LALP-99-192

Overview of Environmental Surveillance at Los Alamos during 1998

Los Alamos
NATIONAL LABORATORY

In Memoriam

Two people, both key players in the development of environmental reports, died this year. Bill Purtymun was instrumental in developing the science of environmental monitoring and initiating this series of environmental reports. Louisa Luján-Pacheco served for several years as the report's editor and helped transform it into the widely distributed and easily read publication that it is today. These two Los Alamos National Laboratory staff members touched the lives of all who knew them. The Laboratory honors their contributions to our environmental monitoring program.

William D. (Bill) Purtymun

February 26, 1927–May 19, 1999

Bill Purtymun's career spanned over 40 years as a geologist and hydrologist associated with the Los Alamos National Laboratory—15 years as a US Geological Survey (USGS) employee assigned to the Laboratory and from 1969 on as a University of California employee. Bill authored and contributed to over 100 Laboratory publications and to over 50 USGS special reports and studies. Bill established water quality monitoring as a Laboratory activity and was a founding author of the Laboratory's annual Environmental Surveillance Report, which now goes back almost 30 years.

Bill was born in Clemenceau, a central Arizona smelter town. Clemenceau later became a ghost town, which caused Bill a good deal of grief during his "Q" clearance recertifications.

The Laboratory recognized Bill's career achievements in 1995 with the publication of his magnum opus "Geologic and Hydrogeologic Records…in the Los Alamos Area," a compilation of 40 years of hydrologic data on the Pajarito Plateau.

Besides his career achievements and contributions to the understanding of the geology and hydrology of the area, Bill was also known for his caring and supporting attitude in mentoring his junior colleagues at the Laboratory. Bill always took the time to show aspiring geologists and hydrologists "the ropes," and he had a profound and positive influence on many careers at the Laboratory and in the environmental surveillance field.

Louisa Luján-Pacheco

May 29, 1968–July 25, 1999

Louisa Luján-Pacheco, a writer-editor with Los Alamos National Laboratory, died on July 25, 1999. She was a graduate of Santa Fe High School and held a bachelor's degree in English Literature and a Master's of English in technical writing. Louisa received both state- and national-level awards as a collaborator on environmental publications.

Her career at the Laboratory began in 1993 in the Communication Arts and Services Group; she served on assignment to three other groups: Stakeholder Involvement, Ecology, and Applied Theoretical and Computational Physics. While working with us here in the Ecology Group, her main task was editing and overseeing the publication of the last five issues of this annual report, *Environmental Surveillance at Los Alamos*. She authored several articles in the award-winning *For the Seventh Generation–Environment, Safety, and Health at Los Alamos National Laboratory: A Report to Our Communities*.

As a working mother of two small children, she took time to pursue two of her passions—women's rights and family rights.

At the Laboratory, she was greatly respected for organizing initiatives for the Women's Diversity Working Group, especially in the area of dependent care for the children of Laboratory workers. Louisa was a superb athlete who kept proving there were no obstacles big enough to stop her.

We remember Louisa most for her vibrant personality, enthusiasm, winning smile, and positive outlook.

Contents

Introduction to the Los Alamos National Laboratory 2

Radiation 4

1998 Dose and Risk Estimates 5

Management of the Environment at Los Alamos National Laboratory 6

Environmental Monitoring 7

Environmental Compliance 12

The information presented in this overview booklet is explained in greater detail in Environmental Surveillance at Los Alamos during 1998. If you would like a copy, please contact the Laboratory's Ecology Group at 505-665-8961. These reports are also available on the World Wide Web at http://lib-www.lanl.gov/la-pubs/00416769.pdf.

Introduction to the Los Alamos National Laboratory

Linking the Rio Grande Valley and the Jemez Mountains, New Mexico's Pajarito Plateau is home to a world-class scientific institution. Los Alamos National Laboratory (or the Laboratory), managed by the Regents of the University of California, is a government-owned, Department of Energy–supervised complex investigating all areas of modern science for the purposes of national defense, energy research, health, and ecology.

The Laboratory was founded in 1943 as part of the Manhattan Project, whose members assembled to create the first nuclear weapon. Occupying the campus of the Los Alamos Ranch School, American and British scientists gathered on the isolated mesa tops to harness recently discovered nuclear power with the hope of ending World War II. In July 1945, the initial objective of the Laboratory, a nuclear weapon, was achieved at Los Alamos and tested in White Sands, New Mexico. Today, the Laboratory's central mission is to reduce the global nuclear danger. The Laboratory continues its role in defense, particularly in nuclear weapons, including developing methods for safely handling weapons and managing waste.

The 43 square miles of the Laboratory are divided into 47 technical areas that are used for scientific and support building sites, experimental areas, waste disposal locations, roads and utilities, and safety and security buffers. An experimental area is located west of the Laboratory in Sandoval County at Fenton Hill. The Laboratory shares Los Alamos County with two residential communities: Los Alamos townsite and White Rock. Most of the land surrounding the Laboratory is undeveloped, owned by the Pueblo of San Ildefonso, the Bureau of Land Management, the Santa Fe National Forest, and Bandelier National Monument, or is rural, supported by ranching and light farming. Santa Fe, the state capital, is 25 miles southeast of Los Alamos; Española is located 20 miles to the east; and Albuquerque, New Mexico's largest city, is 60 miles to the south-southwest. In 1998, more than 234,000 people lived within a 50-mile radius of the Laboratory. The Laboratory and its contractors employed over 13,000 people; the Laboratory is the largest employer in Los Alamos County and northern New Mexico. Other local economic activity is fostered by technology transfer, supporting businesses, and tourism.

The geography and ecology of Los Alamos are diverse. The terrain of the Pajarito Plateau, where Los Alamos is situated, alternates between mesas and deep canyons. The natural borders of Los Alamos—the Rio Grande Valley and the Jemez Mountains—are significantly lower and higher in elevation than the mesas, which range from 6,200 feet to 7,800 feet. Six vegetation types, piñon-juniper, mixed conifer, ponderosa pine, juniper-grassland, spruce-fir, and subalpine grassland, are well represented in the Los Alamos environs. Hundreds of species of wildlife, ranging from aquatic invertebrates to large mammals, reside on or near Laboratory property.

Many of the activities and operations at the Laboratory involve or produce liquids, solids, and gases that contain radioactive and/or nonradioactive hazardous materials. Such activities include conducting research and development programs in basic and applied chemistry, biology, and physics; fabricating and testing explosives; cleaning chemically contaminated equipment; and working with radioactive materials.

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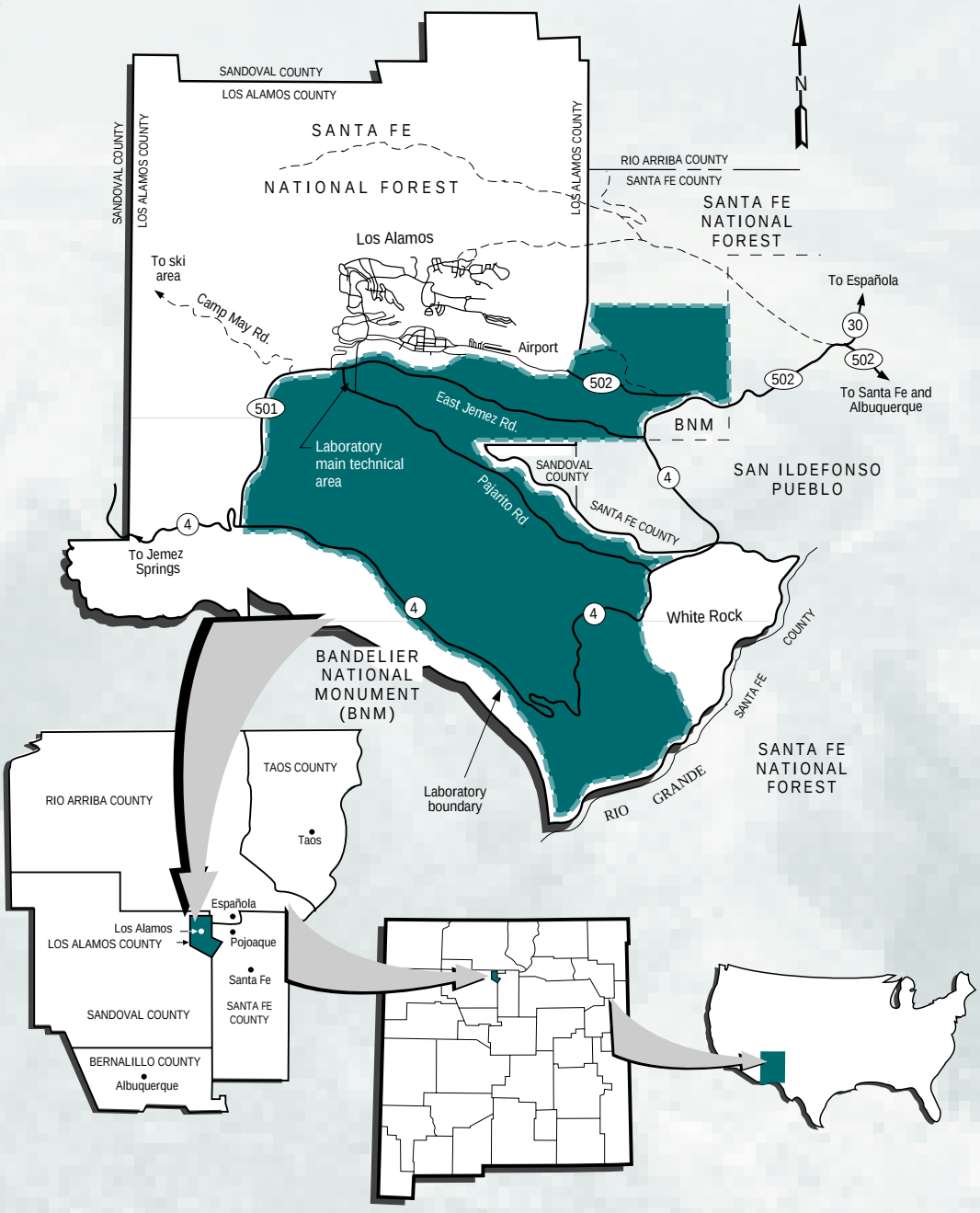
Laboratory policy requires that operations be conducted in a manner that protects human health and the environment and addresses compliance with applicable federal and state environmental protection regulations. This policy is in accordance with Department of Energy requirements to protect the public, environment, and worker health and to comply with applicable environmental laws, regulations, and federal orders.

For more than 20 years, the Laboratory has published an annual environmental surveillance report. This pamphlet provides a summary of the monitoring results and regulatory compliance status that are explained at length in *Environmental Surveillance at Los Alamos during 1998*. This pamphlet also offers an overview that briefly explains important concepts, such as radiation and associated risks. It is organized into five sections: Radiation, 1998 Dose and Risk Estimates, Management of the Environment at Los Alamos National Laboratory, Environmental Monitoring, and Environmental Compliance.

Please call the Laboratory's Ecology Group at 505-665-8961 if you have any questions about the information presented in this booklet.



Radiation

background radiation

Although some radiation is manufactured by human activities, most radiation comes from natural sources. Naturally occurring radiation, also called background radiation, is received by Earth and its inhabitants every day. Although our understanding of radiation is relatively new and is constantly being improved, radiation has always been a part of life on Earth.

Radiation from cosmic rays, terrestrial radiation, and radon contribute the most to an individual's estimated dose. Compared to the national average, there is more naturally occurring radiation in Los Alamos and White Rock residential areas because of the high altitude and naturally occurring uranium in rocks and soil. The total dose from background radiation, greater than 99% of which is from natural sources, is about 350 mrem in this area and can easily vary by 10 mrem from year to year.

human-produced radiation

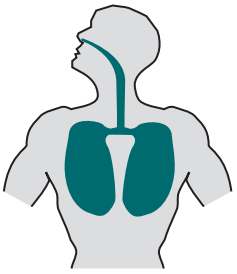
Radiation is also produced by medical procedures and industrial operations. Medical x-rays are a source of radiation, as are consumer goods such as tobacco products, porcelain dentures, television sets, smoke detectors, and microwave ovens. Some of the radiation in the environment is due to fallout from past weapons testing in various countries and nuclear research.

pathways

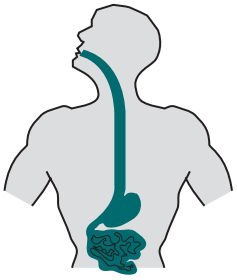
Both background and human-produced radiation have the potential to reach the public. A pathway outlines the route a radioactive contaminant may follow to reach the human population. Radioactive releases may enter the local environment by air or water and pass through soil, plants, livestock, or wildlife, ultimately reaching humans through inhalation, ingestion, or external exposure, such as absorption through skin or wounds.

Pathways

Inhalation: Breathing, Smoking

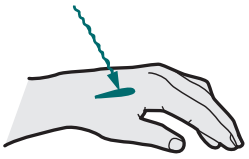


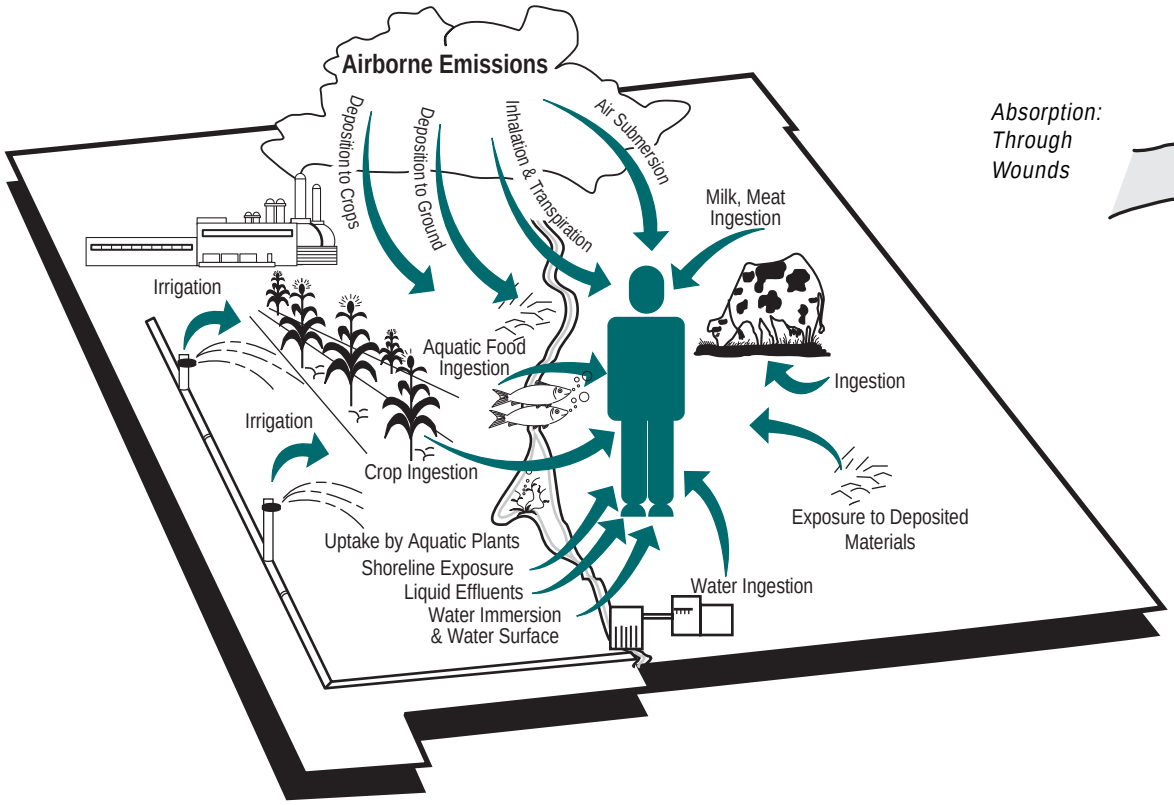
Ingestion: Eating, Drinking, Chewing



Absorption: Through Skin

Absorption: Through Wounds





1998 Dose and Risk Estimates

dose

The effects of radiation are related to dose, which is the amount of radiation received. To protect worker and public health and safety, the Department of Energy maintains dose limits based on guidance from the Environmental Protection Agency, the National Council on Radiation Protection and Measurements, and the International Commission on Radiological Protection. Radiation doses are measured in millirems and typically are assessed for the exposure of a full year.

The maximum doses permitted at Department of Energy sites are in addition to radiation from background, medical, or consumer sources. The Department of Energy's public dose limit is 100 millirem per year from all pathways: inhalation, ingestion, and external exposure. Estimates for radiation ingestion are based on an annual consumption rate.

To calculate a maximum potential dose to a member of the public, we envision an "average" Los Alamos resident who jogs by the Pajarito Laboratory Site (TA-18) each day. This hypothetical person would receive 3 millirem from TA-18 and smaller contributions from other Laboratory sources for a total dose of 3.1 millirem. This dose is 3% of the Department of Energy's public dose limit. All other members of the public would receive a smaller dose.

The Environmental Protection Agency limits the effective dose equivalent (an estimate of the total risk of potential effects from radiation exposure) to any member of the public from radioactive airborne releases from the Laboratory to 10 millirem per year. The 1998 effective dose equivalent is calculated to be 1.72 millirem, or 17% of the Environmental Protection Agency's standard.

Roentgen equivalent man (rem)

The rem is a unit for measuring dose equivalence. It is the most commonly used unit and pertains to people. The rem takes into account the energy absorbed (dose) and the biological effect on the body (quality factor) resulting from the different types of radiation.

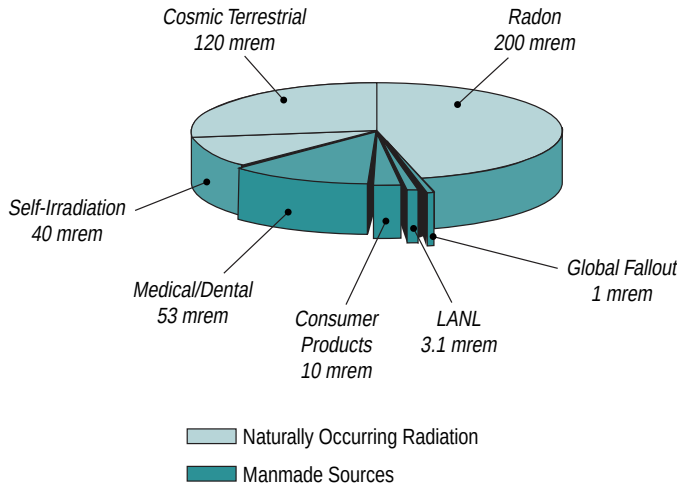
mrem = 1/1000 rem

risk

In March 1996, the Health Physics Society published a position paper on the risks of radiation exposures. They concluded that below an individual dose of 5000 millirem in one year, "risk estimates should not be used; expressions of risk should only be qualitative emphasizing the inability to detect any increased health detriment (i.e., zero health effect is the most likely outcome)." They further noted that health effects (primarily cancer) from radiation exposure are observed in humans only at doses in excess of 10 rem, or 10,000 millirem, delivered at intense dose rates.

The risk of cancer mortality for every United States resident is one chance in five. The added risk to any individual of cancer mortality caused by Laboratory operations is negligible.

Total contributions to 1998 dose for the Laboratory's maximum exposed individual.



environmental protection

The Laboratory's Environment, Safety, and Health Division prepares permits, adheres to regulations, performs and documents environmental monitoring and compliance activities, and provides technical advice in the analysis of air, water, sediments, soil, food, flora and fauna, and hazardous materials. Personnel in the Division also gather data on measurements of natural radiation and Laboratory radiation sources, monitor weather conditions to assess the movement of airborne contaminants to the environment, and conduct cultural and biological investigations across the site.

environmental oversight

The Environmental Oversight and Monitoring Agreement in Principle (known as the AIP) between the Department of Energy and the State of New Mexico provides technical and financial support from the Department of Energy for state activities in environmental oversight, environmental surveys and sampling, site visits, and document review. The State Environment Department regularly holds public meetings and publishes reports on its independent assessments of environmental quality at the Laboratory.

During 1998, the New Mexico Environment Department/Department of Energy Oversight Bureau reviewed oversight of several of the Laboratory's environmental programs. This independent monitoring program allows the Laboratory's data to be verified.

Highlights of Oversight Bureau Review

Air Quality
Overall, the Oversight Bureau's data from its air particulate samplers were similar to data reported by the Laboratory.

Water Quality
In 1998, samples taken by Bureau personnel confirmed the Water Quality and Hydrology Group's findings that high-explosive constituents found in monitoring well R-25 are above health advisory levels. During 1998, Bureau staff conducted 23 informal inspections at the Laboratory for liquid release notifications, the National Pollutant Discharge Elimination System outfall reduction program, and construction activities.

Sediments, Soils, and Foodstuffs
A preliminary comparison of the analysis of split samples from selected locations indicates Laboratory data on sediments, soils, vegetation, and foodstuffs are consistent with the Oversight Bureau's data and track historical radiological trends. Bureau personnel proposed an alternative method of uranium analysis, which the Ecology Group is reviewing.

Environmental Restoration
Bureau personnel continued to integrate the regulatory and technical requirements of the regulations governing the Environmental Restoration Project. The Oversight Bureau staff actively participated with all Environmental Restoration Project groups and were particularly active in sampling and document review at stations relevant to the hydrologic/hydrochemical characterization at the Weapons Engineering Tritium Facility (TA-16).

National Environmental Policy Act
The Oversight Bureau staff submitted an in-depth review of the Laboratory's Site-Wide Environmental Impact Statement.

environmental, safety, and health training

The Laboratory maintains an extensive training program of environmental, safety, and health courses that meet requirements of the Environmental Protection Agency, the Occupational Safety and Health Administration/Act (OSHA), the Department of Transportation regulations, and the Department of Energy regulations. All Laboratory-wide training is done using subject matter experts who validate technical content.

Training is provided for all new employees, contractors, affiliates, long-term visitors, and students. It consists of introductory information on environment, safety, and health topics such as OSHA rights and responsibilities, industrial hygiene, industrial safety, fire protection, and emergency management; general employee radiological training; administrative policies; and security requirements.

In addition, training is available as classroom, self-study, computer-based, or online training in the following categories: waste management; spill coordination; hazardous waste operations; chemical and biological hazards; dosimetry; criticality; safety courses on cranes, forklifts, lasers, lockout/tagout, electrical safety, and pressure safety; and the identification, packaging, shipment, and transport of hazardous materials and wastes, radioactive materials and wastes, explosives, and gas cylinders.

air

Air monitoring stations record concentrations of various radionuclides in the air. Concentrations of gross alpha and beta activity, tritium, plutonium, americium, and uranium are calculated. Gross alpha and beta activities are due almost entirely to the decay of natural radionuclides (primarily radon for alpha activity) and are dependent on variations in natural conditions, such as atmospheric pressure, temperature, and soil moisture. The differences typically seen in gross alpha and beta results for the various air monitoring stations are most likely attributable to these natural factors. The concentration levels of radionuclides allowed in the air are controlled by the Department of Energy's derived air concentration guides and Environmental Protection Agency regulations. The Air Quality Group routinely publishes air quality data at *http://drambuie.lanl.gov:80/~AirQuality* on the World Wide Web.

Radioactive ambient air quality during 1998 was very similar to 1997. Several instances of elevated air concentrations were investigated in 1998. These elevated air concentrations were produced by routine Laboratory operations and, in one case, by elevated tritium emissions caused by an equipment failure. None of these elevated air concentrations exceeded DOE or EPA protective standards for workers or the public.

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stack air emissions

Radioactive materials are an integral part of many activities at the Laboratory, and some of these materials may be vented to the environment through a stack. These operations are evaluated to determine impacts on the public and the environment. During 1998, the Laboratory's radioactive air emissions were much less than during 1997, due in part to a shorter run cycle at the Los Alamos Neutron Science Center. Los Alamos Neutron Science Center operating personnel have developed and implemented a delay line to reduce gaseous/mixed activation product emissions. These emissions were reduced by 28.8% when compared with similar operations without the benefit of the delay line.

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external penetrating radiation

Levels of external penetrating radiation (the radiation originating from a source outside the body, including x-rays, gamma rays, and charged particle contributions from cosmic, terrestrial, and manmade sources) are measured with thermoluminescent dosimeters. Elevated values were noted in Mortandad Canyon and near a former waste site. Above-background doses are measured by dosimeters near TA-18; the maximum total dose a frequent user of Pajarito Road might have received is 3 millirem.

Comparison of 1997 and 1998 Airborne Releases of Radionuclides from Laboratory Operations

Airborne Emissions from Monitored Stacks

		Activity Released		Ratio
Radionuclide	Units	1997	1998	1998:1997
Tritium	Ci	420	825	2.0
Uranium	μCi	22	31	1.4
Plutonium	μCi	3.7	11	3.0
Gaseous mixed activation products	Ci	19,570	7860	0.4
Particulate/vapor activation products	Ci	0.93	3.3	3.5
Total	Ci	19,991	8688	0.4

Ci = Curie, which is the standard unit of measuring radioactivity; 1 Ci = 3.7×10^{10} nuclear transformations per second.
μCi = microCurie, or 0.000001 of a Curie

water

Within the Laboratory boundary, sources of surface water include spring snowmelt, summer storm runoff, and flow from outfalls that are regulated by the National Pollutant Discharge Elimination System of the Clean Water Act. Surface water is monitored on and adjacent to the Laboratory and at regional locations. Levels of plutonium, tritium, strontium, americium, uranium, cesium, alpha and beta particles, and gamma rays are measured at these stations. In 1998, all surface water measurements except 7 gross alpha readings and 1 plutonium-238 reading were below the Department of Energy's derived concentration guides that limit exposure to the public for radioactive effluents in water. Surface water is monitored for its content of metals and inorganic chemicals to detect possible contamination resulting from Laboratory operations. Surface waters at the Laboratory are not a source of drinking or household water.

Groundwater is also monitored to determine its quality. The regional aquifer beneath Los Alamos is the primary source of drinking water for the Laboratory and the residents of Los Alamos County. Groundwater samples from the regional aquifer were consistent with previous results. Drilling of monitoring well R-25 at the Weapons Engineering Tritium Facility revealed the presence in the regional aquifer of high-explosive constituents at concentrations that are above the Environmental Protection Agency Health Advisory guidance values for drinking water. Testing of water supply wells showed that these compounds are not present in drinking water.

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Trace levels of tritium are present in the regional aquifer in a few areas where liquid waste discharges occurred. The tritium levels found in a regional aquifer test well range from less than 2% to less than 0.01% of the drinking water standard and pose no health risk according to the US Public Health Service. Sporadic apparent detections of strontium-90 in regional aquifer wells are not repeatable and probably are analytical artifacts.

The long-term trends of water levels in the water supply and test wells in the regional aquifer indicate that there is little depletion of the resource as a result of pumping for the Los Alamos water supply.

sediments

Sediments are monitored on and near the Laboratory and at regional locations for the presence of tritium; uranium; plutonium; cesium; strontium; americium; and alpha, beta, and gamma activity. In 1998, data from sediment sampling were consistent with results from previous years; none of the sediment samples showed any activity of radioactive substance that exceeded screening action levels (the level at which further evaluation is required by the Environmental Restoration Project) except on Laboratory property in Mortandad and Pueblo Canyons where three stations exceeded the screening action levels for cesium-137. Sediments are also monitored for trace metals, such as antimony and mercury, and organic contaminants, such as polychlorinated biphenyls (PCB). The 1998 results showed no concentrations above the limits of quantitation levels for trace metals and organic contaminants.

soils

Soils are monitored both on- and off-site for tritium; strontium; cesium; uranium; plutonium; americium; and alpha, beta, and gamma activities. All levels were within acceptable values, and no action was required to reduce levels of any radioactive element in the soil. Soils are analyzed for trace and heavy metals, such as beryllium, lead, and mercury. In 1998, all trace elements were within acceptable levels for the Los Alamos region.

Trend analyses show that radionuclides in soils, particularly tritium and uranium, from both on- and off-site areas have been decreasing over time, so that today most radionuclides are approaching values close to background levels.

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foodstuffs and associated biota

During 1998, samples of fruits, vegetables, herbal tea, honey, milk, piñon, eggs, squirrels, fish, deer, elk, and beef cows were collected from the Laboratory and surrounding areas, including several Native American Pueblo communities, to determine the impact of Laboratory operations on the human food chain.

Foodstuff samples from Laboratory and perimeter locations showed that most radioactivity was attributable to natural sources and/or worldwide fallout. Similarly, all trace elements, including beryllium and lead, in produce from Laboratory and perimeter areas were within regional background concentrations.

One elk, collected near a site heavily contaminated with natural and depleted uranium, contained higher uranium concentrations in muscle tissue than background elk.

Most radionuclide concentrations, particularly tritium, total uranium, and cesium-137, in muscle tissue of squirrels collected near TA-53 were higher than levels in squirrels from perimeter and background locations.

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The Laboratory operates under all applicable federal and state environmental, safety, and health laws, codes, orders, and standards. Environmental regulatory agencies include the Environmental Protection Agency and the New Mexico Environment Department. The Department of Energy issues orders that also regulate environmental activities at the Laboratory. Laboratory operations are subject to the following environmental laws.

Resource Conservation and Recovery Act (RCRA) and its Hazardous and Solid Waste Amendments (HSWA)

RCRA requires the Laboratory to regulate hazardous and solid waste, from generation to disposal. Also, RCRA requires the Laboratory to attempt to reduce the amount of hazardous waste produced and to reduce the toxicity of generated hazardous waste by treatment before disposal. Laboratory staff had frequent interactions with federal and state RCRA personnel during 1998. The Laboratory met the 1998 deadlines and milestones required by the Site Treatment Plan for treating mixed waste generated at the Laboratory; over 500 cubic meters of mixed waste were treated and disposed.

The New Mexico Environment Department conducted its annual hazardous waste compliance inspection from August through September 1998. The inspection team visited 544 sites at the Laboratory. New Mexico Environment Department inspectors noted 35 apparent violations of RCRA, including exceeding storage time limits, failing to label a waste container, and failing to document required RCRA training. The New Mexico Environment Department had not issued a formal Compliance Order by the end of 1998 for either the 1998 or 1997 inspections.

RCRA - From Cradle to Grave Tracking of Hazardous Materials

In 1995, the Hazardous and Solid Waste Group began the self-assessment program in cooperation with waste management coordinators to assess the Laboratory's performance in the proper storage and handling of hazardous and mixed waste to meet federal and state regulations, DOE orders, and Laboratory policy. In 1998, we completed 645 quarterly self-assessments.

In 1998, the activities conducted by the Environmental Restoration Project remained in compliance with Module VIII of the RCRA Hazardous Waste Facility Permit that incorporates HSWA regulations. Remedial activities conducted during 1998 included cleanup of seven sites including surface disposal areas and firing sites. The Environmental Restoration Project demolished five contaminated structures. The Laboratory's Environmental Restoration Project originally consisted of approximately 2,100 potential release sites (PRSs). By the end of 1998, approximately 1,200 PRSs still require investigation and/or remediation, and 109 buildings await decontamination and decommissioning.

In August 1998, the EPA confirmed that all underground storage tanks (USTs) that had been installed before December 22, 1988, and that had not already been protected against corrosion, spills, and overfills would have to be upgraded, replaced, or properly closed by December 22, 1998. During 1998, the Laboratory closed five of its remaining seven USTs, resulting in a decrease of USTs from 39 in 1988 to

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2 in 1998. This is the largest reduction of USTs at any registered facility in the state.

Nonhazardous and municipal-type solid wastes generated by Laboratory operations during 1998 accounted for 17% (7,452 tons) of the total volume disposed of at the Los Alamos County landfill. In 1998, approximately 8,800 tons of solid sanitary waste—paper, cardboard, phone books, construction materials, brush, and rubble—that would have been sent to the county landfill were recycled.

The Laboratory received three compliance orders during 1998 that alleged noncompliance with the NM Hazardous Waste Management Regulations. Compliance Order 98-01 was received on June 8, 1998, and alleged sampling and analytical deficiencies at the DP Tank Farms at TA-21. As part of the ordered actions, the Laboratory submitted a Sampling and Analysis Plan to the New Mexico Environment Department to address the alleged deficiencies in October 1998. Upon approval by the New Mexico Environment Department, the Laboratory will begin remedial activities. The Laboratory received Compliance Order 98-02 on June 25, 1998, that alleged violations in the storage of gas cylinders. This Compliance Order had not been resolved by the end of 1998. On June 26, 1998, the Laboratory received Compliance Order 98-03 alleging violations concerning the waste determination and disposal status of asphalt and soil removed from TA-54 during construction activities. The Compliance Order was settled and dismissed by the New Mexico Environment Department.

The Legacy Materials Cleanup project was completed on September 30, 1998. The project required organizations to identify, inventory, and stage all materials for which an owner or programmatic purpose could not be identified. A legacy materials work-off team visited all sites in the Laboratory and collected the materials identified by the organizations, properly characterized them, and determined a disposition path for them. The team collected and appropriately managed more than 22,500 items during this project. The Laboratory can now confidently state that it has addressed all legacy materials that could be identified as waste.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

CERCLA outlines the appropriate responses to certain substance releases to the environment. Based on site assessments and inspections, the Environmental Protection Agency ranks potentially health threatening or environmentally unsound hazards at facilities. Special attention is given to these hazardous sites, which are maintained on a national priority list. The Laboratory is not included on the national priority list but is subject to the CERCLA guidelines for remediating Environmental Restoration Project sites that contain certain hazardous substances not covered by RCRA.

Emergency Planning and Community Right-to-Know Act (EPCRA)

The Laboratory submitted two annual reports cited by EPCRA. One report listed the quantity and location of 47 chemicals and explosives that exceeded threshold amounts. The material safety data sheet for each chemical and/or explosive was included in the report. During 1998, the Laboratory also submitted a Toxic Chemical Inventory Report to the Environmental Protection Agency and the New Mexico Emergency Management Bureau covering releases of approximately 29,400 pounds of nitric acid that were used in plutonium metal processing. There were no other leaks, spills, or other releases of specific chemicals into the environment that required reporting during 1998.

Toxic Subtances Control Act (TSCA)

TSCA regulates the Laboratory's use, storage, handling, and disposal of products and equipment containing polychlorinated biphenyls (PCB). PCBs are commonly found in oil products and may cause adverse health effects in humans.

In 1998, the Laboratory had 31 off-site shipments of PCB waste. PCB wastes are sent to Environmental Protection Agency–permitted disposal and treatment facilities. The Environmental Protection Agency did not conduct an audit of the Laboratory's PCB management program during 1998.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA regulates the manufacturing and application of pesticides. The Laboratory is subject to FIFRA and the New Mexico Pest Control Act. The New Mexico Department of Agriculture conducted an inspection of the Laboratory's pesticide application program during March 1998. No deficiencies were noted.

Clean Air Act (CAA) and New Mexico Administrative Code (NMAC)

The CAA and the NMAC are federal and state codes concerning air quality and emissions. Both radioactive and nonradioactive emissions to the air are screened carefully to protect the public, the ozone layer, and the environment. The effective dose equivalent from the Laboratory's 1998 radioactive air emissions was below the Environmental Protection Agency's limit of 10 millirem per year to any member of the public. The effective dose equivalent was calculated to be 1.72 millirem using methods that have been approved by the Environmental Protection Agency.

In 1998, the Laboratory reviewed more than 100 construction or modification projects to determine if they could cause airborne radioactive emissions. After review, none of the projects was shown to require preconstruction approval.

During 1997, the Department of Energy and the Director of the Laboratory entered into a Consent Degree and Settlement Agreement to resolve a lawsuit filed by the Concerned Citizens for Nuclear Safety group in 1994. The suit alleged that the Laboratory was not in full compliance with the Radionuclide National Emission Standards for Hazardous Air Pollutants provisions of the CAA. Many of the provisions of the decree and agreement were completed or continued in 1998.

Clean Water Act (CWA)

The primary goal of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The three primary programs at the Laboratory established to comply with the CWA are the National Pollutant Discharge Elimination System (NPDES) programs, the Spill Prevention Control and Countermeasures (SPCC) program, and the Section 404/401 Dredge and Fill Permit program.

The NPDES permits establish specific chemical, physical, and biological criteria that an effluent must meet before it is released to the environment. Although most of the Laboratory's effluent is discharged to normally dry arroyos, the Laboratory is required to meet effluent limitations under the NPDES permit program.

The University of California and the Department of Energy are copermittees on the permits covering Los Alamos. The permits are issued and enforced by the Environmental Protection Agency, Region 6, in Dallas, Texas. The New Mexico Environment Department performs some inspections and monitoring for the Environmental Protection Agency. In 1998, Laboratory compliance for the sanitary and industrial waste discharges was 99.4% and 99.3%, respectively. One exceedance occurred at the TA-46 Sanitary Wastewater Systems Facility; seven exceedances occurred at industrial outfalls. No water quality parameters were exceeded. The Laboratory investigated the cause of all exceedances and took corrective actions where appropriate.

As of November 1997, all sewage sludge generated at the TA-46 plant is handled, sampled, and disposed of in accordance with TSCA regulations for 50–499 parts per million PCB-contaminated waste. During 1998, 29.2 dry tons of sewage sludge generated at the Laboratory's Sanitary Wastewater Systems Facility as part of routine wastewater treatment operations were disposed of as 50–499 ppm PCB-contaminated waste at a TSCA-permitted landfill.

In May 1997, the New Mexico Environment Department Surface Water Quality Bureau conducted a compliance evaluation inspection at the Sanitary Wastewater Systems Facility. Most deficiencies noted were administrative in nature, and all concerns have been addressed by the Laboratory. A compliance evaluation inspection was not conducted by the NMED during 1998.

During 1998, the Laboratory had 4 NPDES permits for its storm water discharges. The conditions of these permits require the development and implementation of a Storm Water Pollution Prevention Plan and storm water runoff monitoring at selected facilities. The Laboratory applied for coverage under the new NPDES Storm Water Construction Permit for three existing projects. On August 5, 1998, the Environmental Protection Agency closed out the Administrative Order and Federal Facilities Compliance Agreement for the Waste Stream Characterization Program and High-Explosives Wastewater Treatment Facility.

The Laboratory also has an SPCC Plan, as required by the CWA, which is designed to ensure that adequate prevention and response measures are provided to prevent oil spills from reaching a watercourse. The Laboratory has SPCC plans for the 26 aboveground oil storage tanks that operated during 1998.

The Laboratory has eleven permits under the CWA, Section 404/401 program; discharge activities permitted include utility lines, road crossings, headwaters and isolated waters, wetland/riparian areas, survey activities, bank stabilization, and scientific measuring devices.

Safe Drinking Water Act (SDWA)

On September 8, 1998, operation of the Los Alamos Water Supply System was transferred from the Laboratory to Los Alamos County, under a lease agreement. Responsibility for compliance monitoring under the SDWA and the New Mexico Drinking Water Regulations was transferred to the county. To ensure a smooth transition, the Laboratory continued to collect SDWA compliance samples throughout the remainder of 1998.

Drinking water samples are routinely collected from the Laboratory's, Los Alamos County's, and Bandelier National Monument's water distribution systems and the Laboratory's water supply wellheads to determine the levels of microbiological organisms, organic and inorganic chemical constituents, and radioactivity in the drinking water. During 1998, all parameters regulated under the SDWA were in compliance with the maximum contaminant levels established by regulation. The New Mexico Environment Department did not inspect the drinking water system during 1998.

Endangered Species Act

In 1998, the Department of Energy and the Laboratory's Ecology Group completed a three-year effort to develop a habitat management plan (HMP) for the threatened and endangered species at the Laboratory. The four threatened or endangered species that could potentially reside on the Laboratory's property include the bald eagle, American peregrine falcon, Mexican spotted owl, and Southwestern willow flycatcher. The HMP identifies the location of habitat for these species at the Laboratory. It also provides guidelines to protect these species and their habitats from disturbance or adverse habitat alteration caused by the Laboratory's operations. The HMP will be amended to address new species as changes occur in the status of species over time. The Area of Environmental Interest Site Plans and the Monitoring Plans within the HMP are tightly integrated to ensure that the short- and long-term implementation of the HMP is functional, effective, and accurate.

National Environmental Policy Act (NEPA)

NEPA's objective is to maintain or restore compatibility between humanity and the environment, in the present and in the future. NEPA requires federal agencies to consider the environmental impact of their actions before deciding to proceed with those actions. Laboratory personnel reviewed proposed Laboratory projects for NEPA during 1998. The Department of Energy, as the Laboratory's sponsoring agency, is responsible for preparation and approval of NEPA documents.

Under DOE's compliance strategy for NEPA, a Site-Wide Environmental Impact Statement (SWEIS) was prepared to examine the environmental impacts of operations at a multiprogram site. An earlier SWEIS was prepared in 1979. The draft SWEIS was released on May 15, 1998, for a 60-day review and comment period by the state, Indian Tribes, local governments, other federal agencies, and the general public. Work on the final SWEIS continued through the rest of 1998.

DOE is preparing an Environmental Impact Statement to assess the environmental impacts of conveying or transferring certain land tracts to Los Alamos County and to the Secretary of the Interior in trust for the Pueblo of San Ildefonso.

Two Environmental Assessments were completed during 1998, and three were continued through 1998. NEPA also requires DOE to prepare and implement Mitigation Action Plans to document adverse environmental impacts and establish action plans. Two Mitigation Action Plans were implemented in 1998, and one is awaiting approval.

The Environmental Publications and Design Team of the Ecology Group (ESH-20) would like to thank Meghan Mee for updating this overview. Julie Johnston and Robert Prommel coordinated the technical review. We'd also like to thank the members of the following Los Alamos National Laboratory groups for their contributions to the booklet.

ESH-17, Air Quality
ESH-18, Water Quality & Hydrology
ESH-19, Hazardous & Solid Waste
ESH-20, Ecology
EM, Environmental Management

This publication was produced by the Communication Arts & Services Group (CIC-1).

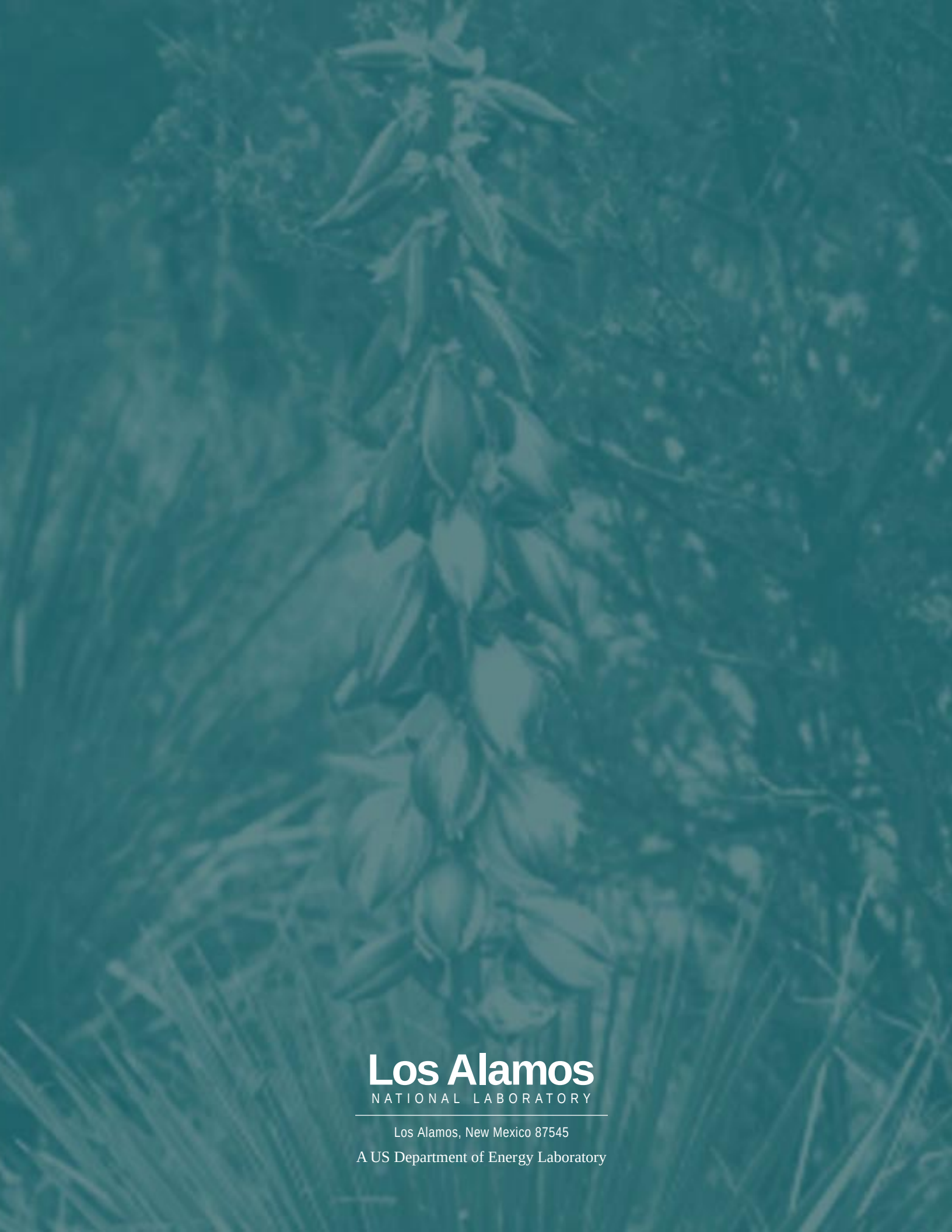
Design: Susan Carlson
Editing: Nikki Goldman
Illustration: Jim Mahan and Dennis Olive
Printing Coordination: Lupe Archuleta

Illustration retrieval numbers:

page 3 esh 96-379c
page 4 esh 96-365c, esh 96-376c
page 5 CIC-1/98-1539a
page 12 Environmental Protection Agency

Photography: CIC-9 where indicated by photo negative number; all other photos were provided by Laboratory organizations.

Cover Teralene Foxx
page 1 ESH 20
page 7 RN99 243 033
page 8 RN99 243 015
page 9 di991882
page 10 ESH-18, di991886
page 11 ESH-20, RN99 253 005, di991883, di991884, di991889
page 13 Teralene Foxx (di99 1885)
page 15 Teralene Foxx (di991887)
page 16 stock photo



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