1. Introduction

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A. BACKGROUND AND REPORT PURPOSE

1. Introduction to Los Alamos National Laboratory

In March 1943, a small group of scientists came to Los Alamos for Project Y of the Manhattan Project. Their goal was to develop the world's first nuclear weapon. Although planners originally expected that the task would require only 100 scientists, by 1945, when the first nuclear bomb was tested at Trinity Site in southern New Mexico, more than 3,000 civilian and military personnel were working at Los Alamos Laboratory. In 1947, Los Alamos Laboratory became Los Alamos Scientific Laboratory, which in turn became Los Alamos National Laboratory (LANL or the Laboratory) in 1981. Through May 2006, the Laboratory was managed by the Regents of the University of California (UC) under a contract administered by the National Nuclear Security Administration (NNSA) of the US Department of Energy (DOE) through the Los Alamos Site Office and the NNSA Service Center based in Albuquerque, NM. In June 2006, a new management organization, Los Alamos National Security (LANS), LLC, took over management of the Laboratory.

The Laboratory's original mission to design, develop, and test nuclear weapons has broadened and evolved as technologies, US priorities, and the world community have changed. The current mission is to develop and apply science and technology to

- Ensure the safety and reliability of the US nuclear deterrent;
- Reduce global threats; and
- Solve other emerging national security challenges (LANL 2005a).

Los Alamos National Laboratory defines its vision as: "Los Alamos, the premier national security science laboratory." The Laboratory has identified 12 strategic goals to implement its vision and mission:

1. Make safety and security integral to every activity we do.
2. Implement a cyber security system that reduces risk while providing exemplary service and productivity.
3. Establish excellence in environmental stewardship.
4. Assess the safety, reliability, and performance of LANL weapons systems.
5. Transform the Laboratory and the nation's nuclear weapons stockpile to achieve the 2030 vision, in partnership with the [DOE] Complex.
6. Leverage our science and technology advantage to anticipate, counter, and defeat global threats and meet national priorities, including energy security.
7. Be the premier national security science laboratory and realize our vision for a capabilities-based organization.

8. Provide efficient, responsive, and secure infrastructure and disciplined operations that effectively support the Laboratory mission and its workforce.
9. Implement a performance-based management system that drives mission and operational excellence.
10. Deliver improved business processes, systems, and tools that meet the needs of our employees, reduce the cost of doing business, and improve the Laboratory's mission performance.
11. Communicate effectively with our employees, customers, community, stakeholders, and the public at large.
12. Develop employees and create a work environment to achieve employee and Laboratory success.

Inseparable from the Laboratory's commitment to excellence in science and technology is its commitment to complete all work in a safe, secure, and environmentally responsible manner. The Laboratory uses Integrated Safety Management (ISM) to set, implement, and sustain safety performance and meet environmental expectations. In addition, the Laboratory uses an International Standards Organization (ISO) 14001-2004 registered Environmental Management System (EMS) as part of ISM to focus on environmental performance, protection, and stewardship (see Section D of this chapter for additional information). The foundation of the EMS and the demonstration of the Laboratory's commitment is the LANL environmental policy:

- We approach our work as responsible stewards of our environment to achieve our mission.
- We prevent pollution by identifying and minimizing environmental risk.
- We set quantifiable objectives, monitor progress and compliance, and minimize consequences to the environment, stemming from our past, present, and future operations.
- We do not compromise the environment for personal, programmatic, or operational reasons.

2. Purpose of this Report

As part of the Laboratory's commitment to our environmental policy, we will monitor and report on how Laboratory activities are affecting the environment. The objectives of this environmental surveillance report, as directed by DOE Order 231.1 (DOE 2004), are to

- Characterize site environmental management performance including effluent releases, environmental monitoring, and estimated radiological doses to the public and the environment.
- Summarize environmental occurrences and responses reported during the calendar year.
- Confirm compliance with environmental standards and requirements.
- Highlight significant programs and efforts, including environmental performance indicators and/or performance measures programs.

Over and above the DOE requirements, the Laboratory establishes annual environmental objectives, targets, and key performance indicators through the EMS. The current objectives are to

- Ensure environmental compliance.
- Reduce waste.
- Improve Laboratory-wide energy and fuel conservation.
- Conduct Laboratory-wide cleanout activities to dispose of unneeded equipment, materials, chemicals, and associated waste by October 2011.
- Achieve zero liquid discharge by 2012.

B. ENVIRONMENTAL SETTING

1. Location

The Laboratory and the associated residential and commercial areas of Los Alamos and White Rock are located in Los Alamos County, in north-central New Mexico, approximately 60 miles north-northeast of Albuquerque and 25 miles northwest of Santa Fe (Figure 1-1). The 40-square-mile Laboratory is situated on the Pajarito Plateau, which consists of a series of finger-like mesas separated by deep east-to-west-oriented canyons cut by streams. Mesa tops range in elevation from approximately 7,800 ft on the flanks of the Jemez Mountains to about 6,200 ft near the Rio Grande Canyon. Most Laboratory and community developments are confined to the mesa tops.

The surrounding land is largely undeveloped, and large tracts of land north, west, and south of the Laboratory site are held by the Santa Fe National Forest, the US Bureau of Land Management, Bandelier National Monument, the US General Services Administration, and Los Alamos County. Pueblo de San Ildefonso borders the Laboratory to the east.

2. Geology and Hydrology

The Laboratory lies at the western boundary of the Rio Grande Rift, a major North American tectonic feature. Three major potentially active local faults constitute the modern rift boundary. Studies indicate that the seismic surface rupture hazard associated with these faults is localized (Gardner et al., 1999). Most of the finger-like mesas in the Los Alamos area (Figure 1-2) are formed from Bandelier Tuff, which includes ash fall, ash fall pumice, and rhyolite tuff. Deposited by major eruptions in the Jemez Mountains volcanic center 1.2–1.6 million years ago, the tuff is more than 1,000 ft thick in the western part of the plateau and thins to about 260 ft eastward above the Rio Grande.

On the western part of the Pajarito Plateau, the Bandelier Tuff overlaps onto the Tschicoma Formation, which consists of older volcanics that form the Jemez Mountains. The tuff is underlain by the conglomerate of the Puye Formation in the central plateau and near the Rio Grande. The Cerros del Rio Basalts interfinger with the conglomerate along the river. These formations overlie the sediments of the Santa Fe Group, which extend across the Rio Grande Valley and are more than 3,300 ft thick.

Surface water in the Los Alamos region occurs primarily as short-lived or intermittent reaches of streams. Perennial springs on the flanks of the Jemez Mountains supply base flow into the upper reaches of some canyons, but the volume is insufficient to maintain surface flows across the Laboratory property before the water is depleted by evaporation, transpiration, and infiltration.

Groundwater in the Los Alamos area occurs in three modes: (1) water in shallow alluvium in canyons, (2) intermediate perched water (a body of groundwater above a less permeable layer that is separated from the underlying main body of groundwater by an unsaturated zone), and (3) the regional aquifer, which is the only aquifer in the area capable of serving as a municipal water supply. Water in the regional aquifer is in artesian conditions under the eastern part of the Pajarito Plateau near the Rio Grande (Purtymun and Johansen 1974).

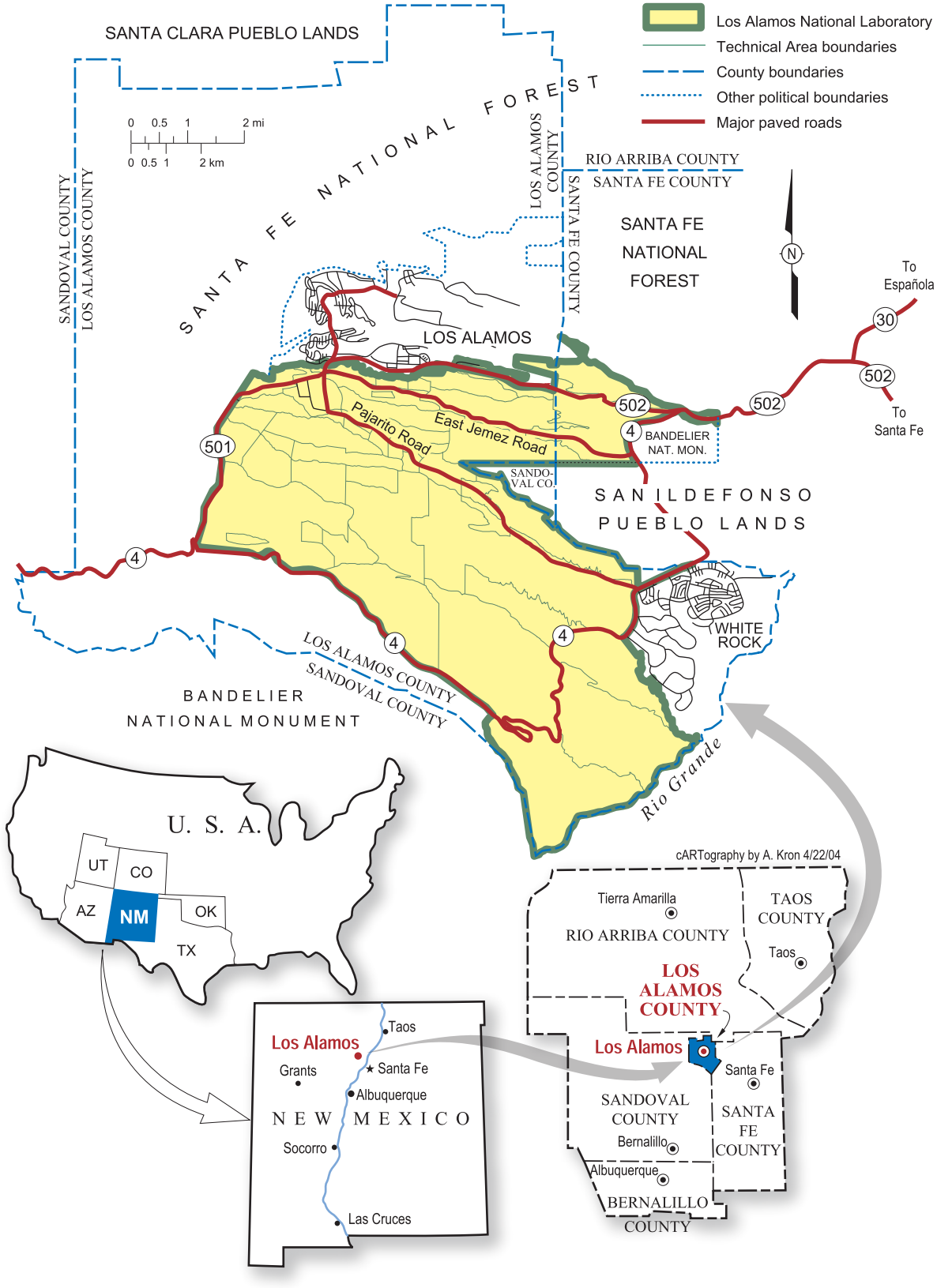


Figure 1-1. Regional location of Los Alamos National Laboratory.

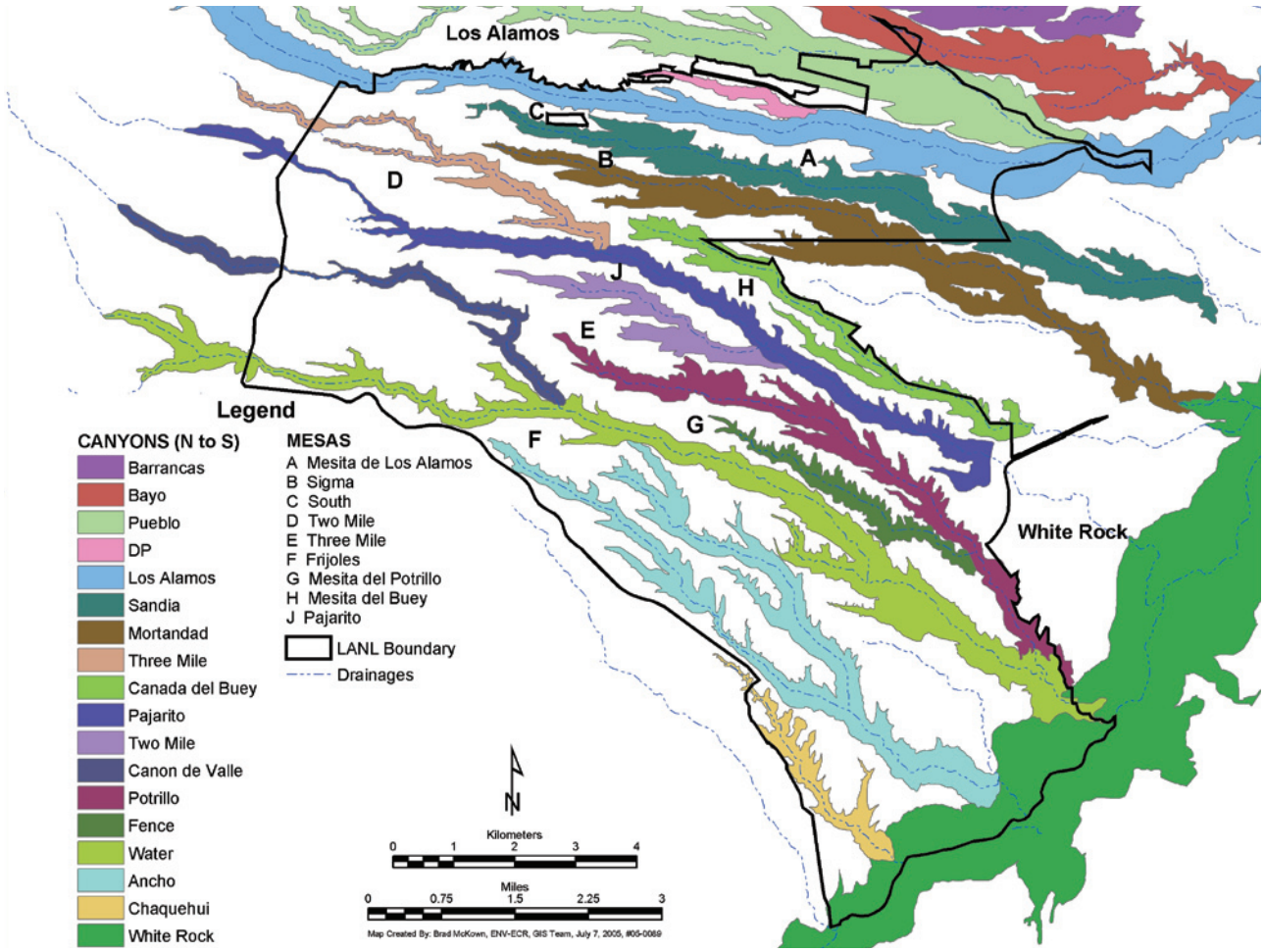


Figure 1-2. Major canyons and mesas on Laboratory land.

The source of most recharge to the regional aquifer appears to be infiltration of precipitation that falls on the Jemez Mountains. The regional aquifer discharges into the Rio Grande through springs in White Rock Canyon. The 11.5-mi reach of the river in White Rock Canyon, between Otowi Bridge and the mouth of Rio de los Frijoles, receives an estimated 4,300–5,500 ac-ft of water from the regional aquifer.

3. Biological Resources

The Pajarito Plateau, including the Los Alamos area, is biologically diverse. This diversity of ecosystems is due partly to the dramatic 5,000-ft elevation gradient from the Rio Grande on the east of the plateau up to the Jemez Mountains 12 mi (20 km) to the west and also due partly to the many steep canyons that dissect the area. Five major vegetative cover types are found in Los Alamos County. The juniper (*Juniperus monosperma* Englem. Sarg.)-savanna community is found along the Rio Grande on the eastern border of the plateau and extends upward on the south-facing sides of canyons at elevations between 5,600 and 6,200 ft. The piñon (*Pinus edulis* Engelm.)-juniper cover type, generally between 6,200 to 6,900 ft in elevation, covers large portions of the mesa tops and north-facing slopes at the lower elevations. Ponderosa pine (*Pinus ponderosa* P. & C. Lawson) communities are found in the western portion of the plateau between 6,900 and 7,500 ft in elevation. These three vegetation types predominate the plateau, each occupying roughly one-third of the Laboratory site. The mixed conifer cover type, at an elevation of 7,500 to 9,500 ft, overlaps the Ponderosa pine community in the deeper canyons and on north-facing slopes and extends from the higher mesas onto the slopes of the Jemez Mountains. Spruce (*Picea* spp.)-fir (*Abies* spp.) is at higher elevations of 9,500 to 10,500 ft. Several wetlands and riparian areas enrich the diversity of plants and animals found on the plateau.

In May 2000, the Cerro Grande fire burned more than 43,000 acres of forest in and around LANL. Most of the habitat damage occurred on Forest Service property to the west and north of LANL. Approximately 7,684 acres, or 28% of the vegetation at LANL, was burned to varying degrees by the fire. However, few areas on LANL property were burned severely. Wetlands in Mortandad, Pajarito, and Water Canyons received increased amounts of ash and hydromulch in runoff because of the fire.

The extreme drought conditions prevalent in the Los Alamos area and all of New Mexico from 1998 through 2003 resulted directly and indirectly in the mortality of many trees. Between 2002 and 2005 more than 90% of the piñon trees greater than 10 ft tall died in the Los Alamos area. Lower levels of mortality also occurred in ponderosa and mixed conifer stands. Mixed conifers on north-facing canyon slopes at lower elevations experienced widespread mortality. These changes likely will have long-lasting impacts to vegetation community composition and distribution.

4. Cultural Resources

The Pajarito Plateau is an archaeologically rich area. Approximately 86% of DOE land in Los Alamos County has been surveyed for prehistoric and historic cultural resources, and more than 1,800 sites have been recorded. During fiscal year 2006, sites that have been excavated since the 1950s were removed from the overall site count numbers. Thus, the number of recorded sites is less than in reports from previous years. More than 85% of the resources are Ancestral Pueblo and date from the 13th, 14th, and 15th centuries. Most of the sites are found in the piñon-juniper vegetation zone, with 80% lying between 5,800 and 7,100 ft. Almost three-quarters of all cultural resources are found on mesa tops. Buildings and structures from the Manhattan Project and the early Cold War period (1943–1963) are being evaluated for eligibility for listing in the National Register of Historic Places, and more than 320 buildings have been evaluated to date. In addition, "key facilities" (facilities considered of national historic significance) dating from 1963 to the end of the Cold War in 1990 are being evaluated.

5. Climate

Los Alamos County has a temperate, semiarid mountain climate. Large differences in locally observed temperature and precipitation exist because of the 1,000-ft elevation change across the Laboratory site and the complex topography. Four distinct seasons occur in Los Alamos County. Winters are generally mild, with occasional winter storms. Spring is the windiest season. Summer is the rainy season, with occasional afternoon thunderstorms. Fall is typically dry, cool, and calm.

Daily temperatures are highly variable (a 23˚F range on average). On average, winter temperatures range from 30˚F to 50˚F during the daytime and from 15˚F to 25˚F during the nighttime. The Sangre de Cristo Mountains to the east of the Rio Grande Valley act as a barrier to wintertime arctic air masses that descend into the central United States, making the occurrence of local subzero temperatures rare. On average, summer temperatures range from 70˚F to 88˚F during the daytime and from 50˚F to 59˚F during the nighttime.

From 1971 to 2000, the average annual precipitation (which includes both rain and the water equivalent of frozen precipitation) was 18.95 in., and the average annual snowfall amount was 58.7 in. (Note: By convention, full decades are used to calculate climate averages [WMO 1984].) The months of July and August account for 36% of the annual precipitation and encompass the bulk of the rainy season, which typically begins in early July and ends in early September. Afternoon thunderstorms form as moist air from the Pacific Ocean and the Gulf of Mexico is convected and/or orographically lifted by the Jemez Mountains. The thunderstorms yield short, heavy downpours and an abundance of lightning. Local lightning density, among the highest in the United States, is estimated at 15 strikes per square mile per year. Lightning is most commonly observed between May and September (about 97% of the local lightning activity).

The complex topography of the Pajarito Plateau influences local wind patterns. Often a distinct diurnal cycle of winds occurs. Daytime winds measured in the Los Alamos area are predominately from the south, consistent with the typical upslope flow of heated daytime air moving up the Rio Grande valley. Nighttime winds (sunset to sunrise) on the Pajarito Plateau are lighter and more variable than daytime winds and typically from the west, resulting from a combination of prevailing winds from the west and downslope flow of cooled mountain air. Winds atop Pajarito Mountain are more representative of upper-level flows and primarily range from the northwest to the southwest, mainly because of the prevailing westerly winds.

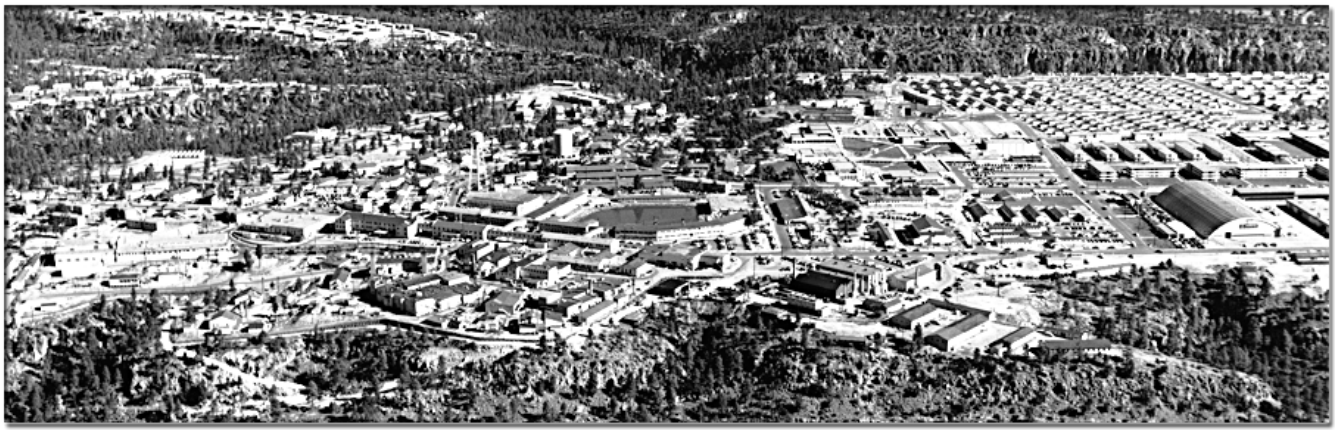
C. LABORATORY ACTIVITIES AND FACILITIES

The Laboratory is divided into technical areas (TAs) used for building sites, experimental areas, support facilities, roads, and utility rights-of-way (Appendix C and Figure 1-3). However, these uses account for only a small part of the total land area; much of the LANL land provides buffer areas for security and safety or is held in reserve for future use. The Laboratory has about 2,000 structures, with approximately 8.6 million square feet under roof, spread over an area of approximately 40 square miles.

In its 1999 Site-Wide Environmental Impact Statement (SWEIS) (DOE 1999), LANL identified 15 Laboratory facilities as "Key Facilities" for the purposes of facilitating a logical and comprehensive evaluation of the potential environmental impacts of LANL operations (Table 1-1). Operations in the Key Facilities represent the majority of exposures associated with LANL operations. In 2005, DOE/NNSA decided to prepare a new SWEIS. The new SWEIS was completed in early 2008, with a Record of Decision (ROD) scheduled to be issued later in 2008. Until a ROD is issued for the new SWEIS, LANL operations continue to be conducted under the existing 1999 SWEIS ROD. The facilities identified as "key" in the 1999 SWEIS are those that house activities critical to meeting work assignments given to LANL and also include the following facilities:

- Those that house operations that could potentially cause significant environmental impacts,
- Those that are of most interest or concern to the public based on SWEIS scoping comments, or
- Those that would be the most subject to change because of programmatic decisions.

In the 1999 SWEIS and in the new SWEIS, the remaining LANL facilities were identified as "Non-Key Facilities" because these facilities do not meet the above criteria. The Non-Key Facilities comprise all or the majority of 30 of LANL's 48 TAs and approximately 14,224 acres of LANL's 26,480 acres (Table 1-1). The Non-Key Facilities also currently employ about 42% of the total LANL workforce. The Non-Key Facilities include such important buildings and operations as the Nicholas C. Metropolis Center for Modeling and Simulation (Metropolis Center), the Nonproliferation and International Security Center (NISC), the new National Security Sciences Building (NSSB) that is now the main administration building, and the TA-46 sewage treatment facility.



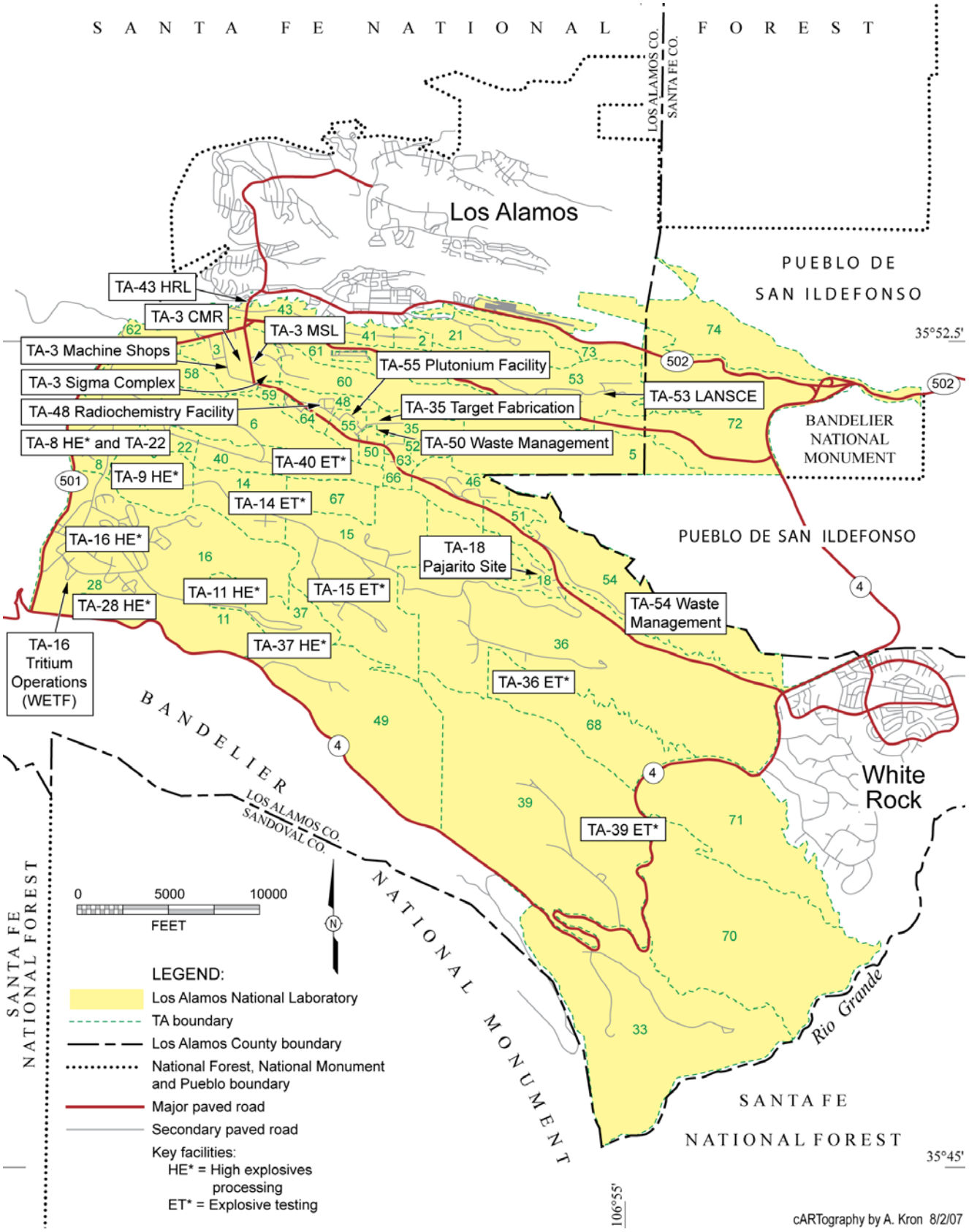


Figure 1-3. **Technical Areas (TAs) and key facilities of Los Alamos National Laboratory in relation to surrounding landholdings.**

Table 1-1
Key Facilities[a]

Facility	Technical Areas	Size (Acres)
Plutonium Complex	TA-55	93
Tritium Facilities	TA-16 & TA-21	312
Chemistry and Metallurgy Research (CMR) Building	TA-03	14
Pajarito Site	TA-18	131
Sigma Complex	TA-03	11
Materials Science Laboratory (MSL)	TA-03	2
Target Fabrication Facility (TFF)	TA-35	3
Machine Shops	TA-03	8
High-Explosives Processing	TA-08, -09, -11, -16, -22, -28, -37	1,115
High-Explosives Testing	TA-14, -15, -36, -39, -40	8,691
Los Alamos Neutron Science Center (LANSCE)	TA-53	751
Biosciences Facilities (formerly Health Research Laboratory)	TA-43, -03, -16, -35, -46	4
Radiochemistry Facility	TA-48	116
Radioactive Liquid Waste Treatment Facility (RLWTF)	TA-50	62
Solid Radioactive and Chemical Waste Facilities	TA-50 & TA-54	943
Subtotal, Key Facilities		**12,256**
Non-Key Facilities	30 of 48 TAs	14,224
LANL Acreage		**26,480**

[a] Data from SWEIS Yearbook – 2003 (LANL 2004).

The operation of the 15 Key Facilities, together with functions conducted in other Non-Key Facilities, formed the basis of the description of LANL facilities and operations analyzed in the 1999 SWEIS for potential environmental impacts. For the purpose of the impact analysis provided by the new SWEIS, the identity of the LANL Key Facilities has been modified to reflect subsequent DOE decisions that resulted in changes to LANL facilities and operations. The Metropolis Center has been added as a Key Facility because of the amounts of electricity and water it may use. Security Category I and II materials and operations have been moved from the TA-18 Pajarito Site to the Nevada Test Site. Under either of the Action Alternatives evaluated in the new SWEIS, Security Category III and IV materials and operations would be removed from the Pajarito Site, and Pajarito Site would be eliminated as a Key Facility. Under the No Action Alternative, the Pajarito Site would remain a Key Facility. Tritium operations at TA-21 have ceased and both the Tritium Science Test Assembly Facility and Tritium Science and Fabrication Facility are planned for decontamination, decommissioning, and eventual demolition. When the ROD is issued in 2008, TA-21 will no longer be a Key Facility.

D. MANAGEMENT OF ENVIRONMENT, SAFETY, AND HEALTH

Safety, environmental protection, and compliance with environmental, safety, and health (ES&H) laws and regulations are underlying values of all Laboratory work. The Laboratory uses Integrated Safety Management (ISM) to create a worker-based safety and environmental compliance culture in which all workers are committed to safety and environmental protection in their daily work. A seamless integration of ES&H with the work being done is fundamental. ISM provides the Laboratory with a comprehensive, systematic, standards-based performance-driven management system for setting, implementing, and sustaining safety performance and meeting environmental expectations. The term "integrated" is used to indicate that safety, protection of the environment, and compliance with ES&H laws and regulations are an integral part of how the Laboratory

conducts its work. ISM is the way that we meet the ethical commitment to avoid injury to people and the environment and the business imperative to meet the safety and environmental requirements of the contract for managing and operating the Laboratory.

Each Laboratory organization is responsible for its own environmental management and performance. Line management provides leadership and ensures ES&H performance is within the context of the Laboratory's values and mission. Laboratory managers establish and manage ES&H initiatives, determine and communicate expectations, allocate resources, assess performance, and are held accountable for safety performance.

Environmental characterization, remediation, surveillance, and waste management programs are part of the Environmental Programs (EP) Directorate. Environmental permitting is managed within the Environmental Protection Division in the Environment, Safety, Health, and Quality (ESHQ) Directorate. An organizational chart and description is available at http://www.lanl.gov/organization/. The major environmental programs and management system are described below.

1. Environmental Management System

The Laboratory is committed to protecting the environment while conducting its important national security and energy-related missions. DOE Order 450.1, Environmental Protection Program, requires all DOE sites to "implement sound stewardship practices that are protective of the air, water, land, and other natural and cultural resources impacted by Department of Energy (DOE) operations and by which DOE cost effectively meets or exceeds compliance with applicable environmental; public health; and resource protection laws, regulations, and DOE requirements." The order further states this objective must be accomplished by implementing an Environmental Management Systems (EMS) at each DOE site. LANL has implemented a pollution-prevention-based EMS pursuant to DOE Order 450.1. The Laboratory met the DOE Order 450.1 requirement to have an EMS implemented by December 31, 2005. An EMS is a systematic method for assessing mission activities, determining the environmental impacts of those activities, prioritizing improvements, and measuring results. DOE Order 450.1 defines an EMS as "a continuous cycle of planning, implementing, evaluating, and improving processes and actions undertaken to achieve environmental missions and goals." This DOE order mandates that the EMS be integrated with an existing management system already established pursuant to DOE Policy 450.4. Although it significantly exceeds DOE Order 450.1 requirements, LANL pursued and achieved registration to the ISO 14001-2004 standard in April 2006.

A key feature of the Laboratory EMS is the focus on ensuring that it is integrated with existing procedures and systems wherever possible. The intent is for the EMS to consolidate these existing programs into a systematic process for environmental performance improvement. The ISM provides an important foundation for the five core elements of the EMS:

1. Policy and Commitment
2. Planning
3. Implementation and Operation
4. Checking and Corrective Action
5. Management Review

More information about the EMS may be found at http://ems.lanl.gov/.

The EMS met several milestones in 2007. LANL's Implementing Procedures (IMP 401, 402, 403) governing communications, legal and other requirements, and environmental aspects were updated to reflect the new LANS management. These procedures defined EMS roles and responsibilities from the Laboratory Director to individual staff levels. In addition to these institutional policy changes, each Associate Director was asked to sign an EMS charter for his/her Directorate that reiterated commitment to the process.

In 2007, the EMS process was executed by multi-disciplinary teams from each Directorate. These organizations identified their activities, products, and services and their potential environmental aspects. They prioritized these aspects to determine which were significant and developed an Environmental Action Plan designed to prevent or eliminate the environmental risk associated with those aspects. The Directorate teams were aided by a trained support person from the EMS Management Team, whose members were trained in ISO 14001:2004 systems.

All 16 Directorates completed the Directorate Environmental Action Plans. Together, these plans commit to nearly 600 environmental improvement and pollution prevention actions that began in fiscal year 2006.

Registration to the ISO 14001:2004 standard requires extensive management review. External audits of the system have been conducted as follows:

- Kansas City Plant Pre-Audit, September 2004 (three auditors, three days)
- National Sanitation Foundation-International Strategic Registration, Ltd.(NSF-ISR, an independent third-party ISO 14001 registrar) Pre-Assessment, September 2005 (two auditors, three days)
- NSF-ISR Desk Audit, November 2005 (one auditor, two days)
- NSF-ISR Readiness Review, Phase 1 Audit, January 2006 (two auditors, three days)
- NSF-ISR Certification Audit, Phase 2 Audit, March 2006 (five auditors, five days)
- NSF-ISR Surveillance Audit 1, September 2006 (two auditors, three days)
- NSF-ISR Surveillance Audit 2, April 2007 (two auditors, three days)
- NSF-ISR Surveillance Audit 3, October 2007 (two auditors, three days)

These audits covered most of the Directorates and Divisions and all major support contractors and included interviews conducted from the Principal Associate Director level to individual staff and students chosen at random by the auditors. The auditors concluded that the Laboratory's EMS meets all the requirements of the ISO 14001-2004 standard with no major nonconformities and recommended that LANL maintain full certification. On April 13, 2006, LANL received full certification of its EMS to the ISO 14001-2004 standard. LANL was the first NNSA national laboratory and was the first University of California-operated facility to receive this distinction.

NNSA recognized the success of the EMS management and the their unique approach by giving the Laboratory the 2007 NNSA "Environmental Stewardship" Award for EMS-developed projects.

A second important component of the EMS is the institutional environmental stewardship and management support programs. These programs, described in the following sections, assist with the integration of job and work-specific evaluations and ensure natural and cultural resources are managed from a Laboratory-wide perspective.

2. Waste Management Program

Research programs that support the Laboratory's mission generate contaminated waste that must be properly managed to avoid risks to human health, the environment, or national security. Remediation of sites that were contaminated by past Laboratory operations also generates substantial volumes of waste. The Laboratory generates Resource Conservation and Recovery Act regulated waste, Toxic Substances Control Act regulated waste, low-level radioactive waste (both solid and liquid), mixed low-level waste, transuranic waste, administratively controlled waste, medical waste, New Mexico Special Waste, and sanitary solid and liquid waste. Certain wastes are treated and/or disposed of at the Laboratory, but most wastes are shipped off-site for treatment and final disposal.

The Laboratory's goal is to minimize hazardous and nonhazardous waste generation as much as is technically and economically feasible, as discussed in Section 3, Pollution Prevention Program, below. The Laboratory also

strives to conduct waste management operations in a manner that maintains excellence in safety, compliance, environment, health, and waste management operations. This goal is accomplished through the following program tenets:

- Ensuring a safe and healthy workplace;
- Minimizing adverse impact to the general public;
- Minimizing adverse impact to the environment; and
- Ensuring compliance with all applicable laws, standards, and regulations governing environment, safety, and health.

LANL manages all waste management and disposal operations except sanitary solid and liquid wastes under its Environmental Programs Directorate. TA-54, Area G, managed by the Waste Disposition Project, is the Laboratory's primary solid radioactive and hazardous waste handling site. Thousands of drums of packaged transuranic waste are securely stored at this site awaiting transport to the DOE's Waste Isolation Pilot Plant (WIPP) near Carlsbad, NM. The site also receives, processes, and disposes of approximately 4,000 m^3 of low-level radioactive waste per year. In the past, wastes were often buried in or released to pits or trenches around the Laboratory; several of these areas, known as Material Disposal Areas (MDAs), have been remediated and the remainder are either being investigated or undergoing remediation as discussed in Section 4, Environmental Restoration Programs, below.

The Radioactive Liquid Waste Program manages the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50. The RLWTF treats approximately 1.6 million gal/year of radioactive liquid waste.

The Water Quality and RCRA Group in the Environmental Protection Division provides guidance and support to Laboratory waste generators on compliance with all waste handling requirements. Within the Environmental Programs Directorate, both the Waste Disposition Project and the Waste and Environmental Services Division provide direct support to waste generators on specific aspects of waste packaging, waste acceptance criteria, and transportation of hazardous and radioactive wastes for proper treatment and disposal.

The Waste Disposition Project also operates the "Green is Clean Program" to reduce low-level radioactive waste generation through a waste segregation and verification program. Generators segregate clean waste from radioactive-contaminated waste and ship it to TA-54 for verification through a very sensitive radioactive measurement system.

3. Pollution Prevention Program

The Pollution Prevention (P2) Program implements waste minimization, pollution prevention, sustainable design, and conservation projects to enhance operational efficiency, reduce life-cycle costs of programs or projects, and reduce risk to the environment. Reducing waste directly contributes to the efficient performance of the Laboratory's national security, energy, and science missions. Specific P2 activities include the following:

- Collecting data and reporting on DOE P2 goals;
- Forecasting waste volume to identify P2 opportunities;
- Conducting P2 opportunity assessments for customer divisions;
- Providing technical support for pollution prevention;
- Funding specific waste reduction projects through the LANL Generator Set-Aside Fund Program;
- Supporting affirmative procurement efforts;
- Conducting an annual LANL P2 awards program to recognize achievements;

- Supporting sustainable design for the construction of new buildings; and
- Communicating P2 issues to the Laboratory community.

The Laboratory's P2 Program continues to be recognized for its accomplishments. The Laboratory received eight national NNSA Pollution Prevention awards for Laboratory projects in fiscal year 2007 (up from seven in the previous fiscal year). Projects in fiscal year 2007 yielded more than $18.4 million in savings to the Laboratory. The P2 Program was instrumental in incorporating preventive measures into the EMS, and the Laboratory received ISO 14001 certification. The Pollution Prevention received an overall performance rating of "Good" for fiscal year 2007. The P2 projects collectively avoided the generation of more than 1 million liters of radioactive liquid waste, 18 metric tons of hazardous waste, 10 cubic meters of mixed low-level waste, 61 cubic meters of low-level waste, and 4 cubic meters of transuranic waste. Together, the P2 projects were responsible for the recycling of 391 tons of metal.

"Green purchasing" is mandated by an executive order and calls for considering environmental factors in purchasing decisions in addition to traditional factors such as performance, price, health, and safety. Green purchasing, also known as affirmative procurement, is procurement of products or services considered to be environmentally preferable, meaning those products that have a comparatively smaller negative effect on human health and the environment. The aim is to eliminate waste, prevent pollution, and improve the quality of the environment.

4. Environmental Restoration Programs

The environmental restoration and cleanup work at LANL is organized into several projects that have responsibility for different aspects of environmental restoration:

- Water Stewardship Program
- TA-21 Closure Program
- Corrective Actions Program (includes investigations and remediations in canyons)

The goal of these programs is to ensure that residual materials and contaminants from past Laboratory operations do not threaten human or environmental health and safety. To achieve this goal, the Laboratory is investigating and, as necessary, remediating sites contaminated by past Laboratory operations. In calendar year 2007, fieldwork at several sites was either implemented, ongoing, or completed. Much of the work under these projects is subject to the requirements in the Compliance Order on Consent (Chapter 2, Section B.1). Most environmental sample analyses (81%) were for characterization or assessment of sites being investigated or cleaned up at LANL (Table 1-2). Chapter 9 summarizes the cleanup work conducted or completed in calendar year 2007.

After sites have been remediated, long-term monitoring may be required as part of the chosen remedy solution. Such monitoring will eventually become part of the existing environmental surveillance programs and will fulfill DOE requirements for a long-term environmental stewardship program.

Table 1-2
Approximate Numbers of Environmental Samples, Locations, and Analytes collected in 2007

Sample Type or Media	Locations	Samples	Analytes or Measurements
Ambient Air[a]	58	2,648	10,339
Stack Monitoring	28	2,723	23,509
Gas	42	235	35,657
Animal	5	12	1,579
Rock	860	1,581	310,891
Soil	1,004	1,323	176,145
Sediment	197	250	35,948
Vegetation	78	96	2,733
Water	13	31	6,000
Groundwater	326	939	187,440
Industrial Process Water	17	65	2,813
Surface Water Snowmelt	38	52	2,209
NPDES Outfalls	38	228	3,495
Surface Water Persistent Flow	45	69	10,237
Surface Water Base Flow	51	78	21,079
Surface Water Storm Runoff	212	1,155	34,596
Neutron Radiation	47	188	188
Gamma Radiation	89	356	356
Other Media	33	68	7,005
Totals:	**3,181**	**12,097**	**872,219**

[a] Does not include particulate (in air) measurements made by six Tapered Element Oscillating Microbalance instruments that calculated particulate concentrations every half hour.

Note: Not all the data counted in the table above are reported in this document.

5. Compliance and Surveillance Programs

LANL's environmental compliance and surveillance programs identify possible environmental hazards and impacts by regularly collecting samples and comparing results with previous results and with applicable regulatory standards. The Laboratory routinely collects samples of air particles and gases, water, soil, sediment, foodstuffs, and associated biota from over 3,100 locations (Table 1-2). Monitoring can detect and identify environmental impacts from hazardous and radioactive materials and data from monitoring can be used to help with mitigation of any impacts. To this end, each pathway by which an individual could be exposed is monitored. The sensitivity of environmental surveillance measurements allows for the detection of contaminants during cleanup or normal operations. Additional monitoring may be conducted in places where there is an increased potential for environmental releases. In some cases, immediate actions are warranted because of monitoring results. The various environmental monitoring programs are discussed below.

a. Air Quality Monitoring

The Laboratory maintains a rigorous ambient air surveillance and air quality compliance program for the emissions of both radionuclide and nonradionuclide air pollutants. The air monitoring and compliance efforts consist of three main parts: compliance and permitting, stack monitoring, and ambient air monitoring (AIRNET).

The Laboratory also works with and assists neighboring communities and pueblos in performing ambient air, direct penetrating radiation, and meteorological monitoring.

i. Compliance and Permitting

The Laboratory operates under a number of air emissions permits issued by the New Mexico Environment Department (NMED) and approvals for construction of new facilities/operations by the US Environmental Protection Agency (EPA). These permits and approvals require pollution control devices, stack emissions monitoring, and routine reporting.

LANS is authorized to operate applicable air emission sources at LANL per the terms and conditions as defined in Operating Permit No. P100-M2. LANL received a modification to its original Operating Permit, P100, in 2007 after beryllium operations at the Chemistry and Metallurgy Research (CMR) Building were discontinued. As part of the Title V Operating Permit program, the Laboratory reports emissions from sources included in the Operating Permit twice a year. In 2007, the Laboratory began to write its new Title V permit application to submit in 2008 for a five-year renewal in 2009.

In addition, the Laboratory maintains compliance with Title VI of the Clean Air Act that regulates the use of ozone-depleting substances, such as halons and refrigerants. The Laboratory maintains records on all work that involves refrigerants and the purchase, usage, and disposal of refrigerants.

To ensure compliance with the National Emission Standard for Hazardous Air Pollutants (NESHAP) for asbestos, the Laboratory conducted internal inspections of job sites and asbestos packaging approximately monthly. During 2007, there were 14 major renovation or demolition projects that involved removal of asbestos. LANL also reports emissions from chemical use associated with research and permitted beryllium activities.

In 2007, the Laboratory received a New Source Review air quality permit 2195-P for three generators to be used at TA-33.

Chapter 2 of this report describes in greater detail these permits and the status of compliance; this information is also available online at http://www.lanl.gov/environment/air/.

ii. Stack monitoring

As described in greater detail in Chapter 2 and Chapter 4, LANL rigorously controls and monitors stack emissions of radioactivity, as required by the Clean Air Act. Members of the Rad-NESHAP team at LANL evaluate these operations to determine potential impacts of the stack emissions on the public and the environment. This team continuously sampled 27 stacks at LANL for the emission of radioactive material to the ambient air. LANL categorizes its radioactive stack emissions into one of four types: (1) particulate matter, (2) vaporous activation products, (3) tritium, and (4) gaseous mixed activation products (GMAP).

For particulate matter, a continuous sample of stack air is pulled through a glass-fiber filter that captures small particles of radioactive material. Charcoal filters are used to capture radioactive vapors and highly volatile compounds. Tritium emissions are measured with a device called a bubbler, which pulls air through three sequential vials that contain ethylene glycol. GMAP emissions are measured in real time by pulling air through an ionization chamber that measures the total amount of radioactivity in the sample and records the results on a strip chart.

During 2007, the stack emissions were small and the resulting off-site dose from these emissions was about 5% of the Clean Air Act standards.

iii. Ambient Air Monitoring

The Laboratory operates an extensive network of ambient air quality monitoring stations (AIRNET) to detect other possible radioactive emissions (see Chapter 4). The network includes station locations on site, in adjacent communities, and in regional locations. These stations are operated to ensure that air quality meets EPA and DOE standards. These data are published in this report (see Chapter 4) and online at http://www.lanl.gov/environment/air/. During 2007, the only releases that the AIRNET system detected did not come from stacks but resulted from the unexpected elevated tritium levels initially observed at TA-54, Area G, in 2006. These slightly elevated levels were detected into April 2007 at which time the tritium-contaminated tank was buried to reduce emissions. Measured tritium concentrations reverted to normal levels.

b. Water Resources Monitoring

The water resources monitoring and compliance efforts consist of three main parts: compliance and permitting, groundwater monitoring, and surface water monitoring.

i. Compliance and Permitting

The Laboratory's Water Quality and Hydrology Group is responsible for all compliance and permitting functions related to the state Water Quality Act and federal Clean Water Act requirements. The group provides institutional expertise and implementation assistance for obtaining regulatory permits and maintaining compliance with all permit requirements. These functions include sampling, processing, and analyzing water and wastewater from treatment facilities; institutional coordination, integration, and communication of all wastewater resource-related monitoring and reporting activities; submitting permit applications, notices of intent to discharge, analytical data, and compliance documentation; interpretation of major state and federal water quality laws and regulations; development of institutional standards and policy regarding water and wastewater with line organizations; and interaction with regulatory agencies, stakeholders, the public, and Indian tribes on water quality or water resource management issues.

ii. Groundwater Monitoring

The LANL Water Stewardship Program manages and protects groundwater and surface water resources (see Chapters 5 and 6). The Laboratory conducts several activities to comply with the requirements of DOE Orders, state and federal regulations, and the Consent Order.

Groundwater resource management and protection efforts at the Laboratory focus on (1) the regional aquifer underlying the plateau, (2) the shallow perched groundwater found within canyon alluvium, and (3) the perched groundwater at intermediate depths above the regional aquifer. The objectives of the Laboratory's groundwater programs are to determine compliance with liquid waste discharge requirements and to evaluate any impact from Laboratory activities on groundwater resources. This program includes environmental monitoring, resource management, aquifer protection, and hydrogeologic investigations.

The Los Alamos County water supply system contains no detected LANL-derived contaminants. At present, the major thrust of the water-monitoring program, being developed in cooperation with NMED, is directed toward estimating the prospective risk from contamination that may enter the drinking water in the future. One such activity is modeling to estimate the possibility of contaminants migrating from the surface through the vadose zone to the aquifer. Data show that plutonium, uranium, cesium, and strontium are tightly bound to the soil matrix and so will not migrate in measurable amounts. Tritium is more mobile, but its migration is slower compared with its approximately 12-year radioactive half-life, so the concentrations of tritium in drinking water will remain far below drinking water standards. Thus, migration of radionuclides is not likely to be a problem, so attention is focused on migration of chemicals such as perchlorate, chromium, and high explosive residues.

LANL has drilled numerous additional monitoring wells over the past several years, and more are planned for 2008. These new wells will provide a better picture of the location and movement of contamination in the groundwater.

iii. Surface Water Monitoring

LANL's surface water protection efforts focus on monitoring surface water and stream sediment in northern New Mexico. The objectives of the surface water program are to address water pollution control compliance, environmental surveillance, watershed management, surface and ground water protection, drinking water quality protection, pesticide protection obligations, and public assurance needs. Samplers at more than 250 sites are set to collect samples when sufficient water is present during storm runoff events. The Laboratory analyzes samples for radionuclides, high explosives, metals, a wide range of organic compounds, and general chemistry.

c. Biological Monitoring

The LANL biological resources program focuses on assisting Laboratory projects and programs to comply with federal and state laws and regulations, DOE Orders, and LANL directives related to biological resources. LANL adopted a Biological Resources Management Plan in 2007. This document, along with LANL's 2005 revision of its Threatened and Endangered Species Habitat Management Plan, provides guidance for biological resources protection at LANL. The presence of federally listed species is monitored annually. In addition, the biological resources program is currently conducting an inventory of riparian habitats at LANL and is initiating a project to monitor State-listed species such as Gray Vireo and Jemez Mountains Salamander.

LANL's Emergency Management and Response Division manages wildland fire, including fuels monitoring and treatment on LANL property. One of the lasting results of past wildfires in and around LANL has been a significant increase in a regional, multi-agency approach to managing wildland fire. In September of 2007, the Lab adopted the Wildland Fire Management Plan which provides a strategic program to manage risk associated with wildland fires (LANL 2007).

d. Soil, Foodstuffs, and Non-foodstuff Biota Monitoring

The Laboratory collects surface soil, foodstuffs, and non-foodstuffs biota from the Laboratory, perimeter communities (Los Alamos, White Rock, and surrounding pueblos), and regional (background) areas to determine whether there is an impact of Laboratory operations on human health via the food chain and the environment. The Laboratory conducts these programs to comply with the requirements of DOE Orders and state and federal regulations. Samples of the various media are collected on a three-year rotating schedule and analyzed for radionuclides, heavy metals, and organic chemicals to determine concentrations and distribution in soil and potential uptake by plants, animals, and humans. Radiation doses to humans and biota (see Chapter 3) and changes in concentrations over time are also measured and analyzed. These data are published in Chapters 7 and 8 of this report and other Laboratory publications.

Monitoring of soil, foodstuffs, and non-foodstuffs biota is an important indication of the health of the environment. Soil and sediment monitoring has established a baseline of known contamination concentrations in selected areas on Laboratory property, in surrounding areas, and regionally. Comparison of known concentrations with future results may indicate movement of contaminants, for example, increases in contaminants in the sediments behind the flood retention structures.

Collection and analysis of foodstuff (crops, game animals, fish, honey, milk, etc.) from the region provides confidence that no unexpected contamination has reached off-site locations. Since the 1990s, the program has identified PCB and mercury levels above EPA and NMED fish advisory levels in some types of fish both upstream and downstream of LANL in the Rio Grande..

Biota monitoring is a non-invasive method of detecting underground materials. The roots of some plants and trees penetrate into subsurface contamination and may bring contaminated material to the surface. For example, vegetation samples collected annually at Area G in TA-54 demonstrate low concentrations of isotopic plutonium (approximately 1 pCi/g or less) in the soil toward the north and east of Area G (Chapter 8). Tree samples indicate an area of underground tritium along the south fence of MDA G. At MDA B, tree samples from 2006 along the northern fence showed above-background plutonium-239 concentrations and cesium-137 concentrations which indicate radioactive materials are within reach of the roots. Also, previous samples of chamisa within the fenced area of Bayo Canyon indicate underground concentrations of cesium on the order of 1,000 pCi/g near the southwest corner (Fresquez et al 1995).

e. Radiation Monitoring

Gamma and neutron radiation is monitored by the direct penetrating radiation monitoring network (DPRNET) described in Chapter 4.

The largest source of direct radiation is TA-54, Area G, and is monitored at 33 DPRNET stations, all of which measure above-background intensities of neutron radiation. As discussed in Chapter 3, the all-pathway maximally exposed individual (MEI) is at the northern boundary of TA-54 and results primarily from neutrons. The neutron radiation is being reduced by removing the sources from Area G.

Though high radiation levels are not expected from TA-21 during the upcoming cleanup at that site, seven new DPRNET stations were installed in 2006 along DP Road and State Road 502, between the potential sources at TA-21 and the public areas to the north and west.

Though not required for compliance purposes, the Laboratory operates several Neighborhood Environmental Monitoring Network (NEWNET) stations that measure gamma radiation levels at 15-minute intervals and post these data to the NEWNET website in near real time (http://newnet.lanl.gov/). Stations are located near the Laboratory boundary and in the nearby communities of Los Alamos, Pueblo de San Ildefonso, and Santa Clara Pueblo. The stations at East Gate and Mortandad Canyon are used to check the dose from LANSCE emissions. During 2007, the dose measured by NEWNET was 0.0 ±0.3 mrem. The data from these stations are available on the NEWNET website and are not discussed further in this report.

f. Cultural Resources Protection

The Laboratory manages the diverse cultural resources according to the requirements of the National Historic Preservation Act and other federal laws and regulations concerned with cultural resources protection. Cultural resources include archaeological sites and associated artifacts, historic buildings and associated artifacts, and traditional cultural properties of importance to Native American and other ethnic groups. Section 106 of the act requires federal agencies to take into account the effects of projects on historic properties and to allow review and comment by the State Historic Preservation Office and the Advisory Council on Historic Preservation. The Section 106 regulations outline a project review process that is conducted on a project-by-project basis.

The Laboratory has adopted a Cultural Resources Management Plan (LANL 2005b) as an institutional comprehensive plan that defines the responsibilities, requirements, and methods for managing its cultural properties. The plan provides an overview of the cultural resources program, establishes a set of procedures for effective compliance with applicable historic preservation laws, addresses land-use conflicts and opportunities, ensures public awareness of DOE's cultural heritage stewardship actions at LANL, and provides a 10-year road map that summarizes and prioritizes the steps necessary to manage these resources.

E. RISK AND HAZARD REDUCTION

The Laboratory is committed to reducing hazards and the associated risk to people and the environment. Current risk depends on the amount of hazardous material that actually reaches a receptor, whereas prospective risk depends on the amount of hazardous material and the probability of *exposure* in the future. It is often given as a range of concentrations and risks (expressed as a dose) rather than a single number or set of numbers due to the uncertainties associated with predicting future concentrations and exposures. Buried hazardous material may have little or no exposure under current conditions but may have an increased probability of exposure over time. In addition, if the material is brought to the surface either now or in the future, the potential for exposure and risk increases substantially.

1. Estimation of Risk

Risk is evaluated either as current (present-day) risk or prospective risk (defined by the EPA as "the future risks of a stressor not yet released into the environment or of future conditions resulting from an existing stressor"). The stressor (also known as a hazard) could be a radionuclide, a chemical, or a combination for which the potential risk is evaluated based on protective assumptions under a reasonable exposure scenario(s), safety analysis, or model.

The terminology used in describing the current risks is that a potential unacceptable risk is present or not. The "acceptable" nature is determined by target levels dictated by the regulatory authorities (NMED or DOE) and are equal to or less than a 10^{-5} (1 in 100,000) probability of cancer, a hazard index equal to 1.0 or less for noncancer-causing chemicals (indicates that no adverse [noncancer] human health effects are expected to occur), and a dose of 15 mrem/yr or less for radionuclides. In keeping with the policy of maintaining all dose and risk as low as reasonably achievable, the Laboratory strives to reduce risk/dose to below these target levels whenever possible. For the MEI reported in Chapter 3 of this report, the calculated cancer risk from the estimated dose in 2007 was approximately 3×10^{-7} (a 3 in 10,000,000 chance of cancer).

To analyze current and prospective risk, LANL uses environmental data, computer evaluation tools, and computer models. A computer program called RACER (http://www.racernm.com/) is in development by the Risk Assessment Corporation (http://www.racteam.com/) in consultation with LANL and the NMED. The RACER tool will analyze collected environmental data to help estimate risk for a variety of exposure scenarios, such as recreational or residential uses. The Laboratory uses models such as the residual radioactivity (RESRAD) model (http://web.ead.anl.gov/resrad/), Hotspot (http://www.llnl.gov/nhi/hotspot/), and CAP88 (http://www.epa.gov/radiation/assessment/CAP88/index.html) to evaluate potential risk based on material inventory buried or stored at a site or in transport (e.g., from the surface to the regional aquifer).

Prospective risk is also used to aid in the evaluation of remediation and corrective measure options. Probabilistic models account for physical system uncertainties within the context of the decisions under consideration. Prospective risk methods can identify the additional data needed to determine the optimal decision, thus guiding data collection operations.

2. Examples of Risk Reduction

The following are examples where current or past Laboratory operations have resulted in the storage of large quantities of wastes or the release of contaminants to the environment, and where the Laboratory is working to reduce both current and prospective risks. These sites are being addressed by the Laboratory to reduce the potential and current hazards to humans and the environment.

a. TA-54, Area G and MDA G

The transuranic waste disposition program expedites the disposal of legacy transuranic waste to WIPP in Carlsbad, NM, and ensures appropriate facilities and equipment are available to facilitate disposal of current and future transuranic wastes. Area G stores substantial amounts of radioactively contaminated waste and other contaminated materials in above-ground storage. MDA G is a subsurface disposal site containing potentially hazardous and radioactive wastes from operational activities and wastes from environmental restoration and demolition activities at the Laboratory. MDA G was also used for the retrievable storage of transuranic waste. Most of the waste will eventually be transported to permanent storage at WIPP.

As discussed in Chapter 3, the dose to the all-pathway MEI results primarily from neutrons emitted from the transuranic waste at Area G (about 1 mrem/yr in 2007). The primary method to reduce both the current and prospective risk at Area G is to steadily reduce the inventory of transuranic waste by transporting drums of radioactive material to WIPP. Of the approximately 130,000 plutonium equivalent curies (PE Ci) of radioactive materials in secure aboveground storage at Area G, the Laboratory shipped approximately 17,215 PE Ci in 2,988 barrels to WIPP in 2007. Additionally, the Laboratory transported 33 drums of neutron sources, recovered by the Off-Site Source Recovery Program, to WIPP. The shipping strategy for 2008 will continue to concentrate on shipping higher-activity materials. Starting in 2009, waste buried in retrievable forms in MDA G will be excavated and shipped to WIPP. All temporarily-stored radioactive wastes are scheduled to be removed by late 2013.

b. TA-21

TA-21 is the site of the Laboratory's original plutonium processing facility, a tritium processing and handling facility, and several MDAs. The inventories of hazardous and radioactive material at the MDAs are not well characterized because there are few records of waste disposal during the 1940s and the Manhattan Project. MDAs V and U have been remediated; MDAs A and T will undergo corrective measures evaluations to determine the appropriate corrective actions; and MDA B is scheduled to be remediated. In addition, the other sites at TA-21 are being characterized or remediated as part of the DP Site Aggregate Area investigation.

c. Groundwater

As discussed in detail in Chapter 5, Groundwater Monitoring, Laboratory-derived impacts to groundwater have been detected in some monitoring wells. At present, there is no measurable LANL-derived contamination in the drinking water system but there may be a prospective risk because of the potential for contamination to migrate to the drinking water supply wells in the future. For the past several years, efforts have been under way to evaluate groundwater quality and augment the current monitoring network to ensure monitoring activities will detect contamination in groundwater before it can affect the drinking water.

d. Environmental Characterization and Restoration

The objective of the environmental investigation and cleanup activities at the Laboratory is to identify and characterize releases (the nature of the contamination), the location and extent of the contamination, whether it requires remediation (poses a potential unacceptable risk), and what type of remediation is appropriate. Over the past few years the Laboratory has been conducting corrective action activities under the March 1, 2005, Consent Order, which specifies requirements and goals to be met.

In the past several years, the Laboratory has determined where contamination is present and in many cases has reduced the legacy contamination. Where contamination is present, the risk is quantified to determine whether it is unacceptable with respect to human health and the environment. Table 9-3 lists the sites for which corrective actions were completed and approved by NMED in 2007.

The chromium investigations in Sandia and Mortandad Canyons continued with the installation of two monitoring wells (regional wells R-35a and R-35b) immediately upstream of PM-3, a municipal drinking water well.

Numerous sampling activities were conducted in 2007 and included sampling of pore gas at MDA A; drilling four boreholes at MDA C near TA-50 to characterize the subsurface below former chemical waste disposal pits; sampling and geophysical, geodetic, and radiological surveying in Bayo Canyon where radioactive materials and high explosives were used; additional sampling in several locations within TA-21 where the country's original plutonium processing facility was located; additional characterization sampling at MDA V and MDA T (both in TA-21) where liquid wastes were stored and processed; and sediment sampling in Sandia Canyon to determine the amount and extent of chromium migration. After results are received and interpreted, the Laboratory will document these sampling activities in reports to the NMED.

Previous risk reduction successes include the cleanup of the Los Alamos County Airport area at TA-73, which contained landfills, septic systems, an incinerator and surface disposal area (Airport Ashpile), and other miscellaneous sites; and MDA V at TA-21 where three absorption beds and other contaminated soil and tuff were excavated.

E. REFERENCES

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2. Compliance Summary

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A. INTRODUCTION

Many activities and operations at Los Alamos National Laboratory (LANL or the Laboratory) use or produce liquids, solids, and gases that may contain nonradioactive hazardous and/or radioactive materials. Laboratory policy implements US Department of Energy (DOE) requirements by directing employees to protect the environment and meet compliance requirements of applicable federal and state environmental regulations. Federal and state environmental laws address: (1) handling, transporting, releasing, and disposing of contaminants and wastes; (2) protecting ecological, archaeological, historic, atmospheric, soil, and water resources; and (3) conducting environmental impact analyses. Regulations provide specific requirements and standards to ensure maintenance of environmental quality. The US Environmental Protection Agency (EPA) and the New Mexico Environment Department (NMED) are the principal administrative authorities for these laws. DOE and its contractors are also subject to DOE-administered requirements for control of radionuclides. Table 2-1 presents the environmental permits or approvals the Laboratory operated under in 2007 and the specific operations and/or sites affected. Table 2-2 lists the various environmental inspections and audits conducted at the Laboratory during 2007. The following sections summarize the Laboratory's regulatory compliance performance during 2007.

B. COMPLIANCE STATUS

The Laboratory continues to meet requirements under the Clean Water Act. The Laboratory was issued a new National Pollutant Discharge Elimination System (NPDES) permit for industrial and sanitary waste water discharges which became effective August 1, 2007. During 2007, none of the 130 samples collected from the SWWS Plant's outfall exceeded Clean Water Act effluent limits. Only three of the 1408 samples collected from industrial outfalls exceeded effluent limits, all due to chlorine exceedances due to either chlorination or dechlorination system malfunctions. Compliance with National Pollutant Discharge Elimination System (NPDES) requirements at permitted construction-sites improved in 2007 to 99% overall (from 94% in 2006).

The Laboratory continues to be well below all Clean Air Act (CAA) permit limits for emissions to the air.

Table 2-1
Environmental Permits or Approvals under Which the Laboratory Operated during 2007

Category	Approved Activity	Issue Date	Expiration Date	Administering Agency
RCRA[a] Permit	Hazardous Waste Facility Permit – Permitted hazardous waste storage units: Technical Areas 50 & 54	November 1989	November 1999*	NMED[b]
	40 CFR 265 Standards – Interim Status hazardous waste storage and treatment facilities: Technical Areas 3, 14, 16, 36, 39, 50, 54, & 55. Permit applications submitted to NMED.	Post 1980 – hazardous waste units; Post 1991 – mixed waste units	Inclusion in Hazardous Waste Facility Permit or closure	NMED
HSWA[c]	RCRA corrective activities	March 1990	December 1999*	NMED
Consent Order	Legacy and contaminated waste site investigations, corrective actions, and monitoring	March 1, 2005	September 20, 2015	NMED
CWA[d]/NPDES[e]	Outfall permit for the discharge of industrial and sanitary liquid effluents	August 1, 2007	July 31, 2012	EPA[f]
	MSGP[g] for the discharge of stormwater from industrial activities	October 30, 2000	October 30, 2005	EPA
	Federal Facility Compliance Agreement for storm water discharges from Solid Waste Management Units (SWMUs)	February 5, 2005	Upon issuance of the Individual Permit, (pending)	EPA
	Construction General Permits (17) for the discharge of stormwater from construction activities	July 1, 2003	June 30, 2008*	EPA
CWA Sections 404/401	COE[h] Nationwide Permits – None issued in 2007	NA	NA	COE/NMED
Groundwater Discharge Plan, TA-46 SWWS Plant[i]	Discharge to groundwater	January 7, 1998	January 7, 2003*	NMED
Groundwater Discharge Plan, TA-50, Radioactive Liquid-Waste Treatment Facility	Discharge to groundwater	Submitted August 20, 1996	Approval pending	NMED
Groundwater Discharge Plan, Domestic Septic Systems	Discharge to groundwater	Submitted April 27, 2006	Approval pending	NMED

Table 2-1 (continued)

Category	Approved Activity	Issue Date	Expiration Date	Administering Agency
Air Quality Operating Permit (20.2.70 NMAC[j])	LANL air emissions	April 30, 2004	April 29, 2009	NMED
	Operating Permit Modification 1	June 15, 2006		
	Operating Permit Modification 2	July 16, 2007		
Air Quality Construction Permits (20.2.72 NMAC)	Portable rock crusher	June 16, 1999	None	NMED
	Retired and removed from operating permit	June 15, 2006		
	Permit number will remain active to track exempt sources at LANL			
	TA-3 Power Plant	September 27, 2000	None	NMED
	Permit revision	November 26, 2003		
	Permit modification	July 30, 2004		
	1600 kW Generator at TA-33	October 10, 2002	None	NMED
	Two (2) 20 kW Generators and one (1) 225 kW generator at TA-33	August 8, 2007	None	NMED
	Asphalt Plant at TA-60	October 29, 2002	None	NMED
	Data disintegrator	October 22, 2003	None	NMED
	Chemistry and Metallurgy Research Replacement (CMRR), Radiological Laboratory, Utility, Office Building	September 16, 2005	None	EPA
Air Quality (NESHAP[k])	Radiological air emissions at CMRR, Radiological Laboratory, Utility, Office Building	July 14, 2005	None	NMED
	Beryllium machining at TA-3-141	October 30, 1998	None	NMED
	Beryllium machining at TA-35-213	December 26, 1985	None	NMED
	Beryllium machining at TA-55-4	February 11, 2000	None	NMED

[a] Resource Conservation and Recovery Act
[b] New Mexico Environment Department
[c] Hazardous and Solid Waste Amendments
[d] Clean Water Act
[e] National Pollutant Discharge Elimination System
[f] Environmental Protection Agency
[g] Multi-Sector General Permit
[h] US Army Corps of Engineers
[i] Sanitary Wastewater Systems Plant
[j] New Mexico Administrative Code
[k] National Emission Standards for Hazardous Air Pollutants

* Permit was administratively continued

Table 2-2
Environmental Inspections and Audits Conducted at the Laboratory during 2007

Date	Purpose	Performing Agency
1/22/07–1/31/07	Hazardous waste compliance inspection (closeout 8/7/2007)	NMED[a]
4/10/2007	CMRR[b] site inspection	NMED
7/17/2007	Title V Operating Permit compliance inspection	NMED

No PCB[c]; Federal Insecticide, Fungicide, and Rodenticide Act; Section 401/404; Construction General Permit; Groundwater Discharge Plan; or NPDES compliance inspections were conducted in 2007.

[a] New Mexico Environment Department

[b] Chemistry and Metallurgical Research Replacement building

[c] Polychlorinated biphenyls

The Laboratory continued to conduct corrective actions in accordance with the March 2005 Compliance Order on Consent (Consent Order), though the NMED issued a Notice of Violation (NOV) for failing to complete the sampling of all monitoring wells within a single watershed within 21 days of the start of a groundwater sampling event. LANL submitted a proposed corrective action and NMED determined no further action was required. The NMED issued a second NOV regarding storage of hazardous waste. All of the Laboratory deliverables (plans and reports) required by the Consent Order were submitted on time to NMED. Self-inspections of RCRA hazardous and mixed waste compliance found a nonconformance rate of 3.71% (compared to 3.02% in 2006).

1. Resource Conservation and Recovery Act

a. Introduction

The Laboratory produces a wide variety of hazardous wastes as a research facility. These wastes are mostly in small quantities compared to industrial facilities of comparable size. RCRA, as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984, establishes a comprehensive program to regulate hazardous wastes from generation to ultimate disposal. The EPA has authorized the State of New Mexico to implement the requirements of the program, which it does through the New Mexico Hazardous Waste Act and state regulations found in the New Mexico Administrative Code (NMAC) Title 20, Chapter 4, Part 1, as revised October 1, 2003 (20.4.1 NMAC).

The federal and state laws regulate management of hazardous wastes based on a combination of the facility's status, the quantities of waste generated, and the types of waste management conducted by the facility. Certain operations require a hazardous waste facility permit, sometimes called a RCRA permit. The LANL hazardous waste facility permit was initially granted in 1989 for storage and treatment operations. It expired in 1999 but was administratively continued beyond the expiration date as allowed by 20.4.1.900 NMAC.

The Laboratory has submitted various permit applications for NMED review since 1996 to renew the hazardous waste facility permit. Permit modification packages have also been submitted to revise and upgrade the waste management conditions and facilities contained in the original permit.

b. RCRA Permitting Activities

In 2007, NMED issued the draft renewed hazardous waste facility permit for public comment and the Laboratory submitted several proposed modifications to the original permit. The draft permit was published on August 27, 2007 and the public comment period was eventually extended into 2008 (February 1, 2008). During the fall of 2007, the Laboratory developed and collected numerous facility comments to the draft permit regarding the proposed waste management, unit design, and environmental monitoring conditions for submittal to NMED in early 2008. The review process for this permit is estimated to be complete in early 2010.

On March 2, 2007, the Laboratory submitted a package of four Class 2 permit modifications to the continued LANL hazardous waste facility permit to reflect upgrades for waste management activities. After a public comment period, NMED approved the modifications on July 24, 2007. The first modification requested the ability to store waste containers within heated transportainers and modular buildings on the asphalt pad (Pad 9) surrounding permitted storage domes 229, 230, 231, and 232. The second proposed modification requested the ability to store waste containers that potentially contain liquids in dome 231. The changes supported waste characterization activity and container preparation improvements for the TRU waste disposition program that should result in improved rates of waste transfer to WIPP.

The third permit modification requested expansion of the storage footprint within the fenced asphalt area at TA-54-38. The maximum storage volumes and types of waste allowed for the site were not altered. This change was needed to accommodate recent DOE safety improvements and to allow better staging of Waste Isolation Pilot Plant (WIPP) transport vehicles. The fourth proposed modification requested the relocation of three modular buildings, a temporary modular containment structure, and a canopy at TA-54, Area L. These relocations support the future closure of the northern portion of the container storage unit and corrective action activities for the land disposal units located there.

On March 15, 2007, the Laboratory submitted a Class 1 permit modification request to NMED to revise the permit to show the replacement of two transportainers at TA-50-69. The modification did not change the storage capacity or waste management procedures at the unit but the replacement did improve and upgrade the existing storage capability. A revised and up-to-date listing of the hazardous waste management units at LANL and their history was also submitted to NMED on March 29, 2007.

In addition, on March 29, the Laboratory submitted an air dispersion modeling protocol for the TA-16 open burn units to NMED. The submittal also provided comparative information on the available options for treatment of high explosives waste in support of open burning. On May 31, 2007, further unit-specific information and an expanded modeling scope for the air pathway assessment was submitted to address a notice of deficiency letter for the TA-16 permit renewal application issued by NMED on April 18, 2007. The air pathway assessment report resulting from implementation of the modeling protocol was submitted to NMED on September 5, 2007.

On August 20, 2007, the Laboratory submitted a Class 3 permit modification request for a new waste management facility to be located at TA-52. This was the Transuranic Waste Facility (TRUWF) to be used for the management of newly generated LANL transuranic waste after the closure of TA-54, Area G to meet the requirements of the Consent Order. The Laboratory hosted a public information meeting regarding the new facility on October 2, 2007. NMED issued a response to the permit modification request on December 20, 2007 requiring additional design and waste management procedure information. The proposed use and design conditions for this facility were under further review by the Laboratory and DOE at the end of 2007. The Laboratory also submitted an update to Figure A-5 of the TA-50 Part B permit renewal application regarding regional surface faulting as a result of NMED's review of the TRUWF request.

On December 18, 2007, the Laboratory submitted five Class 1 permit modifications to NMED. These included updates and changes to the permit inspection plan, updated figures to show the removal of sheds at TA-54-38, revisions to the list of emergency managers, organization names, phone numbers and facility location information in the contingency plan, and changes to the figures showing the LANL boundary.

The Laboratory received approval of the TA-54 Area L Waste Treatment/Storage Tanks closure certification report on February 20, 2007. Two closure plans for waste management units were also submitted to NMED in March 2007. These included closure and post-closure conditions for the TA-54 Area L and Area G landfills.

c. Other RCRA Activities

The compliance assurance program performed Laboratory self-assessments to determine whether hazardous and mixed waste is managed to meet the requirements of federal and state regulations, DOE orders, and Laboratory policy. The program communicated findings from these self-assessments to waste generators, waste-management coordinators, and waste managers who help line managers implement appropriate actions to ensure continual improvement in LANL's hazardous waste program. In 2007, the Laboratory completed 1,939 self-assessments with a nonconformance rate of 3.71%.

d. RCRA Compliance Inspection

From January 22, 2007 to January 31, 2007, NMED conducted a hazardous waste compliance inspection at the Laboratory (see Table 2-2). The Laboratory received eight potential findings for this inspection.

e. Site Treatment Plan

In October 1995, the State of New Mexico issued a Federal Facility Compliance Order to the DOE and the University of California (UC), requiring compliance with the Site Treatment Plan. On June 1, 2006, Los Alamos National Security (LANS) replaced UC as the operating contractor at LANL at which time LANS assumed responsibility for compliance with the order. The plan documents the use of off-site facilities for treating and disposing of mixed waste generated at LANL and stored for more than one year. In 2007, the Laboratory shipped more than 74 m^3 of low-level mixed waste covered by the Site Treatment Plan. The increase over the 2006 volume (1.2 m^3) was due to the reclassification and management of approximately 85 m^3 of mixed transuranic waste as mixed low-level waste.

f. Solid Waste Disposal

LANL sends sanitary solid waste (trash) and construction and demolition debris for disposal to the Los Alamos County landfill on East Jemez Road. The DOE owns the property and leases it to Los Alamos County under a special-use permit. Los Alamos County operates this landfill and is responsible for obtaining all related permits for this activity from the State. The landfill is registered with the NMED Solid Waste Bureau. Laboratory trash placed in the landfill in 2007 included 2,158 metric tons of trash and 808 metric tons of construction and demolition debris. Through LANL recycling efforts, 2,751 metric tons of material did not go to the landfill in 2007.

g. Hazardous Waste Report

The Hazardous Waste Report covers hazardous and mixed waste generation, treatment, and storage activities performed at LANL during calendar year 2007 as required by RCRA, under 40 CFR §262.41, Biennial Report. In 2007, the Laboratory generated about 154,175 kg of RCRA hazardous waste, 43,797 kg of which were generated by the Environmental Remediation and Surveillance Program. The waste is recorded for more than 10,000 waste movements, treatment, or storage actions resulting in more than 492 Waste Generation and Management forms in the Hazardous Waste Report. The entire report is available on the web at http://www.lanl.gov/environment/waste/docs/reports/2007_biennial_hwr_LA-UR-08-0766.pdf.

h. Compliance Order on Consent (Consent Order)

The Consent Order is an enforcement document signed by NMED, DOE, and the UC Regents on March 1, 2005, which prescribes the requirements for corrective action at Los Alamos National Laboratory. The purposes of the Consent Order are (1) to define the nature and extent of releases of contaminants at, or from, the facility; (2) to identify and evaluate, where needed, alternatives for corrective measures to clean up contaminants in the environment and prevent or mitigate the migration of contaminants at, or from, the facility; and (3) to implement such corrective measures. The Consent Order supersedes the corrective action

requirements previously specified in Module VIII of the Laboratory's Hazardous Waste Facility Permit and applies to Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) subject to RCRA and HSWA requirements, but not to sites that are regulated by DOE under the Atomic Energy Act, such as those containing or releasing radionuclides. The Consent Order does not apply to those SWMUs and AOCs that received "no further action" decisions from EPA when it had primary regulatory authority. A description of the Consent Order work done in 2007 may be found in Chapter 9 of this report.

In 2007, the Laboratory submitted all of its deliverables (plans and reports) required by the Consent Order on time to NMED (see Tables 9-1 and 9-2 in Chapter 9 of this report).

i. Notices of Violation

In June 2007, the NMED Hazardous Waste Bureau issued an NOV to DOE and LANS for failing to complete the sampling of all wells within the Water Canyon watershed within 21 days of the start of a groundwater sampling event. LANL made changes to the methods for notifying organizations that must allow access and reassigned responsibility for coordinating and tracking sample scheduling. NMED determined the proposed corrective actions should help ensure future compliance.

In August 2007, NMED's Hazardous Waste Bureau issued LANS and DOE an NOV identifying two alleged violations noted during the 2006 RCRA compliance inspection. The penalty assessed was $26,613 and was paid on February 25, 2008. The 2007 Hazardous Waste Bureau RCRA compliance inspection was conducted from January 22, 2007 through January 31, 2007, resulting in an NOV dated January 28, 2008, that contained eight alleged violations.

An NOV issued in September 2006 alleged a failure to report the release of a groundwater contaminant (chromium) in accordance with the Consent Order. In 2008, DOE and LANS paid a penalty of $251,870 to settle without admitting the allegations.

An NOV dated October 25, 2006 alleged improper management of rubble located on Sigma Mesa generated by the decommissioning and demolition of TA-16, Building 340. The settlement agreement to resolve this NOV was signed in April 2007. LANS, DOE, and NMED agreed to settle the matter for $119,845, which was paid in May 2007. Regular reporting on planned building demolition was also required by the settlement agreement.

j. Other RCRA noncompliances

During 2007, four 55-gallon drums stored in permitted storage area TA-54, Area G, Building 232 contained an EPA Hazardous Waste Number that was not authorized by the LANL Hazardous Waste Facility Permit for storage at that location. All four drums that contained the EPA Waste Number D042 (Trichlorophenol) were stored for a period of time in TA-54-232; two of the drums were also stored for a period in TA-54-229; and one of the drums was stored in TA-54-231 for a period. Upon discovery, the drums were verified to be in or were moved to one of the storage areas at TA-54, Area G authorized for D042.

During a prestart assessment for repackaging activities at TA-50-69, a question was raised as to whether waste containers within the permitted container storage unit at TA-54, Area G, Dome 231, were being remediated for liquids in accordance with the exclusion allowed for at 40 CFR §270.1(c)(2)(vii). The exclusion requires that an absorbent be placed into a container at the time

waste is first placed into the container. After review of relevant documents, LANL determined that up to 313 of the 442 waste containers treated at Dome 231 between November 2006 and March 2007 were treated for small amounts of liquid by the addition of absorbent to the original container. The treatment process was reassessed to ensure that activities at restart would comply with the exclusion requirements.

An inventory conducted in early 2007 at the TA-54 container storage units did not locate 47 waste containers listed in the inventory. Follow-up included subsequent inventories that located containers on-site and identified containers shipped off-site for treatment and/or disposal.

On September 25, 2007, a visiting permit writer for the NMED's Hazardous Waste Bureau discovered a drum located at the TA-54, Area G, Pad 7, interim status container storage unit with an illegible accumulation start date. The hazardous waste label was fixed and information regarding the label including pictures was submitted to the Hazardous Waste Bureau in October 2007.

No weekly RCRA storage area inspection was conducted for the week of December 24, 2007 through December 30, 2007 at the permitted storage units at TA-50, Building 69. The units did not contain any hazardous wastes during that timeframe and a memorandum to file was generated on January 14, 2008 to document the need for no inspection.

Between July 2004 and May 2007, five containers of hazardous waste were incorrectly placed in TA-54 Dome 375 for varying periods of time. TA-54 Dome 375 is used for storage of low-level and transuranic non-hazardous waste. Upon discovery, the waste containers were moved to a container storage unit authorized for hazardous waste storage.

There were no actual or potential hazards to the environment and human health outside the facility and no material was lost or had to be recovered because of these incidents. None of these incidents required other reporting to the NMED by the LANL Hazardous Waste Facility Permit.

2. Comprehensive Environmental Response, Compensation, and Liability Act

The DOE/NNSA conveyed Tract A-8a, located south of Material Disposal Area B and south of DP Road, to the Los Alamos County School Board on January 19, 2007. No other lands were conveyed from DOE to other entities in 2007 under the Land Conveyance and Transfer Project. Environmental Baseline Survey Reports were initiated for tracts A-18 and A-4 in anticipation of scheduled transfers in 2008. These reports contain the Comprehensive Environmental Response, Compensation, and Liability Act 120(h) information required to convey these properties to private or municipal entities and disclose any environmental liabilities that may exist on these tracts. The Environmental Baseline Survey Reports document remedial actions that were taken to protect human health and the environment for the proposed use of the properties, and identify any restrictions on the use of the property where warranted.

3. Emergency Planning and Community Right-to-Know Act

a. Introduction

The Laboratory is required to comply with the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 and Executive Order 13148, *Greening the Government Through Leadership in Environmental Management*. Executive Order 13148 was superseded in January 2007 by Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*.

b. Compliance Activities

For 2007, the Laboratory submitted reports to fulfill its requirements under EPCRA, as shown in Table 2-3 and described below.

Table 2-3
Compliance with Emergency Planning and Community Right-to-Know Act during 2007

Statute	Brief Description	Compliance
EPCRA Sections 302–303 Planning Notification	Requires emergency planning notification to state and local emergency planning committees.	No changes to the notification have been made since the July 30, 1999 notification and an update in 2000.
EPCRA Section 304 Release Notification	Requires reporting of releases of certain hazardous substances over specified thresholds to state and local emergency planning committees and to the National Response Center.	There were no leaks, spills, or other releases of chemicals into the environment that required EPCRA Section 304 reporting during 2007.
EPCRA Sections 311–312 Material Safety Data Sheets and Chemical Inventories	Requires facilities to provide appropriate emergency response personnel with an annual inventory and other specific information for any hazardous materials present at the facility over specified thresholds.	The presence of 36 hazardous materials stored at LANL over specified quantities in 2007 required submittal of a hazardous chemical inventory to the State Emergency Response Commission and the Los Alamos County Fire and Police Department.
EPCRA Section 313 Annual Toxic Release Inventory	Requires all federal facilities to report total annual releases of listed toxic chemicals used in quantities above reportable thresholds.	Laboratory use of lead and nitric acid exceeded the reporting thresholds in 2007, requiring submittal of Toxic Chemical Release Inventory Reporting Forms (Form Rs) to the EPA and the State Emergency Response Commission.

i. Emergency Planning Notification.

Title III, Sections 302–303, of EPCRA require the preparation of emergency plans for more than 360 extremely hazardous substances if stored in amounts above threshold limits. The Laboratory is required to notify state and local emergency planning committees (1) if there are any changes at the Laboratory that might affect the local emergency plan or (2) if the Laboratory's emergency planning coordinator changes. No updates to this notification were made in 2007.

ii. Emergency Release Notification

Title III, Section 304, of EPCRA requires facilities to provide emergency release notification of leaks, spills, and other releases of listed chemicals into the environment, if these chemicals exceed specified reporting quantities. Releases must be reported immediately to the state and local emergency planning committees and to the National Response Center. There were no leaks, spills, or other releases of chemicals into the environment that required EPCRA Section 304 reporting during 2007.

iii. Material Safety Data Sheet/Chemical Inventory Reporting

Title III, Sections 311–312, of EPCRA require facilities to provide an annual inventory of the quantity and location of hazardous chemicals above specified thresholds present at the facility. The inventory includes hazard information and storage location for each chemical. The Laboratory submitted a report to the State Emergency Response Commission and the Los Alamos County Fire and Police Departments listing 36 chemicals and explosives at the Laboratory stored on-site in quantities that exceeded reporting threshold limits during 2007.

iv. Toxic Release Inventory Reporting

Executive Order 13148 requires all federal facilities to comply with Title III, Section 313, of EPCRA. This section requires reporting of total annual releases to the environment of listed toxic chemicals that exceed activity thresholds. Beginning with reporting year 2000, new and lower chemical-activity thresholds were put in place for certain persistent, bioaccumulative, and toxic chemicals and chemical categories. The thresholds for these chemicals range from 0.1 g to 100 lb. Until this change went into effect, the lowest threshold was 10,000 lb. LANL exceeded two thresholds in 2007 and therefore was required to report the uses and releases of these chemicals. The reported materials were lead and nitric acid. The largest use of reportable lead is at the on-site firing range where security personnel conduct firearms training. Table 2-4 summarizes the reported releases for lead and nitric acid in 2007.

Table 2-4
Summary of 2007 Reported Releases under EPCRA Section 313

	Lead (lb)	Nitric Acid (lb)
Air Emissions	8.61	219.9
Water Discharges	0.18	0
On-Site Land Disposal	7,385	N/A
Off-Site Waste Transfers	3,490	337

4. Toxic Substances Control Act

Because the Laboratory's activities are research and development (R&D) rather than the manufacture of commercial chemicals, the Laboratory's main concern under the Toxic Substances Control Act (TSCA) is the regulations covering polychlorinated biphenyls (PCBs) and import/export of R&D chemical substances. The PCB regulations govern substances including, but not limited to, dielectric fluids, contaminated solvents, oils, waste oils, heat-transfer fluids, hydraulic fluids, slurries, soil, and materials contaminated by spills.

During 2007, the Laboratory shipped 46 containers of PCB waste off-site for disposal or recycling. The quantities of disposed waste included 60 lb (27 kg) of capacitors and 2795 lb (1268 kg) of fluorescent light ballasts. The Laboratory manages all wastes in accordance with 40 Code of Federal Regulations (CFR) 761 manifesting, record keeping, and disposal requirements. PCB wastes go to EPA-permitted disposal and treatment facilities. Light ballasts go off-site for recycling. The primary compliance document related to 40 CFR 761.180 is the annual PCB report that the Laboratory submits to EPA Region 6. The renewal request for the Area G PCB disposal authorization was withdrawn in 2006. During 2007, EPA did not perform any PCB site inspections. Approximately 21 TSCA reviews were conducted on imports and exports of chemical substances for the Laboratory's Property Management Group Customs Office.

5. Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act regulates the manufacturing of pesticides and the protection of workers who use these chemicals. Sections of this act that are applicable to the Laboratory include requirements for certification of workers who apply pesticides. The New Mexico Department of Agriculture has the primary responsibility to enforce pesticide use under the act. The New Mexico Pesticide Control Act applies to the Laboratory's licensing and certifying of pesticide workers, record keeping, applying of pesticides, inspecting of equipment, storing of pesticides, and disposing of pesticides.

The New Mexico Department of Agriculture did not conduct assessments or inspections of the Laboratory's pesticide application program in 2007. Table 2-5 shows the amounts of pesticides the Laboratory used during 2007.

Table 2-5
Herbicides and Pesticides used at LANL in 2007

Herbicides		Insecticides	
VELPAR L (Liquid)	169 gal.	TEMPO 20 WP	36 oz
Roundup Pro	1.5 gal.	Maxfource Ant Bait	10 oz
2-4-D Amine (liquid)	15 gal.	Maxfource Ant Bait Station	260 oz
VELPAR DF (powder)	12 lbs	Advion Ant Bait	4 oz
		Advion Ant Bait Arenas	21 oz
		TALSTAR F	11 oz
		Wasp Freeze	35 oz
		Suspend SC	20 oz
		P.I. Contact	207 oz
		Demand CS	16 oz

6. Clean Air Act

Pursuant to the federal CAA Amendments and Title 20 of NMAC, Chapter 2, Part 70, Operating Permits (20.2.70 NMAC), LANS is authorized to operate applicable air emission sources at LANL per the terms and conditions as defined in Operating Permit No. P100-M2. The operating permit conditions mirror existing source-specific permit conditions applicable to operating requirements, record keeping, monitoring, and reporting. By complying with the conditions of the Title V Operating Permit, the Laboratory is deemed to be compliance with all applicable air requirements existing at the date of permit issuance.

As part of the Title V Operating Permit program, LANL reports emissions from sources included in the Operating Permit twice a year. These sources include multiple boilers and electric generators, two steam plants, a combustion turbine generator, a data disintegrator, two carpenter shops, a degreaser, and an asphalt plant. LANL also reports emissions from chemical use associated with R&D and permitted beryllium activities.

According to reporting requirements in the Title V Operating Permit's terms and conditions, the Laboratory must submit an Annual Compliance Certification report to NMED. In the 2007 Compliance Certification report, two permit deviations were reported. These deviations consisted of an opacity exceedance at the TA-3 power plant and a reduction in the High Efficiency Particulate Air (HEPA) filter efficiency at TA-35-213. The opacity exceedance occurred on May 1, 2007, when an opacity of 25% was observed at the power plant during a routine change in fuels from natural gas to fuel oil. The opacity observed was slightly above the opacity limit of 20% stated in the permit. An excess emissions report was submitted to NMED identifying the details of this deviation. The second deviation was for a HEPA filter test occurring on March 28, 2007 at one of the permitted beryllium sources located at TA-35-213. The test indicated that the filter did not meet the established efficiency criteria. The filter was subsequently replaced and beryllium operations at this location were ceased until the filter test was passed.

LANL demonstrated full compliance with all other permit applicable terms and conditions and met all reporting requirement deadlines.

In 2007, LANL requested and received a modification to Operating Permit No P100. This permit modification, P100-M2, was issued on July 16, 2007. The modification consisted of an administrative amendment, retiring the beryllium operations at the Chemistry and Metallurgy Research (CMR) Facility at Technical Area TA-3-29.

Also during 2007, the Laboratory sent notification to NMED on the closure of the TA-21 steam plant. The steam plant was officially closed on September 28, 2007 and is being prepared for decontamination and decommissioning. The three boilers located at this facility were last operated in June of 2007.

The construction and air quality emissions testing of the combustion turbine generator, located at the TA-3 power plant, was also completed during the year. The turbine, which will provide emergency back-up power and power during periods of high demand, started operation on September 23, 2007. An emissions test was performed on October 5, 2007, with results showing emissions well below permit limits. The turbine was included in the LANL operating permit in 2006 under modification P100M1.

According to the terms and conditions of New Source Review air quality permit 2195-P, LANL completed start-up of three electrical generators located at TA-33. These generators will supply power for various projects at the TA-33 site. The generators consist of two 20 kW portable diesel generators and one 225 kW portable diesel generator. All three generators were started on October 15, 2007. An air quality emission test was performed on the 225 kW generator on December 4, 2007, with results showing emissions well below permit limits.

The initial LANL operating permit, P100, was issued on April 30, 2004. This permit is effective for five years and will expire on April 29, 2009. LANL will submit an application 12 months prior to the date of expiration, as required by 20.2.70.300 NMAC. The preparation of the permit revision application started in 2007 and will continue until it is submitted in April 2008.

Under the Title V Operating Permit program, LANL is a major source, based on the potential to emit nitrogen oxides (NO_X), carbon monoxide (CO), and volatile organic compounds (VOCs). In 2006, the TA-3 steam plant and boilers located across the Laboratory were the major contributors of NO_X, CO, and particulate matter (PM). R&D activities were responsible for most of the VOC and hazardous air pollutant emissions. Table 2-6 summarizes these data.

Table 2-6
Calculated Actual Emissions for Regulated Pollutants Reported to NMED for Operating Permit Compliance 2007

	Pollutants[a], tons					
Emission Units	**NO_x**	**SO_x**	**PM**	**CO**	**VOC**	**HAPs**
Asphalt Plant	0.03	0.005	0.01	0.4	0.008	0.008
TA-21 Steam Plant	1.5	0.02	0.1	1.3	0.08	0.03
TA-3 Steam Plant	17.8	0.3	2.3	12.3	1.7	0.6
Regulated Boilers	5.1	0.03	0.5	3.6	0.3	0.1
R&D Chemical Use	NA	NA	NA	NA	10.1	4.8
Degreaser	NA	NA	NA	NA	0.01	0.01
Data Disintegrator	NA	NA	0.4	NA	NA	NA
Carpenter Shops	NA	NA	1.1	NA	NA	NA
Storage Tanks	NA	NA	NA	NA	0.007	NA
Stationary Standby Generators[b]	18.4	4.1	0.9	4.1	0.9	0.005
Miscellaneous Small Boilers[b]	19.2	0.1	1.5	16.1	1.1	0.4
TA-33 Generator	0.09	0.01	0.003	0.07	0.002	< 0.001
TOTAL	**62.1**	**4.6**	**6.8**	**37.9**	**14.3**	**6.0**

[a] NOx = nitrogen oxides. SOx = Sulfur oxides. PM = particulate matter. CO = carbon monoxide. VOC = volatile organic compounds. HAPs = hazardous air pollutants.

[b] Emissions from these source categories were reported for the first time in 2004, as required by the Title V Operating Permit. Emissions units in these categories are exempt from construction permitting and annual emission inventory reporting requirements and are not included in Figure 2-1.

LANL staff calculates air emissions using emission factors from source tests, manufacturer's data, and EPA documentation. Calculated emissions are based on actual production rates, fuel usage, and/or material throughput. To satisfy requirements set forth in Title 20 of NMAC, Chapter 2, Part 73, Notice of Intent and Emissions Inventory Requirements (20.2.73 NMAC) and the Title V Operating Permit, LANL submits an annual Emissions Inventory Report and semi-annual Emissions Reports, respectively, to NMED. Figure 2-1 depicts a five-year history of criteria pollutant emissions. Emissions from 2004 to present are very similar and remain relatively constant following a sharp emissions decline from 2003 emissions.

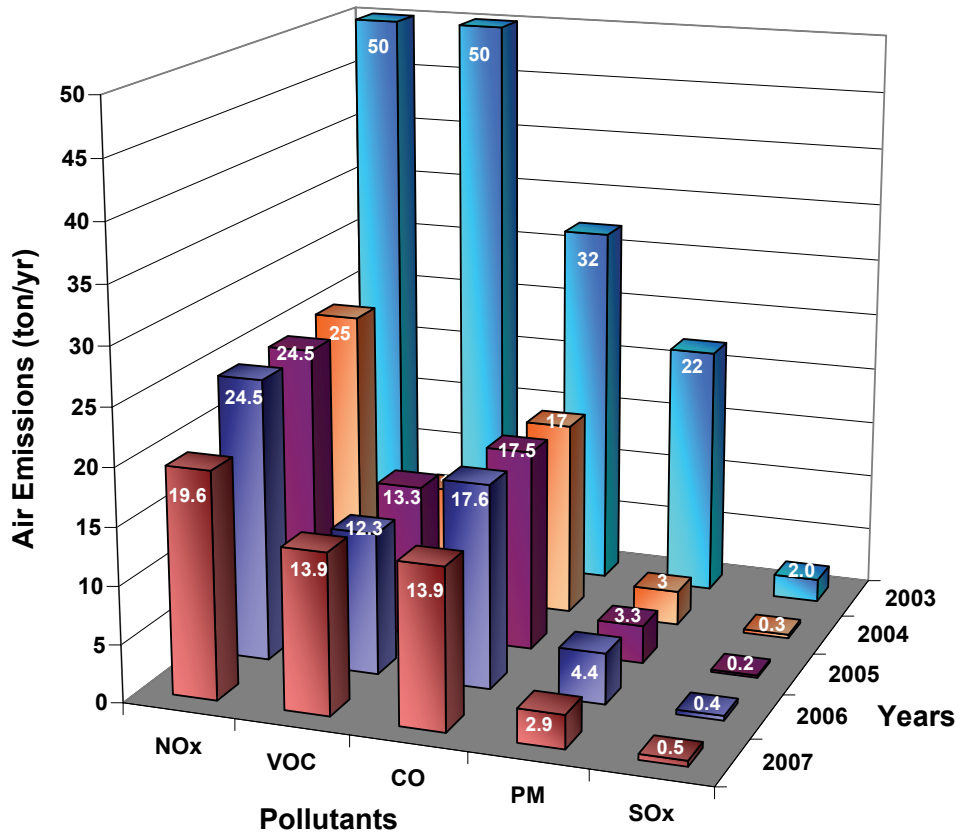

Figure 2-1. LANL criteria pollutant emissions from 2003 to 2007 for emissions inventory reporting.

a. New Mexico Air Quality Control Act

i. Permits

LANL reviews plans for new and modified projects, activities, and operations to identify all applicable air quality requirements including the need to revise the operating permit application, to apply for construction permits, or to submit notifications to NMED. During 2007, the Laboratory performed approximately 149 air quality reviews. Also during 2007, LANL received an NSR air quality permit for three generators to be used at TA-33. No NSR permit applications were submitted in 2007. As previously mentioned above, an administrative permit revision was requested and received during 2007, which retired beryllium operations at the CMR Facility at Technical Area TA-3-29. This provided LANL with the new operating permit number P100M2. LANL submitted eight exemption notifications to NMED. The exemptions were primarily for small boilers and small generators. LANL currently operates under the air permits listed in Table 2-1.

ii. Open Burning

LANL may perform open burning under 20.2.60 NMAC (Open Burning) or 20.2.65 NMAC (Smoke Management) to thin vegetation and reduce the threat of fire. LANL did not perform any open burning during 2007.

iii. Asbestos

The National Emission Standard for Hazardous Air Pollutants (NESHAP) for Asbestos requires that LANL provide advance notice to NMED for large renovation jobs that involve asbestos and for all demolition projects. The asbestos NESHAP further requires that all activities involving asbestos be conducted in a manner that mitigates visible airborne emissions and that all asbestos-containing wastes be packaged and disposed of properly.

LANL continued to perform renovation and demolition projects in accordance with the requirements of the asbestos NESHAP. Major activities in 2007 included 16 large renovation jobs and demolition projects of which NMED received advance notice. These projects, combined with other smaller activities, generated 310.11 m^3 of asbestos waste. All asbestos wastes were properly packaged and disposed of at approved landfills.

To ensure compliance, the Laboratory conducted internal inspections of job sites and asbestos packaging approximately monthly.

b. Federal Clean Air Act

i. Ozone-Depleting Substances

Title VI of the CAA contains specific sections that establish regulations and requirements for ozone-depleting substances (ODS), such as halons and refrigerants. The main sections applicable to the Laboratory prohibit individuals from knowingly venting or otherwise releasing into the environment any refrigerant or refrigerant substitute during maintenance, repair, service, or disposal of halon fire-suppression systems and air-conditioning or refrigeration equipment. All technicians who work on refrigerant systems must be EPA-certified and must use certified recovery equipment. The Laboratory is required to maintain records on all work that involves refrigerants and the purchase, usage, and disposal of refrigerants. The Laboratory's standards for refrigeration work are covered under Criterion 408, "EPA Compliance for Refrigeration Equipment," of the LANL Operations and Maintenance Manual.

The Laboratory continued to work at eliminating the use of Class 1 ODS. In 2007, the Laboratory removed approximately 2,500 pounds of Class 1 ODS from active inventory.

ii. Radionuclides

Under Rad-NESHAP, the EPA limits to 10 mrem/yr the effective dose equivalent of radioactive airborne releases from a DOE facility, such as LANL, to any member of the public. The 2007 dose to the maximally exposed individual (MEI) (as calculated using EPA-approved methods) was 0.52 mrem. The location of the highest dose was along DP Road in eastern Los Alamos. Site preparation activities at Materials Disposal Area B on DP Road contributed about half of this dose; the remainder came from Laboratory stack emissions.

7. Clean Water Act

a. NPDES Industrial Point Source Outfall Self-Monitoring Program

The primary goal of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The act established the requirements for NPDES permits for point-source effluent discharges to the nation's waters. The NPDES outfall permit establishes specific chemical, physical, and biological criteria that the Laboratory's effluent must meet before it is discharged.

From January 1 through May 31, 2007, LANS and the DOE/National Nuclear Security Administration (NNSA) were co-permittees of the NPDES permit covering Laboratory operations. EPA Region 6 in Dallas, Texas, issues and enforces the permit. NMED certifies the EPA-issued permit and performs some compliance-evaluation inspections and monitoring for the EPA. From January 1 through July 31, 2007, the Laboratory's industrial point-source NPDES permit contained 21 permitted outfalls that include one sanitary outfall and 20 industrial outfalls. In July 2007, EPA Region 6 issued the final NPDES point source outfall permit with an effective date of August 1, 2007. This new permit contains 15 permitted outfalls that include one sanitary outfall and 14 industrial outfalls (Table 2-7). In order to meet the requirements in the new permit, the Laboratory initiated a feasibility study to eliminate outfalls and to add additional treatment technologies. To view the Laboratory's NPDES permit, go online to http://www.lanl.gov/environment/h2o/permits.shtml.

Table 2-7
Volume of Effluent Discharge from NPDES Permitted Outfalls in 2007

Outfall Number	TA-bldg	Description	Watershed (Canyon)	2007 Discharge (gal.)
02A129	21-357	TA-21 Steam Plant	Los Alamos	17,741,700
03A047[a]	53-[b]	LANSCE Cooling Tower	Los Alamos	0
03A048	53-963/978	LANSCE Cooling Tower	Los Alamos	14,798,050
03A049[a]	53-[b]	LANSCE Cooling Tower	Los Alamos	0
03A158 [a]	21-209	TA-21 Cooling Tower	Los Alamos	392,375
051	50-1	TA-50 Radioactive Liquid Waste Treatment Facility	Mortandad	1,210,466
03A021	3-29	CMR Building Air Washers	Mortandad	599,378
03A022	3-2238	Sigma Cooling Tower	Mortandad	1,477,924
03A160	35-124	National High Magnetic Field Laboratory Cooling Tower	Mortandad	19,767,226
03A181	55-6	Plutonium Facility Cooling Tower	Mortandad	2,247,895
13S	46-347	Sanitary Wastewater Treatment Plant	Sandia	89,354,000
001	3-22	Power Plant	Sandia	3,311,398
03A024[a]	3-187	Sigma Press Cooling Tower	Sandia	0
03A027	3-2327	Strategic Computing Complex Cooling Tower	Sandia	11,102,489
03A113	53-293/952	LANSCE Cooling Tower	Sandia	303,365
03A199	3-1837	Laboratory Data Communications Center	Sandia	15,067,339
03A028 [a]	15-202	PHERMEX Cooling Tower	Water	0
03A130	11-30	TA-11 Cooling Tower	Water	1,573
03A185	15-312	DARHT Cooling Tower	Water	845,207
05A055	16-1508	High Explosives Wastewater Treatment Facility	Water	8,799
05A097[a]	11-52	TA-11 Drop Pad/HE Testing	Water	0
			2007 Total:	**178,229,184**

[a] Not included in permit effective August 1, 2007

[b] Structure removed

The Laboratory's new NPDES outfall permit requires weekly, monthly, and quarterly sampling to demonstrate compliance with effluent quality limits. The Laboratory reports analytical results to EPA and NMED at the end of the monitoring period for each respective outfall category. During 2007, none of the 130 samples collected from the SWWS Plant's outfall exceeded effluent limits; however, three of the 1408 samples collected from industrial outfalls exceeded effluent limits (see discussion below). Monitoring data obtained from sampling at NPDES permitted outfalls are in data supplement Table S2-1 (on included compact disc) and available online at http://wqdbworld.lanl.gov/.

The following is a summary of the Laboratory's corrective actions taken by the Laboratory during 2007 to address the NPDES outfall permit noncompliance cited above.

- ***TA-53 Los Alamos Neutron Science Center (LANSCE) Outfall 03A048.*** On June 13, 2007, at 11:36 a.m., a total residual chlorine concentration of 510 µg/L exceeded the NPDES daily maximum limit of 11 µg/L in NPDES Permit NM0028355. The discharge was immediately halted, all systems were checked by facility personnel, and all systems were found to be operating correctly. A second compliance sample collected at 12:05 p.m. showed no chlorine detected.

- ***TA-3 Strategic Computing Complex Outfall 03A027.*** On August 1, 2007, a total residual chlorine concentration of 150 µg/L exceeded the NPDES daily maximum limit of 11 µg/L in NPDES Permit NM0028355. The pump that injects chlorine neutralizer into the discharge lost power due to a tripped ground fault circuit interrupter. The device was reset and operational samples showed no chlorine in the blowdown. Administrative controls were implemented to improve detection of system breakdowns.
- ***TA-3 Laboratory Data Communications Center.*** On August 29, 2007, a total residual chlorine concentration of 390 µg/L exceeded the NPDES daily maximum limit of 11 µg/L in NPDES Permit NM0028355. A closed pinch valve on the blowdown line was leaking, allowing treated cooling tower water into the effluent pipe without being dechlorinated. The internal rubber sleeve of the valve was replaced on August 29, 2007, and the system was again operating properly.

b. NPDES Sanitary Sewage Sludge Management Program

The Laboratory's TA-46 SWWS Plant is an extended-aeration, activated-sludge sanitary wastewater treatment plant. The activated-sludge treatment process requires periodic disposing of excess sludge (waste-activated sludge) from the plant's clarifiers to synthetically lined drying beds. After air-drying for a minimum of 90 days to reduce pathogens, the dry sludge is characterized and disposed of as a New Mexico Special Waste. Monitoring data obtained from routine characterization of SWWS Plant sludge is available online at http://wqdbworld.lanl.gov/. During 2007, the SWWS Plant generated approximately 24 dry tons (48,033 dry lb) of sewage sludge. All of this sludge was disposed of as a New Mexico Special Waste at a landfill authorized to accept this material.

c. NPDES Industrial Point Source Permit Compliance Evaluation Inspection

There were no Compliance Evaluation Inspections performed in 2007.

d. NPDES Storm water Construction Permit Program

The NPDES Construction General Permit (CGP) Program regulates storm water discharges from construction activities disturbing one or more acres, including those construction activities that are part of a larger common plan of development collectively disturbing one or more acres.

LANL and the general contractor apply individually for NPDES CGP coverage and both are permittees at most construction-sites. Compliance with the NPDES CGP includes the development and implementation of a Storm water Pollution Prevention Plan (SWPPP) before soil disturbance can begin and site inspections once soil disturbance has commenced. A SWPPP describes the project activities, site conditions, best management practices (BMPs), and permanent control measures required for reducing pollution in storm water discharges and protecting endangered or threatened species and critical habitat. Compliance with the NPDES CGP is demonstrated through periodic inspections that document the condition of the site and also identify corrective actions required to keep pollutants from moving off the construction-site. Data collected from these inspections is tabulated weekly, monthly, and annually in the form of Site Inspection Compliance Reports.

During 2007, the Laboratory implemented and maintained as many as 53 construction-site SWPPPs and addendums to SWPPPs and performed 544 storm water inspections. The Laboratory uses a geographic information system to manage project information and generate status reports that facilitate reporting under the Director's Portfolio Reviews. The overall CGP compliance record in 2007 was 99% for all inspections compared to 94% in 2006. During the summer months, when most high-intensity precipitation events occur, 275 out of 276 inspections were compliant. At the end of 2007, 100% of the Laboratory's permitted sites were in compliance with the CGP.

The LANL storm water team continued to develop new methods to improve storm water compliance. Improvements were made in precipitation measurement by increasing the number of precipitation stations and by creating subsequent "Thiessen Polygons" that overlay the Pajarito Plateau and associate individual construction projects with specific precipitation stations. Because storm water inspections are triggered by precipitation amounts, using more accurate and site-specific precipitation data result in a more strategic and compliant inspection program.

To further reduce future CGP non-compliances and to increase awareness of CGP requirements, the storm water team revised subcontractor document language and briefed subcontractors on CGP requirements at pre-bid and pre-construction meetings. Storm water requirements were included in subcontract requirements so all bidders are provided project specific environmental requirements to assist pre-planning for storm water requirements. Presentations were also given to Subcontractor Technical Representatives (STR) and work planners to increase awareness on CGP requirements. A standing weekly meeting was instituted with LANL Project Management Division personnel to review the storm water compliance status of projects.

e. NPDES Industrial Storm water Program

The NPDES Industrial Storm water Permit Program regulates storm water discharges from identified regulated industrial activities (including SWMUs) and their associated facilities. These activities include metal fabrication; hazardous waste treatment, storage, and disposal; landfill operations; vehicle and equipment maintenance; recycling activities; electricity generation; warehousing activities; and asphalt manufacturing.

UC and the DOE were co-permittees under the EPA 2000 NPDES Storm water Multi-Sector General Permit for Industrial Activities (MSGP-2000). MSGP-2000 expired October 30, 2005, without EPA issuing a new permit. Administrative continuance of the MSGP-2000, which requires continued compliance with the expired permit requirements, was granted to existing permit holders. This continuance will remain in effect until a new permit is issued. There is currently no identified date for issuance of a new permit.

On December 1, 2005, EPA issued a draft MSGP. Proposed changes to the permit include increased storm water monitoring requirements, changes in benchmark monitoring parameters, increased inspection frequencies, additional SWPPP content requirements, and increased requirements for BMP selection, implementation, and maintenance.

MSGP-2000 required the development and implementation of site-specific SWPPPs, which must include identification of potential pollutants and activities and the implementation of BMPs. Permit requirements also include the monitoring of storm water discharges from permitted sites. In 2007, LANL implemented and maintained 15 SWPPPs under the MSGP-2000 requirements, covering 26 facilities and site-wide SWMUs. Compliance with the MSGP-2000 requirements for these sites is achieved primarily by implementing the following:

- Identifying potential contaminants and activities that may impact surface water quality and identifying and providing structural and non-structural controls (BMPs) to limit the impact of those contaminants.
- Developing and implementing facility-specific SWPPPs.
- Monitoring storm water runoff at facility gauging stations for industrial sector-specific benchmark parameters and visually inspecting storm water runoff to assess color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of storm water pollution.

Several additional facilities met the requirements for a MSGP-2000 "No Exposure Certification," which identified the facility as having a regulated industrial activity but did not require permit authorization for its storm water discharges due to the existence of a condition of no exposure. Such facilities were not covered under or subject to the requirements of a SWPPP.

f. Federal Facility Compliance Agreement/ Administrative Order

On February 3, 2005, DOE entered into a compliance agreement with EPA to protect surface water quality at the Laboratory through a Federal Facilities Compliance Agreement. The FFCA establishes a compliance program for the regulation of storm water discharges from SWMUs and AOCs until such time as those sources are regulated by an individual storm water permit pursuant to the NPDES Permit Program. Certain SWMUs and AOCs (collectively, Sites) are covered by this agreement. On March 30, 2005, EPA issued an Administrative Order (AO) to the Laboratory that coincides with the FFCA.

The FFCA/AO establishes a schedule for monitoring and reporting requirements and requires the Laboratory to minimize erosion and the transport of pollutants or contaminants from Sites in storm water runoff. The Laboratory also complies with the requirements of the Multi-Sector General Permit (MSGP).

The FFCA/AO requires two types of monitoring at specified sites, pursuant to two monitoring management plans, including: 1) watershed sampling at approximately 60 automated gauging stations at various locations within the canyons pursuant to a Storm water Monitoring Plan (SWMP), and 2) site-specific sampling at approximately 294 sites, on a rotating basis pursuant to a SWMU SWPPP over a four-year period. The purpose of storm water monitoring is to determine if there is a release or transport of contaminants into surface water that could cause or contribute to an exceedance of applicable surface water quality standards. If a release or transport occurs, it may be necessary to implement BMPs to reduce erosion or to re-examine, repair, or modify existing BMPs to reduce erosion. The SWMU/SWPPP must also describe an erosion control program to control and limit contamination migration and transport from sites and to monitor the effectiveness of controls at the sites.

In 2007, the Laboratory completed the following tasks:

1. Submitted the annual modification of the SWPPP for SWMU/AOCs that describes watershed-scale monitoring, site-specific monitoring, and the erosion control program at SWMU/AOCs;
2. Continued negotiations with EPA and NMED on the development of an individual permit for storm water discharges from SWMUs;
3. Submitted all monthly water screening action level exceedance reports and quarterly status reports required by the FFCA on schedule;
4. Completed the following fieldwork:
   - Installed 38 new site-specific samplers to bring the total to 122;
   - Collected 538 storm water samples at site-specific locations;
   - Collected 213 storm water samples at gage locations;
   - Conducted 1193 inspections at 279 sites;
   - Completed maintenance of BMPs at all FFCA sites;
   - Completed 290 Annual Comprehensive Site Compliance Evaluation inspections.

The Annual Comprehensive Site Compliance Evaluation inspections were conducted by qualified personnel as required under the MSGP to assess the presence of existing industrial materials, leaks and spills, off-site tracking of sediment, tracking/blowing of industrial materials, and evidence of pollutants entering into receiving waters. The annual inspections also included an evaluation of the existing structural BMPs at each site.

The Laboratory provided supplemental information submittals in support of the Individual Permit application for storm water discharges from certain SWMUs/AOCs. A draft permit is expected to be issued by EPA in early 2008 for public comment.

g. Aboveground Storage Tank Compliance Program

The Laboratory's Aboveground Storage Tank (AST) Compliance Program is responsible for ensuring compliance with the requirements established by EPA (CWA, 40 CFR, Part 112) and NMED Petroleum Storage Tank Bureau (PSTB) Regulations (20.5 NMAC). During 2007, the Laboratory was in full compliance with both EPA and NMED requirements.

Spill Prevention Control and Countermeasures (SPCC) Plans fulfill the federal requirements for the AST Compliance Program, as required by the CWA (40 CFR, Part 112, Oil Pollution Prevention Regulations). Comprehensive SPCC Plans are developed to meet EPA requirements that regulate water pollution from oil spills.

EPA proposed additional extensions to compliance deadlines for meeting new regulatory requirements under the federal Clean Water Act (40 CFR, Part 112). Proposed new regulations will require the Laboratory to modify and implement its SPCC Plans by July 1, 2009. The primary modifications address AST storage capacity, inspection frequency, integrity testing requirements, and equipment. The Laboratory continued the process of completing all modifications to existing and new SPCC Plans and implementing those modifications.

The Laboratory maintained and operated 27 ASTs in compliance with 20.5 NMAC of the NMED-PSTB Regulations. In July 2007, the Laboratory paid annual AST registration fees of $100 per AST.

During 2007, four removed and decommissioned ASTs from TA-53 (LANSCE) and three from TA-3-316 were closed out with NMED-PSTB pursuant to 20.5 NMAC.

On February 21, 2002, the Laboratory notified EPA, NMED, and the National Response Center of a discharge of approximately 48,000 gallons of diesel fuel into the environment from a tank at TA-21-57. Soil removal and sampling were performed in accordance with Laboratory, state, and federal regulatory requirements to determine the extent of the leak. The Laboratory completed characterization of the release in December 2003 and is continuing to work with NMED on a path forward for mitigation efforts. In 2007, the Laboratory continued efforts to implement a Sampling and Analysis Plan to conduct additional characterization of the TA-21-57 diesel release site to further evaluate subsurface diesel contamination. Additional characterization will provide information needed for establishing current conditions for the subsurface diesel contamination. Upon evaluation of additional characterization, the Laboratory intends to develop applicable processes for site mitigation or monitoring.

On April 3, 2003, the Laboratory notified NMED of the discovery of diesel-contaminated soil near the TA-3 Power Plant AST (TA-3-26). The Laboratory completed initial characterization of the diesel-contaminated soil in April 2004 and is continuing to work with NMED on a path forward for additional characterization and mitigation efforts. In 2007, the Laboratory completed characterization work at TA-3-26. The Laboratory plans to implement the Tier 1 Evaluation in 2008 pursuant to 20.5 NMAC of NMED-PSTB Regulations to evaluate the need for mitigation.

h. Dredge and Fill Permit Program

Section 404 of the CWA requires the Laboratory to obtain permits from the US Army Corps of Engineers to perform work within perennial, intermittent, or ephemeral watercourses. Section 401 of the CWA requires states to certify that Section 404 permits issued by the Corps will not prevent attainment of state-mandated stream standards. NMED reviews Section 404/401 joint permit applications and issues separate Section 401 certification letters, which may include additional permit requirements to meet state stream standards for individual Laboratory projects. In addition, the Laboratory must comply with 10 CFR 1022, which specifies how DOE sites comply with Executive Order 11988, Floodplain Management, and Executive Order 11990, Protection of Wetlands.

During 2007, no Section 404/401 permits were issued to the Laboratory.

In addition, LANL reviewed 622 excavation permits and 47 project profiles for potential impacts to watercourses, floodplains, or wetlands. No Floodplain/Wetland Assessments were prepared in 2007. No violations of the DOE Floodplains/Wetlands Environmental Review Requirements were recorded. NMED and the Corps of Engineers did not inspect any sites permitted under the Section 404/401 regulations during 2007.

8. Safe Drinking Water Act

Los Alamos County, as owner and operator of the Los Alamos water supply system, is responsible for compliance with the requirements of the federal Safe Drinking Water Act (SDWA) and the New Mexico Drinking Water Regulations (NMEIB 2007). The SDWA requires Los Alamos County to collect samples from various points in the water distribution systems at the Laboratory, Los Alamos County, and Bandelier National Monument to demonstrate compliance with SDWA maximum contaminant levels (MCLs). EPA has established MCLs for microbiological organisms, organic and inorganic constituents, and radioactivity in drinking water. The State has adopted these standards in the New Mexico Drinking Water Regulations. EPA has authorized NMED to administer and enforce federal drinking water regulations and standards in New Mexico. Information on the quality of the drinking water from the Los Alamos County water supply system is in the County's annual Consumer Confidence Report, available online at: http://www.losalamosnm.us/.

In 2007, the Laboratory conducted additional confirmation monitoring of the Los Alamos County water supply system for quality assurance purposes. Chapter 5 presents these data.

9. Groundwater

a. Groundwater Protection Compliance Issues

Under requirements of DOE Order 450.1 the Laboratory prepared a groundwater protection management plan to protect groundwater resources in and around the Los Alamos area and ensure that all groundwater-related activities comply with applicable federal and state regulations. The Consent Order requires the Laboratory to establish a groundwater monitoring system, conduct investigations to determine the nature and extent of contamination in the groundwater, and remediate the groundwater if necessary. Characterization wells in the intermediate and regional aquifers are shown in Figure 2-2.

New Mexico Water Quality Control Commission (NMWQCC) regulations control liquid discharges onto or below the ground surface to protect all groundwater in New Mexico. Under the regulations, when required by NMED, a facility must submit a groundwater discharge plan and obtain NMED approval (or approval from the New Mexico Oil Conservation Division for energy/mineral-extraction activities). Subsequent discharges must be consistent with the terms and conditions of the discharge plan.

In 2007, the Laboratory had one approved groundwater discharge plan (see Table 2-1) for the TA-46 SWWS Plant and two groundwater discharge plans pending NMED approval for the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) and the Laboratory's 21 domestic septic systems. On August 27, 2002, the Laboratory submitted a renewal application for the SWWS Plant groundwater discharge plan; NMED approval was pending at the end of 2007. On August 20, 1996, the Laboratory submitted a groundwater discharge plan application for the RLWTF at TA-50. On April 27, 2006, the Laboratory submitted a groundwater discharge plan application for the discharge of domestic wastewater from 21 domestic septic systems. Approval of these two discharge plan applications were still pending at the end of 2007.

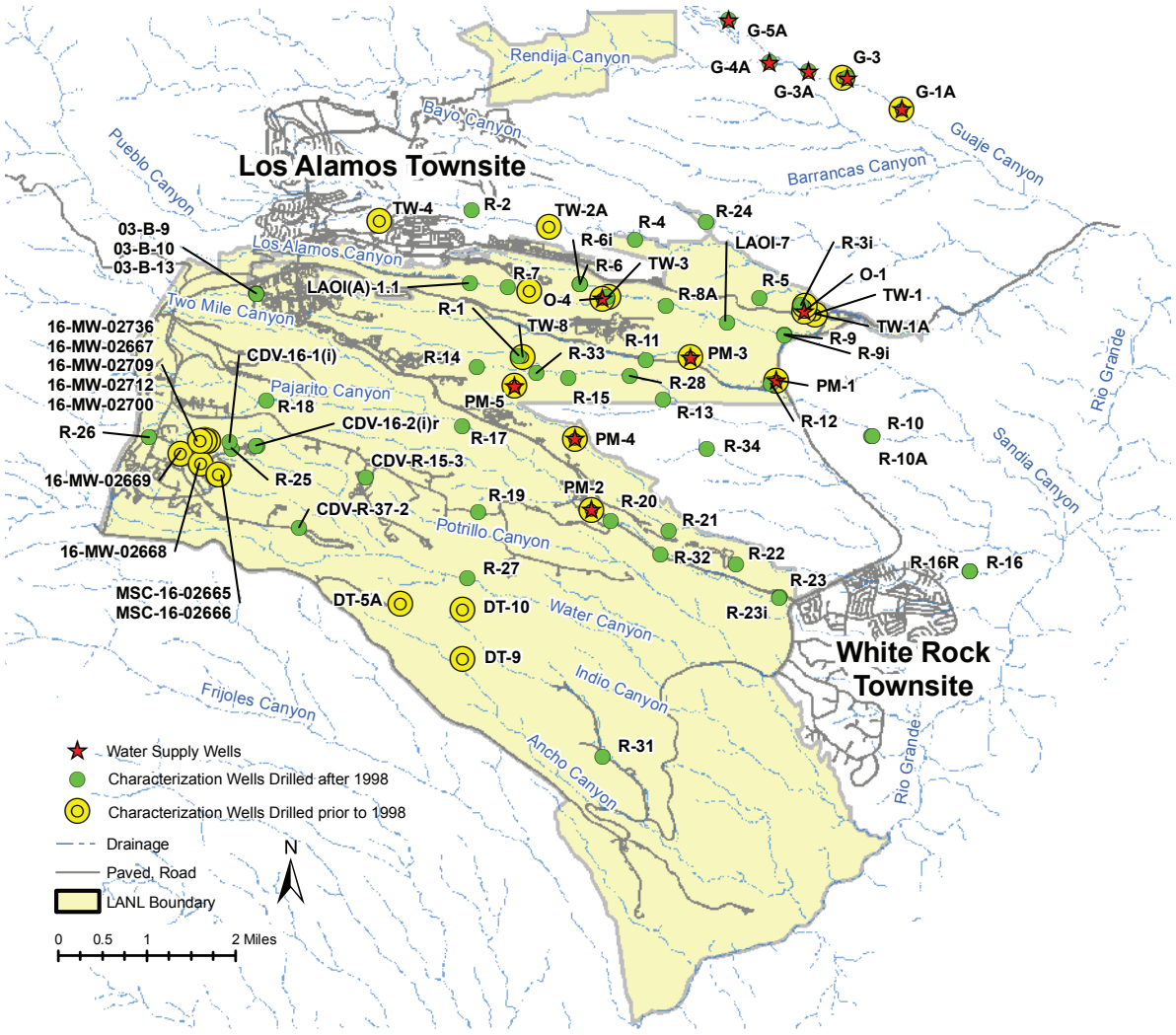

Figure 2-2. Intermediate-perched and regional aquifer characterization wells at and near LANL.

b. Compliance Activities

The Laboratory performed most groundwater compliance work in 2007 pursuant to the Consent Order. These activities included groundwater monitoring, groundwater investigations, and groundwater well construction.

Sample analytical, water-level, well construction, and other groundwater data can be reviewed online on the Laboratory's Water Quality Database website, http://wqdbworld.lanl.gov/. Periodic monitoring reports can be found on the Laboratory's Environment website, http://www.lanl.gov/environment/h2o/reports.shtml.

In 2007, LANL installed two regional monitoring wells (Table 2-8) in Sandia Canyon as part of the Interim Measures Work Plan for Chromium Contamination in Groundwater (LANL 2006). Wells R-35a and R-35b were installed adjacent to municipal supply well PM-3 and downgradient of monitoring well R-28 where elevated chromium levels are present. Well R-35a is screened at the same elevation as the top of the screen louvers at PM-3. Well R-35b is screened near the top of the regional aquifer. Together, this well pair is designed to act as an early warning monitoring point for the potential migration of chromium detected at monitoring well R-28 located in Mortandad Canyon to the south.

Table 2-8
Wells and Boreholes Installed in 2007

Type [a]	Identifier	Watershed (Canyon)	Total depth (ft bgs)	Screened interval (ft bgs)	Water level (ft bgs)	Comments
R	R-35a	Sandia	1086.2	1013.1–1062.2	792.1	Lower Sandia Canyon, immediately southwest of municipal supply well PM-3.
R	R-35b	Sandia	872.2	825.4–848.5	786.9	Lower Sandia Canyon, immediately southwest of municipal supply well PM-3.

[a] R = regional aquifer well

10. National Environmental Policy Act

The intent of the National Environmental Policy Act (NEPA) (42 U.S.C. 4331 et seq.) is to promote productive harmony between humans and the environment. Federal agencies such as DOE/NNSA must consider the environmental impacts of proposed projects and ensure public participation as part of the decision-making process. The Laboratory's Risk Reduction Office devotes considerable resources to assist NNSA in compliance with the NEPA, pursuant to DOE Order 451.1B. Proposed projects and actions at LANL are reviewed to determine if there are resource impacts, and the appropriate coverage under NEPA, and these recommendations are provided to NNSA. The NEPA analysis in the new LANL Site-Wide Environmental Impact Statement (SWEIS) was prepared in 2007.

DOE NEPA implementing regulations (10 CFR Part 1021.330[d]) require a SWEIS to be reviewed at least every five years and a Supplemental Analysis performed to examine whether the SWEIS still adequately covers site operations. The local DOE site office produced a Supplement Analysis in September 2004 that was reviewed by DOE headquarters. In October 2004, DOE headquarters made the decision to expand the Supplement Analysis to a Supplemental SWEIS. In April 2005, DOE headquarters decided to convert the Supplemental SWEIS to a full SWEIS and consider three alternatives for future operations at LANL. The new SWEIS, issued in May 2008, considers operations for a period of five years, 2008–2012. NNSA considered comments received during the scoping period (January 19 to February 17, 2005) and during the public comment period on the Draft SWEIS (July 7 to September 20, 2006). Public hearings on the Draft SWEIS were held in Los Alamos, Española, and Santa Fe, New Mexico. Comments on the Draft SWEIS were requested during a period of 75 days following publication of the EPA's Notice of Availability in the Federal Register. The three SWEIS alternatives considered are as follows:

- **The No Action Alternative:** This alternative would continue operations at current levels. This alternative considers the levels of operation covered in the 1999 SWEIS Record of Decision Expanded Operations Alternative. This alternative would include updates on the operations of the 15 Key Facilities defined in the 1999 SWEIS to anticipate operational levels over the next five years and consideration of new facilities proposed for construction over this period.
- **The Expanded Operations Alternative:** This alternative would include the No Action Alternative plus new or enhanced facilities for ongoing operations. Actions would be implemented to upgrade or replace aging facilities and systems, improve security, and remediate obsolete buildings and contaminated lands. Selected operations would increase, including plutonium pit production.

- **The Reduced Operations Alternative:** This alternative would include operational reductions at certain facilities while enhancing some facilities for ongoing operations. The major changes considered in this alternative are the closing of LANSCE, stopping construction of the nuclear facility portion of the CMRR Facility, and reducing operations of approximately 20% for Dual-Axis Radiographic Hydrodynamic Test (DARHT) and reducing firing site operations by 20%.

The three alternatives were analyzed and the Expanded Operations Alternative was selected as the preferred alternative. A Record of Decision on the new SWEIS is expected to be issued in late 2008.

11. Endangered Species Act

The Endangered Species Act requires federal agencies to protect populations and habitats of federally listed threatened or endangered species. The Laboratory contains potential habitat for two federally endangered species (Southwestern willow flycatcher, *Empidonax traillii extimus*, and black-footed ferret, *Mustela nigripes*), one federally threatened species (Mexican spotted owl, *Strix occidentalis lucida*), and two candidate species (yellow-billed cuckoo, *Coccyzus americanus*), and New Mexico meadow jumping mouse, *Zapus hudsonius luteus*). The Southwestern willow flycatcher, black-footed ferret, and New Mexico meadow jumping mouse have not been observed on Laboratory property. In addition, there are several federal species of concern and state-listed species potentially occurring within LANL (Table 2-9).

The Laboratory meets its requirements for threatened and endangered species protection through implementation of its Threatened and Endangered Species Habitat Management Plan and review of excavation permit requests and project profiles. During 2007, LANL reviewed 636 excavation permits and 107 project profiles for potential impacts to threatened or endangered species. The Laboratory conducted annual surveys for Mexican spotted owl, Southwestern willow flycatcher, Jemez Mountains salamander and grey vireo. During 2007, LANL prepared biological assessments for one project, CMRR Laydown Area, which required consultation with the US Fish and Wildlife Service regarding potential impacts on federally-listed threatened or endangered species.

Table 2-9
Threatened, Endangered, and Other Sensitive Species Occurring or Potentially Occurring at LANL

Scientific Name	Common Name	Protected Status[a]	Potential to Occur[b]
Empidonax traillii extimus	Southwestern Willow Flycatcher	E	Moderate
Mustela nigripes	Black-footed Ferret	E	Low
Strix occidentalis lucida	Mexican Spotted Owl	T	High
Coccyzus americanus	Yellow-billed Cuckoo	C	Moderate
Zapus hudsonius luteus	New Mexico meadow jumping mouse	C	Moderate
Haliaeetus leucocepahlus	Bald Eagle	NMT, S1	High
Gila pandora	Rio Grande Chub	NMS	Moderate
Plethodon neomexicanus	Jemez Mountains Salamander	NME, FSOC	High
Falco peregrinus anatum	American Peregrine Falcon	NMT, FSOC	High
Falco peregrinus tundrius	Arctic Peregrine Falcon	NMT, FSOC	Moderate
Accipiter gentiles	Northern Goshawk	NMS, FSOC	High
Lanius ludovicianus	Loggerhead Shrike	NMS	High
Vireo vicinior	Gray Vireo	NMT	Moderate
Plegadis chihi	White-faced Ibis	S1	Moderate
Myotis ciliolabrum melanorhinus	Western Small-footed Myotis Bat	NMS	High
Myotis volans interior	Long-legged Bat	NMS	High
Euderma maculatum	Spotted Bat	NMT	High
Plecotus townsendii pallescens	Townsend's Pale Big-eared Bat	NMS, FSOC	High
Nyctinomops macrotis	Big Free-tailed Bat	NMS	High
Myotis thysanodes thysanodes	Fringed Bat	NMS	High
Myotis yumanensis yumanensis	Yuma Bat	NMS	High
Myotis evotis evotis	Long-eared Bat	NMS	High
Bassariscus astutus	Ringtail	NMS	High
Vulpes vulpes	Red Fox	NMS	Moderate
Ochotona princeps nigrescens	Goat Peak Pika	NMS, FSOC	Low
Lilium philadelphicum var. andinum	Wood Lily	NME	High
Cypripedium calceolus var. pubescens	Greater Yellow Lady's Slipper	NME	Moderate
Speyeria Nokomis nitocris	New Mexico Silverspot Butterfly	FSOC	Moderate

[a] E = Federal Endangered; T = Federal Threatened; C = Federal Candidate Species; NMS = New Mexico Sensitive Taxa (informal); S1 = Heritage New Mexico: Critically Imperiled in New Mexico; NMT = New Mexico Threatened; NME = New Mexico Endangered; FSOC = Federal Species of Concern.

[b] Low = No known habitat exists on LANL; Moderate = Habitat exists, though the species has not been recorded recently; High = Habitat exists and the species occurs at LANL.

12. Migratory Bird Treaty Act

Under the provisions of the Migratory Bird Treaty Act, it is unlawful "by any means or manner to pursue, hunt, take, capture [or] kill" any migratory birds except as permitted by regulations issued by the US Fish and Wildlife Service. LANL biologists developed and published "Migratory Bird Best Management Practices Source Document, Version 0" during 2007 to document best management practices to mitigate impacts to migratory birds at LANL. LANL biologists also began self-reporting of bird electrocutions on power lines to US Fish and Wildlife Service.

13. Cultural Resources

The goal of the National Historic Preservation Act (NHPA) of 1990 is to have federal agencies act as responsible stewards of the nation's resources when their actions affect historic properties. NHPA Section 106 requires federal agencies to take into account the effects projects may have on historic properties and to allow for comment by the Advisory Council on Historic Preservation. Section 106 regulations outline a project review process conducted on a project-by-project basis.

In 2007, the Laboratory conducted 32 projects that required some field verification of previous survey information. Four new archaeological sites were identified in 2007; however, no new historic buildings were identified. Fifteen archaeological sites and zero historic buildings were determined eligible for the National Register of Historic Places.

The Laboratory began the sixth year of a multiyear program, which included archaeological excavation in support of the Land Conveyance and Transfer project. The DOE/NNSA is in the process of conveying to Los Alamos County approximately 2,000 acres of Laboratory lands. Thirty-nine archaeological sites were excavated during the 2002 to 2005 field seasons, with more than 200,000 artifacts and 2,000 samples collected. The artifacts are currently stored at LANL but will be transferred for curation to the Museum of New Mexico. Together, these sites provide new insights into past activities on the Pajarito Plateau from 5000 BC to AD 1943. From a compliance perspective, these excavations resolve the anticipated adverse effects to archaeological sites from the future development of lands to be acquired by Los Alamos County. These sites are also ancestral places to the Pueblo people and representatives from the pueblos of San Ildefonso and Santa Clara acted as tribal consultants and monitors on the project. During fiscal year 2007, all analyses were completed and nearly all of the report was written.

In support of LANL's decontamination and decommissioning program, square footage reduction, and laboratory consolidation activities during fiscal year 2007, the Laboratory conducted historic building assessments and other documentation work related to six proposed projects as required under the provisions of the NHPA. Buildings included in these projects are located at TAs-3, 11, 16, 36, and 37. This work included field visits to historic properties (including interior and exterior inspections), digital and archival photography, and architectural documentation (using standard LANL building recording forms). Additional documentation included the production of location maps for each of the evaluated projects. Historical research was also conducted using source materials from the LANL archives and records center, historical photography, the Laboratory's public reading room, and previously conducted oral interviews.

The long-term monitoring program at the ancestral pueblo of Nake'muu was completed in 2006 as part of the DARHT Facility Mitigation Action Plan (DOE 1996). Nake'muu is the only pueblo at LANL that still contains its original standing walls. During the nine-year monitoring program, the site has experienced a 0.9% displacement rate of chinking stones and 0.3% displacement of masonry blocks. Statistical analyses indicate these displacement rates are significantly correlated with annual snowfall, but not with annual rainfall or explosive tests at the DARHT facility.

Native American consultation is ongoing with respect to identifying and protecting traditional cultural properties, human remains, and sacred objects in compliance with the NHPA and Native American Graves Protection and Repatriation Act (NAGPRA). Work for the Land Conveyance and Transfer Project included consultation with the Pueblos of San Ildefonso and Santa Clara for project monitoring, the implementation of a NAGPRA intentional excavation agreement, identification of potential reburial locations, protection of Traditional Cultural Properties, and student internships. Other projects include completion of the management plans for the TA-3 University House Traditional Cultural Property, the TA-72 NAGPRA management area, and the Cerro Grande Rehabilitation Project.

C. UNPLANNED RELEASES

1. Air Releases

There was one unplanned air release during 2007:

- An opacity of 25% was observed at the TA-3 power plant on May 1, 2007. The visible emission observed was slightly above the limit of 20% stated in the permit. The duration of this visible emission was less than 10 minutes.

2. Water Releases

There were no unplanned releases of radioactive liquids in 2007. There were 18 unplanned releases of non-radioactive liquids in 2007:

- Approximately 5,000 gal. of fire suppression water into upper Sandia Canyon.
- Approximately 1,000 gal. of domestic wastewater onto the ground near TA-18.
- Approximately 100 gal. of domestic wastewater onto the ground near TA-49-113.
- Approximately 1 quart of motor oil into a storm drain system near TA-3-38.
- Approximately 100 gal. of domestic wastewater into a storm drain near TA-33-114.
- Approximately 30 gal. of concrete washout water into a storm drain near TA-3-39.
- Approximately 20 gal. of storm water onto a roadway from a waste storage container.
- Approximately 10,000 gal. of potable water into upper Mortandad Canyon.
- Over 20,000 gal. of potable water into Los Alamos Canyon and DP Canyon.
- Approximately 1,700 gal. of potable water into a storm water drainage system near TA-33-114.
- Approximately 2,200 gal. of fire suppression water into a storm water drainage system near TA-54-412.
- Approximately 500 gal. of fire suppression water into upper DP Canyon near TA-21-209.
- Over 4,000 gal. of potable water into Water Canyon.
- Approximately 2,000 gal. of steam condensate into a storm water drainage system near TA-3-39.
- Approximately 5,000 gal. of potable water into upper Sandia Canyon.
- Approximately 40 gal. of domestic wastewater onto the ground near TA-3-316.
- Approximately 6,750 gal. of potable water into upper Sandia Canyon.

The Laboratory investigated all unplanned releases of liquids as required by the NMWQCC Regulations 20.6.2.1203 NMAC. Upon cleanup, the NMED and the DOE Oversight Bureau inspected the unplanned release sites to ensure adequate cleanup. In 2007, the Laboratory was in the process of administratively closing out all releases for 2007 with the DOE Oversight Bureau and anticipates these unplanned release investigations will be closed out after final inspections.

D. REFERENCES

DOE 1996: "Dual-Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement Mitigation Action Plan," United States Department of Energy report USDOE/EIS-0228 (January 1996).

LANL 2006: "Interim Measures Work Plan for Chromium Contamination in Groundwater," Los Alamos National Laboratory document LA-UR-06-1961, Los Alamos, New Mexico. (LANL 2006, 091987) (March 2006).

NMEIB 2007: New Mexico Environmental Improvement Board, State of New Mexico, "Drinking Water Regulations" (as amended through April 2007), found at 20.7.10 NMAC.