For the Seventh Generation

Environment, Safety, and Health at Los Alamos National Laboratory: A Report to Our Communities

1998–1999, Volume III

LALP-99-174
October 1999

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The Environment, Safety, and Health Division sponsors the production of this document.

Dennis Erickson, Director

J. Lee McAtee, Deputy Director

On the cover:
Three generations of the Fresquez family with baskets of produce grown in the family's garden in the Española Valley, New Mexico.

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Members of the production team for this edition of "For the Seventh Generation" dedicate their work to the memory of their friend and colleague, Louisa Lujan-Pacheco (1968–1999).

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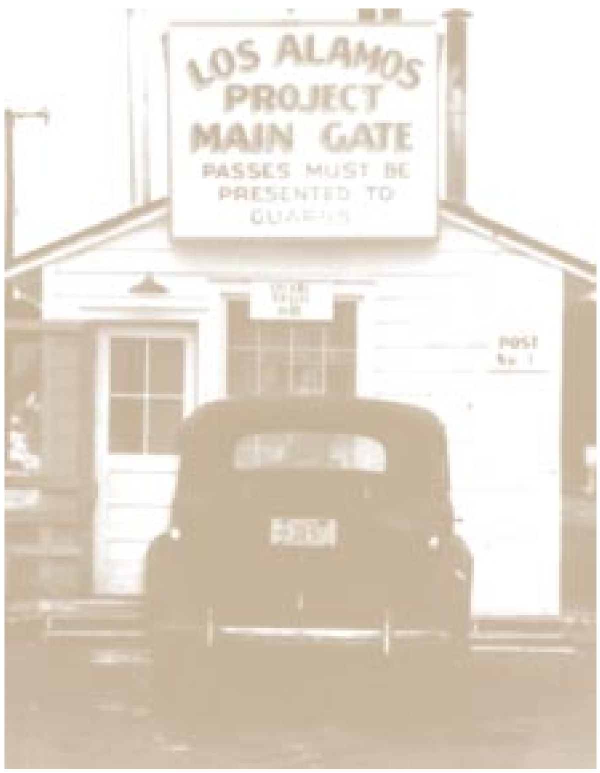
The previous reports in this unclassified series are LALP-97-147 and LALP-98-101.

For the Seventh Generation

And each generation was to raise its chiefs and look out
for the welfare of the seventh generation to come.
—The Great Law of the Iroquois Confederacy

Secrecy and urgency surrounded the creation of the world's first nuclear weapon. Almost overnight a quiet and remote boys' school in northern New Mexico, a place of pristine nature, became a nuclear weapons facility. And although not intentionally, scientists—in their haste to build a weapon to end World War II—began contaminating the beautiful Pajarito Plateau.



Soon after the Manhattan Project ended, as scientists increased their knowledge of the materials they were working with, Los Alamos National Laboratory began to monitor its environmental impact. Long before Congress created the Environmental Protection Agency, the Laboratory was collecting environmental data. Today, Laboratory operations must comply with state and federal environmental regulations. More importantly the laboratory must be increasingly governed by an environmental ethic that goes beyond compliance to stewardship.

Similarly, we are an institution that has always valued all who contribute to our missions—people of many different vocations that have to face many different kinds of challenges as they work. Over the years, we have learned—sometimes through unfortunate and even tragic accidents—to examine our thinking, to improve our practices, and to improve our record in safety and health. When a series of accidents happened several years ago, the Laboratory responded by putting in place a system of integrated safety management. Our new approach puts safety first at all levels of our operations for the benefit of our workers, our environment, and our public.

This year's progress report tells how we are dealing with past, present, and future environment, safety, and health concerns. We begin with the story of Laboratory environmental monitoring on the historic Pajarito Plateau and wind up with articles about our newest facilities. In concluding this report, Director John Browne shares his view of the direction our Laboratory is taking as we head into the new millennium.

1998–1999 ES&H Highlights

For the past 56 years, the Laboratory's progress in environment, safety, and health has played against a backdrop of national events and scientific accomplishment. The timeline below records some of these important events. This year's highlights in environment, safety, and health illustrate that we continue to pursue a path toward environmental excellence.

Waste Isolation Pilot Plant (WIPP) receives first Laboratory waste

On March 26, 1999, an inaugural load of radioactive waste arrived at WIPP, heralding the opening of the nation's first permanent nuclear waste repository.

"This shipment represents the beginning of fulfilling the long-overdue promise to all Americans to safely clean up the nation's Cold War legacy of nuclear waste and protect the generations to come."

—Bill Richardson, Secretary, US Department of Energy

Site-Wide Environmental Impact Statement approved

It has taken five years, but we now have a complete study of the Laboratory's effect on ecosystems within our site boundaries. We can use this information to help us make decisions regarding the Laboratory's operations.

"The Site-Wide Environmental Impact Statement serves as our baseline understanding of what the Lab is, what we do here, and what the environmental impacts are."

—Corey Cruz, Environmental Impact Statement Project Office, Department of Energy Albuquerque Office

Threatened and Endangered Species Habitat Management Plan completed

This plan—three years in the making—for proactive management of our Laboratory's natural environments will help protect the habitats of threatened and endangered species present on our Laboratory's site.

"This plan is cutting edge, being the first such study ever prepared for any Department of Energy site, and it is the first such study to incorporate scientific analyses such as ecological risk assessment."

—Diana Webb, Ecology Group Leader, Los Alamos National Laboratory

Till Audit results reported

Two years ago, as part of a consent decree between the Department of Energy, the Laboratory, and Concerned Citizens for Nuclear Safety, the court ordered an audit of our radioactive air emissions program. John Till of Radiological Assessments Corporation conducted the independent audit.

"This was a very unusual compliance audit and perhaps the most rigorous air emissions audit to take place at a DOE facility. As we agreed, the audit went well beyond what the law requires for environmental compliance It went well beyond what is required by our regulators. We have learned a great deal."

—Dennis Erickson, Director, Environment, Safety, and Health Division, Los Alamos National Laboratory

Legacy Materials Work-Off project successful

We identified and safely disposed of over 20,000 legacy materials—hazardous materials that no longer had an owner or served a program.

"The Legacy Materials Work-Off project, serving as the remedial plan for correcting past deficiencies, will ensure that the Laboratory has eliminated all unusable or unknown chemicals from our inventory."

—Jim Jackson, former Deputy Director, Los Alamos National Laboratory

Number of work-related injuries and illnesses decreases

By practicing safety first and implementing the principles of integrated safety management, the Laboratory has experienced significant reductions—25% and 40%—in the numbers of work-related accidents and in lost workday cases reported this year.

"When I look at these improvement rates, I don't see just numbers, I see real people—our workers and their families—who went through the year without sustaining any of the hardships that work-related injuries or illnesses can bring."

—Lee McAtee, Deputy Director, Environment, Safety, and Health Division, Los Alamos National Laboratory

Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility opens

After complying with rigorous environmental analysis under the National Environmental Policy Act, the Laboratory operates the first of DARHT's two x-ray systems. We can now perform nonnuclear experiments to measure the many complex, dynamic aspects of a nuclear weapon during its implosion phase.

"Successful completion of the first phase of DARHT not only provides the country with the finest flash x-ray system in the world and one which begins to address the tough requirements of Stockpile Stewardship, but it also demonstrates the Laboratory's ability to complete a complex technical project when we apply our best efforts."

—Mike Burns, DARHT Project Leader, Los Alamos National Laboratory

1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000

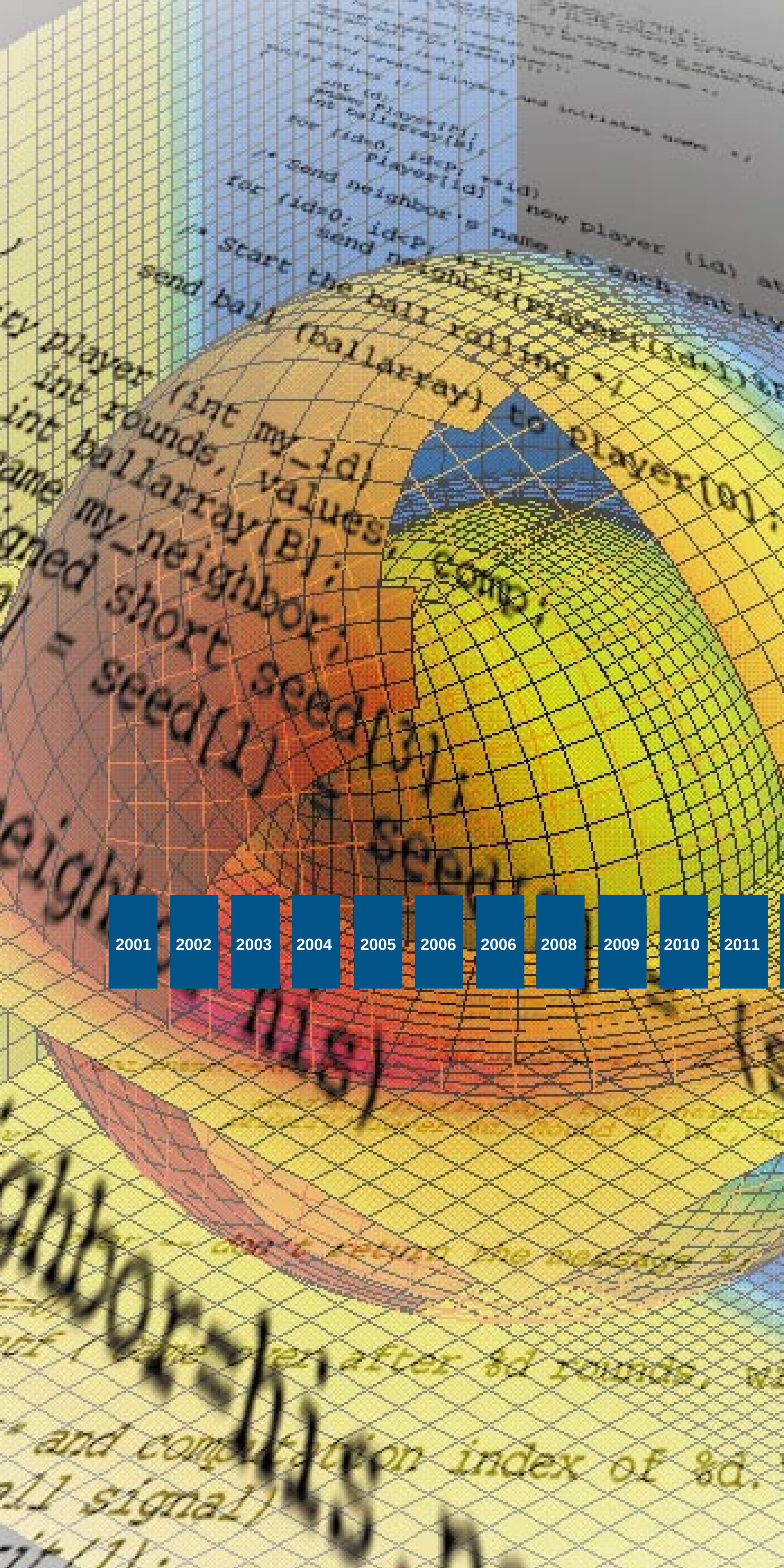
- 1943: University of California (UC) chosen to operate Los Alamos Laboratory (Project Y) for the US Army Corps of Engineers (Manhattan District)
- 1944: First uranium reactor ("water boiler") achieves full power
- 1945: First atomic weapons test July 1945 | Germany surrenders May 1945 | Bombs dropped on Japan August 1945 | Japan surrenders September 1945
- 1946: First military test of nuclear weapon (Bikini)
- 1947: Los Alamos Laboratory name changes to Los Alamos Scientific Laboratory | First remote-controlled critical assembly facility is built at Pajarito Site | Atomic Energy Commission replaces US Army Corps of Engineers
- 1949: Clementine, first plutonium reactor, achieves full power
- 1950: President Truman orders development of hydrogen bomb | Korean War begins
- 1952: Operation Ivy First hydrogen bomb is successfully tested
- 1953: Laboratory moves from original site around Ashley Pond to present site
- 1955: Rover rocket program is launched
- 1957: Security gates come down, opening Los Alamos to the world | US sets off first underground test in Nevada desert | Soviet Union launches Sputnik
- 1959: Nonproliferation technology started
- 1961: Berlin wall is erected
- 1963: US and Soviet Union sign Limited Test Ban Treaty
- 1964: World's largest tandem Van de Graaff accelerator begins operation
- 1965: First US combat troops are sent to Vietnam
- 1969: Neil Armstrong is first man on moon
- 1972: Los Alamos Meson Physics Facility is dedicated and begins full operations
- 1973: Peace treaty ending the Vietnam War is signed
- 1974: Energy Research and Development Administration replaces Atomic Energy Commission
- 1977: Department of Energy replaces Energy Research and Development Administration
- 1978: Plutonium processing facility becomes operational
- 1980: Hot Dry Rock program produces electricity
- 1981: Los Alamos Scientific Laboratory name changes to Los Alamos National Laboratory
- 1983: Antares laser fusion facility is operational
- 1985: Soviet Union announces a nuclear testing moratorium
- 1989: Los Alamos Neutron Scattering Center is dedicated | BEAR Project neutral particle beam is successfully tested in space | Berlin wall is torn down
- 1992: US nuclear testing moratorium is announced | Exchange visits of US and Russian Laboratory Directors take place.
- 1993: Los Alamos scientists visit the closed Russian city of Arzamas-16
- 1998: Blue Mountain, the world's fastest computer, operates at 1.6 teraflops
- 1999: The first shipment of Los Alamos National Laboratory waste is sent to the Carlsbad Waste Isolation Pilot Plant | The Dual-Axis Radiographic Hydrodynamic Test facility operates its first axis

Presidents: Franklin D. Roosevelt | Harry S Truman | Dwight D. Eisenhower | John F. Kennedy | Lyndon B. Johnson | Richard M. Nixon | Gerald Ford | Jimmy Carter | Ronald Reagan | George Bush | Bill Clinton

Robert Thorn (Acting) 3/79 - 7/79

Robert Thorn (Acting)10/85 - 12/85

Laboratory Directors: J. Robert Oppenhemer | Norris E. Bradbury | Harold Agnew | Donald Kerr | Siegfried S. Hecker | John C. Browne



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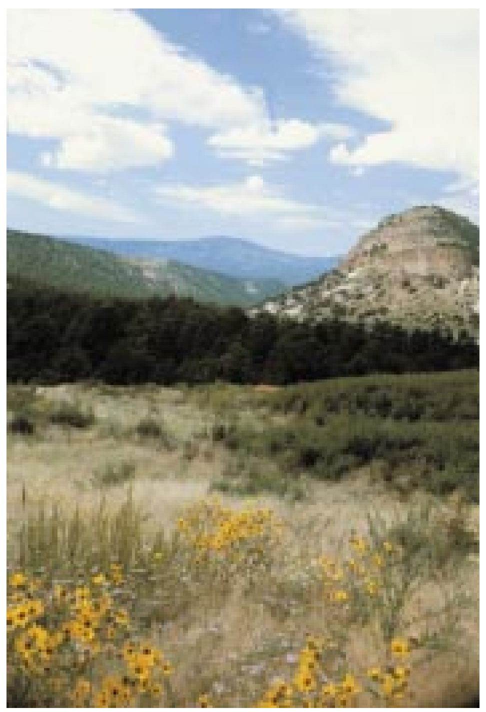
The Land Ethic and Environmental Monitoring

A land ethic of course cannot prevent the alteration, management, and use of these ‘resources,’ but it does affirm their right to continued existence, and, at least in spots, their continued existence in a natural state.
—Aldo Leopold, conservationist (1887–1948)

Aldo Leopold was a renowned scientist and scholar, whom some believe is the father of environmental stewardship. Leopold hunted from an early age and this, along with his extraordinary powers of observation, eventually led him to an intimate understanding of the natural world and how his actions had an effect upon it. He developed what he called the land ethic, which in his words “simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively, the land.”



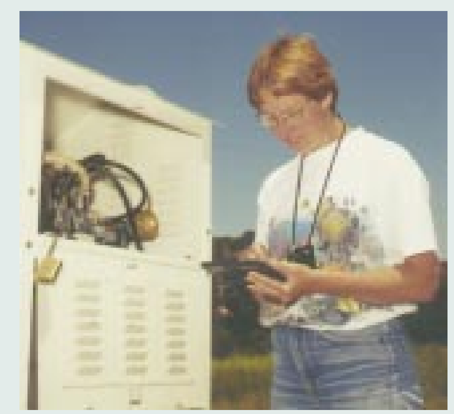
At Los Alamos National Laboratory, the Environmental Monitoring Program is based on a land ethic. This strong program keeps tabs on the air, soil, water, locally grown food, and regional wildlife and plant life (called biota). These five parts of the program help create the big picture of the Laboratory’s effect on environmental health and safety.

Each year, our scientists and technicians complete exhaustive sampling within Laboratory boundaries, near our fence line, and in the surrounding region (up to 50 miles away). This past year we also collaborated in sampling projects with our tribal neighbors and the New Mexico Environment Department.

The environmental data collected over the past 30 years identify trends that fill in the details of the big picture. What we are finding from our soils and foodstuffs sampling is a significant decrease in the presence of radionuclides over time—in fact, just off of our property we find indistinguishable levels. In our analysis of fish for radionuclides downstream from the Laboratory, we observe no upward trends. Although bees and honey from most Laboratory hives, including those near our fence line, have shown the radionuclide tritium in significantly higher amounts than those found just off our property over time, these amounts have been decreasing. We have also observed that as we apply more engineering controls to our operations, we can reduce our impact on the environment. Consequently, we have limited the migration of radionuclides from our Radioactive Liquid Waste Treatment Facility and have been reducing our radioactive air emissions.

During 1998, we sampled over 600 locations and performed over 250,000 analyses for chemical and radiochemical constituents on more than 12,000 environmental samples. We collected and analyzed these samples, calculated potential radiation exposure to the public, and published the findings in the annual report, *Environmental Surveillance at Los Alamos*, which is available in our public reading rooms in northern New Mexico, from the Laboratory’s Community Relations Office, and from the Los Alamos University of California office. You will also find some of the results of our environmental monitoring in “On the Road to Excellence,” the next article in this publication.

The Big Picture



At the Fresquez family garden— David Lujan and Pete and Christian Fresquez (top) collect food samples for analysis. In the Foodstuffs and Biota Monitoring Program, scientists study what humans eat, including native edibles like elk, deer, fish, and piñon nuts. Our scientists also examine biota to understand the effects Laboratory operations may have on the natural food chain and to make sure that our local wildlife is not ingesting harmful constituents.

Alice Baumann checks data— (center, left) from a station that collects samples of particulate matter from the air and water vapor samples. As part of our Air Monitoring Program, we test for airborne radionuclide levels. This program has an air-monitoring network with 50 stations—some as far away as Santa Fe, Española, Pojoaque, Taos Pueblo, and Jemez Pueblo.

Louis Naranjo, Jr., collects soils— (center, right) within Laboratory boundaries, around its perimeter, and from locations miles away. As part of the Soil Monitoring Program, these samples will be analyzed for radionuclides, radioactivity, and heavy metals. Analysis of soil samples is an important indicator of the effects of our operations on the human food chain.

On the banks of the Rio Grande— David Rogers and Max Maes (bottom) are collecting samples of surface water, groundwater, and sediments. As part of our Water Monitoring Program, we have a sampling station network for surface water and sediments. We also have a growing network of monitoring wells (see article on our hydrogeologic workplan) that gives access to the different levels of groundwater on the Pajarito Plateau.

On the Road to Excellence

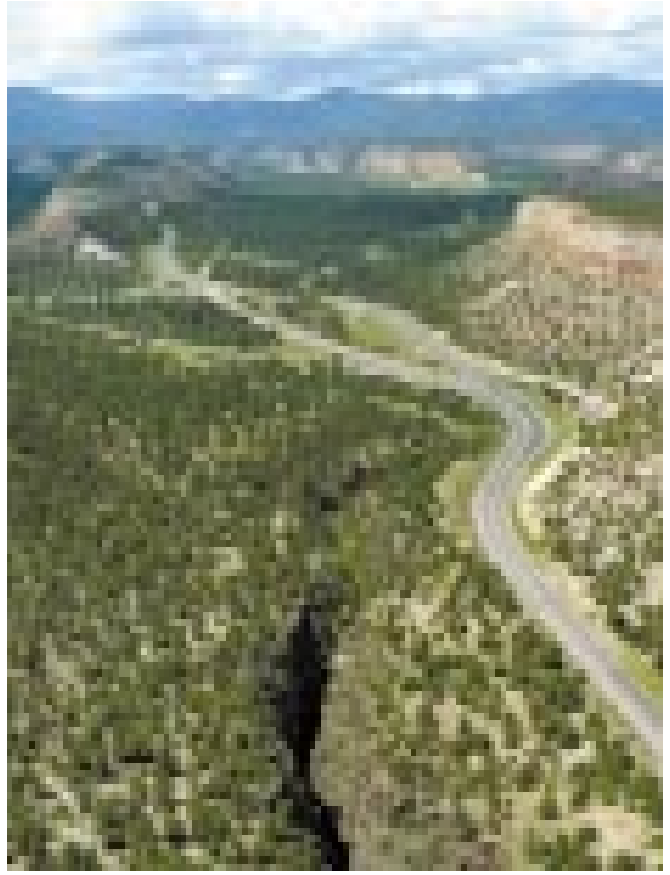
We were to understand the principles of living together.
— Great Law of the Iroquois Confederacy

Almost everyone who cares about their work wants to know at some point, "How am I doing?" The Laboratory is no different.

The question of how we are doing in our environment, safety, and health operations is answered in continuous effort with the Department of Energy and the University of California that measures our performance against mutually agreed-upon goals. In this process, we must also respond to the laws and regulations set by Congress, such as the Clean Air Act, by federal agencies such as the Environmental Protection Agency, and by state agencies such as the New Mexico Environment Department. Ultimately, we will know we are doing the right thing when we have earned respect from our communities for the integrity of our efforts, the excellence of our operations, and the honesty of our communications.

Each year the Laboratory, Department, and University set environment, safety, and health targets that represent outstanding achievement and move us toward Director John Browne's goals for the Laboratory (see Director Browne's letter at the end of this report). We know the targets we set are not easy to achieve. However, we cannot overstate the importance we give to achieving them, because success involves nothing less than the health and safety of our workers, the environment, and the public.

Our environment, safety, and health performance is measured by setting targets. The results are then rated to determine if we are good, excellent, or outstanding. Each target is built of many factors—some of which count more than others—that we place into complex formulas to help us determine if we have hit the target. Naturally, when we choose challenging targets and seek to be out-



standing, we also risk not achieving that target. One example during the year we are reporting—the University's 1998 fiscal year—concerns the reduction of hazardous waste. While our target was 16%, we achieved only a 10% reduction.

The performance measures and their targets as shown on the next two pages of this environment, safety, and health community progress report are those we believe are of most interest to the public. For more detailed information about the Laboratory's environmental record, refer to our annual report, *Environmental Surveillance at Los Alamos*, which is available online at *http://lib-www.lanl.gov/pubs/la-13487.htm* and from our community reading rooms and outreach centers.

Injury and illness record

The Occupational Safety and Health Act tells us which work-related injuries and illnesses are to be recorded; related to these are lost-workday cases—each case represents a work-related injury or illness that results in lost work time.

Target #1—20% decrease in total recordable work-related injuries and illnesses

Performance—25% decrease in total recordable work-related injuries and illnesses

Target #2—28% decrease in lost-workday cases

Performance—40% decrease in lost-workday cases

We continue to show dramatic improvements in worker safety and health and strive for the ultimate target of zero work-related injuries or illnesses on the job.

Environmental performance

The Laboratory must comply with environmental laws and regulations that apply to Laboratory operations.

Target—100%

Performance—82%

Although some violations occurred of the Laboratory's Resource Conservation and Recovery Act Operating Permit and the National Pollutant Discharge Elimination System Permit, no environmental harm was caused by any of these. Some violations were administrative, such as containers insufficiently labeled or an emission stack not monitored on schedule. Others had to do with maintenance and repair and did not result in any environmental harm—for example, a leak in a potable water system.

Waste minimization

The Department of Energy determines these targets and applies them to all the facilities it operates across the country.

Target #1—16% reduction in generation of low-level and mixed low-level waste

Performance—15% reduction in generation of low-level and mixed low-level waste

Target #2—16% reduction in generation of hazardous waste

Performance—10% reduction in generation of hazardous waste

The Laboratory reduced waste in several ways—increased recycling, decreased generation, and use of alternative materials, to mention a few. One-time disposal projects, such as the Legacy Work-Off Project, prevented our achieving a higher rating in reducing hazardous waste. We are continuing to scrutinize waste minimization activities and processes so we can identify and implement other ways to reduce waste.

Sanitary waste recycling and reduction

Reduce the total amount of routine, sanitary waste so that less is generated than in the previous year. Recycle as much as we can.

Target #1—Decrease sanitary waste generation by more than 5%

Performance—Sanitary waste generation was at a maintenance level

Target #2—Increase proportion of sanitary waste recycled to more than 80%

Performance—84% of sanitary waste recycled

Several one-time measures—for example, recycling metals from clean-out projects and hand-sorting trash from dumpsters—helped the Laboratory achieve this rating. If we plan to meet future goals, we will need more such efforts. One idea under consideration is to improve our waste reduction effort by consolidating waste streams and directing them to a recycling facility.

Radiation protection of the public

The results from data on human exposures to radiation sources from releases of Laboratory radioactive material into the environment.

Target #1—Releases of radioactive material will not lead to human radiation exposures over 100 millirem for the year—the Department of Energy standard for all pathways (ingestion, inhalation, etc.)

Performance—6.1 millirem

Target #2—Releases of radioactive material will not lead to human radiation exposure over 10 millirem for the year—the Environmental Protection Agency standard for the air pathway (inhalation)

Performance—3.5 millirem

This measure looks at all areas of radiation exposures to the public and radiation surveillance at our Laboratory. Data from air-monitoring stations indicate a very low level of Laboratory-produced radioactive air emissions. The figures describe safe dose limits above naturally occurring radiation—radon, cosmic radiation, terrestrial radiation, and radiation generated internally.

Radiation protection of workers

Doses resulting from radiation intakes by our workers, who are carefully monitored.

Target #1—No individual worker's radiation dose exceeds the federal legal limit of 5 rem for a calendar year, and no worker receives a single radiation dose greater than the Department of Energy target of 2 rem

Performance—No individual worker's radiation dose exceeded the federal legal radiation dose limit of 5 rem for a calendar year, but **o**ne worker exceeded the single radiation dose greater than the Department of Energy target of 2 rem

When a worker exceeds a dose target, as in the case mentioned above, that worker will be further monitored and managed so that any subsequent doses will not exceed the yearly limit.

From the Desk of Howard Hatayama

Howard Hatayama— Director of Environment, Safety and Health for the University of California, Office of the President, Laboratory Administration Office

A professional with 18 years in the environmental field, Hatayama worked for the California Environmental Protection Agency, as well as various international organizations before coming to the University. Hatayama is a registered professional engineer. He holds a bachelor of science degree in chemistry from Claremont McKenna College and a master of science degree in sanitary engineering from the University of California at Berkeley.

For over six years, I have worked in the Office of the President of the University of California to administer the environment, safety, and health aspects of the University's contracts to run the three national laboratories—Los Alamos and her two sister laboratories, Lawrence Livermore and Lawrence Berkeley. My job is to provide the University's oversight of environment, safety, and health performance of the laboratories.

The University has a long-standing reputation for excellence in higher education and for research and development. Our laboratories are recognized as excellent research and development institutions, and we are seeking the same level of performance in protecting the safety and health of our workers, our environment, and the public. In fact, as a public institution, we feel that this is an essential part of our responsibility for maintaining the public trust. In more specific terms, we see that the mission of our laboratories is to carry out research and development while preventing harm to our employees and to our communities, preventing pollution, and restoring the environment around our laboratories. We believe we are succeeding at Los Alamos as we look at reduced work-related illness and injury rates, reduced numbers of liquid discharges from the Laboratory, better compliance with air pollution regulations, reduced amounts of waste generated, and progress toward cleaning up past contamination. In some cases, we are indeed excelling.

The University recognizes that in today's world, one of the key ingredients of success is the support of the Laboratory's regional community. You may have noticed that in the past few years, the University has been working with Los Alamos, Rio Arriba, and Santa Fe counties more closely than ever before. The University of California Northern New Mexico office in downtown Los Alamos provides a local window to the University and plays a key role in helping to build effective working relationships with community members. We are also very actively involved in establishing numerous educational and economic development opportunities in the area. We hope that these efforts, along with the Laboratory's improving environment, safety, and health record, demonstrate our commitment to being a good corporate citizen in northern New Mexico. We know that the Laboratory must continue to earn your support by making real progress on environment, safety, and health issues that impact the community, and we are committed to accomplishing this goal.

Howard K. Hatayama

Waste Not Wanted

This hazardous waste transportation system used for WIPP is the safest in the country.

—National Academy of Sciences

Many of us do home remodeling, or we landscape the yard or put in a garden or a shed. The kids may build a tree house, or in these more modern times, a half-pipe for in-line skating and skateboarding. The common thread in all of this activity is the pile of leftover junk that must be disposed of at the completion of the project. This must be one of those universal truths—all work creates waste.

Different work creates different waste. Special problems exist for places like Los Alamos National Laboratory that create radioactive waste from national-defense-related work. One particular type of waste that is created, low-level transuranic waste, consists mostly of protective clothing, tools, rags, glassware, and other such items contaminated with trace amounts of radioactive elements—mainly plutonium, but also neptunium, americium, curium, and californium. Until the recent opening of the Waste Isolation Pilot Plant (WIPP) in southern New Mexico, transuranic waste did not have a specific place for disposal. The creators of that waste were forced to store it on site. For example, the waste facility at Technical Area 54 at our Laboratory contains more than 8000 cubic meters of transuranic waste, which has been accumulating since the 1940s and fills about 40,000 55-gallon drums.

WIPP is this country's first and only deep geological repository for safe permanent disposal of transuranic waste. Large rooms have been created half-a-mile underground in an ancient salt formation. Workers place drums or boxes of waste into these large rooms, and the space is filled with the excavated salt for permanent burial. However, they are very particular about the type of waste that is buried here. Anybody bringing waste here must first show not only that the waste has been properly identified, but also how (see next two pages).

The opening of WIPP has been long-awaited by Sandy Wander, the Laboratory's transuranic waste certification official, and kicked off a flurry of activity as final preparations were completed to ship six standard waste boxes as soon as possible. According to Sandy, "Judge Penn's ruling to open WIPP is not a popular one for everybody. But at least everyone can know and be assured that we know precisely what is inside every waste container and that we have completed documents that verify and certify that the waste meets WIPP's acceptance criteria."

The WIPP Process

This Laboratory is the first facility to develop a process for identifying waste characteristics and properly documenting this characterization. Our process was the first to be approved by the Department of Energy Carlsbad Area Office and the federal Environmental Protection Agency. The process is a series of validation and verification steps to make sure waste data meet strict objectives established in the Transuranic Waste Characterization Quality Assurance Program Plan. Each step of the process is thoroughly documented.

1

Radiographic examination and radioassay—With x-rays, waste experts examine each 55-gallon drum for items not allowed at WIPP. Some examples of items not accepted are pressurized canisters, explosives, sealed containers greater than 4 liters, and liquids. Personnel also identify the radioactive characteristics of the material in each drum.

2

Visual examination—Examiners visually inspect the contents of some of the drums that have undergone radiography. This activity verifies the radiography—showing that the waste items recorded from the radiographic examination are actually in the drum.

3

Headspace gas analysis—Personnel extract a sample of gas contained in the headspace directly under the drum lid with an airtight syringe. They inject the sample into a gas chromatograph/mass spectrometer and analyze the gas sample for hydrogen, methane, and volatile organic compounds.

4

Solid-waste core sampling—Workers remove a core of soil or cemented sludge from the solid contents of a drum. They examine the core for hazardous chemicals and metals.

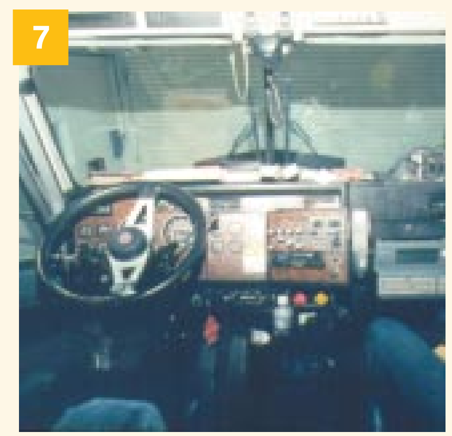
5

Verification, comparison, and certification from the WIPP Waste Information System—After waste characteristics are identified, the waste certification official verifies the correctness of the data and compares the data with the WIPP's Waste Acceptance Criteria. She then sends all the characterization, certification, and shipping information to a database program at the Department of Energy Carlsbad Area Office. WIPP personnel can then approve the waste containers for shipment.

6

Loading the TRUPACT-II—Personnel load up to 14 drums or 2 standard waste boxes into a Transuranic Packaging Transporter Model 2 (TRUPACT-II). The TRUPACT-II is an elaborate shipping container designed and approved by the Nuclear Regulatory Commission for shipping waste to the pilot plant. Three TRUPACT-IIs fit on a semitrailer.

7



Transporting the waste—The semitrailer is equipped with a geographic positioning system and a satellite telephone (with a cellular phone for backup). Drivers must be certified each year, must pass stringent traffic safety and emergency response examinations, and must maintain spotless driving records. While travelling, they must follow strict protocol, which demands they understand procedures for bad weather and know the designated areas where they are permitted to pull off the road.

It's difficult to imagine that Sandy Wander ever gets out from underneath the weight of all the paperwork required for shipping waste to WIPP. But she does.

Sandy Wander—Certification Official for Los Alamos National Laboratory's Transuranic Waste Characterization and Certification Program

Sandy, of the Laboratory's Transuranic Waste Characterization and Certification Program, is the person who verifies all the data for the transuranic waste that is sent to WIPP. She estimates that for every container of transuranic waste there are about 200 pages of data and information that she needs to review. That doesn't even count the hundreds of pages of procedures—both detailed technical procedures and quality assurance procedures—that were developed and are under constant revision as the characterization and certification process is streamlined.

Sandy has worked at the Laboratory for about two years. Before, she worked as support staff for the Department of Energy Carlsbad Area Office, where she conducted characterization audits at the Department's major laboratories. For six years before Carlsbad, she worked in waste management quality assurance at Lawrence Livermore National Laboratory.

In her spare time, Sandy may be found on the racquetball court or backpacking in some of the challenging mountains in the West. Her last adventures led her to the Timberline Trail around Mt. Hood and to the Wonderland Trail around Mt. Ranier. No task, be it a mountain of paper or a real mountain, is too great for Sandy Wander to conquer.

WIPP's First Shipment—A Historic Event

David A. Gurulé—
Area Manager
Department of Energy
Los Alamos Area Office

I have seen many changes in northern New Mexico and at Los Alamos National Laboratory during my varied assignments within the US Department of Energy complex. Now more than ever we are in the midst of exciting times here at Los Alamos. We have changed our views about the natural environment to demonstrate accountability and place more value on the natural world around us.

Being a native New Mexican, I share the concerns that my fellow citizens have for the environment and for our own safety and welfare. This is why I applaud the long-awaited opening of the WIPP near Carlsbad and the consequent shipping of certified waste from our Department of Energy facilities. We now have the opportunity to consolidate all of the waste of this type from many facilities nationwide into one site where it will be permanently buried in salt in such a way that future generations will never be threatened by it.

I am especially pleased with the people at Los Alamos who were instrumental in preparing a comprehensive quality assurance and technical program for characterizing and certifying transuranic waste to be sent to WIPP. WIPP is an important component in the Department's plan to clean-up nuclear waste throughout the complex.

The first shipment marked a historic event for the Department of Energy, WIPP, the Laboratory, and New Mexico. In fact, the first shipment went out just days after the official opening of the plant. That night I was at the facility when the waste was shipped. It was an exciting time. About 100 people gathered to see the truck pull out with the TRUPACT-II containers loaded on it. Most of the folks working on the Transuranic Waste Characterization and Certification Project, representatives from the Department's Albuquerque Office, and many senior managers from the Laboratory were present. I spent most of the early morning hours on the phone to the Carlsbad manager, the state police, and state government representatives. It was a disappointment to wait all night, delaying hour after hour hoping that the fog at Clines Corners would lift so the truck could pull out. But, the disappointment was short-lived, as the truck went out later that day.

I am excited that a site in New Mexico was the first to ship to WIPP. I look forward to meeting and working with members of communities throughout northern New Mexico in the months ahead to identify and meet the continued challenges facing us all.

Preventing Waste, Saving the Future

The United States, with only 5% of the world's population, consumes over 25% of the world's consumable products. Shocking, isn't it?

So how can we solve this problem? Simple: create less waste, consume fewer resources, and recycle.

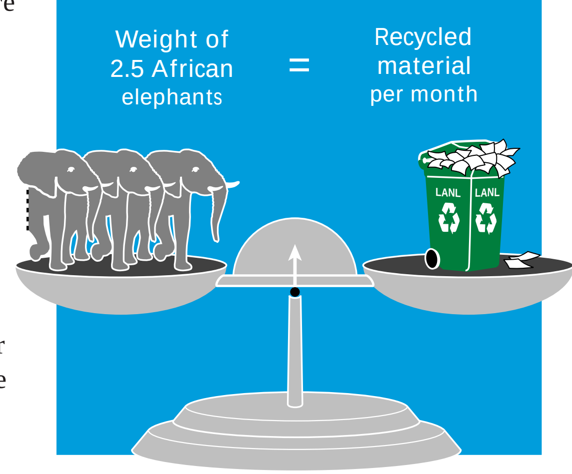
Two measures, Executive Order 13101 and Appendix F of the University of California's contract with the Department of Energy, are helping the Laboratory create less waste, consume fewer resources, and boost recycling efforts. Tom Starke, program manager of the Environmental Stewardship office, explains, "The Laboratory is committed to protecting the environment. That's why we are striving to reduce our sources of waste."

Executive Order 13101 states that it is the government's duty to protect the environment and promote economic growth through the purchase of recycled and other environmentally preferable products. Since the order was issued in 1998, the Laboratory has begun buying paper that contains at least 30% recycled products, remanufactured toner cartridges, and desktop accessories made from recycled plastic.

Appendix F of the Department of Energy-University of California contract mandates that the Laboratory produce no more than 2166 metric tons of solid sanitary waste a year. By implementing several recycling and waste reduction practices, the Laboratory has met this performance measure in both 1997 and 1998. In 1999, the Laboratory has also had to begin recycling 35% of its trash.

FACTOID:

An adult African elephant weighs 5.5 to 6.0 metric tons. If the mail room recycles 13.5 metric tons of material each month, that's the equivalent of the weight of almost two-and-a-half elephants a month!



One way in which the Laboratory is meeting the Appendix F measure is through the A1000 program. Because they already carry mail to mail stops, Laboratory mail carriers agreed they would carry junk mail back to the mail room for sorting and recycling. Laboratory employees can send their junk mail back to the mail room by addressing it to Mail Stop A1000. Unwanted mail is picked up by Los Alamos County and recycled. The A1000 program will also collect and sort used books, computer software, and transparencies for recycling and reuse.

On average, the mail room staff recycles approximately 13.5 metric tons of material each month, with a staff of only 18. The whole Laboratory complex, with a population exceeding 14,000 people, recycles 20 metric tons of paper per month. By rising to the challenges of measures like Executive Order 13101 and Appendix F, the Laboratory is helping the United States reduce its consumption of the world's resources.

Inspiring Change

Carol Smith and Mary Van Eeckhout began the Laboratory's first Welfare-to-Work Program in 1997.

The Laboratory has a central warehouse that receives, transports, and distributes mail in and around all Laboratory facilities. Recently one of the Business Operations groups has been recognized for their initiative with the A1000 recycling effort. But perhaps even more importantly than A1000, the group has become identified as a place for new beginnings for many former welfare recipients.

The first Laboratory Welfare-to-Work Program was started in 1997 by Carol Smith and Mary Van Eeckhout. "Originally we intended this to be an on-the-job training program. We thought on-the-job training would help people in new, entry-level positions," explains Carol.

Mary continues, "Then—at about this same time—the New Mexico Department of Human Services began its Welfare-to-Work Program, and so we decided to change our focus from on-the-job training to helping people gain entry-level jobs at the Laboratory."

In its first year, the Los Alamos National Laboratory's Welfare-to-Work Program provided nine welfare recipients with entry-level positions, job counseling, and job training, while the state of New Mexico assisted the participants with child care, transportation, and tutoring. Since then, seven of the participants now work full-time at the Laboratory and the other two have gone on to find and maintain jobs in northern New Mexico.

The goal of the program is simple: finding every participant a permanent job. "The best thing about our program," says Carol, "is watching people blossom. Someone who's been on welfare for most of his or her adult life can come here, learn new skills, gain job experience, and then either find a permanent position here or move on to a job outside the Laboratory." Mary adds, "We're helping people break the cycle of dependence by giving them the skills and confidence to work, and in turn they become role models for their own children."

The success with Welfare-to-Work ought to be a model not only for the entire Laboratory, but for any private business in northern New Mexico. Perhaps more businesses will realize that it is in our community's best interests to inspire change in others, so that others may inspire change in ourselves.

Drusilla Roybal explains to this year's Welfare-to-Work participants that their new job duties might include sorting and recycling some of the 13.5 metric tons of junk mail that is returned through the A1000 program.

Know Fuel, Know Fire

We all understand the importance—and danger—of fire. Since prehistoric times when the ancient ancestors of today's Puebloans lived here on the Pajarito Plateau, we have needed fire to heat our homes and cook our food. Today, as before, we still enjoy a good fire in the fireplace on cold wintry nights or a blazing campfire on a beautiful summer night.

But we also know to be careful, because in the wrong circumstances, fire can become a frightening and destructive force. For northern New Mexicans, this understanding is fresh with examples—memories of the Dome, Oso, and Hondo fires. Furthermore, we are very aware of the unusually low level of precipitation these past few years and the resulting seasonal dryness of our forests.

A fire capable of great destruction requires only a simple recipe: ignition, heat, and fuel. Take away any one of these ingredients and a fire cannot happen. Wildfire experts like Randy Balice and Patrick Valerio at the Laboratory understand the workings of this basic recipe in a forest setting. Says Randy, "Of the three components of fire, we can't control two. To prevent fire, we can only do something about one component—the amount of forest fuel available—to avoid catastrophe."

Patrick says, "We've a serious problem with overgrown ponderosa pine forest, not only within Laboratory boundaries, of which roughly one-third is ponderosa, but throughout the entire Pajarito Plateau. Where 150 mature trees per acre is an ideal situation, our forests range from 400 to 1000 trees per acre. We've begun various projects around the Laboratory to deal with this problem."

Randy and Patrick know that proper management, as described in the next two pages can restore the ponderosa pine to a proper balance. A forest that contains far fewer trees per acre will reduce the amount of available fuel for any potential wildfire, rendering it controllable. Naturally, when fire is controllable, both the Laboratory and its surrounding communities are safer places to work and live.

Patrick Valerio—Wildland Fire Behavior Specialist/Forester

As with most native northern New Mexicans, Patrick Valerio appreciates the natural beauty of New Mexico. With one of the nation's lowest populations per square mile—and many, many square miles—New Mexico has large expanses of pure nature. Of course, Patrick is partial to the scenery closer to home in the north, where the bottomland of the Rio Grande drainage basin rises to the heights of the Sierra de los Valles. Numerous ecosystems exist in between. The variety of the landscape and the extended panorama provide ever-changing scenery—even down a road that is completely familiar.

Growing up in farming and ranching—a third generation New Mexican—Pat knows about working with the land and about a commitment to stewardship of that land. His course in life has led him to protecting wildlands, beginning as an ecologist and continuing for 18 years. He is certified as a Prescribed Burn Boss II and has helped with wildland restoration of over 35,000 acres, not only in his home state but also in Colorado, Wyoming, and South Dakota. Today, Patrick works at the Laboratory as a Wildland Fire Behavior Specialist/Forester and is heavily involved with planning and implementing forest management at the Laboratory.

Forest First Aid

What is a Healthy Forest?

The ideal setting for a ponderosa forest is a mosaic of open areas interspersed with stands of multi-aged trees and mature trees scattered widely about. A fire in a ponderosa pine forest can be good or bad depending on the amount of available fuel. The more the fuel, the hotter the fire. The hotter the fire, the worse it is.

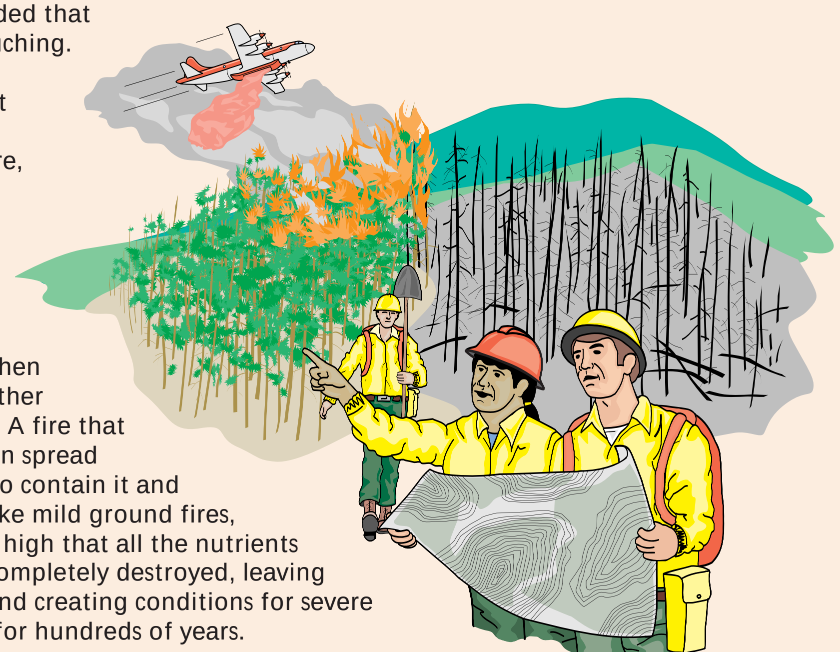
Picture a lightning strike in a healthy forest. The impact occurs at the top of an old snag and spirals down the trunk into the ground where a clump of grass begins to burn. Without a lot of duff or dead wood around, the fire is left to smolder in the underbrush, never receiving enough fuel to grow. This fire could smolder for days, slowly moving along the undergrowth burning the grasses and whatever duff and litter that has accumulated. Burning breaks down this material and puts it back into the soil as nutrients because the fire has not gained enough heat to be damaging. The same lightning strike in a too dense forest would begin the same way but would have more fuel to burn and would quickly grow, climbing the ladder fuels (undernourished grasses and shrubs and undersized trees) until it becomes a crown fire.

An overgrown forest (top right), resulting mainly from our 100-year practice of preventing forest fires, has

- a forest floor with dead wood and a thick duff layer,
- ladder fuels,
- no sunlight penetration,
- no wildlife, and
- an upper forest canopy so crowded that the crowns of all the trees are touching.

On the other hand, a healthy forest (middle right) has

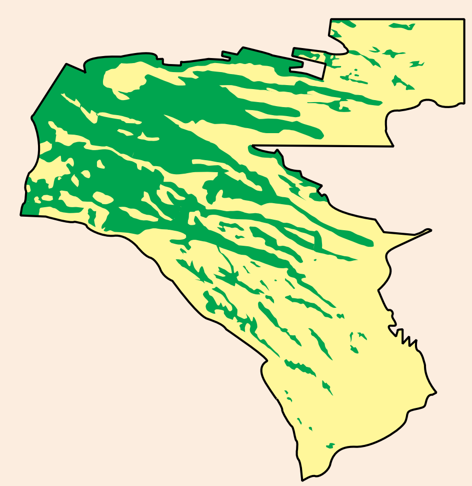
- around 150 mature trees per acre,
- life-giving sunlight,
- grass meadows with shrubs,
- wildlife, and
- no threat of crown fires.



What is a Crown Fire?

Crown fires (bottom right) occur when the trees are all close enough together that the tops of the trees all touch. A fire that gets to the top of the trees can then spread unimpeded by any human efforts to contain it and reach scorching temperatures. Unlike mild ground fires, crown fires create temperatures so high that all the nutrients above and below the ground are completely destroyed, leaving behind a black, barren landscape and creating conditions for severe erosion that will not be overcome for hundreds of years.

How Patrick Valerio Helps—Thinning overgrown forests is necessary to help return them to optimum conditions. Patrick and others go into a forested area—possibly an area that Randy and his crew have labeled as high risk—and mark trees for removal. They look for overcrowded trees or trees that are physically damaged, perhaps diseased. Crews from the US Forest Service and Johnson Controls Northern New Mexico then go through the area and cut down the marked trees, making large piles of wood for the public to take home. Whatever is left over—the stuff that is too small to carry home, called slash—is ground up into mulch. The mulch is also available to the public. By the end of summer 1999, 350 acres of ponderosa pine forest will have been thinned.



Mixed Conifer and Ponderosa on the Laboratory— Roughly one-third of Laboratory grounds consists of ponderosa and mixed conifers (shown in green on the map). The forest within half-a-mile along State Road 501 from the Wellness Center to the back gate has been thinned. Thinning efforts are also taking place along power line corridors and at other sites throughout Laboratory property.

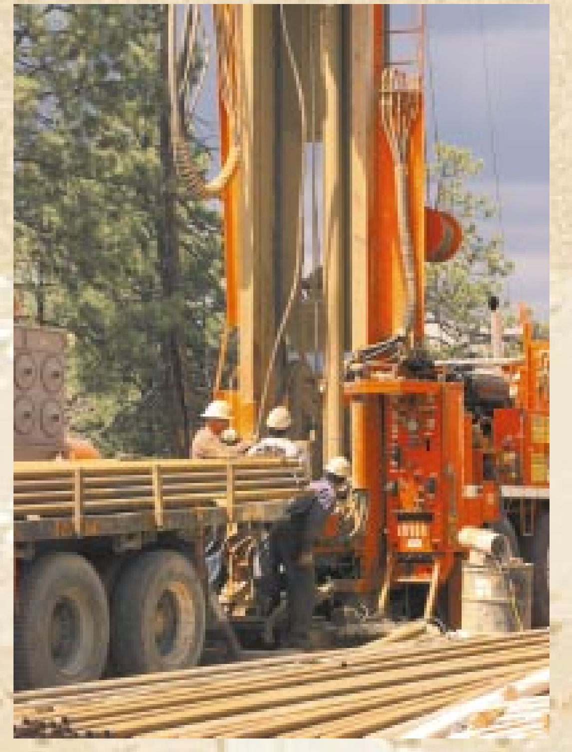
How Randy Balice Helps—He works with a crew to develop a base line estimate of fuel levels in a variety of environmental locations on Laboratory and US Forest Service land to evaluate hazards from wildfire. Randy's crew has discovered that mixed conifer forests in both canyons and mountains are the densest (more foliage per acre) and ponderosa pine forests on mesas also have the overstory vegetation density comparable to mixed conifer density. The densities of both forest types are way above the norm.

Tapping the Earth Below

Have you ever wondered what the earth is like below the ground—under the grass, dirt, and rocks? How far do you have to dig before you reach the drinking water and what kinds of earth and rocks do you go through to get to the water? Hydrogeology is the science that examines these questions; scientists studying hydrogeology examine how the geology (sequence of rock units) influences and controls the flow of groundwater (hydrology). In the next seven years, scientists at the Laboratory are going to learn much more about the hydrogeology beneath Laboratory land because a Hydrogeologic Workplan was developed, which lays out a schedule for 83 new wells to be drilled across the Laboratory.

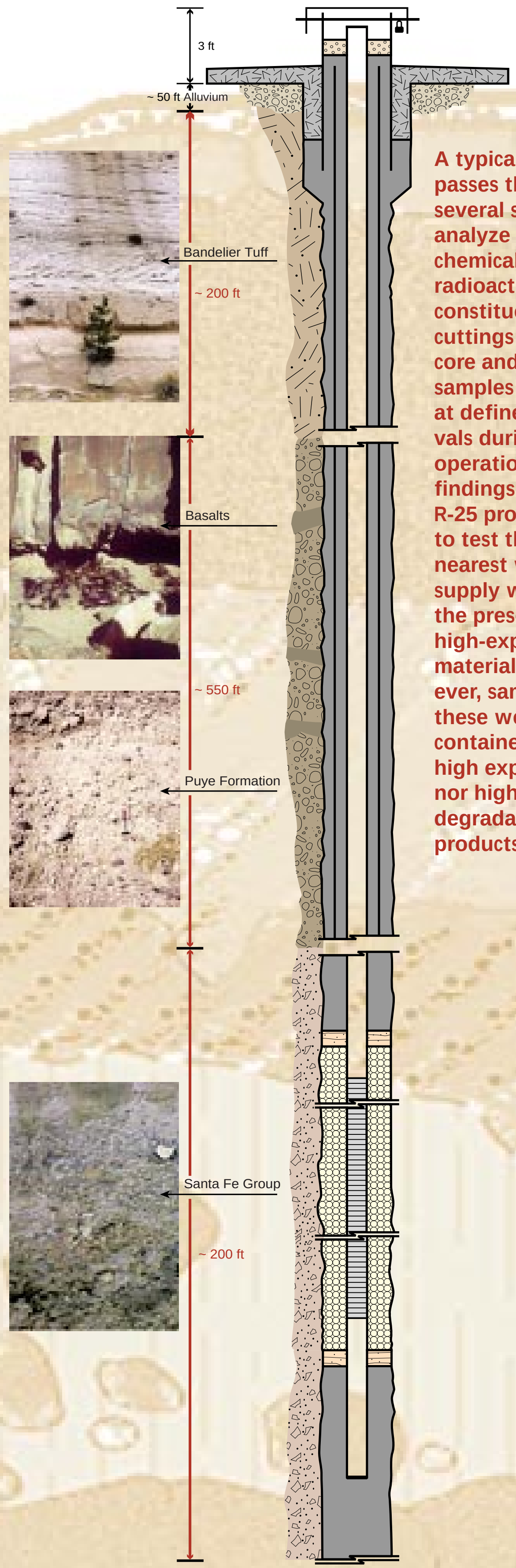
Data collected from 21 existing wells for 40 years have aided scientists in developing a conceptual model of the hydrogeologic system beneath Laboratory land. The initial conceptual model shows three separate saturated zones of groundwater—a shallow, intermediate, and deep zone (the latter a source of Los Alamos' drinking water)—separated by dry rock. A small amount of water is believed to percolate down from the shallow and intermediate zones into the deep zone over a period of several years to decades. The data collected from new wells will help refine and confirm the conceptual model and the flow of water.

The existing wells are clustered in specific regions of the Laboratory. The new wells described in the Workplan will be located in areas about which we have very limited hydrogeologic information. In some cases, we will place a well where there is the greatest chance of potential groundwater contamination, such as a former waste discharge area. The data collected from the new wells will be analyzed to help scientists determine if groundwater has been or may be affected.



Drilling activities for well R-25 were completed in early 1999. This well is located in Technical Area 16 (TA-16), where operations include high-explosives research, development, testing, and manufacturing. Discharges from past manufacturing activities at TA-16 appear to be the source of high-explosive constituents discovered in the groundwater sampled from this well.

By understanding more about the hydrogeology of the Laboratory, scientists will be able to design a better network of monitoring wells to detect contamination. The Hydrogeologic Workplan will also allow scientists to plan future operations to protect the groundwater—especially the drinking water. Samples taken from the municipal supply wells show that the water meets safe drinking water standards. However, through the implementation of the Hydrogeologic Workplan, scientists have gathered data that show the Laboratory has affected the deepest groundwater zone in some areas with constituents such as nitrate, tritium, and high explosives. These constituents have not impacted the present municipal supply wells, and the Laboratory wants to keep it that way.



A typical well passes through several strata. We analyze for chemical and radioactive constituents in drill cuttings and in core and water samples collected at defined intervals during drilling operations. Our findings at well R-25 prompted us to test the six nearest water-supply wells for the presence of high-explosive materials. However, samples from these wells contained neither high explosives nor high-explosive degradation products.

Charlie Nylander—Hydrogeologic Workplan Project Leader

Charlie Nylander knows that when he looks under his feet there is more than what appears on the surface—and he knows what it is. As Hydrogeologic Workplan Project Leader, Charlie leads a large team of earth scientists, engineers, statisticians, and computer-modeling experts who are researching groundwater resources underneath the Pajarito Plateau.

A native Santa Fean, Charlie didn't become interested in water until 1972, the year he took his first graduate course in Water Pollution Control at New Mexico State University. Since then, Charlie has been Chief of the New Mexico Water Pollution Control Bureau, a private consultant and project leader at the Rocky Flats Environmental Site, and has held several technical and management positions at Los Alamos.

"My present job at the Laboratory is the hardest and most challenging of my career because I have to deal with parties who have such different interests," says Charlie. He explains that past experience has helped him understand the demands of regulators, Washington officials, the public, and scientists and technologists. Consequently, he can help focus and integrate the team's efforts into satisfying these demands.

Charlie believes the outcomes of the Hydrogeologic Workplan will be many. "Once we understand how the groundwater flows through the rocks beneath the Laboratory, we can improve our planning for future monitoring activities, better assess the Laboratory's effects on human health and environmental risks, and more adequately protect and manage hydrogeologic resources for everyone's benefit for years to come."

DARHT: Understanding Environmental Issues

This year, the Laboratory began operations of the Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility's first axis, one of two accelerator halls that contain x-ray equipment for viewing nonnuclear high-explosives tests. Through these nonnuclear tests at DARHT, scientists can perform experiments that help ensure the safety, reliability, and performance of the US nuclear weapons stockpile.

The path leading to the opening of this facility was not always a smooth one; citizens' groups intervened and we had to change the way we were conducting the environmental review process (see timeline). The change, a turning point in our way of doing business, involved strict adherence to the National Environmental Policy Act. The Act requires that an initial environmental impact statement analyze all significant environmental impacts surrounding the construction and operation of any new federal facility. It also calls for an action plan that explains what will eliminate or moderate the environmental impacts. Finally, the Act gives the general public a chance to participate in meetings, review the initial environmental impact statement, and suggest changes.

During a court-ordered 16-month construction freeze, we resolved these issues by completing an environmental impact statement and mitigation action plan. As part of the process, we held public meetings with citizens' groups, neighboring Pueblo leaders, the US Fish and Wildlife Service, the State Historic Preservation Office, and environmentalists. At these meetings, topics ranged from conserving cultural resources to protecting threatened and endangered species and natural habitats. With help from the public, the Laboratory identified actions that would moderate DARHT's environmental impact.

As a result, the new DARHT Facility incorporates several features that will limit potential negative environmental impacts (see photos and captions on next page) and will provide for long-term monitoring of the environment and cultural resources around the facility.

The DARHT Timeline

Early 1980s—The Laboratory and Department of Energy begin preliminary design of DARHT.

April 1994—Construction of the DARHT Facility begins.

October 1994—Three citizens' groups ask the Department of Energy to prepare an environmental impact statement (EIS) and to halt construction on DARHT until it is completed.

November 1994—Two citizens' groups file a lawsuit in US District Court to stop DARHT construction until the EIS is completed. The Department of Energy agrees to prepare a DARHT EIS.

January 1995—US District Court halts the construction of DARHT.

May 1995 — Draft DARHT EIS is available to the public. The Department of Energy and the Laboratory host several tours of DARHT for state personnel, tribal officials, local government officials, officials from federal agencies, and interested parties.

May and June 1995—One-day public meetings are held in Los Alamos and Santa Fe.

January 1996—The mitigation action plan for DARHT is published.

April 1996—DARHT construction resumes.

July 1999—DARHT phase one construction is completed.

Ultimately, an Example of Environmental Stewardship

Respecting Our Elders—The Laboratory monitors DARHT to see if its vibrations affect this ancient ruin across the canyon. Nake'muu, which translates as "village on the edge," is one of the oldest and best-preserved ruins on Laboratory property. To protect this valuable cultural resource, the Laboratory hired a team from Mesa Verde National Park to take precise photographs of the ancient site. The markers seen in this photo help Laboratory archeologists observe if there is structural change.

Letting the Roamers Roam—The fence around DARHT is not a typical security fence that is chain linked and eight feet high with barbed wire along the top. The DARHT fence is less than five feet high and has smooth, not barbed, strands. This fence does not impede the movements of elk and mountain lions—bigger animals can now jump over this fence and smaller ones can scramble through it. The light pole in the foreground is also new in the design. The light flashes when an experiment is in progress.

Protecting Wildlife Habitat—A pair of Mexican spotted owls—a threatened species—nesting in a canyon below DARHT hatches two fledglings each year. These owls and other wildlife on Laboratory property are important indicators of the health of the Laboratory's environment. Their habitat has been protected by the DARHT mitigation action plan.

Returning the Grounds to a Natural State—The DARHT mitigation action plan addresses steps to restore the native vegetation to preconstruction conditions. However, construction crews understood environmental stewardship and kept damage to the native vegetation low enough to where it could rejuvenate itself with proper erosion controls and procedures. In this picture, riprap dissects an area that has been reseeded with native grasses.

Beryllium Worker Safety at Los Alamos

Beryllium is six times stronger than steel, yet lighter and more pliable than aluminum. These properties make it essential to aerospace and defense industries. More and more, the light-weight metal is being used in satellite guidance systems, spacecrafts, nuclear reactors, aircraft brakes, x-ray machine windows, nonsparking tools, and in parts for electronics, lasers, and automobiles.

Right now, beryllium work is performed in several areas here at the Laboratory: in weapons production, in defense and energy research, and in decontamination and decommissioning activities.

The complex, state-of-the-art ventilation system at the new Beryllium Technology Facility is just one part of the Laboratory's Beryllium Disease Protection Program.

This winter, the Beryllium Technology Facility will open. This facility will be a state-of-the-art center for the Department of Energy and for outside businesses interested in cooperative research and development agreements concerning beryllium.

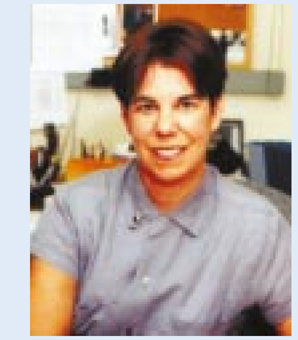
But while beryllium is a very useful element, exposure to beryllium may cause serious health problems. A health problem of most concern is Chronic Beryllium Disease, an allergic-type lung disease caused by inhaling airborne beryllium particles. This disease is chronic, debilitating, and sometimes fatal. Chronic Beryllium Disease is very hard to prevent because it may not be evident until many years after exposure. Because some people may be more susceptible to it than others, it is extremely important to use minimization techniques to keep exposures as low as possible.

Before contamination control practices were widely used in the beryllium industry, there were incidents where wives developed Chronic Beryllium Disease from laundering their husbands' work clothes, or secretaries who did not work in beryllium areas came down with the disease. To prevent anything like this from happening in northern New Mexico, the Laboratory has strengthened its policies on beryllium worker safety. A new program for Chronic Beryllium Disease Prevention has been initiated to update protective measures that have been in place since 1991.

The goals of the Laboratory's new program include limiting the number of workers who are exposed to beryllium, monitoring work areas to determine the amount of airborne beryllium, improving training and communication about the hazards of beryllium exposure, increasing controls to minimize the potential for exposure, and including all at-risk workers in the beryllium medical surveillance program. No other Department of Energy facility has such an extensive beryllium worker safety program in place. (Turn to pages 30-31 for some of the details of how this program works.)

By building a state-of-the-art facility and thoroughly educating its workers, the Laboratory hopes to avoid any incidents like those in the past. The Laboratory will prove that safe beryllium research and development can be achieved without sacrificing worker health and safety.

Babetta Marrone—Biomedical Researcher



Babetta "Babs" Marrone is a biologist who has worked 14 years at the Laboratory in the Life Sciences Division. The last four years she has been a group leader for the division's Cytometry Group, and she has been working on a project that might make it possible for beryllium workers to know ahead of time whether or not they might be susceptible to the disease.

"When I became group leader for Cytometry Group, I was searching for some new research directions for the group. While working on a small collaborative project on an early diagnosis technique for lung cancer, I heard about Chronic Beryllium Disease. As soon as I heard about the issues surrounding the lymphocyte proliferation test, which is a part of the Laboratory's beryllium medical surveillance program, I was certain that flow cytometry could be helpful. The genetic susceptibility work for Chronic Beryllium Disease came later as we realized that we could also use our capabilities to understand the disease's genetic basis."

By using either conventional DNA sequencing or a new mini-sequencing method by flow cytometry, scientists can identify the specific genetic DNA sequence or code that is particular to Chronic Beryllium Disease susceptibility. Potential beryllium workers would provide a blood sample, which would be examined using a flow cytometer. If the specific DNA sequence associated with increased risk for development of Chronic Beryllium Disease is identified, the individual would be notified.

Babs explains, "Right now the genetic test is part of a research study. At some point in the future, we hope to make the test available as part of the medical surveillance program, but there are many ethical and legal issues that need to be addressed first."

Victor Vargas—Materials Science Technician

When he's at work, Victor Vargas is a materials science technician. When he's not at work, he coaches girls' basketball and fast-pitch softball. Strangely enough, Victor has found that these two worlds are very similar.

"Thoroughness and preparedness are the keys to being a great coach and a great technician. In both cases, I have to be on my toes and ready for any situation," says Victor.

"Just as my girls have to mentally prepare for a game, rely on their instincts, and remember the rules and drills we go through during practice, every day at work, I have to remember my safety training, perform what I've practiced, and rely on common sense."

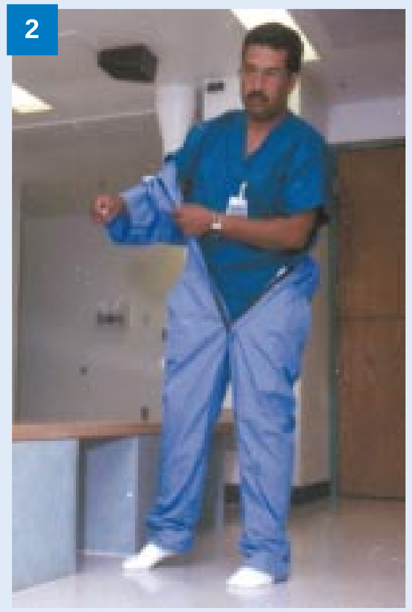
Prepared, Both at Work and at Play

To keep workers and their families safe from beryllium particles, all items worn in the beryllium operations area must be kept totally separate from anything worn outside the facility. This is easier said than done, but a thorough worker safety program is ensuring that anything involving beryllium never leaves the facility. Victor demonstrates the steps involved in his day-to-day routine at work.

1

Outside the men's locker room at the Beryllium Technology Facility, Victor grabs a pair of scrubs and a bag containing an extra pair of socks, underwear, and locker shoes. These items are what Victor will wear in the facility when he is not in the beryllium machining area. Victor changes into his scrubs and locker shoes and puts his personal clothing in his locker.

2



In the support rooms of the facility, Victor puts on a pair of cloth coveralls and sits down on a barrier bench, which is just outside the beryllium operations area. He slips off his locker shoes, swings his feet over the bench, and faces the opposite direction. There he puts on his work boots.

3

In the barrier area, Victor fits a personal air sampler, which is about the size of a Walkman radio, to his belt. While he works, the air sampler will continually sample the air he breathes. After his day of work, the filter inside the sampler will be monitored.

Beryllium Worker Safety at Los Alamos

4

Next, Victor puts on Tyvex coveralls that have built-in booties to cover his work boots and a hood to cover his head.

5

Finally, Victor carefully puts on his respirator and two layers of rubber gloves.

6

In the beryllium operations area, Victor will spend the day conducting beryllium powder operations.

7

When Victor leaves the beryllium operations area, he stands under a downdraft vent. As air blows down over his body, an exhaust in the floor pulls the air and any beryllium particles away from Victor's breathing zone. While this is happening, Victor removes the Tyvex coveralls and throws them away. Next, he takes off his second layer of coveralls and puts them into a water-soluble laundry bag. At the end of the day, the bag containing the coveralls will be laundered in the facility's own laundry room.

8

After washing his respirator, his hands, forearms, and face, Victor gives his personal air sampler to a technician, who will monitor the sampling data. Victor puts his respirator, eyeglasses, and boots back in his cubby in the barrier area, swings himself over to the support area, and puts on his locker shoes.

9

Before he enters the locker room, Victor hangs his locker shoes up on a rack. Inside the locker room, he puts his scrubs, underwear, and socks into a special mesh bag with his name on it, which then goes into another water-soluble laundry bag. Finally he showers, dresses in his regular street clothes, and clocks out.

From the Director — Pursuing the Six Zeros

"Only if each employee, each local work unit, each group, each division sets its goal to be zero and puts in place the programs to achieve that goal will the Laboratory have the ability to make dramatic improvements."—John C. Browne

I hope you've enjoyed this, the third in a series of reports to our communities on environment, safety, and health. I am proud of our Laboratory's improving record in environment, safety, and health, including development of our safety culture which, since 1996, has been increasingly based on an integrated safety management system.

In my role as Laboratory Director, I have many responsibilities and a wide variety of tasks to perform. However, those that help our Laboratory set goals that achieve excellence in the areas of the environment, safety, and health are among the most important. These goals go to the heart of our Laboratory because they affect the people who work for us, the public we serve, and the planet we all live on.

Soon after beginning my tenure as Director, I began to look at other organizations—ones that have achieved world-class standing in successfully protecting the environment, safety, and health. I was particularly impressed by DuPont Industries and, following their lead, I've embraced a six zeros program that sets the following goals:

- zero safeguards and security violations,
- zero injuries and illnesses on the job,
- zero injuries and illnesses off the job,
- zero environmental incidents,
- zero ethics incidents, and
- zero people mistreatment incidents.

For Los Alamos to move toward the environmental and safety records of best-in-class organizations, such as DuPont, I realized that we must begin at the grassroots level. Only if each employee, each local work unit, each group, each division sets its goal to be zero and puts in place the programs to achieve that goal will the Laboratory be able to make dramatic improvements.

Naturally, the first question you ask is "Why set a goal of zero—you can never achieve it?" The answer to that question is more questions. While the zero goal may be unachievable, why would we want to set a goal that would allow us to settle for less than zero? How much environmental damage are we willing to accept? How many injured people is the right number?

I believe we all would like to work in an organization that is free from injuries, free from events that harm the environment, and free from incidents of people mistreatment. Whether or not we ever achieve zero, we are certainly motivated to reduce our present injury rate, which is in the midrange for Department of Energy contractors, but still ten times higher than DuPont's.

Now that you've read this year's "For the Seventh Generation," consider what is between the lines. I hope when you do, you'll see that our workers are rising to meet the challenges of our national mission—to enhance global security—while conducting safer operations and protecting the environment from adverse impacts.

For the Seventh Generation

And each generation was to raise its chiefs and to look out
for the welfare of the seventh generation to come.

We were to understand the principles
of living together.

We were to protect the life that surrounds us.

We were to give what we had to the elders and to the children.

What of the rights of the natural world?

Who is speaking for the waters of the earth?

Who is speaking for the trees and the forests?

Who is speaking for our children?

We must stand for these people, and the natural world
and its rights; and also for the generations to come.

Poem based on a statement by Oren Lyons, Iroquois, which appears in
Look to the Mountain—An Ecology of Indigenous Education
by Gregory Cajete, Ph.D., Santa Clara Pueblo.

The indigenous people of North America lived in harmony with the natural environment, protecting and conserving it so their way of life would be indefinitely sustainable. Every decision was examined for its long-term implications, not just for the tribe's children and grandchildren, but for the seventh generation to come. This philosophy is common amongst the Pueblo Nations of our region and is also to be found in the Great Law of the Iroquois Confederacy.

Los Alamos National Laboratory was established in 1943 as Project Y of the Manhattan Engineer District. Under the leadership of J. Robert Oppenheimer, the Laboratory developed the world's first atomic bomb. Today, Los Alamos is a multidisciplinary, multiprogram laboratory whose central mission still revolves around national security.

Managed by the University of California for the US Department of Energy, the Laboratory maintains a commitment to its tradition of free inquiry and debate, which is essential to any scientific undertaking. Located on the Pajarito Plateau about 35 miles northwest of Santa Fe, the capital of New Mexico, Los Alamos National Laboratory is one of 28 Department of Energy laboratories across the country.

The Laboratory covers more than 43 square miles of mesas and canyons in northern New Mexico. As the largest institution and the largest employer in the area, the Laboratory has approximately 7000 University of California employees plus approximately 1000 contractor personnel. Our annual budget is approximately $1.3 billion.

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Los Alamos
NATIONAL LABORATORY
Los Alamos, New Mexico 87545

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