS-IT
Gary Thompson, EM-DOE-FP
Kathie Womack, ESA-EA
Michael Yesley, LC-BPL

5 years

Thomas Baca, EM-DO
Paul Brooks, MST-7
Larry Freestone, S-6
Irene Gabel, CIT-BS
David Gardner, MST-10
Robert Grundemann, NMT-9
Keith Haberman, ESA-EA
Robert Kimpland, NIS-6
Pamela May-Maloney, LC-LEL
Laura McClellan, CIC-15
Patrick McCormick, CIC-ACL
Robert Metcalf, ESH-4
Orrin Myers, EES-15
Thomas Nelson, EM-PPC
Jennifer Pratt, NMT-10
Douglas Revelle, EES-8
David Rogers, ESH-18
Eric Schmierer, ESA-DE
Judith Snow, DX-2
Constance Soderberg, NMT-1
Parrish Staples, NIS-5
Yusheng Zhao, LANSCE-12

Houts ...

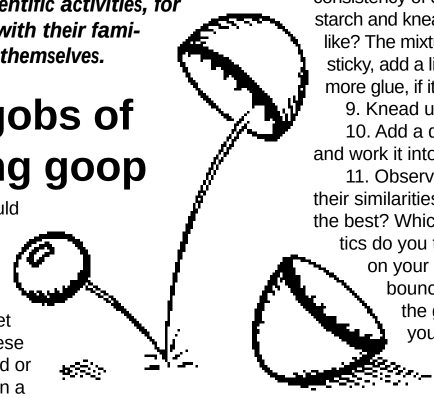
continued from Page 8

years. He was leader of the Criticality, Reactor and Radiation Physics Team in TSA-10.

He received bachelor's degrees in mechanical and nuclear engineering at the University of Florida and a doctorate in nuclear engineering from the Massachusetts Institute of Technology.

"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.

Great gobs of bouncing goop



One point that should be remembered is that experiments often fail. Even after years of painstaking work, researchers may not get the desired results. These ideas are then reworked or scrapped. Every once in a while, though, materials that fail in one use succeed in another. A good example of this happened in 1947 when Peter Hodgson, an advertising agent from New Haven, Conn., revolutionized the toy industry with a new "miracle substance." He had heard about a new material discovered by researchers at General Electric in the late 1940s. The researchers were looking for a replacement for natural rubber. The substance they came up with was soft and elastic, but unfortunately, it didn't quite have all the properties they needed. Hodgson thought he could make some use of it, so he purchased $147 worth of the stuff, divided it into 100 one gram balls, packaged it, and sold it through a mail order catalog. "Silly Putty" became an instant hit!

Thousands of new industrial products are created each year by researchers conducting carefully controlled chemical reactions to change the properties of matter. In this activity you will experiment with mixing liquids and solids to make two types of semi-solids called polymers. A polymer is a complex chemical compound with an unusual set of physical properties.

WARNING: The gobs of goop you will create can clog drains, so throw them away in the trash when you are finished.

The stuff you'll need

Measuring spoons; a bottle of white Elmer's® liquid glue; 1 tablespoon powdered borax (a detergent booster found in the laundry section); water; 1 tablespoon liquid starch; plastic spoons for stirring; 2 small paper or plastic cups; food coloring (1 color for each gob); newspaper or plastic garbage bag to cover work area; paper towels; ruler; a pinch of table salt; a pencil.

Here's the plan

Gob of Goop 1

1. Add 1 tablespoon powdered borax to 1/2 cup water. Stir until the borax stops dissolving (there will still be borax at the bottom of the container).
2. Place 2 tablespoons of glue in a clean cup. Wash the measuring spoon right away.
3. Add a drop of food coloring and stir. Add the glue to 2 teaspoons of the borax solution and stir.
4. What do you notice happening to your mixture? What does your mixture look like? Take the mixture out with your hand and roll it into a ball. How does it feel and smell?
5. Set the goop aside until the next gob is done.

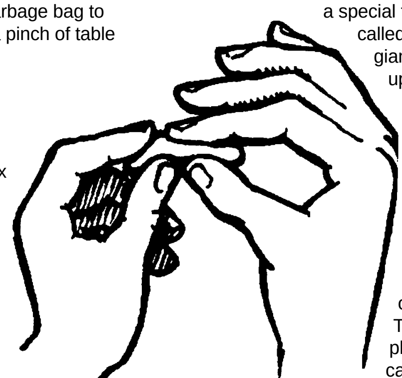
Gob of Goop 2

6. Pour 2 tablespoons of glue into a clean cup.
7. Slowly pour 1 tablespoon of liquid starch into the glue.
8. When the mixture looks like it is the consistency of chewed gum, lift the glue out of the starch and knead it with your hands. What does it feel like? The mixture may begin to fall apart, so if it is sticky, add a little bit of starch. If it is stringy, add a little more glue, if it is too runny add a tiny pinch of salt.
9. Knead until you can form a ball.
10. Add a drop of another color of food coloring and work it into the mixture.
11. Observe the two gobs of goop and compare their similarities and differences. Which gob stretches the best? Which gob is the stiffest? What characteristics do you think a gob needs to bounce? Based on your observations, predict which gob will bounce the highest and which will bounce the greatest number of times. Record your predictions.
12. Standardize your tests by bouncing the gobs from the same height. Hold the ruler on its end so that the 12-inch mark is off of the table. Hold the gob to be tested next to the ruler at the 12-inch mark. Let the gob drop. Be sure not to throw it. The only motion in the ball should come from the force of gravity pulling it down. Watch to see how high up the ruler the gob bounces. Drop each gob three times and record the greatest height and number of bounces for each trial. This will help to minimize the variables in each trial. Average the results of the three trials to determine which gob bounced best.

Wrap-up

In both formulas, you started with liquids that underwent a chemical change when mixed with additional components. Each liquid turned into an elastic solid. To bounce well, a material must be able to bend and return to its original shape without too much internal friction. If it is too elastic, it will "give" under pressure and the rebound will be poor. In general, a material that is both elastic and stiff will be the best bouncer. Which of your gobs bounced the highest? Which bounced the greatest number of times?

What's going on here?



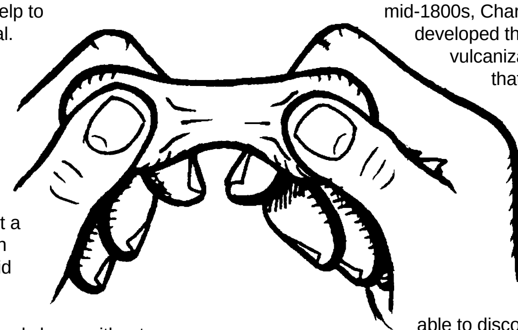
When you mixed your gobs of goop, you created a special type of chemical compound called a polymer. Polymers are giant molecules that are made up of tens of thousands of small linked molecules called monomers.

Mineral crystals are rigid polymers and so is the cellulose that makes up the trunk of a tree. In fact, the proteins that makeup the human body are really a collection of different organic polymers.

The polymers you made are plastic. Plastics are significantly different from the polymers in things like wood and rock. Plastics are solids that can be softened with heat and deformed with pressure. The goops are also elastic. This means that they deform under pressure, but return to their original form when the pressure is released. Known as elastomers, compounds like these put the stretch in rubber bands, the bounce in ping pong balls, and the flexibility in car tires.

Elastomers are created when monomers link together into chains by a process called chemical bonding. Because different monomers bond together in different ways, the amount of stretch and bounce in an elastomer depends on what chemicals are used to start with. In your experiment, when the molecules of the glue are mixed with the molecules of the borax, or starch, they begin to arrange themselves into a tangled structure of flexible, cross-linked chains. When the final product is put under pressure, the tangles temporarily straighten out. When the pressure is released, they snap back to their original tangled structure. The amount of spring an elastomer has is controlled by the strength of the bonds. In general, the stronger the bonds, the stiffer the elastomer. If too much pressure is put on an elastomer, however, the bonds will break and the elastomer will lose its ability to bounce back.

Where does this happen in real life?



Probably the most famous natural elastomer is natural rubber made from the latex or sap of certain tropical trees. Unfortunately, when natural rubber gets hot, it often gets soft and tacky like glue. Searching for a way to stabilize the material in the mid-1800s, Charles Goodyear developed the process of vulcanization. He found that by allowing the natural latex to react with sulfur molecules, the rubber became harder and more durable.

As chemical technology improved and scientists were able to discover the internal structure of polymers, it became possible to create synthetic polymers using a variety of different monomers. The first true synthetic plastic was called celluloid and it was produced by John Wesley Hyatt in 1869. Designed primarily as a replacement for ivory in the manufacture of billiard balls, celluloid soon found its way into things like movie film and shirt collars to keep them stiff.

Today, it's hard to find commercial products that do not have synthetic polymers in them. Everything from cars and toys to artificial hips contain these versatile compounds. One of the more interesting uses of synthetic elastomers is in the manufacture of chewing gum. If you look at a package of gum, you will find that the list of ingredients always includes something called gum base, a type of synthetic rubber that gives gum its elasticity. To make the gum more pleasant to chew, chemists mix in other ingredients including plastics, wax, flavorings, and, of course, loads of sweeteners. By varying the concentration of rubber in gums, chemists can make one that really stretches, like bubble gum.

Now try this

After completing your initial goop tests, change some of the variables to see how the properties of the compounds are affected. Look back at the recipe for a particular gob of goop and change one thing. Vary the recipes until you feel you have found the best bouncing gob of goop. Good luck!

This month in history

February

1807 — Zebulon Pike leads the first Anglo-American expedition into New Mexico

1848 — "The Communist Manifesto" by Karl Marx is published

1867 — The U.S. House of Representatives votes to impeach President Andrew Johnson

1915 — The cornerstone is laid for the Lincoln Memorial in Washington, D.C.

1943 — The staff of the Ranch School leaves Los Alamos

1949 — The Atomic Energy Commission approves an Idaho site for the National Reactor Testing Station, which becomes the Idaho National Engineering and Environmental Laboratory (INEL)

1956 — Critical experiments begin on LAPRE I (Los Alamos Power Reactor Experiment), a new concept in nuclear reactor design

1961 — The first all-solid-propellant rocket is launched into orbit from Wallops Island, Va.

1979 — Forces led by Ayatollah Ruhollah Khomeini take over Iran

1985 — John Herrington is sworn in as the secretary of energy

1992 — The Connection Machine 5, a massively parallel computer, is delivered to the Laboratory

1993 — A 1,210-pound bomb explodes in the underground parking garage of the World Trade Center in New York City

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spotlight

In the shadow of Cristobal

by Todd Hanson

There was a time when the shadows of powerful men like Juan de Oñate and Coronado barely had faded from the New Mexican landscape. In that time, a man named Cristobal Baca would give up all that he knew as familiar and comfortable to leave Mexico (then called New Spain) and journey across the desert. In 1608, Cristobal would settle and raise a family in the lands that would become New Mexico. Thirteen generations later, his ancestors would look back at this trek with awe and admiration. It was a journey that would become an almost legendary part of the Baca family history, and a story that Tom Baca, director of the Lab's Environmental Management Program, enjoys sharing.

Tom Baca bridges the past and the present dressed in authentic era costume and holding the Baca coat of arms he carries in parades. *Photo courtesy of Baca*

Like many New Mexicans today, Baca is keenly interested in the history of his family. Yet unlike many New Mexicans, Baca can trace his family history back to a time when our nation was not yet a nation and when, to the Europeans at least, this was truly the New World. Baca's roots in the New World can be traced back to the arrival of Luis Baca, Cristobal's grandfather, who arrived in New Spain in the mid-1500s. This voyage in itself was no doubt a difficult journey, but it was Cristobal Baca who trekked north on the heels of Juan de Oñate to live in what is now New Mexico.

Baca's exploration of his past began more than 20 years ago as part of a modest Bicentennial project he undertook aimed at overlaying his family's history on that of the nation's. His research uncovered the past six generations of his family history and took him back to the time of the American Revolution. That first small project whetted his appetite for genealogical research and set him on the course he maintains today. To date, his research has taken him back 16 generations to the lands of Old Spain. Baca is a member of the New Mexico Hispanic Genealogical Research Center and proud to belong to the Primeras Familias (First Families) de Nuevo Mexico.

The research is fraught with challenges and surprises, yet has proven to be utterly fascinating. According to Baca, one of the more intriguing facts about doing Hispanic genealogical work in New Mexico is that many of the lines are related. "When you find someone doing research with any Hispanic family in New Mexico," says Baca, "you'll ultimately tie in within six generations. All Bacas are, in fact, related and can trace their heritage back to Cristobal Baca."

Baca attributes much of his success in adding depth and breadth to the knowledge of his roots to the use of the Internet and to various computer programs designed to organize the data gathered during the research process. The Internet, in its amazing capacity as a communications medium, has allowed people in diverse parts of the world to communicate and to contribute information to what is frequently seen as a huge puzzle. People are often able to use the Internet to link their own family research to that of others and thereby complete more of the puzzle or to explore a growing number of vast public databases of genealogical information. Often these databases are located in other countries where the cost of traveling to do primary research would be prohibitive. The Internet is ideal since it allows researchers to gather information inexpensively and from the comfort of their home or office. Then software programs, like Family Origins, PAF (Personal Ancestral File) and Family TreeMaker, can help organize the data and streamline the research.

When asked who, of all his distant ancestors, he would most like to meet, Baca decides quickly, "Cristobal Baca would be the one." Why? "He had the view of life in New Spain and then experienced the transportation of his family into New Mexico and their survival here." The closest Baca probably will ever get to meeting his ancestors, however, is by dressing in the authentic era clothing he owns. Over the past year, he has appeared in numerous parades and events celebrating the Cuarto Cenntenario, the 400-year anniversary of Oñate's arrival in New Mexico.

In the end, the land of New Mexico is perhaps the most tangible part of the Baca family history. Since Baca is responsible for nuclear and hazardous waste management, pollution prevention and legacy-waste issues at the Lab, it is not surprising that his personal interest in finding and documenting his roots has evoked a profoundly emotional connection with his job of protecting our environment — both the land and the water.

"You know," Baca says softly, "water always has been New Mexico's most limiting resource, and it was certainly a challenge when they [his ancestors] first came to develop the water resources and then attempt to protect them." Obviously, it is still a challenge for us today, but Baca is up to the task as he lives and works in the shadow of Cristobal.

Reflections
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