Reflections

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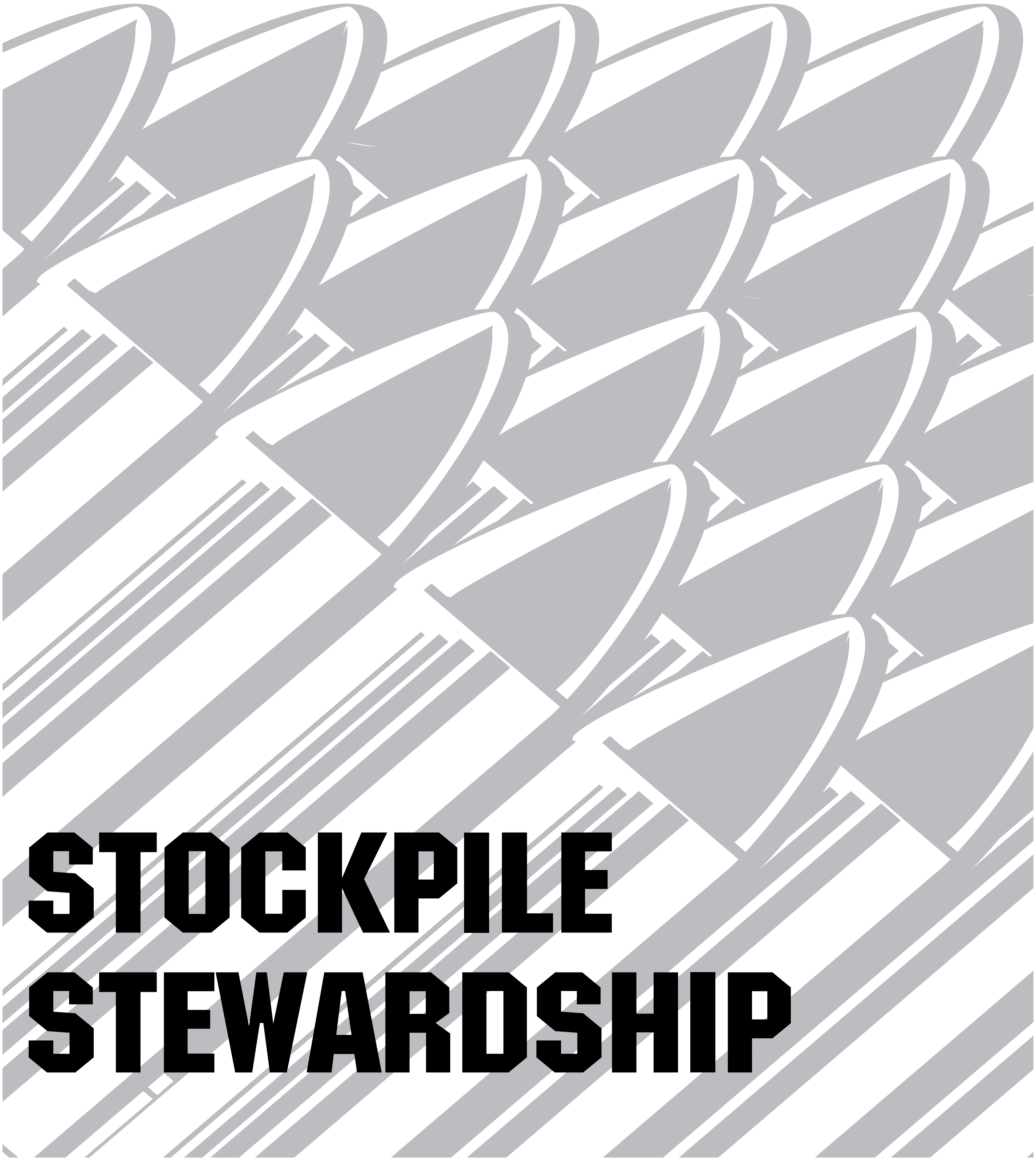

STOCKPILE STEWARDSHIP

Inside this issue ...

Cover illustration by Edwin Vigil

editor's journal

Common sense and caution

We're a little past the half-way mark for winter weather in Northern New Mexico, and many employees who commute to the Laboratory are just getting accustomed to that "seasonal knot" that develops in their stomachs each day they drive to work in snowy or icy conditions.

And I can't say that I blame them. Winter driving can be a nerve-wracking chore, no matter how much experience you've had driving on snow-packed or ice-covered roads.

I learned to drive as a 16-year-old in northern Ohio, where heavy lake-effect snows are a fact of winter life — some years, it seemed as though the snows came before Halloween and continued through Easter. The driving instructor at my high school stressed that common sense and caution are the keys to safe driving in any season. And he drilled into our heads that the most important thing a person can do when driving on weather-affected roads is to "slow down."

You would think anyone who has ever gotten behind the wheel of a vehicle would know this just by instinct. But it never ceases to amaze me when the roads are bad that some "genius" will go whizzing past a long line of cars because traffic is just not moving fast enough. And who among you hasn't endured some driver following a few feet away from your vehicle's bumper, apparently hoping to make you go faster. That you might stop suddenly or skid on a patch of ice doesn't seem to concern these bumper huggers.

I don't have a long commute to work, and consequently, my seasonal knot isn't as large as those of many Lab employees who travel a greater distance. Some of them say they dread driving to and from work during winter. And while they are quick to point out that it's no picnic driving at any time of the year with speeding "road warriors" heading toward the Lab, they say icy or snow-packed roads make a stressful commuting situation much worse.

One employee shared with me his theory about bad winter-weather drivers. He thinks most of them drive foolishly because they associate slow or cautious driving with being wimpy or scared. He also speculates that these winter speed demons lack self-control and are some of the same people subject to so-called "road rage."

I don't know if he's right, but it does appear that many people just don't use common sense when driving. Common sense tells most of us that you must adjust your driving speed and use caution when the roads are not dry.

We can't stop others from driving unsafely, but we can stop ourselves. It's simple. The next time you get in your vehicle and head out for work, or anywhere for that matter, use common sense. Pay attention to road and weather conditions. Drive cautiously and defensively. Drive as if your life and the lives of others on the road are on the line. And at the very least, slow down!

You might get where you're going a little later than planned, but arriving late is a lot better than never arriving. Also consider joining a van or car pool. Fewer vehicles on the road can help make the commute safer.

And speaking of safety, this month's feature story highlights stockpile stewardship and the Lab's role in ensuring the safety and reliability of the nation's nuclear weapons (see pages 6 and 7). Also featured is an article about proposed plans for revamping the Lab's aging infrastructure (see pages 4 and 5).

Reflections

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Unsafe drinking water prompts Lab help

by Steve Sandoval

The drinking water in the small village of San Miguel de Uspantán in Guatemala is safer to drink today, thanks to the work of two Laboratory employees.

And the villagers responsible for operating the village's drinking water system are also armed with new techniques and knowledge to ensure that the water remains safe to drink.

Bill Turney and Steve McLin of Water Quality and Hydrology (ESH-18) spent about 10 days in Guatemala last October at the request of the Española Valley Rotary Club. The civic group annually takes on an international charitable project. "We've been doing this for a number of years now," said Sondra Contrell, president of the group. "When I was there last year, in speaking with local doctors I found that about 80 to 85 percent of the illnesses treated were related to poor water conditions," said Contrell.

"I thought it would be a lot smarter to treat the problem," she said, so she contacted the Lab. "It's very nice to get the Laboratory involved in this and see the enthusiasm generated for this project," said Contrell.

San Miguel de Uspantán is about 135 miles from Guatemala City and 50 miles from the Mexican border. The village of about 4,000 people sits at the base of mountains where the village draws its drinking water from three springs, Turney explained.

Turney and McLin tested the water supply for nitrates and bacteria such as *E. coli* and coliform. Two of the three springs were free of any bacteria and nitrates — the absence of nitrates suggests little or no use of pesticides or herbicides — while one spring showed the presence of *E. coli* and coliforms, said Turney.

Most adults can withstand the presence of nitrates, Turney said. But for infants less than six months old, nitrates rob their blood's oxygen-carrying capacity, he said.

The village's infant mortality rate is between 50 percent and 80 percent, which was one of the reasons the Lab was asked to test the water.

Steve McLin of Water Quality and Hydrology (ESH-18) empties water from a bottle next to Nacimiento Cotoxac spring in Guatemala. The waterfall in the background only flows during rainstorms. The waterfall and a nearby spring where the village of San Miguel de Uspantán in Guatemala draws its water were contaminated with coliform and E. coli bacteria.
Photo courtesy of Camille Flores

Turney added that a United States-built hospital near the village isn't staffed and the closest hospital is in Guatemala City. "Most of the villagers don't have automobiles and most of them don't even have bicycles," said Turney.

Added McLin, "Most of them don't have garbage pickup. It took me a day to figure out they were so poor they don't have garbage ... I really thought they had very clean habits."

To test the village's water, Turney and McLin took portable nitrate-testing kits. They also measured chlorine levels in the water, as well as the acid level, and used testing kits to test for *E. coli* and coliform bacteria.

To test for the coliforms, Turney and McLin took samples from the reservoirs, added a reactive agent and let the samples sit in vials for 24 hours. After this incubation period, the samples were placed under an ultraviolet lamp, Turney explained. The presence of *E. coli* and coliforms is indicated by the darkness of the water when exposed to the ultraviolet light, he said. The tests also showed the absence of chlorine in the water. Chlorine is used to kill bacteria in water.

Turney and McLin demonstrated their findings to village officials so they could see first hand the problems with the water supply.

"They're missing a little of the know-how, but they're hungry to learn," Turney said of village water system officials, noting that village officials knew of chlorine and its beneficial effects. He said the village owns some water treatment equipment, but it hadn't been used properly.

"They asked us to come back and teach them to use what they have," said Turney.

And the two Lab employees left several nitrate-test kits for village officials to test the water. The kits cost about $12. The Guatemalan Ministry of Health has some money available to purchase the kits to test for *E. coli* and other bacteria.

"Getting the chlorination working was achievable in a short period of time," said McLin.

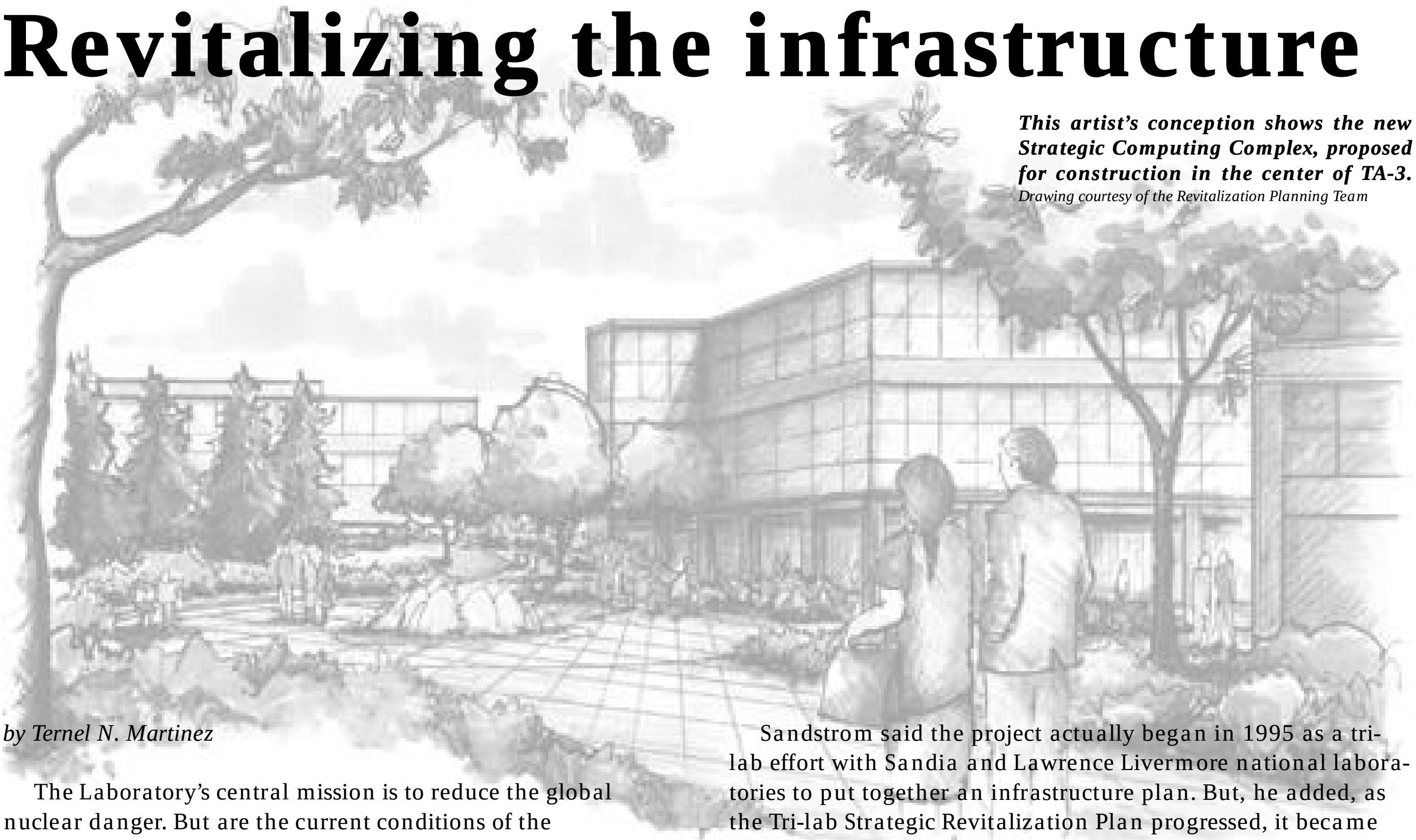
"If it saves any lives it was well worth it," added Turney.

"All these conditions are life-threatening," McLin said about hepatitis, polio and cholera that can be contracted from bacteria- or virus-laden drinking water. "Down there, these conditions are prolonged and life-threatening."

Turney and McLin both said they'd return to the village to see what progress has been made in addressing the high infant mortality rate and improvements to the water system. "I feel like if we don't follow up, not much will happen," said McLin.

"We have the expertise here [at the Lab]. It's our duty to do this," said Turney. "The Lab is a big player in international affairs. This is another way to be a player in my opinion."

Revitalizing the infrastructure



This artist's conception shows the new Strategic Computing Complex, proposed for construction in the center of TA-3.
Drawing courtesy of the Revitalization Planning Team

by Ternel N. Martinez

The Laboratory's central mission is to reduce the global nuclear danger. But are the current conditions of the Laboratory's facilities and infrastructure posing a threat to the Lab's ability to meet its mission in the near or distant future, or even to conduct science in general?

Before you answer, consider the following:

• Eighteen percent of total Lab square footage currently is classified by the Department of Energy as in poor or failing condition. Only 30 percent of the Lab's facilities are listed in excellent or good condition.

• Thirty-nine percent of total lab/production facility space is more than 40 years old.

• The Laboratory currently uses 145 trailers or transportables. In Technical Area 3 alone, 845 employees work in these trailers, most of which have outlived their designed life span of 10 years.

• The Laboratory is supplied with power through two lines; should one fail, it is very doubtful that the remaining power line could cover the shortfall. And the Lab's energy requirements are expected to increase dramatically over the next several years.

• The Lab currently has a backlog of about $107 million in maintenance requests.

When one factors everything that infrastructure entails, such as traffic safety, security, electric power distribution and supply, sanitary waste disposal and transportation, the Lab's situation is indeed dire, said Don Sandstrom of the Nuclear Materials and Stockpile Management Program Office (NMSM-PO).

Sandstrom heads the Infrastructure and Facilities Revitalization Project, designed to develop a long-term, comprehensive sitewide plan to revitalize the Lab's facilities and infrastructure so that they are capable of meeting the Lab's current and future mission needs over the next several decades. The Planning Team in Facility Project Delivery (FSS-1) is working with Sandstrom to put together a comprehensive, integrated sitewide plan. Utilities and Infrastructure (FSS-8) also is providing support.

Sandstrom said the project actually began in 1995 as a tri-lab effort with Sandia and Lawrence Livermore national laboratories to put together an infrastructure plan. But, he added, as the Tri-lab Strategic Revitalization Plan progressed, it became clear that Los Alamos' revitalization needs were much greater than the other two.

"The average person at the Laboratory takes his or her infrastructure needs for granted," said Sandstrom. For example, at TA-3, the sanitary waste systems are greatly overloaded. "We've had sewage backups in the Otowi Building, the Advanced Computing Laboratory and other places, and this makes for an unsatisfactory workplace," he said.

Other problems include aging and undersized natural gas lines (many of which are deteriorating), steam plant pipes that leak approximately 20 million gallons of water per year, and at least 15 substandard intersections on Lab roads. Many roads are not wide enough to handle the bicycle traffic and present additional safety risks to users, said Sandstrom.

Project team members first raised the facilities and infrastructure problems to the workforce during a two-day workshop last May. More than 50 representatives from various divisions and program offices attended the workshop, which also strove to develop the criteria and guidelines for addressing infrastructure issues and the options available to the Lab.

The workshop was partially successful in that it made many line and program managers aware of the fragility of the supporting infrastructure, Sandstrom said. "The workshop was not completely successful because they expected that buildings and equipment directly involved in the Lab's main programs would be revitalized or replaced in the near-term. This flies in the face of financial realities.

"The key to accomplishing comprehensive infrastructure and facilities revitalization is integrating the Lab's current and perceived future programmatic needs into the plan," said Sandstrom. "We need input from program and line management on what their needs are."

The project team and consultants from ADP Marshall, a consulting firm that has been helping the team put together the sitewide plan, spent the next several months after the workshop interviewing program and line organization personnel on what those needs were. The team then held a second status meeting last Oct. 28 to give participants an update on the plan and to make sure everyone's needs were accurately understood.

"In the environment we work in, we have to be able to respond to changing requirements and demands. That's why I refer to the plan as a living document — we should be able to deviate slightly from the plan at times without disrupting the integrity of the whole thing," said Sandstrom.

Sandstrom said the plan actually is being done in two parts: a master plan for TA-3, and an overall Labwide plan. "TA-3 has the largest concentration of people and facilities, the latter of which are in very bad shape. If we get TA-3 fixed up, then a major portion of the Lab's facility and infrastructure problems will have been solved," he said.

The TA-3 plan was completed last January; it now needs to be endorsed by the Lab's Planning Council, which is responsible for approving all plans dealing with the physical development of the Lab. It then needs to be approved by the Los Alamos Area Office. The sitewide plan should be completed by the end of this fiscal year, said Sandstrom.

Revitalizing the entire Lab's infrastructure is a tremendous, expensive task. The project team had proposed a funding formula that would commit an average of $20 million a year for 10 years to revitalize classical infrastructure such as roads, sewers and power. New facilities and ongoing maintenance would require even more funding, Sandstrom said.

Some major upgrades already are under way at places such as the power plant cooling tower and the natural gas grid and border in TA-3. And the Lab is working with DOE on obtaining National Environmental Policy Act approval for a third power line, to be installed at the Lab by the year 2000.

Getting the additional needed funds is a major uncertainty, although Sandstrom noted that the Lab does have several funding options available.

First, the Lab would continue to get line-item funding for programmatic facility needs through Congress.

Second, the Lab should commit to earmarking a certain percentage of all programmatic funding for facility revitalization and infrastructure, a concept endorsed by almost all participants during the May 1997 workshop, he said. The percentage of programmatic funds to be earmarked has not yet been determined, but it could be between five and 10 percent. Also, the Lab should try to obtain special add-on funding from specific programs, he explained.

Still another funding option would be to get third-party financing. For example, the Lab may try to get a private company to build a facility, with the Lab leasing the space inside, he said.

The plan contains several assumptions: TA-3 will remain the core center of activity at the Lab; the proposed research park, a Nonproliferation and International Security Building and a strategic computing complex will be built; the Administration Building will be replaced (it would be less expensive than fixing everything in the building, estimated to cost more than $90 million); and all transportables will be removed.

The plan's proposals include moving all work involving special nuclear materials such as plutonium and highly-enriched uranium out of TA-3. This would mean relocating all activities in the Chemistry/Metallurgy Research Building involving special nuclear materials to other facilities.

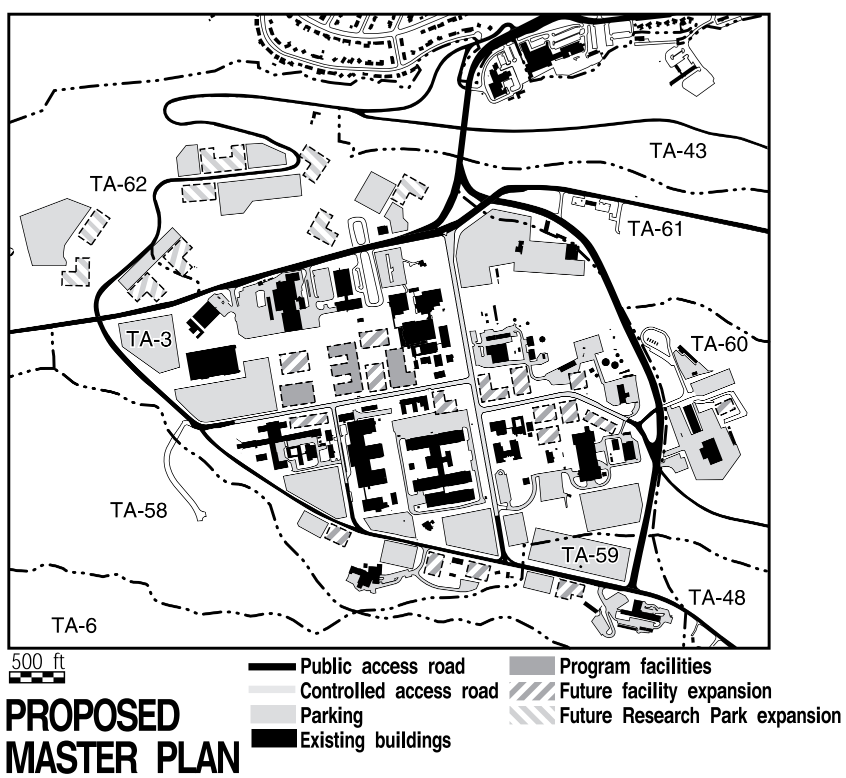
Other major recommendations may include relocating the general warehouse function to the Española Valley (and perhaps even outsourcing the activity), turning the current SM-30 General Warehouse and SM-40 into office spaces or laboratories and encouraging Los Alamos County to help finance lab or office space in the research park, which the Lab would lease back.

Regardless of what recommendations ultimately are accepted, something must be done to revitalize and upgrade the Lab's facilities and infrastructure, and soon, warns Sandstrom.

"We're doing 1990s work in 1950s facilities," he said. "We must come up with a viable plan for revitalization soon and stick with it. If we don't significantly revitalize our infrastructure and replace the outmoded facilities, we will be unable to accomplish our mission of reducing the global nuclear danger."

Additional information on the Revitalization Project is available online at http://www.lanl.gov/revitalize/.

This map shows how TA-3 might look, given all the assumptions in the Revitalization Plan. The assumptions include replacing the Administration Building, constructing the Strategic Computing Complex and building the Nonproliferation and International Security Center. *Map courtesy of the Revitalization Planning Team*



Stockpile Stewardship: Keeping nuclear weapons safe, secure and reliable

by John A. Webster

Ask employees what the Lab's core mission is, and most will say "reducing the global nuclear danger." Ask them to explain all that this entails and some will admit that they don't know. While many people know the Lab is tasked with keeping the nation's nuclear stockpile safe, secure and reliable, some are not aware of all that the Lab is doing to accomplish its mission. … And a few may even wonder why the Lab has this mission.

But for Don Wolkerstorfer, program manager for hydrodynamic experiments in the Nuclear Weapons Technology (NWT) Program, the why is simple. "Even though the Cold War has ended, nuclear weapons and the knowledge of how to make them will never simply disappear," he said. "As long as it is U.S. policy to maintain a nuclear deterrent, the Laboratory has responsibilities for the nuclear stockpile."

That responsibility is embodied in a program called stockpile stewardship, through which Laboratory scientists and engineers in the weapons programs work to ensure that the weapons in the stockpile are safe, secure and reliable without underground testing.

The majority of the weapons in the stockpile were designed at Los Alamos, thus the Lab's responsibilities extend from their original design, development and production to maintenance and surveillance activities, assessment and implementation of system modifications, safety upgrades and life-extension measures and, ultimately, the safe and secure dismantlement of retired weapons.

Achieving and maintaining a high level of confidence in the safety, security and reliability of the stockpile was difficult in the era of underground testing. Without testing, it becomes what Laboratory Director John Browne has called a "major technical challenge." Each year, the Laboratory director must certify to the president that the Lab has met the challenge.

"In the era of underground testing, you had the ability to learn something you didn't have to be smart enough to ask," said Dwight Jaeger, group leader of Weapons Engineering (ESA-WE). "Now, you have to be smart enough to ask the right questions. It's much more difficult."

The stewardship program at the Laboratory involves an ongoing cycle of activities. Routine surveillance is designed to

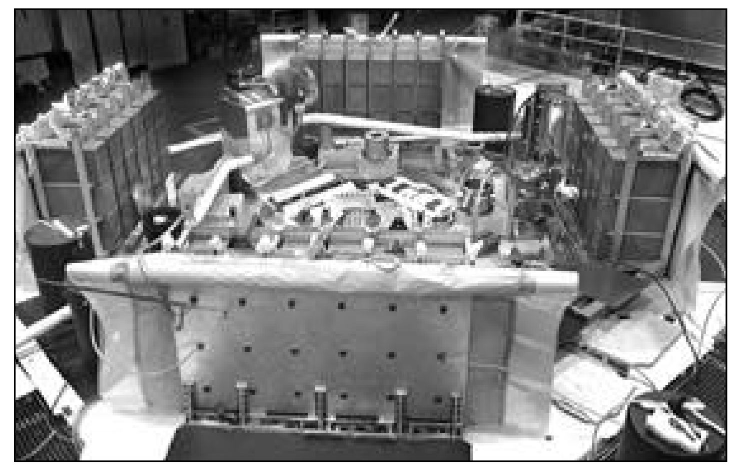
detect abnormalities or identify potential problems. Next, the findings are analyzed to determine whether they could impact safety and performance. Finally, solutions, such as repairing or remanufacturing weapons components, are developed and implemented to maintain confidence in the stockpile's safety, security and ability to function as designed.

Many potential problems relate to material changes that occur as the weapons age. Without underground testing, it is as if the Lab had responsibility for thousands of automobiles parked in garages for decades and never drove them or even started them up, but is required to maintain them and be certain they are ready to run perfectly at any time.

In automobiles, vinyl dashboards crack, rubber window seals leak and fan belts split over time. In nuclear weapons, bonded materials separate, high explosives deteriorate and nuclear materials also change. So the weapons undergo rigorous surveillance — inspections to detect any potential problems.

"We've been doing routine surveillance to monitor the weapons since day one," said Joe Martz, project leader for enhanced surveillance. "But now we're developing new tools that will help us predict the problems before they come up — that's the 'enhanced' part."

The Laboratory uses a variety of unique facilities and capabilities to help ensure the safety, reliability and performance of the weapons in the stockpile. NWT is focusing on developing new tools and enhancing existing capabilities for high-performance computing, hydrodynamic testing, advanced materials science and high-energy-density physics experiments.



Jerry Paul of Hydrodynamics and X-ray Physics (P-22) works on Pegasus, a pulsed-power facility where electrical energy is discharged into experimental packages to study hydrodynamics and material properties. Photo by Fred Rick

Computer simulations always have played a central role in the design and analysis of nuclear weapons. Earlier supercomputers were adequate for designing new weapons, and nuclear testing provided the ultimate confidence in the safety, reliability and performance of those designs. With the end of testing, however, numerical simulations are now the principal method of gaining a comprehensive knowledge of the many complex processes that occur in a thermonuclear weapon.

To simulate a nuclear test, scientists need to increase computational speeds and memory capacities by a factor of 100,000. The Department of Energy, the three weapons laboratories and the computer industry have committed to a partnership, the Accelerated Strategic Computing Initiative (ASCI), to achieve this goal in less than a decade. The Lab's simulations will incorporate data from past nuclear experiments, current nonnuclear experiments, the experience of designers and engineers and the knowledge of its physicists, chemists and materials scientists.

Hydrodynamic tests are high-explosives-driven experiments for studying the implosions of the primary stages of a nuclear weapon. This specialized science is termed hydrodynamic testing because solids and metals flow like liquids when driven by the detonation of high explosives.

Often called "hydrotests," these experiments allow researchers to examine the position, velocity and condition of material surfaces as well as the growth and pattern of wave-like disturbances. They address the most essential issue in stockpile reliability: the functionality and safety of a nuclear weapon's primary stage.

Materials science encompasses a wide range of activities at the Lab and includes research on ceramics, plastics and metals as well as nuclear materials such as plutonium. Subcritical tests at the Nevada Test Site, such as Rebound, which was successfully conducted by the Lab last year, provide valuable information on the effects of aging on plutonium.

Nuclear explosives achieve the highest temperatures and pressures found in the solar system — hence the term "high-energy-density physics." Under these conditions, atoms are almost completely ionized and neutron radiation is so intense that higher-order nuclear processes become common.

Los Alamos scientists have gained their knowledge of such extreme conditions through theoretical calculations, laboratory experiments and nuclear tests. Without tests, the Lab uses complementary experimental capabilities that simulate various aspects of the high-energy-density regime.

The Lab's stewardship program is geared toward giving the scientists and engineers the tools they need to evaluate specific situations and select appropriate responses. "If we discover aging effects, like corrosion or gaps between components," said Lu Salazar, program manager for stockpile management, "we'll need to decide whether to requalify the weapon or recommend that the system be removed from the stockpile. The challenge will be to determine when those aging effects are of consequence, which changes require component refurbishment and which changes are acceptable without action."

In some instances, the best solution may be to repair or remanufacture certain components of the weapon. But questions arise: If the weapon must be remanufactured to correct a problem, are there modifications that will extend its lifetime? Can other potential problems be avoided by substituting safer or more reliable components? Or, since even a well-intentioned modification has the potential to introduce unforeseen problems, would it be best to do nothing at all?

The stockpile stewardship program is designed to enable Lab scientists and engineers to make these critical decisions based on complete, accurate scientific knowledge, while ensuring the credibility of the nuclear deterrent.

As NWT Director Steve Younger puts it, "Our job (as stockpile stewards) is to make sure that no one in the world doubts that the United States has the capability to project overwhelming force in the defense of our national interests."

DARHT. The Dual-Axis Radiographic HydroTest Facility will produce high-energy beams from two accelerators to create three-dimensional images of the behavior of materials under explosive conditions. The facility is expected to be operating in about five years.

The Stockpile Stewardship "Toolbox"

Ensuring that the nation's nuclear stockpile is safe, reliable and secure, without conducting underground tests, requires sophisticated experimental facilities to study aging effects, materials behavior, basic physics and engineering problems.

The primary facilities at which this work is performed by Laboratory researchers include the following:

PHERMEX (Pulsed High-Energy Machine Emitting X-rays) is a radiographic facility where an accelerator produces a beam of electrons that impacts a tungsten target, producing a burst of X-rays that is used to make images of the behavior of materials under explosive conditions.

DARHT (Dual-Axis Radiographic HydroTest) is an advanced X-ray radiographic facility that uses two accelerators at right angles to produce three-dimensional images of explosive conditions. Designed to be 10 times as effective as PHERMEX, DARHT is expected to be operational in about five years.

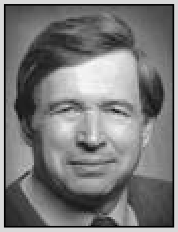
LANSCE (Los Alamos Neutron Science Center) at TA-53 produces powerful neutron and proton beams that are used for experiments in hydrodynamics, nondestructive surveillance, materials science, measuring nuclear processes and shock-wave phenomena.

Pegasus II (not an acronym) is a high-energy pulsed-power facility at TA-35 where a variety of weapons physics and basic science experiments are conducted. It builds up huge charges of electrical energy that are discharged into an experimental package to study hydrodynamic effects and material properties.

Atlas (also not an acronym) is a more powerful pulsed-power facility that is under construction. Expected to be operational in the year 2000, it will allow researchers to conduct hydrodynamic experiments at greater pressures and temperatures and help evaluate aging effects that may occur in stockpiled weapons.

NTS (Nevada Test Site) is the area where underground nuclear tests used to be conducted and where subcritical tests such as Rebound, which was conducted by the Laboratory last year, are now performed to study the effects of aging on nuclear materials.

Mezei becomes Laboratory's first John Wheatley Scholar


Ferenc Mezei

Ferenc Mezei of the Los Alamos Neutron Science Center has been named the Laboratory's first John Wheatley Scholar.

Mezei joined LANSCE in August but has been a Laboratory affiliate since 1984. The appointment is for two years.

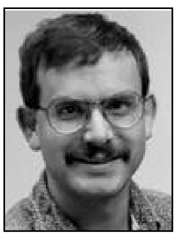
The appointment as a Wheatley Scholar recognizes outstanding achievements in condensed matter physics. It honors the memory of John Wheatley, a world renowned low-temperature experimental physicist who worked at the Lab from 1981 until his death in 1986.

Mezei's area of expertise is in neutron scattering. Mezei in 1972 invented the technique called neutron spin echo spectroscopy for which he received the Hewlett-Packard Europhysics Prize in 1986.

In 1976, he invented neutron supermirrors, thin film structures that enhance the reflection of neutrons on flat surfaces. While working at the Hahn-Meitner Institute in Berlin, in 1993, Mezei proposed the concept of long pulse spallation sources, a technique now explored at LANSCE.

Mezei earned his diploma in physics and doctoral degree, also in physics, from the Eotvos University in Budapest, Hungary.

Martz new leader of Enhanced Surveillance Project


Joe Martz

Joe Martz of the Nuclear Weapons Technology (NWT-PO) Program Office has been named leader for the Enhanced Surveillance Project. He replaces Ben Laake, also of NWT-PO, who currently is on a change-of-station assignment to the Pentagon.

The Enhanced Surveillance Project is the largest principal effort in material science in support of science-based stockpile stewardship. The objective is to develop tools, techniques and procedures to measure, analyze and predict the effect of aging on weapons materials, components and systems. The project also focuses on if or when these effects will impact weapon reliability, safety or performance.

Project efforts are integrated with similar efforts at Pantex, Allied Signal in Kansas City, Mo., and Savannah River, Oak Ridge, Lawrence Livermore and Sandia national laboratories. Of the approximately $60 million earmarked for enhanced surveillance this fiscal year, more than $10.6 million of the work is being conducted at Los Alamos.

Martz joined the Lab in 1983. During his career, he has conducted research on plutonium properties and surface chemistry and has made substantial contributions to Department of Energy plutonium storage policies. More recently, he played a leading role in integrating the weapons complex efforts related to plutonium aging.

Papazian named senior project leader for NTS activities


Raffi Papazian

Raffi Papazian of the Dynamic Experimentation (DX-DO) Division recently was named senior project leader for Nevada Test Site activities in the Above-ground Experiments/NTS Program. This is a joint appointment between the Nuclear Weapons and Technology (NWT) Program Office and DX Division.

Papazian will remain in DX and continue as test director and head of the test office. In his role as project leader, Papazian will be the primary contact between the Laboratory and the Department of Energy in Nevada. As one of the DX test directors, Papazian will fulfill the chain-of-command line organization responsibility required to formally authorize and conduct experiments at the Nevada Test Site.

Part of his new responsibilities include planning and executing the next series of subcritical experiments, hopefully at the rate of two per year per laboratory (Lawrence Livermore National Laboratory also is involved in subcritical experiments) at the site's Los Alamos-managed facility.

Papazian has been at the Lab since 1984. He holds a bachelor's degree in mechanical engineering from the University of Miami.

Busboom appointed director of security


Stan Busboom

Stan Busboom is the new director of security in the Laboratory's Facilities, Safeguards and Security (FSS) Division Office. Busboom replaces Larry Runge who retired earlier this year.

Busboom has been group leader for Security Systems (FSS-11) since last April when he came to the Laboratory from the U.S. Air Force in San Antonio.

He has a master's degree in public administration from Golden Gate University in San Francisco. His bachelor's degree also is in public administration from the University of Arizona in Tucson.

In his new position, Busboom is responsible for FSS' business results of all safeguards and security groups, Fire Protection (FSS-21) and Emergency Management and Response (FSS-20).

December and January service anniversaries

December
35 years
Floyd Archuleta, CIO
Loyola Salazar, ESH-OIO

30 years
Charlene Douglass, FSS-14
Raymond Garcia, DX-5
Leroy Miera, FSS-6
Mario Schillaci, ESH-12
Wayne Smith, DX-8
Donald Vance, CST-8

25 years
Edward Arthur, CIT-PO
Wanda Dunlop, CIC-6
Stephen Hodson, CIC-5
C. Thomas Klingner, CIC-7
Fred Montoya, NMT-2
Gary Russell, LANSCE-12
Ralph Vigil, ESA-WMM
Janet Zirkle, NMT-4

20 years
Carolyn Blossom, ESH-9
Edward Chapyak, X-NH
John Fox, ESH-DO
Charles Hatcher, NIS-5
Steven Limback, ESA-EPE
Robert Lopez, FSS-DO
Jake Martinez, NIS-18
Matthew Martinez, ESH-12
Archie Nixon, NMT-2
Eugene Peterson, CST-18
Wilfred Salazar, BUS-4
David Simons, NIS-RD
Nancy Tessmar, DX-1
David Villareal, ESA-WMM
Jeffrey Willis, MST-STC
Bradley Wright, NMT-8

15 years
Robert Calhoun Jr., DX-5
Randall Erickson, NMSM-SD
Belinda Haag, CIC-1
Abraham Kadish, EES-4
Roy Kierstead, FSS-11

10 years
Deann Caspersen, BUS-8
Kathryn Elsberry, NMT-6
Bobbie Harlow, ESA-TSE
Alan Keeler, ESH-1
Lori Kelley, CIC-6
G.F. Niederauer, TSA-10

5 years
Kevin Buescher, X-CM
Brandy Duran, CST-18
Loretta Fresquez, X-PA
Fawn Gore, LS-DO
Michael Jasperson, CST-12
John McDermon, CIC-2
Gary Velasquez, FSS-11
Karen Walterscheid, HR-2

January
30 years
Lorraine Silva, BUS-3

25 years
James Brewton, CIC-8
Charles Burns, LANSCE-6
Sandra Cata, FSS-9
Michael Cline, T-3
Mary Edgett, CIC-10
K.A. Firestone, DX-DO
Betty Jorgensen, MST-7
H. Ferman Kelso, NMT-4
Ronald Kirkpatrick, NIS-9
Bernabe Martinez, CIC-4
Margarita Martinez, HR-5
Jake Salazar, LANSCE-7
Gerald Streit, TSA-4
William Shanahan, X-PA
William Thompson, DIR

20 years
Johnny Anderson, CST-1
Yolanda Archuleta, ESA-WMM
James Barefield, CST-15
James Boyer, CST-4
Jo Ann Brown, T-1
Roger Ferenbaugh, EES-15
Dolores Gula, CIC-1
Ronald Hammond, NMT-5
Werner Hauschild, DX-5
Edmund Kettering, ESA-WMM
P.D. Kleinschmidt, NMT-5
Peter Ladelfe, NIS-2
Richard Lemler, NMT-5
Tien Keh Li, NIS-5
Consuelo Montoya, ESH-19
Lorraine Ortega, CIC-10
Arthur Romero, ESA-DE
Lourdes Thompson, CST-26
Douglas Tuggle, FSS-20
E. Alan Wadlinger, DX-6
William Wray, CST-4

15 years
Stephen Becker, X-TA
John Benage Jr., P-22
John Conwell, CIC-15
Gail Flower, CIC-1
Brian James, ESA-TSE
Richard Lauer, ESA-WMM
Comora Manzanares, HR-1
Monte Parker, TSA-4
Robert Robinson, LANSCE-12
Ronald Rodriguez, AA-3
Joseph Thompson, CST-7
Mitchell Trkula, MST-7
David Yeamans, CST-7

10 years
Lee Arellano, LANSCE-FM
Jeffrey Bloch, NIS-2
David Clark, NMT-DO
Fernando Garzon, MST-11
Karen Grace, NIS-4
Bruce Lamartine, MST-7
Jean Marshall, X-CI
Jeff Martinez, BUS-1
Lori Mullen, EM-SWO
Wilma Stout, NMT-4
Lawrence Ticknor, TSA-1

5 years
Diane Albert, GR
Lisa Apodaca, BUS-8
John Benner, ESA-EA
James Bland, ESH-12
Stephen Boerigter, TSA-7
George Erickson, LANSCE-9
Loren Hatler, X-NH
Robert Farris, FSS-21
Robin Justice, FSS-21
Frank Krawczyk, LANSCE-1
Monica Lucero, BUS-7
Susan Martin, ESH-5
Gordon Medford, CST-26
Arthur Nobile Jr., ESA-TSE
Sidney Pinkston, FSS-21
John Quagliano, CST-3
Paul Schumann, ESH-19
Robert Tonelli, AA-3
Rajendra Vaidya, MST-6
B.J. Van der Hoeven, FSS-DO
Terri Villareal, BUS-7

In Memoriam

Charles Cotter

Laboratory employee Charles Cotter died Dec. 18 in Albuquerque after a short illness. He was 59 years old. Cotter, a former science teacher in the Los Alamos Public Schools, worked at Environmental Waste Management (CST-7) since 1994 as a research chemistry lab technician. Born in Sulphur, Okla., Cotter earned his bachelor's degree in education in 1961 from East Central University in Ada, Okla. He also earned an associate of science degree in agriculture in 1958 from Murray Junior College in Tishomingo, Okla. Cotter became a casual employee at the Lab in 1967 as an accelerator specialist. He later became an experimental facility equipment operator. Cotter served in the U.S. Army Reserve and the National Guard and was a member of the American Chemical Society.

Virginia Ione Lindsey Johnson

Laboratory retiree Virginia Ione Lindsey Johnson died Oct. 26 in Socorro, N.M. She was 87. A 1928 graduate of Morton High School in Richmond, Ind., Johnson joined the Laboratory in 1948 in its health research organization. She held numerous positions at the Lab before retiring in 1969, including switchboard operator, clerk typist and counting technician.

Ira Leffler

Lab retiree Ira Leffler, 77, died Nov. 10 after a brief illness. Leffler received his bachelor's and master's degrees in chemistry from Wichita State University. In 1963, he came to Los Alamos, where he performed high-temperature materials and X-ray analysis and evaluations of all field service materials. He worked in groups such as Materials (N-1) and Maintenance (ENG-4). Leffler retired in 1982. He was a member of the American Chemical Society and the Mineralogical Society.

Alvin "Ace" Lyle

Laboratory retiree Alvin "Ace" Lyle died Oct. 19 from complications brought on by Parkinson's Disease. He was 79. The former U.S. Navy captain and aviator received his bachelor's degree in mechanical engineering from the University of Texas, Austin, and his master's degree in nuclear engineering from the University of New Mexico. He came to Los Alamos in 1954 as a mechanical engineer working in the GMX Division. He also worked as a project engineer in the Engineering (ENG) Division, as an experimental engineer in the Nuclear Rocket Propulsion (N) Division and as a supervisor for the Omega West Reactor. In 1972, Lyle served a two-year assignment with the Atomic Energy Commission as an environmental project manager. In addition, he helped organize and develop the Los Alamos Graduate Center at UNM/Los Alamos. Lyle retired in 1985.

Phyllis Martell

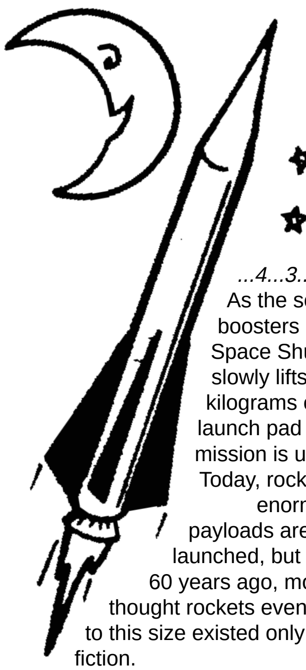
Laboratory employee Phyllis Martell died from injuries received in an automobile accident Dec. 22 near El Rancho. She was 58. Martell, a writer/editor, worked in Communication Arts and Services (CIC-1). She had been a Laboratory employee since 1984. She joined the former Technical Writing and Editing (IS-11) Group in 1987.

Hugh "Pete" Murray

Hugh "Pete" Murray died Dec. 30 in Santa Fe after a lengthy illness. He was 58. Murray joined the Laboratory in 1965 as a staff member in the former Engineering (E) Division, left in 1969 and returned four years later. At the time of his death, Murray was a project leader in Space Engineering (NIS-4) where he worked on numerous projects including the Laboratory's Fast On-orbit Recording of Transient Events, or FORTE, project that launched last summer. He also worked on NIS-4's signal processing team and was the project leader for the Satellite Attack Warning System project. Murray earned his bachelor's degree in mechanical engineering from Carnegie Mellon University in 1961 and his doctoral degree in nuclear engineering from the University of Arizona in 1965.

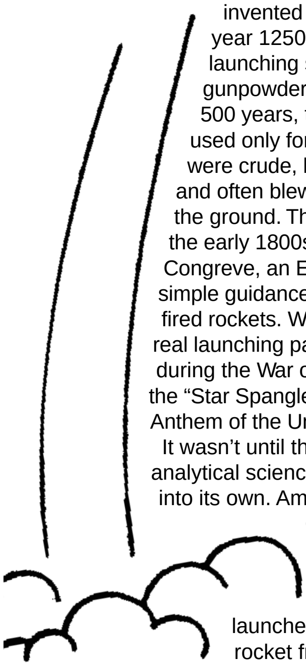
Seltzer tablet rocket

"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.



...4...3...2...1...liftoff! As the solid rocket boosters kick in, the Space Shuttle Atlantis slowly lifts its 2 million kilograms off the launch pad and another mission is under way. Today, rockets with enormous payloads are commonly launched, but less than 60 years ago, most people thought rockets even close to this size existed only in science fiction.

Historians aren't quite sure who invented the first rocket, but by the year 1250 AD, Chinese warriors were launching simple bombs using gunpowder for propulsion. For over 500 years, these simple rockets were used only for military purposes. They were crude, had no steering mechanism, and often blew up before they even got off the ground. Things started to improve in the early 1800s, however, when William Congreve, an English scientist, added a simple guidance system to his gunpowder fired rockets. With the addition of the first real launching pad, his "rockets' red glare" during the War of 1812 was made famous in the "Star Spangled Banner," the National Anthem of the United States.



It wasn't until the early 1900s that the analytical science of rocketry really came into its own. American scientist Robert Goddard studied how much thrust could be obtained from a variety of different fuels. In 1926, he launched the first liquid-fueled rocket from his aunt's farm in Massachusetts, and the space age began.

All rockets operate on the same basic principles of propulsion. In this activity, you will construct a rocket that is fueled by a seltzer tablet. You will observe what types of chemical changes happen to give it boost.

The stuff you'll need

- a small plastic film can
- an empty 16 ounce plastic soda bottle
- a round balloon
- measuring cups
- 4 seltzer tablets
- water
- measuring spoons

diagram 1

Here's the plan

1. Pour a tablespoon of water into a film can.

2. Drop a 1/2 seltzer tablet into the water. What happened when you dropped the tablet in the water? What did you hear and see? Place your palm over the top of the can, what do you feel?

3. Break up two seltzer tablets and place them into the soda bottle.

4. Pour 1/4 cup of water into the bottle and quickly put the opening of the balloon over the top of the bottle (diagram 1). Swish the contents of the bottle around several times and observe what happens to the balloon.

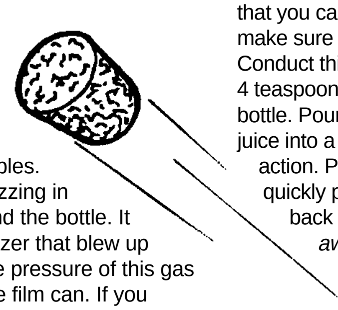
5. Pour the water and seltzer in the film can down the drain.

6. Pour another tablespoon of water into the film can and drop in another 1/2 tablet.

7. Snap the lid on tight, and stand back! Observe what happens.

8. What happened to the balloon when you placed it over the top of the bottle? Why do you think this happened? What happened to the lid of the film can? Why do you think it happened? What do you think would happen if you punched a small hole in the film can lid with a pin?

Wrap-up



When you added the seltzer tablets to water, a chemical reaction took place producing gas bubbles. You could hear the gas fizzing in both the open film can and the bottle. It was the gas from the seltzer that blew up the balloon and it was the pressure of this gas that popped the top of the film can. If you punched a hole in the lid of the film can, the gas would escape through the hole instead of blowing off the lid.

What's going on here?

When a seltzer tablet dissolves in water, a chemical change takes place and carbon dioxide gas (CO_2) is formed. Most seltzer tablets contain a base called sodium bicarbonate (baking soda) and dehydrated citric acid. When the tablet is dropped in the water, the citric acid combines with the baking soda. Acids and bases undergo a chemical reaction when they mix, producing a gas and salt.

In the closed can the newly created gas has no place to go, since the film can is already full of air. This is like trying to add more air to a balloon that is already full. The pressure inside the film can eventually blows the lid off.

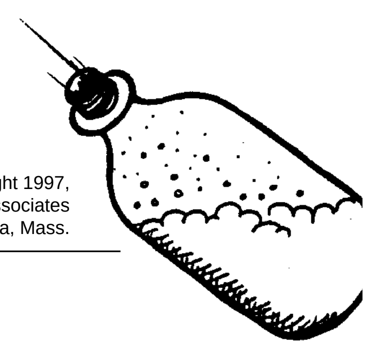
This is the same thing that happens when you open a can of soda. You notice the fizz that it makes. The carbon dioxide rushes out, making a whoosh sound.

Where does this happen in real life?

Carbon dioxide is used in many products, from fire extinguishers to soda pop, and it is the by-product of many different chemical reactions including the burning of things like wood, paper, coal and oil. When bakers make bread, they add yeast to the dough. Yeast is living organisms that feed on the sugar in the dough, converting it to energy and carbon dioxide. As the carbon dioxide tries to escape, it pushes the dough up making it fluffy. We say the dough rises, but it's really getting pumped up by the carbon dioxide gas. Yeast takes a while to get going, so to get a quick rise out of the bread or cake, bakers use baking powder. It has the same effect as yeast, but it works in a fraction of the time.

Now try this

Your film can rocket makes a pleasant pop, but if you want to move up to the big time blasters, you'll need an empty plastic soda bottle (1 liter is best but 2 liters will work), a cork, some baking soda, and either vinegar or lemon juice. Before starting, make sure the bottle is clean and dry, and make sure the cork fits snugly in the bottle opening, but loosely enough that you can pull it out with your fingers. Also, make sure you use a cork and not a screw top. Conduct this experiment outdoors. Place about 4 teaspoons of baking soda in the bottom of the bottle. Pour 1/2 cup of either vinegar or lemon juice into a cup with a spout and get ready for action. Pour the liquid into the bottle and quickly put the cork in and shake the bottle back and forth several times. *Aim the cork away from people and breakable items.* It will fly out with considerable force!



This month in history

February

1540 — An expedition led by Francisco Vasquez de Coronado begins a two-year journey across the Southwest searching for gold

1848 — The war between Mexico and the U.S. ends with the signing of the Treaty of Guadalupe Hidalgo, by which Mexico cedes large parts of the Southwest

1873 — The University of California establishes a medical school in San Francisco

1946 — University of Pennsylvania researchers build ENIAC, the first general-purpose electronic digital computer

1954 — The Bevatron proton accelerator begins operation at Lawrence Berkeley Laboratory

1959 — Criticality is achieved at LAPRE II, a Laboratory reactor designed to produce 1,000 kilowatts of heat

1960 — The first nuclear test by France is conducted in the Sahara Desert

1966 — The Russian Luna 9 spacecraft makes the first moon landing

1978 — The first shipment of plutonium arrives at the Lab's new state-of-the-art processing facility at TA-55

1984 — The Lab's Wellness Center officially opens

1992 — Russian lab directors Belugin and Nechai visit Los Alamos and Lawrence Livermore national labs; U.S. lab directors Sig Hecker and John Nuckolls return the visit later the same month

1995 — New Mexico Gov. Gary Johnson and 12 tribes sign compacts allowing the tribes to offer casino gambling

Syndicated material

Removed at the request of the syndicate

December solution

S	N	O	W		R	O	B		A	U	L	D
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spotlight

Powerlifter overcomes long odds

by Ternel N. Martinez

David Bracken of Safeguard Science and Technology (NIS-5) works on his deadlift at the Iron Pit Gym in Bloomington, Ind. Here he is using the "sumo style" for lifting, with his legs situated outside of his arms. *Photo courtesy of Bracken*

David Bracken of Safeguard Science and Technology (NIS-5) still can remember when as a 95-pound high school freshman, he used to be picked on by bigger students. Not one to back down then, Bracken got into a lot of fights in high school.

Fast-forward to the present. His fighting days are long since over. He has put on considerably more weight since his high school days (he now weighs about 160), although at five-foot, four inches tall, he still doesn't strike an imposing figure. His build, though, hides the strength he possesses.

One would never guess, for example, that Bracken is capable of squatting 500 pounds, bench pressing 300 pounds or dead lifting 505 pounds. In other words, one would never guess that he is a powerlifter.

Powerlifting is an offshoot of weightlifting that emphasizes sheer strength over form. A competition consists of three events. The bench press lift is done from a prone position and demonstrates upper-body strength. The squat, or deep-knee bend lift, demonstrates leg power. In the two-handed dead lift, the person raises the weight from the ground to hip level in one movement, displaying low-back and gripping power.

A powerlifter gets three chances at each type of lift during competition; the best weight amount lifted for each makes up the total weight score. Strict technical requirements must be met.

"I try to take a scientific approach to this sport. I do not have natural ability, I've just worked very hard at it," said Bracken, who is a member of the American Drug-free Powerlifting Association. He currently is categorized as an elite powerlifter. His personal best for a single meet is 1,285 pounds (squat, bench press and dead lift totals added together), which he did during a competition last March.

One of the things that Bracken tries to do at each meet is better his totals from the meet before. "As long as I can improve my total from meet to meet, I'm happy," said Bracken.

But this story is not so much about his powerlifting career, impressive as it is, than it is about overcoming seemingly impossible odds, refusing to give up and continuing to compete — successfully — in powerlifting meets. In reality, Bracken's powerlifting career could have ended almost as soon as it began.

In March 1985, Bracken took top honors for his weight class in his first competition. Six months later, he was diagnosed with Chron's Disease, an incurable, chronic inflammatory disease that can affect any part of the gastrointestinal tract, but most commonly the end of the small intestine.

Chron's Disease can cause abdominal pain, fever, loss of weight and strength, and other problems. The cause is unknown. Some people fortunately have long periods of remission, sometimes for years. Unfortunately, there is no way to predict when a remission may occur or when symptoms will return.

The disease knocked Bracken out of competition for several years. "Back then, I was able to squat about 370 pounds," he said. "When the disease hit me, I couldn't even squat 225 pounds." Bracken takes medication for the disease, and for the most part it is under control, although last year he suffered a bleeding colon caused by the ailment. Ironically, Bracken never has suffered a major sport-related injury.

Bracken eventually regained most of his strength, and more than seven years after his first competition, he placed second in the Omni 41 ADFPA Classic held in Merrillville, Ind.

But then graduate studies further hampered Bracken's powerlifting activities for a while. It wasn't until about two years ago that he again was able to seriously compete, entering the ADFPA Kentucky State/Bluegrass Open Power Lifting and Bench Press Championships and placing third.

Bracken's ultimate goal is to reach international elite status, meaning his three lifts total 1,345 pounds. Doing so also would break the state record for total weight for his weight class, currently standing at 1,325 pounds. One can only imagine how much further along Bracken might have been in his powerlifting career had he not contracted Chron's Disease.

Reflections
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