# Reflections

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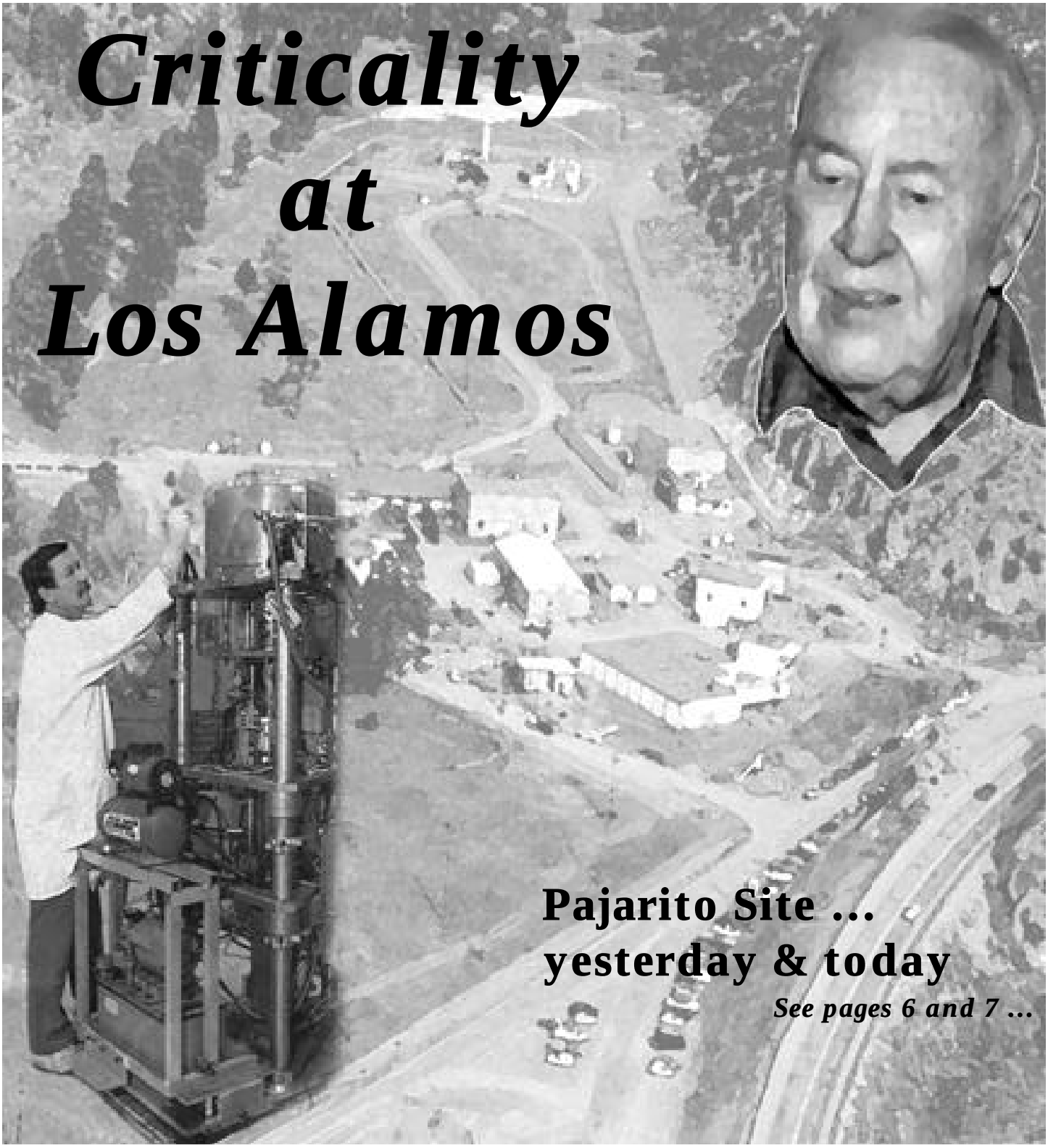

# Criticality at Los Alamos

## Pajarito Site ... yesterday & today

*See pages 6 and 7 ...*

## About the cover ...

*A 1986 aerial shot of Pajarito Site forms the background for this month's cover illustration. Also on the cover are retiree Hugh Paxton, upper right, long-time group leader and criticality safety expert, and Rick Paternoster of Advanced Nuclear Technology (NIS-6) with Lady Godiva IV, a critical assembly currently used in criticality safety tests.*

## Inside this issue ...




# Reflections

**Reflections, the Laboratory monthly publication for employees and retirees, is published by Public Information (PA-1). 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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## editor's journal

# Hooked on history

I'm fascinated with history, always have been. I enjoyed every history class I ever took as a junior high, high school and college student — and believe me, I took every history class I could squeeze into my schedules. If literature and writing had not been my first loves, I no doubt would have pursued degrees in history, political science or a related field.

Documentaries based on events long past, chronicles of milestones in the human experience, tours of historical sites, old journals, archives, biographies of historic figures, historical trivia, even period novels and movies, easily can capture and hold my attention fast. In fact, history is one of the reasons I find the Lab such an interesting place to work.

It's amazing just how much scientific history you run across here without making much of an effort. Granted, the Lab is only 54 years old, but its historic richness is bountiful and continues to grow. And I'm not just talking about the Manhattan Project years.

So many scientific "firsts" or breakthroughs have occurred here that I don't dare try to list all, or even many, of them. But if I were to compile a list, it certainly would have on it development of the MANIAC computer to solve large-scale hydrodynamic problems; formulation of the Monte Carlo technique for particle-transport computations; the first thermonuclear reaction produced in the George shot of the Greenhouse test series; detection of the neutrino; development of the first flow cytometer and cell sorter; development of fuel cells for transportation applications; development of heavy fermion and strong electron correlation materials; the world's first high-temperature hot-dry-rock system; discovery of the human telomere (the DNA sequence that defines the end of each chromosome); the High Performance Parallel Interface (HIPPI) protocol for high-speed networking; development of ultrafast, time resolved, infrared spectroscopy to study chemical reactions; the mapping of Chromosome 16 (the largest human chromosome to be mapped completely at a high level of detail); development of a diagnostic test for the early detection of lung cancers ... See what I mean? The list would take up far more space than I'm allotted here.

What really makes history come alive for me at the Lab is that we not only can read about these achievements and point to them with pride, in many cases we can talk with people who did the work. A number of these history makers continue to live in the community after having retired from the Lab; others are still working here, still pushing at scientific frontiers. And still others have yet to make scientific history, but no doubt will.

In this month's "Reflections," we highlight a bit of the Lab's history by focusing on Pajarito Site (Technical Area 18), home of the nation's first critical assembly facility. Recollections of early activities at the site by Lab retiree Hugh Paxton, a criticality safety expert and leader of the group at TA-18 from 1948 to 1975, are included in the feature (see pages 6 and 7).

And speaking of history, don't miss the answers to last month's Lab trivia quiz on Page 11. The quiz was loaded with historical tidbits.

# 'the physics of flight ...'
# 'the art of kite-making ...'

*by John A Webster*

The second annual Los Alamos Kite Festival, which blends art and science in a region-wide event open to all comers, will be held May 17 at Overlook Park in White Rock.

The festival, which includes kite-making workshops at several locations for a few weeks preceding the actual flight day, is sponsored by the Los Alamos Cultural Arts Council with participation by the Bradbury Science Museum and kite enthusiasts across the Laboratory and region.

"A primary focus is to teach kids the physics of flight and the art of kite-making," said Marcia Zalbowitz, a contract employee in Science and Technology Base (STB) Programs and president of the Arts Council.

***Children at Piñon School in White Rock learn how to make and decorate kites at a workshop during the 1996 festival. The children are working with Tyvek™, a lightweight but strong synthetic material.***

"But the festival is for kite-makers and kite-fliers of all ages," she said, "and another important purpose for the festival is simply to have fun."

The festival organizers planned awards for the most artistic kite, the most aerodynamic kite and the most popular kite, as determined in an informal vote by spectators at the event.

In addition, there will be a competition for artists to create their impression of a kite. "We don't even care if it flies or not," said Zalbowitz.

People wishing to participate in the kite-flying simply have to show up at Overlook Park for the event, which begins at 10 a.m. There is no fee, but participants are asked to register, in part so voters for the people's choice award can identify their selections.

Workshops are scheduled at the park on the day of event for those who want to enter a kite of their own making. A special workshop was planned on the making of "fighter kites", small, highly maneuverable kites that try to knock each other out of the sky in competitions in India.

In addition, the science museum plans to sponsor a "kite hospital" at the field so festival participants will be able to repair any damaged kites, add tails and otherwise make sure their kites are fit.

Sessions were planned before the event to teach people how to teach kite-making to children. The workshop leaders include Tom Beery of Experiment and Diagnostic Design (DX-5), Steve Harmony of Desktop (CIC-2), Aaron Lai of Atmospheric and Climate Science (EES-8) and Garry Franklin of the science museum (CIO-2). (Instructions for making a simple kite, prepared by Franklin, can be found in "Science Fun" on Page 10.)

Last year's festival, which was also held at Overlook Park, attracted some 300 participants of all ages from as far away as Silver City, N.M., and southern Colorado.


***Above: The "Octopus Kite" is flown by Sam Pedregon of Pueblo, Colo., during the first annual Kite Festival held last year.***

***Right: "Martin's Big Legs," a 32-foot-long kite made by England's Martin Lester, hovers over the field at Overlook Park during the 1996 Los Alamos Kite Festival.***

*Photos by Shimshon Gottesfeld of Electronics and Electrochemistry (MST-11)*

# Tactical goals: How we're doing

***This article concludes the report on the progress that the Lab has made with its tactical goals. The other seven goals were covered in the April issue of "Reflections." A full progress report is available at http://lanl.gov/subject/planning on the World Wide Web, or call 7-9770.***

## Productivity and Strategic Business Development

***Champion: Tom Garcia***

• The Lab met or exceeded all Department of Energy national laboratory productivity performance measure targets for fiscal year 1996. The Lab also reduced the cost per full-time research employee by more than 7 percent, saving about $67 million.

• The Laboratory obtained baseline measurements of how much time technical staff members spent performing nontechnical activities. Subsequent technical productivity surveys will track progress in this area.

• An outsourcing/partnering CQI team has completed strategy, criteria and initial screenings of activities considered for possible outsourcing; more detailed business analyses for a few functions were initiated last month.

• Strategy and action plans have been completed for contracting, which include a criterion that contractors do more to enhance regional economic development.

• The Lab is expected to have a business development strategy for industrial and civilian programs this month (the original target date was the end of last year).

## Integrated Environmental Science

***Champion: Tom Baca***

• A tactical goal Executive Steering Committee was formed, and a draft business plan for meeting the objectives of this tactical goal was completed in February. Global environmental systems based on data acquisition, modeling and high-performing computing will be the focus of development for the tactical goal.

• Thrust plans were developed and approved, and program development teams formed for the following areas: actinides in the environment, green chemistry, bioremediation and environmental security. Program development activities have begun in these areas.

• The Environmental Protection Agency has funded the Lab to establish and co-manage the first new Green Chemistry Institute (Dense Phase Fluids).

• The Lab is one of eight institutions currently being considered by DOE as a site for a bioremediation field research center.

• Ten peer-reviewed environmental restoration proposals have been funded at a total of $8 million beginning in fiscal year 1997. The Lab has submitted 65 new proposals for funding consideration for fiscal year 1998.

## Modeling, Simulation, and High-performance Computing

***Champion: Hassan Dayem***

• The Lab developed a five-year, $360 million program to receive the next generation of high-performance supercomputers for use as part of the Accelerated Strategic Computing Initiative and High-Performance Computing and Communications programs. It includes a $160 million agreement with Silicon Graphics/Cray Research to implement a 4 teraflop computer by December 1999.

• Several cross-divisional teams are converting weapons physics codes to run on the ASCI "Blue" machine.

• The Lab has submitted six high-performance computing Grand Challenge proposals to DOE; an awards announcement is expected soon.

• About 5 percent of the open high-performance computing resources will be made available to the general Lab community for research and development through a competitive process.

• While a formal agreement among DOE/ER and DOE/DP has not yet been signed, the Lab is developing an integrated computing environment for all its customers.

## The Genome and Beyond

***Champion: John Browne***

• The Lab conducted a major internal planning exercise with an external consultant; the results are being reviewed by Lab management.

• Los Alamos is part of a tri-Lab institute that is conducting the next phase of genome work.

• DOE has committed funds for new neutron scattering instrumentation for structural biology research.

• Bioscience has become an integral component of the NBC effort at the Lab. Los Alamos has established its role for addressing the molecular basis for risk from radiation and chemical incidents.

• A telemedicine technology transfer project currently is in progress.

# New plutonium bioassay process

*by John A. Webster*

A new procedure to monitor employees for possible plutonium intake produces results that are about 30 times as sensitive as previous methods. It also allows investigators to pinpoint the source of contamination in many cases.

The process was developed and implemented by a multidisciplinary team from the Chemical Science and Technology (CST) and Environment, Safety and Health (ESH) divisions. It went into effect the first of this year.

"This brings us closer to strict compliance with the requirements adopted by the Department of Energy a few years ago," said team leader Bill Inkret of Policy and Program Analysis (ESH-12). "We've really taken on this mandate. Presently, we're the only place in the country that's doing this."

Approximately 330 people, 85 percent of whom work at Technical Area 55, are checked at least annually for possible plutonium intake because they work around or handle plutonium. The monitoring, which is required by the DOE, is performed by testing samples of urine taken during a 24-hour period.

Before Jan. 1, the samples were analyzed solely for alpha radiation. The new procedure adds thermal ionization mass spectroscopy, or TIMS, to the analysis. The use of a clean-room facility at TA-48 to perform the tests also contributes to the accuracy and sensitivity of the analyses.

"The new procedure allows us to conduct tests using smaller samples, and it allows us to detect doses from intakes that are about 30 times lower (than the previous detection limit)," Inkret said.

***Don Rokop of Environmental Science and Waste Technology (CST-7) uses the thermal ionization mass spectrometer in the clean laboratory at TA-48 to check urine samples for plutonium.*** *Photo by John Flower of Photo,Video, Digital Imaging (CIC-9)*

It also is an invaluable source of reliable data in case of an accidental spill or release of plutonium in the workplace. For one thing, it cuts the time required to evaluate samples from approximately eight months to three to five weeks.

"This allows us to provide accurate information to individuals much faster, thus reducing the time they might be worrying," Inkret said.

"It not only cuts the assessment time," added Don Rokop of Environmental Science and Waste Technology (CST-7), "it allows us to get unambiguous confirmation of the source (of any contamination). Sometimes you don't know where it came from, but with TIMS we can 'fingerprint' the source very accurately."

Knowing the source helps doctors recommend treatment, if any is called for, and helps investigators identify any problems or practices that contributed to the accident, Rokop said.

Wes Efurd of Nuclear and Radiochemistry (CST-11), one of the chemists who prepares the analyses, said the Clean Chemistry and Mass Spectrometry Laboratory at TA-48, which was built in 1988, is a key part of the analytical process.

"This is the first facility in the world designed from the ground up for mass spectroscopy of very small samples and for low-level actinide chemistry," Efurd said. "We're doing chemistry in facilities that are clean enough for electronics work or even for surgery."

The analysis also uses the Lab's innovative chain-of-custody process for tracking samples. The process, implemented by Dawn Lewis of ESH-12 in 1991, has been adopted by other DOE facilities.

The new procedure, which has been supported by ESH, CST and the Nuclear Materials Technology (NMT) Division, can be used to detect intake of two isotopes — plutonium-239 and 240. The team is continuing to study ways to improve the sensitivity and accuracy of analyses for plutonium-238.

Besides Inkret, Efurd, Rokop and Lewis, the members of the team that developed the new process are Guthrie Miller of ESH-12; Harald Poths of CST-7; Tim Benjamin, Fred Roensch and Donald Dry, all of CST-11; and Paul Hoover and David Wannigman, both of Health Physics Operations (ESH-1).

"The Lab's teaming ability really worked," said Inkret. "All these people with top technical capabilities had the freedom to come together for a project of importance to the Lab."

***The Kiva control room, as shown in this 1950 photo, was used to monitor and record results from critical assembly tests at the Pajarito Site. Shown left to right are Vernal Josephson, Roger Paine, Lester Woodward and Hugh Karr. Similar control rooms exist today at Technical Area 18 to conduct criticality testing.*** *File photo*

# 'Good old P.U.'

*by Steve Sandoval*

Hugh Paxton didn't know when he came to Los Alamos in late 1948 that he would be doing critical experiments at the Laboratory and go on to become one of the foremost experts in criticality safety.

"They wanted somebody to fill a vacancy and that was it," Paxton recalled about his initial contact with the Lab. "Criticality safety was new to me, but I enjoyed it."

Criticality safety experiments had already been moved out to Technical Area 18, the Pajarito Canyon site, when Paxton arrived in Los Alamos by way of Oak Ridge and Philadelphia.

"They put us out there so we would be away from other people so if we did anything really disastrous it wouldn't really hurt anybody," said Paxton.

Paxton has long since retired from the daily Lab grind. But his legacy to criticality safety endures. Paxton and Norm Pruvost, who worked at TA-18 with Paxton, edited the Nuclear Criticality Safety Guide recently released by Nuclear Criticality Safety (ESH-6). The guide is a bible of sorts for researchers who conduct experiments where near-criticality is a concern.

"Hugh is a mentor to many of us here," said Thomas McLaughlin, group leader of ESH-6. "In his small discipline he was a giant."

Paxton's rise to prominence in the area of nuclear criticality safety wasn't by design. He was a nuclear physicist with degrees in math and physics from University of California, Los Angeles, and UC, Berkeley, who did Manhattan Project work at Columbia University and also was an instructor before moving to Oak Ridge. In between, Paxton recalled, he took a position with the Sharpless Corp. in Philadelphia developing shrinkproof ceramics.

"That's because I thought I was out of nuclear physics," said Paxton. "That was really an interim job and a mistake."

A colleague coaxed Paxton to give Los Alamos a look, he recalled. "When I was ready to leave Sharpless I almost went to Chicago," Paxton recounted. "Don't be a fool, come out and take a look at Los Alamos," his colleague urged.

Paxton and his wife Jean did, and they haven't left since.

At TA-18, the work always has focused on safety.

"Criticality safety became synonymous with the work of handling fissile material by hand outside reactors," said Pruvost. "There will always be safety questions that have to be addressed seriously with in-depth technical competence."

To this day, the objective of criticality safety remains the prevention of a criticality accident (see accompanying story).

Of the two fatal accidents that occurred at TA-18 in 1945 and 1946, Paxton is adamant in saying they would have been avoided with the current safety procedures in place. "The experiments would have been conducted very differently," said Paxton. "They worked with their hands. They would have been protected."

The fatal radiation injury to Harry Daghlian occurred when a heavy uranium block slipped from his hand onto a near-critical assembly consisting of a plutonium ball and a natural uranium reflector.

A year later Louis Slotin suffered a similar fate. In this case, a screwdriver being used to lower a beryllium reflector shell toward the same plutonium ball slipped. The shell dropped instead of being held short of criticality. Manual control was outlawed after the second accident, and the facility at Pajarito Canyon was rushed to completion.

The first kiva where the critical assembly devices are housed went into operation in 1947. Two other kivas have since been added.

The critical assemblies, which are designed to bring fissile material to a near-critical stage so researchers can study what happens, have borne whimsical names.

Lady Godiva, for instance, got its name, because it was unclad — it didn't have any reflectors for natural uranium reflecting.

Flat Top was so named, Paxton said, because it was basically set up on a large, flat metal table.

Paxton said a secretary at the site named Jezebel, the first pure plutonium assembly, because "she thought it might be a bad actor."

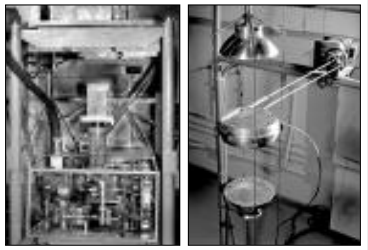
Topsy was already in operation when Paxton came to the Lab. "It just grew," he said of Topsy, named for the character in "Uncle Tom's Cabin."

Today, researchers use Godiva IV, Topsy, Big Ten, Skua and SHEBA to conduct criticality safety tests.

Paxton also fondly recalled "Pajarito University," as it came to be known. "Good old P.U.," he said.

To pass the time, many of the scientists and researchers, and their families, at TA-18 took to sports, said Paxton. Games of volleyball, touch football and ping pong in the basement of one of the buildings were common. "It was a very sociable, self-contained group. We liked to get together at parties."

And while the end of the Cold War has changed the focus of Laboratory research and its mission, criticality testing will continue to be needed, said Paxton. "There can still be concern wherever there is processing of fissile material," he said. "As far as I'm concerned, criticality safety and reactor safety are of real importance. As long as there is processing of reactor fuel, safety of the operation is important."



***Topsy, left, was named for the character in "Uncle Tom's Cabin." The Jezebel assembly, right, was the first pure plutonium assembly.*** *File photos*



## Pajarito Site: 'the only game in town ...'

*by Steve Sandoval*

***Employees from Advanced Nuclear Technology (NIS-6) perform a fuel exchange operation on the SHEBA assembly. The protective equipment, including respirators, is worn to guard against inadvertent contamination.*** *Photo courtesty of Photo, Video, Digital Imaging (CIC-9)*

The Cold War may have effectively ended earlier this decade, changing the Laboratory's mission primarily to watching over and maintaining the nation's remaining nuclear weapons. It is known as stockpile stewardship.

But criticality safety is still at the forefront for employees in Advanced Nuclear Technology (NIS-6). Criticality safety is loosely defined as protecting against the consequences of an inadvertent nuclear chain reaction, preferably by preventing the reaction.

At the Lab's historic Pajarito Site at Technical Area 18, the staff at NIS-6 have built upon the original criticality work and expanded their role today. "They've become broader today," said Group Leader Rick Anderson, describing the work at NIS-6. "However, some of the work we're doing today is identical in concept to the work done back then."

Referring to the initial criticality experiments at Pajarito Site in the 1940s, Anderson said, "Back then they performed a bunch of nuclear safety measurements for situations of interest. Now the Department of Energy has changed to a different set of missions including environmental restoration and materials disposition. For these new situations which we're encountering now, we need to perform new safety measurements.

"Criticality experimental capability is, if anything, more important now because fissionable nuclear materials — uranium and plutonium — are being encountered and must be dealt with in forms fundamentally different than those encountered during weapons design and manufacturing," he said.

Work at NIS-6 evolves around five primary activities: safeguards assay; arms control; the Nuclear Emergency Search Team, or NEST; the Los Alamos Critical Experiments Facility; and environmental applications.

Control of larger quantities of nuclear materials, rather than the Cold War era issue of processsing of nuclear materials, is the issue for researchers involved in safeguards assay. Part of this involves helping former Soviet states deal with nuclear weapons and materials, said NIS-6 Deputy Group Leader John Pratt.

Arms control at NIS-6 principally means dealing with arms control inspection regimes and demonstrating where a "particular arms control measurement will function effectively," said Pratt.

NIS-6 staff who work on NEST are interested in diagnosing what's inside a nuclear device. Pratt said NIS-6 works closely with Transport Methods (XTM) in this regard.

The Defense Nuclear Facilities Safety Board said in 1993 that DOE nuclear weapons labs must maintain the expertise to support ongoing research in ensuring safety of weapons labs DOEwide. To that end, NIS-6, through the Los Alamos Critical Experiments Facility, works most closely with criticality safety as the primary DOE facility for conducting criticality safety.

With the closing of Rocky Flats outside Denver and a change in how Sandia National Laboratories uses its counterpart facility, the Pajarito Site "is essentially the only game in town for criticality experiments," a November 1996 Weapons Complex Monitor report said.

In fact, staff from TA-55 and other DOE labs come to the Pajarito Site year-round for three- and five-day training programs in criticality safety. Part of the training is in the classroom and is conducted by Nuclear Criticality Safety (ESH-6), NIS-6's sister group that was split off from NIS-6 in the early 1980s. Part is hands-on work teaching criticality safety through experimentation at TA-18.

Lastly, NIS-6 staff work to ensure that the environment isn't harmed by research involving radioactivity. Pratt said NIS-6 uses technology to look for ionization that alpha particles leave in the air.

At Pajarito Site today, as in the Manhattan Project era, NIS-6 staff uses critical assembly devices to conduct criticality safety testing. However, because it is safer, experiments are now performed remotely. Remote instrumentation provides instantaneous feedback to researchers and students. Equipment also automatically shuts down an experiment if an undesired situation is reached.

people

# CIC-1 garners awards at annual competition

Communication specialists in Communication Arts and Services (CIC-1) won 25 awards, including Best of Show, in the annual competition sponsored by the Kachina chapter of the Society of Technical Communications.

Grace Hollen and Pete Sandford won the Distinguished Technical Communication and Best of Show in Technical Publications Award for the Physics Division's Progress Report for 1994. This entry, along with five others from CIC-1, advanced to the international competition, which is being held this month. Winners will be announced during the society's annual convention this month in Toronto.

Others whose work advanced were Octavio Ramos and Teri Ortiz, who won a Distinguished Technical Communication Award for Environmental Management, An Overview, and four Award of Excellence in Technical Art winners: Zizi Kolshorn, Donald Montoya and Eileen Patterson, who won twice for the brochure and poster for Information Architecture; Kolshorn and Ann Mauzy for BITS — Computing and Communications Special Edition; and Kathi Geoffrion Parker and James Russell for Computing, Information, and Communications 1995-1996.

The following are other winners and their works:

**Award of Excellence in Technical Publications**

• Paul Henriksen and Parker — Nonproliferation and International Security 1996

• Judy Prono, Russell and Susan Carlson — 1995 Laboratory-Directed Research and Development

• Russell and Parker — Computing, Information, and Communications 1996

• Mauzy and Carlson — Actinide Research Quarterly

• Patricia Mendius and Pamela Paine — X Windows

**Award of Merit in Technical Publications**

• Denise Derkacs — ESH-13 Environment, Safety, and Health Training

• Derkacs — Radiological Worker I and II Training

• Ruth Holt and Patterson — From Concept to Completion

• Kolshorn — Department of Energy: MICS HPCC Program


• Mauzy and Joyce Martinez — Finite Element Analysis of the I-40 Bridge over the Rio Grande

• Gloria Sharp and Necia Grant Cooper — Los Alamos Science

• Linda Wood, Virginia Cleary and Deidré Plumlee — Life Sciences Division and Center for Human Genome Studies, 1994 Progress Report

**Award of Merit in Technical Art**

• Sandford and Hollen — Physics Division Progress Report January 1994-December 1994

• Sandford — Landscape Paradigms in Physics and Biology

**Award of Merit in Online Communication**

• Chad Keiffer and Amy Longshore — Web Site for the Los Alamos Neutron Science Center

**Award of Achievement in Technical Publications**

• Yvonne Martinez — Debugging and Performance Tuning for Parallel Computing Systems

• Wood and Carlson — 94-1 R&D Project Lead Laboratory Support Technical Program Plan

**Award of Achievement in Technical Art**

• Kolshorn — Industrial Partnership Office (brochure)

**Award of Achievement in Online Communication**

• Jim Cruz and John Deal — Breaking into Multimedia

## PERS long-term-care program open to UC employees and retirees

Interested in obtaining coverage for long-term care? University of California employees and retirees are eligible to participate in the Public Employees' Retirement System's Long-Term-Care Program. Long-term-care coverage provides for care that is needed because of age, illness or injury (such care includes help with basic activities — dressing, bathing, eating).

The application period for the PERS Long-Term Care Program began April 1 and runs through June 30. The program is an individually underwritten product.

UC Benefits recently explored the possibility of sponsoring a long-term-care program for UC employees and retirees. The UC Benefits staff along with its long-term-care advisory group concluded that the vendor responses to the university's Request for Proposal were not responsive to the needs of UC employees and retirees, nor were they competitive in the marketplace. Consequently, UC decided it would not sponsor or endorse any long-term-care insurance product at this time.

Because the university does not sponsor or endorse any long-term-care programs, individuals interested in the PERS program must make their own arrangements for enrolling and for paying the premiums (payroll deduction is not an available option).

For more information on the PERS long-term-care package, call PERS at 1-800-266-1050.

# Obituaries

## *J. Carson Mark*

J. Carson Mark, leader of the Laboratory's Theoretical (T) Division for 26 years, was remembered for his enthusiasm, good judgment and sense of humor at a memorial gathering in his honor at Fuller Lodge.

*J. Carson Mark*

Mark, who was born in Canada July 6, 1913, and later became a naturalized U.S. citizen, died March 2 at the age 83 and was honored by some 150 friends and colleagues at Fuller Lodge four days later.

He came to Los Alamos in 1945 with the British Mission and joined the Lab staff permanently in 1946. A year later, he became leader of T Division and remained in the position until his retirement in 1973.

Mark, who earned a bachelor's degree in 1935 and a doctorate in mathematics in 1938, had a broad range of research interests, including hydrodynamics, neutron physics and transport theory. At the Lab, he was involved in the development of various weapons systems.

He was involved in issues related to disarmament and nonproliferation after his retirement. He also was a consultant to the Lab and served on the Nuclear Regulatory Commission's Advisory Committee on Reactor Safeguards.

Mark is survived by his wife Kathleen Abbott Mark of Los Alamos; three daughters, Joan Mark Neary of Tesuque, Elizabeth Mark Smith of Davis, Calif., and Mary Ellen Mark of Albuquerque; three sons, Thomas Mark of Newport, Ore., and Graham Mark and Christopher Mark, both of Los Alamos; 13 grandchildren; and three great-grandchildren.

## *Henry H. (Heinz) Barschall*

Henry H. "Heinz" Barschall, a pioneer in neutron physics and a contributor to Laboratory programs spanning 53 years, died in Madison, Wis., Feb. 4.

As a physicist at Los Alamos during the Manhattan Project from 1943 to '46 and during many summers thereafter, he studied the interaction of fast neutrons with nuclei and provided essential information for the design of nuclear weapons. Colleagues in this work included John Manley, Harold Agnew, Richard Taschek and Louis Rosen. For the test at Trinity site, his measurements of the shock wave velocity as a function of distance from the tower determined the yield of the device to 10 percent.

***Henry H. "Heinz" Barschall***

Born in Berlin in 1915, Barschall arrived at Princeton University in 1937 as a refugee and, following the discovery of fission in 1938, performed the first experiments on fission of uranium induced by fast neutrons. His thesis research on the scattering of neutrons by light nuclei showed that the strength of the so-called "spin-orbit" interaction between a nucleon and a nucleus was unexpectedly large. This discovery is central to present understanding of nuclear structure and of scattering of neutrons by nuclei.

After the war, Barschall moved to the University of Wisconsin at Madison where he advised 41 doctoral students and trained many others and where he continued his research in neutron physics, making further, seminal contributions toward understanding neutron scattering and reactions. For his continuing contributions to neutron physics he received the first T. W. Bonner prize of the American Physical Society. He was elected to the National Academy of Sciences in 1972.

Barschall was known for his clarity of thought and expression. His economical writing style; his well prepared, often humorous presentations; and his thoughtful, concise comments influenced students, colleagues and the physics community at large for six decades.

Rosen, a friend and colleague for many years, remembers his "meticulous writing style. If you wrote a paper with Heinz, you needed to be aware of the high standards he set."

As editor of Physical Review C (Nuclear Physics) in the 1970s and 1980s, Barschall guided that journal to a high level of quality and efficiency. He earned a special citation from the Association of Research Libraries in 1990 for his studies of the cost and impact of scientific journals.

He continued to be active after his retirement in 1986. Last October, he visited Los Alamos to chair a meeting of the International Commission of Radiation Units, which is writing a report on nuclear data needed for computer simulations of neutron and proton cancer therapy.

He also returned to the Laboratory regularly as a member of the Accelerator Production of Tritium External Review Committee. While he well understood the importance of nuclear theory for predicting nuclear cross sections, he had a reputation for being skeptical about relying on theory. He was effective at building support for new experiments, and this led to numerous cross section measurements at Los Alamos for both APT and neutron cancer therapy.

Barschall is survived by his wife Eleanor, whom he met while she was teaching in Los Alamos, and by their two children, Peter and Anne.

## *Roy Lucht*

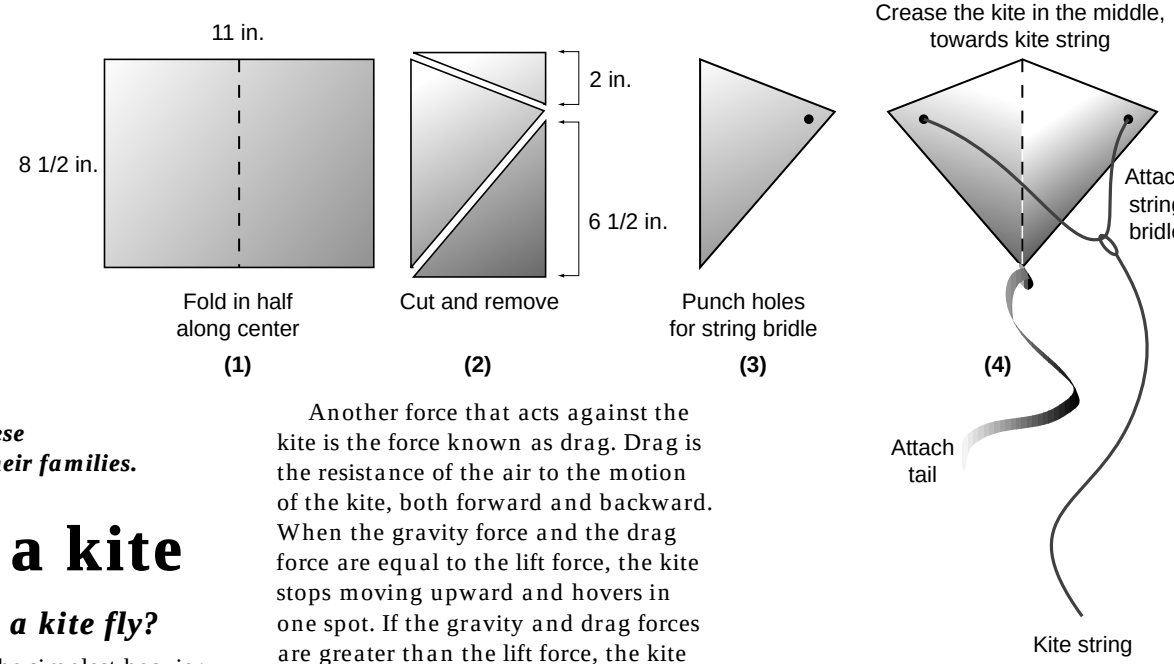
Lab employee Roy Lucht, 50, died March 4 in Dallas after a lengthy bout with leukemia.

Lucht, an applied physicist, first came to the Lab in 1975, working in Spectroscopy and Photochemical Research (AP-3). He left in 1980, but came back in late 1981 and remained here. Most recently, Lucht was deputy group leader for Detonation Science and Technology (DX-1).

The several detonation and munitions projects Lucht worked on at the Lab for the U.S. Navy and Air Force and the Department of Energy included the Propellant Hazard Test and Analysis Program (where he was principal investigator), the Deflagration to Detonation Program and the Response of High Explosive to Low Energy Project. Lucht also was chair of the Explosives Review Committee at the Lab and he published more than 35 technical journal articles dealing with detonations and munitions.

Lucht is survived by his wife, Kathy; two daughters, Heidi and Holly of Albuquerque; his parents, Vernon and Loretta of Albuquerque; and a sister and brother.

***This month's science experiment is presented by Bradbury Science Museum educator Garry Franklin, who prepares and demonstrates scientific facts and fun for students and other museum visitors. We encourage readers to share these experiments with their families.***




# Go fly a kite

## *Why does a kite fly?*

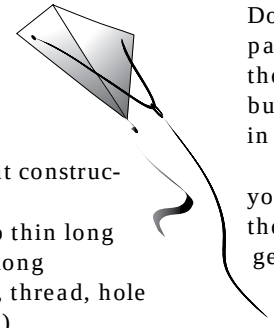
The kite is the simplest heavier-than-air vehicle. There are three basic forces acting on a kite that determine if it flies and how it flies. The three forces are "lift," "drag" and "gravity." A simple flat kite gets most of its lift from the wind blowing against its lower surface which is held at an angle that tilts the top upward. This can be demonstrated by throwing playing cards at a target. If the card is level with the floor or is tilted slightly downward, it is less likely to hit the target. If the front edge is tilted slightly upward, there is a slight lift and the card can reach its target more successfully.

When the top of the kite is tilted upward the air flowing toward it is deflected downward, providing the lift. This is an example of one of Newton's Laws of Motion: For every action there is an equal and opposite reaction. The air goes downward, the kite goes upward. There are other things that can cause lift. A kite can be lifted if it has a shape similar to an airplane wing or if there are hot air currents in the area where it flown.

Lift is not the only force acting on a kite. The weight of the kite acts in the opposite direction of lift. This is the force of gravity. A very heavy kite will require a tremendous lift force if it is to fly. Very light materials must be used to make a kite, especially in low or moderate wind conditions.

Another force that acts against the kite is the force known as drag. Drag is the resistance of the air to the motion of the kite, both forward and backward. When the gravity force and the drag force are equal to the lift force, the kite stops moving upward and hovers in one spot. If the gravity and drag forces are greater than the lift force, the kite comes falling to the ground. Drag can also be the friend of the kite flyer if the kite has a tail. The drag of the kite tail, not its weight, is the main stabilizer of a flat kite.

## *Making a simple paper kite*



**Materials needed**

- supply of lightweight construction paper
- crepe paper, cut into thin long strips about 10 feet long
- scissors, hole punch, thread, hole reinforcers (optional)

Use the diagram at the top of the page to make your kite and follow these guidelines as you construct your kite.

1) The crease in the center of the paper should always face you.

2) The thread attached at the top two holes (called the bridle) should be at least 15 inches long and not tied so tightly as to damage the paper (use reinforcers to strengthen the paper).

3) The knot in the bridle must be centered above the central crease so that both sides are exactly the same length.

4) The tail, one of the 10-foot lengths of paper, is tied in the middle to the kite by a short piece of thread, loosely tied.

5) Attach your spool of thread to the loop in the bridle.

## *Flying your kite*

*Safety first!* Do not fly your kite around power lines or telephone lines. Do not fly your kite in the street or in parking lots with cars. Running with the kite to get it flying is not necessary, but if you do be sure there is nothing in your way that you might trip over.

Hold the kite by the bridle with your back toward the wind. Release the kite while at the same time pulling gently on the thread. It may be helpful if someone else holds the kite while you stand about 10 feet away with the thread in your hand.

If your kite does not fly properly, try some of the following tips:

**Very light winds:** shorten the tail or take it off, make bridle longer

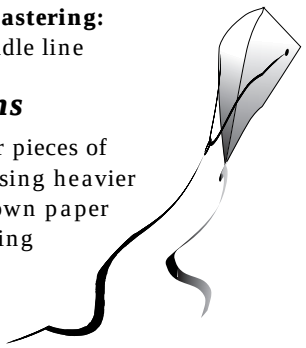
**Heavy winds:** use more tails (for this kite, add 2 to 4 tails, one at a time)

**Darting:** strengthen and lengthen tail, place some weight (a couple of pieces of tape) on the side that is darting

**Roller coastering:** lengthen bridle line

## *Variations*

Try larger pieces of paper. Try using heavier paper or brown paper bags. Try using newspapers.



# This month in history

## *May*

**1862 —** Mexican forces defeat French invaders in the Battle of Puebla, a victory celebrated as Cinco de Mayo

**1944 —** First chain reaction at the Water Boiler, a Lab reactor built to provide neutrons for experiments and help study reactor design

**1946 —** An accident at the Lab during experiments on critical assemblies results in the death of Louis Slotin

**1954 —** The U.S. Supreme Court holds in Brown vs. Topeka Board of Education that racial segregation in public schools is unconstitutional

**1964 —** J. Robert Oppenheimer gives his first public talk at Los Alamos since resigning as director, speaking on "Niels Bohr and Atomic Weapons"

**1972 —** Eight Laboratory employees die in the crash of a Ross Aviation plane after takeoff from Albuquerque

**1977 —** The Weapons Neutron Research Facility produces neutrons for the first time

**1979 —** Donald Kerr becomes the fourth director of the Lab

**1989 —** The Lab and DOE sponsor a cold fusion workshop in Santa Fe attended by more than 430 researchers from 14 countries

**1993 —** President Clinton visits the Laboratory

**1996 —** DOE announces it will enter negotiations to extend UC's contract to manage the Lab

***This information is culled from numerous sources. Suggestions and submissions are welcome.***

**Syndicated material removed at the request of the syndicate**

## Answers to last month's 'Brainteasers'

**(1)** Bob Thorne; **(2)** Raemer Schreiber; **(3)** James Schlesinger; **(4)** Nan Moore or Marge Dube; **(5)** An Army C-2 truck widely used at the Lab in the 1940s and 50s; **(6)** The Badge Office; **(7)** George Bell; **(8)** It was a bare sphere of uranium, thus, like its namesake, unclad; **(9)** Ashley Pond; **(10)** Fermor Church; **(11)** Firing site in TA-36; **(12)** Names, specifically Robert Fowler and Richard Baker; **(13)** Hans Bethe; **(14)** Enrico Fermi and Niels Bohr; **(15)** Richard Feynman; **(16)** The twice-weekly LASL Newsletter and the weekly Bulletin; **(17)** Association of Los Alamos Scientists, formed Aug. 30, 1945; **(18)** Jumbo; **(19)** The first thermonuclear explosion, detonated at Eniwetok in 1952; **(20)** In 1967, as governor of California; **(21)** September 1980; **(22)** Julius; **(23)** Less than three years, October 1974 to August 1977; **(24)** CIC-17, Media; **(25)** Tom Brokaw, here to interview Manhattan Project pioneers; **(26)** The Lab's first Z-pinch fusion device; **(27)** It was the only place during the early years where the houses had tubs instead of showers.

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spotlight

# Embudo native: *An officer and a lady*

*by Steve Sandoval*

Ever since Pia Griego was in high school she wanted to be in the military. A reserve officer training course she took as a junior at Española Valley High School piqued her interest even further.

That was in 1984. Today, Griego is a second lieutenant in the New Mexico Army National Guard. Last fall, Griego was the only Hispanic female who graduated from officer candidate school. There are now 28 women who are officers in the New Mexico Army National Guard — fewer than 10 of whom are Hispanic.

The Embudo native is assigned to Detachment 1, 3631st Maintenance Company of the Army National Guard in Española, where she is platoon leader in the company's automotive section. In this company, Griego leads 30 other guard members.

As the company's family support group officer, she works with soldiers' families when, for example, guard personnel are deployed. She also works with and acts as a liaison with the community, she said.

All this Griego does while working fulltime with the streamlined purchasing team in Procurement (BUS-5) — she's worked here since 1984 — and taking classes at University of New Mexico, Los Alamos, and the College of Santa Fe. Griego is taking nine hours this semester and needs 12 credit hours to earn a bachelor's degree in public administration.

"It takes discipline," Griego understated about juggling competing demands on her life. "You get used to it; it requires good time management."

A quick glance at Griego's schedule gives glimpses of her military influence. She's up at 5 a.m. every day. After her morning 2-mile run, she leaves Embudo, north of Española, about 6:30 a.m., gets to work by 7:30 a.m. and leaves at 4:30 p.m.

Griego's classes are weekends and evenings with some occasional afternoon course work required. Her National Guard requirements take up many weekends and evenings, she said.

The Junior Air Force Reserve Officer Training Course (ROTC) at Española Valley High School started her on the road toward obtaining her gold bars. In the beginning, Griego wasn't sure what she had gotten herself into. "It was definitely culture shock for me," she said.

After graduation, Griego went to Fort Jackson in South Carolina for 16 weeks of basic training and military operations. "That's when I experienced the real world," Griego recalled, also noting that this was the first time she had been away from home, and family, for any extended period.

"I really questioned what I was doing," Griego said. "Those five months out there felt so long; I felt like it was never going to end.

"We do get used to the niceties here at home … I was so young then; I eventually adapted," she said. The occasional phone calls home and conversations with her mom kept Griego from packing it in and returning to New Mexico. "My mom was real good at keeping me motivated," said Griego.

***Pia Griego of Procurement (BUS-5) receives her bars during graduation ceremony at Kirtland Air Force Base in Albuquerque after completing the New Mexico Army National Guard's Officer Candidate School last August. Griego is a second lieutenant in the Army National Guard. Pinning her bars is Joe Rodriguez, left, of Detonation Science and Technology (DX-1). Also shown is Sgt. Major Ray Velarde, with back to camera, of the U.S. Army Reserve. In the background, left, is Major Terry Tribble.*** *Photo courtesy of Griego*

Upon completion of basic training, Griego was a private first class. She rose as high as sergeant in 1988 but couldn't advance further in her specialty, administration. So Griego decided to go to officer candidate school, an intensive 18-month program that included camps and drills and more camps. The Lab allows leave for employees who belong to branches of the military.

Griego's road to getting where she is now speaks for itself. But Griego spends a lot of time talking to young women about the military, explaining that the guard isn't a weekend social gathering. "I give them the straight talk, that it's somewhat difficult," she said. "But if they're willing to pursue it, they can do it."

**Reflections**
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