



**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
(NPDES) PERMIT RE-APPLICATION**

PERMIT NO. NM0028355

for:

Los Alamos National Laboratory
Los Alamos, New Mexico

submitted by:

U. S. Department of Energy
Los Alamos Area Office

and

University of California

prepared by:

Los Alamos National Laboratory
Water Quality and Hydrology Group (ESH-18)
NPDES Permit Re-Application Team

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ACRONYMS AND ABBREVIATIONS

AO	Administrative Order
BPJ	Best Professional Judgment
CAA	Clean Air Act
CAT-X	Categorical Exclusion
CFR	Code of Federal Regulations
CST	Chemical Science and Technology
CST-9	Inorganic Trace Analysis Group
CWA	Clean Water Act
DOE	U.S. Department of Energy
DOE/AL	DOE Albuquerque Operations Office
DOE/LAAO	DOE Los Alamos Area Office
DMR	Discharge Monitoring Report
EPA	Environmental Protection Agency
ESH	Environment, Safety and Health
ESH-5	Industrial Hygiene Group
ESH-18	Water Quality and Hydrology Group
ESH-20	Ecology Group
FFCA	Federal Facilities Compliance Agreement
FIMAD	Facility for Information, Management, Analysis, and Display Group
FMU	Facility Management Unit
FONSI	Finding of No Significant Impact
FOTW	Federally Owned Treatment Works
GPS	Global Positioning System
HEWTF	High Explosives Wastewater Treatment Facility
LANSCCE	Los Alamos Neutron Science Center
LANL	Los Alamos National Laboratory
MGD	Million Gallons Day
MSDS	Material Safety Data Sheet
NEPA	National Environmental Policy Act
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
NPDES	National Pollutant Discharge Elimination System
NOI	Notice of Intent to Discharge
O&M	Operations and Maintenance
OSRs	Operational Safety Reviews
PCBs	Polychlorinated Biphenyls
POTW	Publicly Owned Treatment Works
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
R&D	Research & Development
RCRA	Resource Conservation and Recovery Act
RLWTF	Radioactive Liquid Waste Treatment Facility
SDWA	Safe Drinking Water Act

ACRONYMS AND ABBREVIATIONS (Con't)

SIC	Standard Industrial Classification
SOP	Safe Operating Procedure
SWSC	Sanitary Wastewater System Consolidation
TAs	Technical Areas
TSCA	Toxic Substances Control Act
UC	University of California
USCOE	U. S. Corps of Engineers
USF&W	U. S. Fish and Wildlife Service
WAC	Waste Acceptance Criteria
WMC	Waste Management Coordinator
WPF	Waste Profile Form
WSC	Waste Stream Characterization Program or Corrections Project

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1. INTRODUCTION

This document is an application for renewal of the National Pollutant Discharge Elimination System (NPDES) Permit No. NM0028355 submitted to the U. S. Environmental Protection Agency (EPA) by the U.S. Department of Energy (DOE) and University of California (UC), Los Alamos National Laboratory ("LANL" or "Laboratory"). The DOE and LANL are herein referred to as the NPDES Permit "applicant."

NPDES Permit No. NM0028355 is currently the only active NPDES Industrial Wastewater Permit at the Laboratory. On December 29, 1997, the Laboratory's second NPDES Industrial Wastewater Permit No. NM0028576 for the Fenton Geothermal Site, was discontinued by the EPA at the request of the Laboratory and the DOE. (Appendix A provides a copy of associated documentation).

Also, the Laboratory's storm water runoff will not be reflected in this re-application. Currently, the Laboratory's storm water runoff is regulated under a New Mexico General Notice of Intent (NOI) to Discharge approved by the New Mexico Environment Department (NMED). The Laboratory's Point Source Storm Water Program is also covered by a single EPA NPDES Storm Water Baseline General Permit for Industrial Activity. This Permit expired on September 9, 1997, and under EPA guidance, the Laboratory applied for an extension of the Baseline General Permit until EPA publishes the modified Multi-Sector General Permit. The Laboratory will be applying for a Multi-Sector General Permit to cover storm water runoff upon publication of EPA guidance.

This re-application for NPDES Permit No. NM0028355 is submitted in accordance with the provisions of the Clean Water Act (CWA), 33 U.S.C. 1251 and the NPDES Permit Program requirements listed in 40 CFR 122.21. It is the intent of this summary to provide the EPA Permit Writer and others with adequate background information concerning environmental and other conditions at the Laboratory for review of technical data presented in this re-application. The applicant suggests that because of the uniqueness of LANL operations and their significant diversity and complexity, that the EPA Permit Writer visit the Laboratory during the review process to gain firsthand knowledge and understanding of the information and issues presented in this re-application document.

Due to the complex nature of the NPDES Permit Re-Application and potential need for supplemental information, the applicant requests that all previous applications, modifications, maps, data, and pertinent correspondence submitted in reference to NPDES Permit No. NM0028355 be considered as part of this re-application package by reference. In addition, all future document submittals such as current permit modifications, or additional data and/or correspondence

concerning NPDES Permit No. NM0028355 transmitted to the EPA up to the time the new permit is issued, should be considered part of this re-application. The applicant will continue to provide copies of all such information to the EPA Permit Writer as new information becomes available.

2. FACILITY DESCRIPTION

This section describes the research activities, organization, and environment of the Laboratory. Soil conditions, area geology, groundwater conditions, climate and surface water conditions, are also discussed because they impact the understanding of the Laboratory's surface water discharges.

2.1 Laboratory Research Activities

The Los Alamos National Laboratory is a multidisciplinary/multiprogram laboratory. Although the Laboratory's central mission is to reduce the nuclear danger through evaluation and stockpile stewardship, the Laboratory also provides significant programmatic support to many civilian efforts. Because of evolving technologies and changing national priorities, the Laboratory increasingly uses its multidisciplinary research and development capabilities to solve civilian problems in the areas of health, national infrastructure, energy, education, aeronautics, and the environment. Extensive basic research programs in physics, chemistry, metallurgy, mathematics and computers, earth sciences, and electronics support these efforts.

2.2 Laboratory Organization

The Laboratory is managed by the Regents of the University of California. The Laboratory's contract is administered through the DOE Los Alamos Area Office (DOE/LAAO) and the Albuquerque Operations Office (DOE/AL). Laboratory facility maintenance support services are provided by Johnson Controls Northern New Mexico, a wholly-owned subsidiary of Johnson Controls World Services. Laboratory security and fire protection services are provided by Protective Technologies Los Alamos and the Los Alamos County Fire Department, respectively.

2.3 Laboratory Environment

The Laboratory and the associated residential 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). The 43-square mile Laboratory and adjacent communities are situated on the Pajarito Plateau, which consists of a series of finger-like mesas separated by deep east-to-west oriented canyons (Figure 2) cut by ephemeral and intermittent streams. The mesa tops range in elevation from approximately 7,800 feet on the flanks of the Jemez Mountains to about 6,200 feet at their eastern termination above the Rio Grande Canyon.

The Laboratory is divided into technical areas (TAs) that are used for building sites, experimental areas, waste disposal locations, roads, and utility rights-of-way. However, these uses account for only a small part of the total land area. Currently, Laboratory facilities are contained within 37 active technical areas (Figure 3) spread over 27,500 acres and comprise approximately 5 million square feet of building area. Land surrounding the Laboratory is largely undeveloped and serves primarily as safety and security buffer zones or, the land is being held in reserve by DOE for future use. Due to safety and security issues, limited access by the public is allowed in certain areas of the Laboratory. Large tracts of surrounding land are also held by the Santa Fe National Forest, Bureau of Land Management, Bandelier National Monument, General Services Administration, and San Ildefonso Pueblo.

The communities closest to the Laboratory facilities are Los Alamos Townsite, which is just north of the Laboratory, and White Rock, located a few miles to the east-southeast. Most of Los Alamos County, as well as adjoining portions of neighboring Sandoval, Rio Arriba, and Santa Fe Counties, is undeveloped. The only significant developments in Los Alamos County are the Laboratory facilities and the associated residential communities. Land ownership distribution for Los Alamos County is shown in Figure 4. Los Alamos County has an estimated 1996 population of approximately 18,000 (BBER 1995).

In 1996, the Los Alamos Townsite, the original area development (and now including residential areas known as Eastern Area, Western Area, North Community, Barranca Mesa, and North Mesa), has an estimated population of 12,000. The White Rock area (including the residential areas of White Rock, La Senda, and Pajarito Acres) has about 6,000 residents. About one-third of the people employed in Los Alamos commute from other counties. Population estimates for 1996 place about 246,000 people within a 50 mile radius of Los Alamos.

2.4 Geology

Los Alamos National Laboratory is located in Northern New Mexico on the Pajarito Plateau, which extends eastward from the Jemez Mountains (Figure 5). The Laboratory is bordered on the east by the Rio Grande, within the Rio Grande Rift. The Pajarito Plateau is capped by rocks of the Bandelier Tuff, consisting of volcanic ashfall deposits and pyroclastic flows erupted from the Jemez Mountains volcanic center about 1.2 to 1.6 million years ago (Figure 6). The tuff is over 1,000 ft thick in the western part of the plateau and thins eastward to about 250 ft 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 (Figure 6). The tuff is underlain by the Puye Formation conglomerate beneath the central and eastern portion of the plateau. Cerros del Rio basalt flows interfinger with the conglomerate beneath the Laboratory. 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.

2.5 Soil Conditions

A soil survey of Los Alamos County was prepared by the U.S. Department of Agriculture, Soil Conservation Service, and Forest Service. This soil survey was published in June, 1978, under DOE Contract W-7405-ENG.36. The soil survey classifies soils according to soil series, soil type, and soil phase.

The principal parent materials of about 95 percent of the Los Alamos soils are Bandelier Tuff, volcanic rocks of the Tschicoma and Puye Formations, and the Cerros del Rio Basalts of Chino Mesa, and the remnants of El Cajete pumice. The remaining five percent of the soils were formed from colluvium, alluvium, andesitic rocks of the Paliza Canyon Formation, Cerro Rubio Quartz Latites, and tuffs associated with sediments of Cerro Toledo Rhyolite. Textures of these soils range from very fine sandy loams and clay loams to gravelly, sandy loams and stony, silty clay loams (See Figure 7).

2.6 Climate and Surface Water

Rainfall in the Los Alamos area totals about 18 in/yr. and varies greatly with elevation. The plateau is semiarid, with ponderosa forest at higher elevations giving way to pinon-juniper as elevation decreases. The plateau is separated into finger-like mesas by canyons, which contain riparian vegetation and small ephemeral streams that for the most part have short-lived or intermittent flow during runoff events. (Refer to Appendix B for a map depicting the Laboratory's springs and surface water bodies)

Perennial springs on the flanks of the Jemez Mountains supply base flow into upper reaches of some canyons, but the volume is insufficient to maintain surface flows across the Laboratory site before streams are depleted by evaporation, transpiration, and infiltration. Runoff in some canyons, resulting from large thunderstorms or heavy snowmelt, reaches the Rio Grande several times a year. Effluents from sanitary sewage, industrial waste treatment plants, and cooling-tower blowdown enter some canyons at rates sufficient to maintain surface flows for varying distances.

Canyons located within Laboratory boundaries ultimately drain to the Rio Grande. The Rio Grande then flows southward to Cochiti Lake through the middle and on into the lower Rio Grande Basin. The Rio Grande surface waters downstream of Los Alamos are used primarily for crop irrigation in central and southern New Mexico. Laboratory outfalls impact surface water in the area of the Laboratory insofar as they discharge to drainage areas or into the canyons. The following canyons receive NPDES point source discharges from LANL: Los Alamos, Sandia, Mortandad, Canon de Valle, Pajarito, Canada del Buey, Water, Pueblo, Guaje, and Rendija. Except during major runoff events, the cumulative flow of wastewater discharges does not reach the Rio Grande. The intermittent runoff leaving Laboratory property has been measured at gaging stations located on each major canyon. These flow measurements have been published for water years 1995, 1996, and 1997 and are provided in Appendix Y. Appendix C presents a listing noting each outfall included in the re-application, and the canyon to which it discharges. Appendix D provides a listing of the distances from existing NPDES permitted outfalls to the Rio Grande.

Currently, designated State Water Quality Standards do not exist for the intermittent drainages located within the Laboratory boundaries, only for the Rio Grande itself. Laboratory drainages eventually enter into two different stream segments of the Rio Grande (2-111 and 2-118). New Mexico Stream Standards for stream segment 2-111 and 2-118, specify these reaches of the Rio Grande as follows: segment 2-111 includes "the main stem of the Rio Grande from the headwaters of Cochiti Reservoir upstream to the Taos Junction Bridge...", and segment 2-118 includes "perennial tributaries to the Rio Grande in Bandelier National Monument and their headwater in Sandoval County, all perennial reaches of tributaries to the Rio Grande in Santa Fe County unless included in other segments."

Designated uses as delineated in the New Mexico Stream Standards for stream segment 2-111 include: irrigation; livestock and wildlife watering; wildlife habitat; marginal cold water fishery; secondary contact; and, warm water fishery. In addition, designated uses for stream segment 2-118 include: domestic water supply; high quality coldwater fishery; irrigation; livestock watering; wildlife habitat; municipal and industrial water supply; secondary contact; and, primary contact. *State of New Mexico Standards for Interstate and Intrastate Streams* are provided in Appendix E.

2.7 Groundwater Occurrence

Groundwater beneath the Pajarito Plateau occurs in three modes, two of which are perched (Figure 8). Perched water is a body of groundwater above a less permeable layer that is separated from an underlying main body of groundwater by an unsaturated zone. The three modes of groundwater occurrence at the Laboratory are: (1) perched alluvial groundwater in canyon bottoms; (2) limited-

extent zones of intermediate depth perched groundwater whose location is controlled by subsurface changes in rock type and permeability; and, (3) the regional aquifer beneath the Pajarato Plateau. These types of groundwater are described in more detail below.

Streams have filled some parts of canyon bottoms with alluvium ranging up to as much as 100 ft in thickness. Runoff percolates through the alluvium until it is impeded by less permeable layers of tuff. This creates shallow bodies of perched groundwater within the alluvium. As water in the alluvium moves down the canyon, it is depleted by evapotranspiration and infiltration into underlying rocks.

The regional aquifer of the Los Alamos area occurs at a depth of 1200 ft along the western edge of the plateau, and 600 ft along the eastern edge (Figure 6). This is the only aquifer in the area capable of serving as a municipal water supply. The surface of the aquifer rises westward from the Rio Grande within the Tesuque Formation (part of the Santa Fe Group). The aquifer rises further into the lower part of the Puye Formation beneath the central and western part of the plateau (Figures 6 and 8). Depth to the regional aquifer is about 1,000 ft beneath the mesa tops in the central part of the plateau. The regional aquifer is separated from alluvial and perched waters by about 350 to 620 ft of unsaturated tuff and sediments with low (<10%) moisture content.

Beneath portions of Pueblo, Los Alamos, and Sandia Canyons, perched groundwater occurs at intermediate depths within the thick zone of unsaturated rock underlying the alluvium. The intermediate perched groundwater occurs within the lower part of the Bandelier Tuff and within the underlying conglomerates and basalt (Figure 8). The perched groundwater has been found at depths ranging from about 120 ft in Pueblo Canyon, to about 450 ft in Sandia Canyon. Its location is controlled by variations in the permeability of the rocks underlying the plateau. These intermediate-depth groundwater bodies are formed in part by recharge from the overlying perched alluvial groundwater. Perched water also occurs within the Bandelier Tuff at the western Laboratory border near the Jemez Mountains. The source of this perched water may be infiltration from streams discharging from the mouths of canyons along the mountain front, and underflow of recharge from the Jemez Mountains.

Currently, the municipal and industrial water supply for the Laboratory and community is from 14 deep wells in three well fields. The well fields include the Guaje Well Field and the on-site Pajarito and Otowi Well Fields. The Guaje Well Field, located northeast of the Laboratory, contains seven wells, five of which have had significant production through 1996. The five wells of the Pajarito Well Field are located in Sandia and Pajarito Canyons and on mesa tops between those canyons. Otowi #1 and Otowi #4, the first wells in a new field designated as the Otowi Well Field, were completed in 1990. Otowi #4 resumed production

in 1996 after pump problems were repaired. Otowi #1 had a new pump installed during 1996 and is currently contributing to the production of the Laboratory's water supply.

Four new "Guaje Replacement Wells" (#1, #2, #3, and #4) are proposed to replace five of the six existing Guaje Wells #1, #2, #4, #5, and #6. The blowdowns from the five Guaje Wells to be replaced are currently assigned the EPA outfall numbers 04A171, 04A173, 04A174, 04A175, and 04A176. Outfalls 04A172, 04A173, and 04A174 associated with Guaje Wells #1A, #2, and #4 are currently included in the re-application, however, it is expected that these three wells will become inoperable in late 1998 and will be eliminated from the NPDES Permit sometime in 1999.

Surface, well, and spring waters are sampled routinely and analyzed for organic and inorganic chemical constituents, microbiological organisms, and radioactivity. Analytical results are published annually in the Environmental Surveillance Report prepared by the Laboratory's Environmental Surveillance Program. Safe Drinking Water Act (SDWA) sampling results for 1997 are provided as supporting documentation to Forms 2C and 2D for the Laboratory's drinking water wells. Copies of the Laboratory's Environmental Surveillance Report are submitted to the EPA Regional Administrator and the Director of the NMED annually. A listing of all existing and proposed production wells and booster stations included in this re-application are provided in Appendix C. In addition, the location of existing production wells are noted in Appendix F.

3. 1990 NPDES PERMIT RE-ISSUANCE/RE-CERTIFICATION ISSUES

During the Laboratory's 1990 NPDES Permit Re-Application process, a number of issues arose regarding the application of the New Mexico Water Quality Standards. Table 1 below provides a chronology of events which briefly describes some of these issues.

Table 1, 1990 NPDES Permit Chronology of Events

<u>Date</u>	<u>Event</u>
September 1990	LANL submits application for new permit.
October 1990	EPA issues preliminary draft permit.
March 1991	Previous NPDES permit expires. Permit continued pursuant to 40 CFR 122.6.
May 1991	EPA issues draft permit.
August 1991	LANL comments on draft permit.
August 1991	NMED denies certification of permit.

September 1991	NMED proposes to address State Water Quality Standards issues.
November 1991	EPA visits Laboratory and NMED.
March 1992	EPA issues draft permit.
April 1992	NMED comments on preliminary draft permit.
May 1992	EPA issues draft permit.
July 1992	LANL comments on draft permit.
July 1992	NMED issues conditional certification.
August 1992	EPA reopens certification period.
September 1992	NMED issues new conditional certification.
October 1992	LANL appeals certification to NMWQCC.
December 1992	Hearing date set for March 2, 1993.
December 1992	NMED replies to LANL Petition for Review.
January 1993	NMED and LANL request delay until April, 1993.
January 1993	New Hearing date set for April 20, 1993.
April 1993	Settlement Agreement reached: NMED re-certified the NPDES Permit conforming to Livestock & Wildlife Watering Standards and LANL withdraws its appeal and agrees to Water Use Study.
July 1993	EPA holds public hearing in May 1992 for draft permit.
September 1993	EPA issues final NPDES Permit No. NM0028355.
October 1993	LANL files an "Intent to Request an Evidentiary Hearing" on the EPA-issued permit to rectify errors.
January 1994	EPA drafts final NPDES Permit with corrections.
June 1994	EPA re-issues final NPDES Permit No. NM0028355, effective August 1, 1994.
August 1994	Final NPDES Permit No. NM0028355 effective.
October 1996 to October 1997	U.S. Fish and Wildlife performs Water Use Study at the Laboratory.
October 1998	Current NPDES Permit expires.

Initially, the State of New Mexico applied standards based on the designated uses of "livestock and wildlife watering" for stream segments No. 2-111 and No. 2-118 of the New Mexico Water Quality Standards for Interstate and Intrastate Streams in New Mexico. Later, the State decided to apply the general standard which applies to existing or attainable uses of these same stream segments. As a result, NMED issued two separate conditions of certification.

In October 1992, UC and DOE petitioned the New Mexico Water Quality Control Commission (NMWQCC) to review NMED's conditional certification of the NPDES permit limits. A hearing date, for presenting arguments to the NMWQCC, was set for March 1993. In January 1993, NMED and LANL requested a delay of the hearing until April 20, 1993. Settlement negotiations took place during the first quarter of 1993, and resulted in a Settlement Agreement with NMED wherein the Laboratory would fund a "Water Use Study" of the receiving channels of the Laboratory's discharges in order to determine potential attainable uses. NMED conditionally certified the permit based on this agreement.

The final NPDES Permit No. NM0028355 was issued to the Laboratory on June 24, 1994, effective August 1, 1994. The *State of New Mexico Standards for Interstate and Intrastate Streams*, dated January 23, 1995, now distinguish the water quality standards for designated uses "livestock and wildlife watering" individually, as livestock watering and wildlife habitat. Refer to Appendix E for a copy of the State Water Quality Standards.

3.1 Conditional Certification/Settlement Agreement of "Draft" 1990 Permit Re-Application.

In September 1992, the NMED issued a conditional certification of the draft NPDES Permit for the Laboratory based upon effluent limits to protect the livestock and wildlife watering. The agreement required that a study be conducted for the purposes of identifying the stream uses associated with the watercourses in the canyons at the Laboratory. The Water Use Study was conducted by the U.S. Fish and Wildlife Service (USF&W) in 1997. The USF&W is currently evaluating its findings from the study and a finalized report is due in late 1998. Appendix G provides a copy of the Settlement Agreement.

3.2 Waste Stream Characterization Program and Corrections Project

In 1990, the Laboratory's NPDES Permit Re-Application included a commitment by the Laboratory and the DOE to the EPA to identify and eliminate all non-complying waste streams and un-permitted outfalls.

From 1991-1994, in cooperation with Laboratory facility owners and operators, the Water Quality and Hydrology Group (ESH-18), under the Waste Stream Characterization Program, conducted a Lab-wide waste stream characterization survey. The survey resulted in the identification and documentation of 7,602 deficiencies into 83 final reports. These reports were reviewed with facility owners and operators in order to obtain concurrence on the proposed recommended corrections. These reports were provided to the EPA and NMED.

A schedule for correction of the 7,602 deficiencies was established in Federal Facilities Compliance Agreement (FFCA), Docket No. VI-90-1240, dated July 12, 1990, and Administrative Order (AO), Docket No. VI-90-1263, dated July 19, 1990. The FFCA was issued to the DOE and the AO was issued to the Laboratory by the EPA. The original schedule for the Waste Stream Corrections (WSC) Project in the AO required 25% of the 7,602 deficiencies identified be corrected by September 30, 1994; 50% corrected by September 30, 1995; and, 100% by September 30, 1996. The Laboratory successfully achieved full compliance with the 25% and 50% completion milestones, and met the revised milestone of 100% completion on March 31, 1997. The March 31, 1997 deadline was authorized under the revised FFCA, Docket No. VI-96-1237, dated November 8, 1996, and AO, Docket No. VI-96-1236, dated December 10, 1996. (See Appendix H)

The Laboratory provided institutional funding of approximately \$5.3 million to perform the corrective actions needed to bring the Laboratory facilities into compliance with the NPDES Permit. Correction of the 7,602 deficiencies included: (1) physical construction fixes such as elimination of non-compliant waste streams and potential un-permitted discharges, plugging of drains, installation of plumbing modifications including recirculation units; (2) administrative corrections and control measures such as implementation of best management practices (i.e., SOPs, access control, labeling of piping, etc.); and, (3) modification of discharge permit applications required by EPA.

During the WSC Project, operational safety reviews (OSRs) were conducted by the Laboratory's Industrial Hygiene Group (ESH-5) in coordination with Facility Management ESH Teams. The primary objective of the OSRs was to evaluate new and completed waste stream corrections, including plugged drains, for potential operational and worker hazards. Hazard mitigation/abatement corrections included both construction and administrative actions including re-routing of drains and operator control of discharges in compliance with NPDES Permit requirements.

In order to document and report completion of this work to EPA and NMED, all waste stream deficiencies identified and corrected have been tracked and verified by use of a database system developed by the Laboratory. Outfall-related information from this database was used in the preparation of this re-application. Appendix I is a background summary and documentation of accomplishments regarding the Waste Stream Characterization Program and WSC Project.

Benefits attributable to completion of the Waste Stream Characterization Program and WSC Project include: proper characterization of outfall discharges; elimination of 75 un-permitted outfalls; elimination of over 30 outfalls as a result of waste stream corrections and significant water conservation; and, reduction of contaminants entering into the environment from these discharges.

4. OUTFALL REDUCTION

The Laboratory's 1990 NPDES Permit Re-Application contained consolidated information for 117 outfalls. By October, 1993, an additional 24 outfalls were added to the Permit bringing the total number of permitted outfalls to 141. A summary of the Outfall Reduction Program is described below.

In 1995, the Laboratory initiated the NPDES Outfall Reduction Program. Activities accomplished under the NPDES Outfall Reduction Program are consistent with the objectives set forth in the *Laboratory's Business Plan for NPDES Permit Compliance*, dated March 31, 1995. The Business Plan was prepared by the ESH-18 Group's NPDES Outfall Team to: (1) provide a framework for unifying and coordinating Laboratory NPDES Program compliance activities; (2) develop and implement the NPDES Permit Compliance and Outfall Reduction Programs at the Laboratory; and, (3) insure and improve compliance with the CWA and the Laboratory's NPDES Permit.

The primary objective of the Laboratory's NPDES Outfall Reduction Program was to perform an in-depth assessment of permitted outfalls to determine candidate outfalls for elimination. The overall goal of the NPDES Outfall Reduction Program is to reduce pollution into the environment by eliminating wastewater effluent discharges from permitted outfalls. Additional benefits provided by the NPDES Outfall Reduction Program include: (1) reduction of administrative costs associated with sampling, monitoring, chemical testing, and reporting of outfall effluents; (2) conservation of water; (3) reduction of NPDES Permit exceedances; and, (4) an increase in overall compliance with the CWA and NPDES Permit requirements.

Under the NPDES Outfall Reduction Program, 107 permitted outfalls were identified and targeted for elimination. The 107 target outfalls cover all types of wastewater systems including, sanitary (Category S), radioactive (Category 051), and industrial. Industrial effluents are further broken down into waste stream categories by the Laboratory's NPDES Permit. These NPDES waste stream categories include: 001 Power Plant; 02A Steam Plant; 03A Treated Cooling Water; 04A Non-Contact Cooling and Water Production Facilities; 05A High Explosives Wastewater Discharge; 06A Photo Rinsewater; 07A Asphalt Batch Plant; and, 128 Printed Circuit Board Discharge.

As of February, 1998, 92 outfalls of the 107 targeted, have been eliminated Lab-wide from the NPDES Permit. The elimination of an additional 15 outfalls by October, 1998, is pending completion of physical construction and approval from the NMED and the EPA. The elimination of 107 outfalls total will have resulted from several activities including: (1) the removal of process flows; (2) re-piping of wastewater drain systems; (3) modification, removal, replacement or installation of equipment such as package recirculation units; and, (4) plugging of open floor drains. In addition, the construction of the Laboratory's TA-46 Sanitary Wastewater System Consolidation (SWSC) Facility and the TA-16 High Explosives Wastewater Treatment Facility (HEWTF), contributed significantly to outfall reduction accomplishments.

Following completion of all scheduled outfall reduction activities, the Laboratory is expected to have 34 remaining outfalls. This re-application contains the required Form 2C information for these 34 outfalls and also contains Form 2D information for 13 new discharges originating from the new Guaje Wells and potable water supply system.

Future activities are planned at the Laboratory to further reduce the number of permitted outfalls to 16. The goal of 16 NPDES permitted outfalls, will be accomplished as a result of the long-term NPDES Outfall Reduction Program objectives which are supported by Laboratory Division Directors, Facility Managers, and/or outfall owners. Outfall owners will be encouraged to develop designs and plant modifications which provide for "reduced" or "no flow" outfall wastewater effluent discharge systems. For a graphical depiction of the history of outfall reduction at the Laboratory, see Appendix I.

4.1 TA-46 Sanitary Wastewater System Consolidation (SWSC) Facility

In November, 1992, the construction of the Laboratory's TA-46 SWSC Facility was completed. Construction of the SWSC Facility eliminated eight of the Laboratory's nine sanitary treatment facilities, plus 32 septic tank systems. As a result, eight permitted outfalls (Category S), were eliminated and overall compliance significantly increased (See Appendix K). The only sanitary outfall

remaining to-date is Outfall 13S located at the new TA-46 SWSC Facility. A map depicting the SWSC collection system is provided as Appendix L.

The influent to the TA-46 SWSC Facility is similar to the influent contributed to a Publicly Owned Treatment Works (POTW) operated by a municipality, i.e., the influent is primarily derived from sanitary waste sources (toilets, sinks, kitchens, floor washings, etc.), but also contains small contributions from industrial-type activities. However, due to the discharge of industrial-type wastewater and the fact that it is owned by the DOE, by definition the SWSC Facility is a Federally Owned Treatment Works (FOTW).

As previously described in Section 3.2, the 1991-1997 Waste Stream Characterization Program and WSC Project accomplished: (1) a Lab-wide characterization of wastewater effluents, including the inspection of facilities contributing influent to the sanitary wastewater treatment facility; (2) the identification of wastewater discharge deficiencies; and, (3) the implementation of corrective actions including administrative controls, which would assure that measures are in place to control contributions of industrial and chemical waste into the sanitary system. The WSC Project also accomplished a lab-wide posting of warning signs at sinks and drains in an effort to eliminate such wastes from discharging into the sanitary sewer.

The Laboratory has implemented the Waste Acceptance Characterization, and Certification Program which further reduces the potential discharge of incompatible waste to the TA-46 SWSC Facility and to other treatment facilities, by requiring adherence with strict waste acceptance criteria. This Program is described in more detail in Section 6.0 following.

4.1.1 Management of Laboratory's Sanitary Treatment Solids

The TA-46 SWSC Facility discharges domestic wastewater effluent originating from the Laboratory. Since the SWSC Facility opened in 1992, all sludge and grit/screenings have been managed as separate waste streams: sludge has been land applied in accordance with Part 503 Regulations of the CWA and by Part II.K.c Sewage Sludge Requirements of the Laboratory's NPDES Permit, and grit/screenings have been disposed of at the Los Alamos County Landfill under New Mexico Solid Waste Regulations. (Refer to Appendix M, for a copy of the Laboratory's *Administrative Procedures for the Handling, Disposal, and Reuse of Sanitary Treatment Solids*, LANL-ESH-18-602, September, 1994).

As a result of the detection of low concentrations (less than or equal to 4.38 ppm) of polychlorinated biphenyls (PCBs) in SWSC Facility sludge, the land application of sludge was suspended in May, 1996. The Laboratory is currently disposing of all SWSC Facility sewage sludge as a PCB-contaminated waste at a landfill permitted under the Toxic Substances Control Act (TSCA). Refer to

Appendix M for a copy of the Laboratory's "Draft" *Interim Management Procedures for Sanitary Treatment Solids*, dated February 3, 1998. These draft interim management procedures are not intended to be a stand-alone document but as an addendum to the Laboratory's *Administrative Procedures for the Handling, Disposal and Reuse of Sanitary Treatment Solids* (LANL-ESH-18-602). This addendum is intended to cover management practices not addressed in the LANL-ESH-18-602 Procedures.

A "Notice of Planned Change" to landfill the sludge was submitted to EPA Region 6 on July 31, 1997. EPA approved this change in the Laboratory's sludge disposal practice as required by Part II, Section K.e. of the Laboratory's NPDES Permit. Refer to Appendix M, letter from Mr. Nelson Hunt EPA Region 6, to Mr. Steven Rae, LANL, November 13, 1997. The LANL and the DOE are actively seeking concurrence from all state and federal regulatory authorities on a final disposal method.

4.1.2 Septic Tank Systems

There are numerous remote buildings and structures not connected to the TA-46 SWSC Facility that must rely on a variety of on-site sanitary wastewater treatment systems, which include holding tanks and septic tanks with absorption (leach) fields, seepage pits, or evapotranspiration beds.

As present, there are 35 permitted septic tank systems located throughout Laboratory boundaries. (See Appendix O). Of these, nine are holding tanks, 17 discharge to either a seepage pit or leach field, two discharge to sand filters, two have evapotranspiration beds, two have drain lines, two discharge to an absorption trench, and one discharges to a filter trench. The construction of the TA-46 SWSC Facility has eliminated 32 of the original 87 permitted septic tank and holding tank systems and an additional 20 have been abandoned in place. These disconnected and abandoned systems will be decommissioned under the Laboratory's Environmental Restoration Project.

The Laboratory's on-site sanitary liquid waste treatment systems are governed by the following regulations, Laboratory permits, and requirements:

- State of New Mexico Liquid Waste Disposal Regulations, 20 NMAC 7.3
- NPDES Outfall Permit No. NM0028355 for the TA-46 SWSC Facility (Outfall 13S).
- State of New Mexico Ground and Surface Water Quality Protection Regulations, 20 NMAC 6.2

Wastewater from holding tanks and septic tank systems meeting the Waste Acceptance Criteria (WAC) for the TA-46 SWSC Facility is periodically pumped and hauled to this facility for treatment.

4.2 TA-16 High Explosives Wastewater Treatment Facility (HEWTF)

In October 1997, construction of the TA-16 HEWTF was completed. As a result of the construction of the HEWTF, 17 of 21 high explosive (Category O5A) wastewater outfalls have been eliminated and overall effluent reduction of 99% has been realized through waste minimization efforts. Construction of the HEWTF and associated collection system now allows for the transfer of HE-contaminated fluids from existing building sumps to the treatment facility, rather than continued discharge to the environment from on-site outfalls at TA-9, 11, 16, and 22. Construction measures to eliminate permitted discharges from two HE outfalls are completed and pending regulator approval for deletion of the outfalls from the Laboratory's NPDES Permit. Once EPA approval is received, only two HE outfalls will remain in the new NPDES Permit. The two remaining Category O5A outfalls are: Outfall 05A055, located at the new TA-16 HEWTF; and Outfall 05A097, located at TA-11.

4.3 National Environmental Policy Act (NEPA) Issues

As required by the DOE's National Environmental Policy Act (NEPA) Regulations, two Environmental Assessments were performed by DOE/LAAO with the assistance of ESH-18 and the Laboratory's Ecology Group (ESH-20) to determine impacts to the environment due to the reduction of effluent and elimination of outfalls. On September 29, 1995, the DOE/LAAO issued a "Finding of No Significant Impact (FONSI)" for high explosives wastewater outfalls which could be eliminated as a result of the construction of the HEWTF.

Additionally, a categorical exclusion (CAT-X) and FONSI were issued by the DOE/LAAO on January 23, 1996, and September 20, 1996, respectively, for proposed effluent reduction from NPDES outfalls targeted for elimination as a result of WSC Project activities and Outfall Reduction Program activities. Appendix V provides copies of the corresponding environmental assessments performed by the Laboratory.

5. NPDES PERMIT RE-APPLICATION OUTFALL CHARACTERIZATION AND CLASSIFICATION

Reference is made to Appendix F, which provides a listing of the 34 previously permitted outfalls and 13 proposed new outfalls, for which this NPDES Permit Re-Application is made. These 34 outfalls currently remain from the 117 outfalls previously permitted under the 1990 Permit Re-Application. The 47 (34 existing and 13 new) total outfalls are located at 14 technical areas spread over a 43 square mile area within Laboratory boundaries, and are arranged in numerical order by the category of discharge.

The LANL NPDES Permit has historically been administered through categorical classification of wastewater discharges. Currently, the 34 previously permitted outfalls and 13 new outfalls included in this re-application are grouped into the following seven discharge categories: Power Plant (001); Steam Plant (02A); Treated Cooling Water (03A); Non-Contact Cooling and Water Production Facilities (04A); High Explosives Wastewater Discharge (05A); the TA-46 SWSC Facility (13S); and, the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) (051).

The categorical approach to outfall classification assumes that within each outfall category, discharges are similar in chemical constituents. As discussed in Section 3.2, *Waste Stream Characterization Program and Waste Stream Corrections Project* above, beginning 1991, the Laboratory initiated the Waste Stream Characterization Program to identify, verify, and correctly characterize and permit all wastewater sources to discharging outfalls.

6. WASTE ACCEPTANCE, CHARACTERIZATION, AND CERTIFICATION PROGRAM

The Laboratory's Waste Acceptance, Characterization, and Certification Program requires any waste generator to properly identify and document the characterization of any solid, hazardous, radioactive, or mixed waste pursuant to the Laboratory Implementation Requirements (Lab-wide Standards). The Waste Profile Form (WPF) is used to provide a complete and concise description of the waste, including the details of the generating process. The WPF process provides generators with guidance to help make the determination of the waste's physical, chemical, and radiological characteristics with sufficient accuracy to permit proper segregation, treatment, and disposal according to the final treatment/disposal facility's WAC.

The Laboratory has developed WACs for the TA-50 RLWTF, TA-46 SWSC Facility, and TA-16 HEWTF. Waste Acceptance Criteria are based on NPDES effluent limits, New Mexico Water Quality Standards, Resource Conservation and Recovery Act (RCRA) Universal Treatment Standards, and/or other federal and state requirements. The treatment processes and the capacities of these facilities are also considered during the development of WACs.

Each Group or Division at the Laboratory that generates liquid waste is represented by a Waste Management Coordinator (WMC), the primary contact between the waste generators and the treatment/disposal facility. Each Laboratory Group must ensure that: (1) waste streams discharged into the TA-50 RLWTF, TA-46 SWSC Facility, or the TA-16 HEWTF are acceptable under the Laboratory's NPDES Permit; (2) operating personnel are familiar with pertinent administrative requirements, and waste management regulations; (3) the wastewater does not exceed the recommended limits set forth in the WAC for

the TA-50 RLWTF, TA-46 SWSC Facility, or the TA-16 HEWTF; (4) listed hazardous wastes are not discharged into the TA-50 RLWTF, TA-46 SWSC Facility, and the TA-16 HEWTF; and (5) the treatment/disposal facility personnel are notified of any unusual or accidental discharges that may violate waste management regulations.

Waste Profile Forms (WPFs) are prepared by the WMCs as required for any new discharge to the aforementioned NPDES wastewater treatment facilities or their collection systems. Additionally, the Laboratory's Waste Acceptance, Characterization, and Certification Program requires that a WPF be prepared if an existing waste stream to these facilities significantly changes in quality or quantity. The waste generator is required to notify the Laboratory's ESH-18 Group of any significant changes in the waste streams. Appendix J provides a copy of the Laboratory's WPF.

7.0 LABORATORY'S NPDES PERMIT RE-APPLICATION PROJECT

Much of the information used in preparation of this Permit Re-Application was collected over a seven-year period from 1991 - 1998. In addition to the information collected during the period of 1991 - 1997 under the Laboratory's Waste Stream Characterization Program, WSC Project and the Outfall Reduction Program, a specific project was initiated in October, 1997, to implement several routine and non-routine activities to further characterize waste stream discharges at permitted outfalls. The project was entitled "Los Alamos National Laboratory's NPDES Permit Re-Application Project."

The NPDES Permit Re-Application Project was created in order to identify, implement, coordinate, and ensure the safe and timely completion of all work plan activities necessary to obtain and compile the required information for the 34 remaining and 13 new outfalls included in this NPDES Permit Re-Application. The Project framework was designed and implemented by the ESH-18 NPDES Permit Re-Application Team to ensure the integration and quality of all work performed.

General work plan activities included: (1) the administration of an outfall survey; (2) special sampling of effluent at outfalls for re-application-specific parameters in addition to the routine compliance sampling of permit-required constituents; (3) the performance of special flow studies at permitted outfalls; and, (4) the research, compilation, and integration of existing operational, management, and compliance data into a computer generated EPA re-application format. The Executive Summary from the management plan entitled "*Los Alamos National Laboratory NPDES Permit Re-Application Project Implementation Plan*" is provided as Appendix P. This Implementation Plan was prepared to document the methodology implemented to accomplish work plan activities. The performance of the noted work plan activities was intended to provide the means

to achieve a single, integrated approach to compiling the data required by this re-application. A brief discussion of Project work plan activities and the Implementation Plan is provided below.

7.1 Outfall Surveys

The NPDES Permit Re-Application Team developed a survey form for each of the 34 outfalls to be included in the re-application. The survey form requested specific information from outfall owners required by the Form 2C portions of the application. In addition, the Team performed an in-depth review of all existing outfall information. The sources reviewed included:

- the Waste Stream Characterization Program and WSC Project database;
- 1990 Permit Re-Application documentation;
- existing outfall operations and maintenance manuals (O&M), logs, and records;
- NPDES Discharge Monitoring Reports (DMRs);
- compliance inspection reports;
- discharge non-compliance records and reports;
- topographical maps;
- chemical inventories;
- waste profile forms (WPFs);
- recorded flow data and frequency of discharge data;
- Material Safety Data Sheets (MSDSs);
- operational sampling data; and,
- Notices of Changed Conditions or Planned Changes previously submitted to EPA and NMED from 1990 to 1998. (Refer to Appendix Q for a listing of the applicable EPA/NMED Notices of Changed Conditions or Planned Changes).

In addition, a site visit was scheduled with each outfall owner. The purpose of the site visit was to provide the survey team with the opportunity to interview the outfall operator and view the process(es) which contribute to the outfall's waste stream. Other activities which were accomplished at the site visit included:

- verification of sources to outfall, including storm water;
- verification of outfall location using a hand held Global Positioning System (GPS) receiver;
- identification of all actual processes that contribute to the waste stream; and,
- identification of any future equipment or process changes or activities that may contribute discharge to the respective outfall.

Upon completion of the site visit, line drawings were developed denoting all contributing sources and treatment processes for the outfall. Data collected from the survey was also entered into an ACCESS database and used to complete the re-application forms. In addition, chemical treatment and discharge

information obtained from the survey process was evaluated to determine the need for performing additional characterization activities such as sampling of discharges or performing a flow study.

7.2 Outfall Sampling

The analytical data required for Form 2C of the re-application was collected through an established sampling program in accordance with sampling procedures listed in 40 CFR 136 and also documented in the ESH-18-prepared "*Sampling Plan for Los Alamos National Laboratory's NPDES Permit Re-Application*," revised April, 1998. This Plan, provided as Appendix R, addresses physical, chemical, environmental, radiological, and biological safety issues, provides guidance on the sampling methods, lists parameters for which samples were analyzed, and identifies the outfalls that were sampled and the requirements for records retention. The Laboratory reviewed the Sampling Plan with both EPA and NMED. EPA concurred with the re-application sampling regime presented by the Laboratory.

Data reflected in the Form 2C is a compilation of data produced from routine NPDES Permit compliance monitoring, and data produced from special sampling of outfalls for re-application-specific parameters. All sampling of effluents was conducted by staff from the ESH-18 NPDES Outfall Team. Analytical services and support for NPDES routine Permit compliance data was provided by the Laboratory's Chemical Science and Technology (CST) Division, Johnson Controls Northern New Mexico, and Quanterra. Analytical services and support for samples collected for re-application parameters was provided by Assaigai Analytical Laboratory, Johnson Controls Northern New Mexico, CST-9, IONICS International, American Radiation Services, Aquatech-Marion, and Acculabs.

The Laboratory uses groundwater for its potable water supply. Groundwater contains various levels of natural elements which are dissolved as water passes through the sub-surface geology. The Laboratory has sampled and analyzed water from the various existing wells and found variation in background elements by location. The variation increases as the water is distributed throughout the Laboratory; some outfalls show the persistence of the background metals (Al, As, etc.) and others show zero concentrations. The Laboratory did not attempt to conduct a study and to develop a set of chemical constituents for establishing standard background levels for intake water. Instead, we have provided chemical data from the results of the Laboratory's 1997 SDWA Sampling Program for well water in the Forms 2C and have summarized the outfall sampling data in the DMR summaries for each outfall. If a background element was not present in existing SDWA or DMR data, it was marked as "Believed Absent" in Form 2C. If the element was detectable, it was marked as "Believed Present" in the Form 2C.

The initial approach to sampling was to identify priority outfalls which are believed to be representative of the majority of outfalls, and at a minimum, one outfall from each outfall category. These "priority outfalls" which were sampled for the re-application are listed in Table 2 below. In instances where, through the outfall survey, outfalls were determined to not be "substantially identical" to the representative sample for that outfall category, additional sampling was conducted and analytical results were submitted with this Permit Re-Application. Outfalls sampled for this re-application are presented in the *Sampling Plan for Los Alamos National Laboratory's NPDES Permit Re-Application, revised April, 1998*, provided in Appendix R. The Laboratory provided EPA with this information at a meeting held on January 30, 1998.

The Laboratory performed a full scan for all Form 2C priority pollutants for a minimum of one outfall per NPDES outfall category. Information for priority pollutants analyzed were selected from a "knowledge of process" basis (i.e., knowledge of raw materials, maintenance of chemicals, intermediate and final products and by-products), and also from analytical data available for outfall effluents.

Also, the EPA Form 2C specifically requires the applicant to identify whether or not "Potential Contaminants of Concern" exist in outfall wastewater discharges. At a January 30, 1998, meeting with EPA Region 6 representatives, the Laboratory indicated that the Form 2C as currently formatted, did not address or require information regarding many contaminants that may be generated at the Laboratory. Potential for generation of these "other" contaminants arise from the Laboratory's diverse research and development programs and activities.

EPA representatives acknowledged this information and indicated that in the case where these "other potential contaminants of concern" were identified, that the Laboratory should document this information in summary form by the generic chemical name, and provide this information as an attachment or appendix to the relevant Form 2C. The Laboratory has provided the information in this re-application with the Form 2C as recommended by EPA.

As required by Form 2C, information obtained by re-application sampling efforts, process surveys, and historic compliance sample data from DMRs, was used to identify analytes that are "believed absent" from the particular outfall waste stream. The DMR data summaries for the Laboratory's NPDES Permit Re-Application were compiled by taking the data from DMRs for the period between August 1, 1994 through October 31, 1997. The data was entered into an EXCEL spreadsheet from which the necessary calculations were made. The tables are attached to the relevant Forms 2C and are entitled *DMR Outfall Summary (1994-1997)*. A copy of the compiled historical DMR sample data is provided for each of the 34 outfalls included in this re-application.

All the information noted above was used to identify and document outfalls that were "substantially identical" and sampled as priority outfalls for the re-application. Provided as Table 2 following, is a summary of the priority outfalls sampled.

Table 2, Priority Outfalls Sampled for the Re-Application

Outfall Category	Outfall #	TA-BLDG	FMU
Radioactive/ Industrial Effluent	051	50-1	84
Sanitary	13S	46-00	80
Power Plant	001	3-127	80
Steam Plant	02A129	21-357	80
Treated Cooling Water	03A022	3-66	73
LANSCE*	03A047	53-60	61
	03A048	53-62	61
	03A049	53-64	61
Non-Contact Cooling Water – Pajarito *	04A163	Pajarito Well #1	80
	04A164	Pajarito Well #2	80
	04A165	Pajarito Well #3	80
	04A166	Pajarito Well #4	80
Guaje	04A176	Guaje Well #6	80
Otowi	04A161	Otowi Well #1	80
High Explosives Wastewater	05A055	16-401, 406	70
	05A097	11-52	70

* Only one of the indicated outfalls will be sampled

Instructions provided in Form 2C of the re-application for sampling specify the requirements for sample collection, (i.e., whether a sample must be collected as a composite sample or grab sample depending on the parameter being sampled). In addition to sampling the "priority" outfalls, an evaluation was made of all 34 outfalls for the potential for sampling pursuant to these instructions. Findings from this evaluation indicated that some outfalls could not be sampled in strict adherence to the prescribed instructions due to the following reasons: some outfalls do not have an active discharge to sample due to seasonal operations or inactive operations, and one permitted outfall has not yet been constructed, or there were operational limitations on the duration and volume of discharges.

Form 2C instructions allow for some flexibility with this regard. The instructions state: "The Director may waive composite sampling for any outfall for which you demonstrate that use of an automatic sampler is infeasible and that a minimum of four grab samples will be representative of your discharge." A verbal request was made by the Laboratory in December, 1997, to EPA Region 6 for such a waiver for those outfalls where composite sampling was infeasible. Approval was granted by EPA. On January 30, 1998, EPA also provided verbal approval to the Laboratory allowing the collection of one grab sample in lieu of four grab samples for intermittent and batch discharges. The method of sample collection, "grab" versus "composite" is noted as required on the Form 2C application form.

Sampling personnel implemented quality assurance/quality control (QA/QC) procedures for sample collection, sample preservation, and field analysis, as required by the NPDES Permit or the noted NPDES Permit Re-Application Sampling Plan. The methodology for samples collected in compliance with monitoring requirements for the existing NPDES Permit require that collection occur following final treatment, prior to or at the point of discharge as documented in Part II of the Laboratory's NPDES Permit. All samples were handled in accordance with chain-of-custody procedures established by the individual laboratories that analyze samples (LANL 1994a). These QA/QC activities are detailed in the various Laboratory and internal Group procedures and quality assurance plans.

7.2.1 Sample Analysis

All analytical laboratories that were responsible for the analysis of re-application samples were required to have established QA/QC programs, in accordance with NPDES Permit requirements.

All data provided by analytical laboratories was evaluated for accuracy and input into an ACCESS database. The database was used to populate the analytical portion (Section III) of the Form 2C Permit application with the applicable data.

On January 30, 1998, a verbal request was made by the Laboratory to the EPA Region 6 Permit Writer for approval for the use of EPA Methods 300.0 and 200.8 by Assaigai Analytical Laboratories for the analysis of samples submitted for NPDES Permit Re-Application purposes. EPA Method 300.0 is "The Determination of Inorganic Anions in Water by Ionic Chromatography. EPA Method 200.8, "Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma Mass Spectrometry," is a method used for the analysis of cadmium and lead in wastewater samples.

On February 4, 1998, the Laboratory received an EPA letter approving the Laboratory's request to use EPA Method 200.8 for the measurement of cadmium and lead for permit and permit re-application purposes. In addition, on March 6,

1998, the EPA Permit Writer provided approval to the Laboratory regarding use of EPA Method 300.0 by the Laboratory as an alternative analytical method for NPDES Permit and Re-Application purposes. Follow-up written documentation was transmitted from the Laboratory to EPA Region 6 summarizing the aforementioned requests and approvals. (Refer to Appendix S, for miscellaneous correspondence regarding requests to EPA for approval regarding use of alternative analytical methods)

7.2.2 Quality Assurance/Quality Control

The Laboratory has implemented a Laboratory-wide QA/QC Program (LANL 1993a) in accordance with 10 CFR 830.120 (DOE 1991) and Director's Policy 110 (LANL 1991). Additionally, Laboratory environmental QA/QC programs are required to meet the requirements of DOE Order 5400.1 (DOE 1990a).

All data collected during the NPDES Permit Re-Application Project was subjected to a quality assurance review. Two types of quality assurance reviews were conducted. The first type was to ensure the accuracy of the data itself. The second type was to ensure the accuracy of data entry into the permit re-application forms. Also, a QA/QC review was performed by all chemical analytical laboratories consistent with NPDES Permit requirements. Selected data practices were also reviewed by the Laboratory's Inorganic Trace Analysis Group (CST-9). Prior to input of information to re-application forms, the NPDES Permit Re-Application Team reviewed analytical data for completeness and conformance to NPDES analytical requirements.

Quality assurance review for data accuracy was conducted to ensure that data collected during outfall surveys, flow studies, and sampling activities are reasonable and the data source are adequately documented. This QA review was initially conducted on an on-going basis as data was collected. Re-Application Project Team members reviewed data as it was gathered and reported by analytical laboratories. Questionable or undocumented data initiated additional investigations with outfall owners/operators and in some cases required additional field investigations, flow studies or re-sampling activities. In addition, to ensure accuracy, all collected or compiled data was compared and evaluated against existing data obtained from other internal and external entities.

7.3 Flow Study

In instances where outfall operators are not required to meter their discharge or where actual flow rate data from facility records is not available, a flow study was required to obtain actual flow data or estimates of flow rates based on Best Professional Judgment (BPJ). The goal of the flow study was to obtain:

- the frequency of discharge from the outfall;
- daily average and daily maximum flow rates from the outfall; and,
- flow rates from all operations which contribute discharge to the outfall.

The level of effort and activities necessary for conducting a flow study on an outfall was dependent on the type and quality of the flow data received via the survey effort. Following completion of the survey, each of the outfalls was evaluated and assigned as either categories, A, B, C, or D. Following is a summary defining each of the flow categories and a listing of the necessary activities specific to each.

A = Outfall with existing flow metering with reliable historical data available:

- Review existing records and determine peak and average flows.
- Continue monitoring during survey phase and incorporate information into application.

B = Outfalls with existing flow metering with questionable historical data:

- Initiate new flow monitoring utilizing existing metering.
- Obtain reliable data.

C = Outfalls with no existing metering that can be monitored using ESH-18 flow measuring equipment:

- Review previous applications and flow monitoring data on DMRs.
- Coordinate work with ESH-18 outfall survey and storm water monitoring teams to install temporary monitoring/metering equipment at these outfalls.
- Obtain reliable data to determine required peaks and average flows.

D = Outfalls with no existing metering that cannot be monitored using ESH-18 flow measuring equipment:

- Review previous application and flow monitoring data from DMRs.
- Determination of required peak and average flows were made by calculations utilizing generally accepted engineering methods.
- Calculations were documented and crosschecked.

The devices and methods chosen for measuring flow were consistent with accepted engineering practices and were used to ensure the accuracy and reliability of measured discharge volume. The flow measurement devices were able to measure flow with a maximum deviation of less than 5% from true discharge rates throughout the range of expected discharge volumes. Where outfalls were discharging as part of normal operations, real time monitoring of the outfall was used to determine flow rates.

A Parshall flume or a V-notch weir was used to measure flow at each Category C outfall where flow was present. Twenty-four hour flow recorders were installed on the flume or weir to measure instantaneous and total flow. The total flow was divided by the total time monitored in order to obtain the average flow rate. The maximum daily flow rate was determined by taking the largest cumulative flow over the associated twenty-four hour period. Some outfalls were monitored for a two-week period. (Refer to Appendix R, for more specific details regarding outfall sampling methodology.)

In some cases, actual monitoring of flow was not possible because some outfalls operate seasonally. For example, many cooling towers will operate only during the warmer months. Where historical data was not available and flow monitoring was not possible, flow estimates were based on BPJ. These estimates in some cases were also based on available data from "substantially identical" outfalls, the review of manufacture equipment design documentation to determine flow rates for the process in question, or data which may allow for water balance calculations.

7.4 Data Integration

All NPDES Permit Re-Application forms have been recreated as "Reports" by using Microsoft ACCESS, Version 7.0 software. Computer generation of the EPA forms allowed for automated data entry, and also ensured accuracy and completeness. The forms were reviewed by a quality assurance specialist for conformance to the "original" forms as downloaded from the internet at the address following (www.epa.gov/earth1r6/6wq/npdes/forms/forms.htm). Prior to including these recreated forms in the final submittal, EPA approval authorizing their use was requested by the Laboratory.

On January 30, 1998, the EPA Region 6 Permit Writer was provided with copies of the recreated forms. A request for approval to use these recreated forms in lieu of those provided on the internet was made. At the January 30, 1998 meeting, approval was granted by the EPA Region 6 Permit Writer.

Another record keeping and documentation objective of the Laboratory's NPDES Permit Re-Application Project was to produce data of known, documented quality for inclusion in this NPDES Permit Re-Application. This supporting documentation was obtained by survey, flow study and sampling/analysis activities for each outfall. Other sources of information included:

- operating logs and/or operational sampling data obtained from outfall operators;
- compliance inspection documents from previous three years;
- field notes from survey site visits and process of knowledge interviews;

- process flow diagrams;
- chemical inventories;
- WPFs;
- a map denoting outfall location relative to discharging structure;
- photos of the outfall;
- sampling and analysis documentation;
- flow study logs or calculations;
- MSDS sheets for chemicals included in waste streams;
- DMR Summaries;
- previously submitted Notices of Changed Conditions or Planned Changes;
- Waste Stream Characterization Survey Reports;
- SDWA data from the Laboratory's 1997 sampling efforts; and
- any other documents that were determined to be relevant to renewal of the Permit.

Outfall survey form data, flow study monitoring data, and analytical data were all captured in a ACCESS database that was used to re-create and complete the application forms required for renewal of the Permit. Use of the database enabled automation of the application's completion and should have ensured consistency of responses.

The Laboratory used the Microsoft ACCESS software to integrate and report the data on the NPDES application forms. All data which was included into a database was automatically and directly imported into the NPDES application tables and form(s) using update queries.

7.5 NPDES Permit Re-Application Project Implementation Plan

The objective of the *LANL NPDES Permit Re-Application Project Implementation Plan* was to document how the UC, DOE, and the Laboratory developed, implemented and managed work plan activities set forth under the Laboratory's NPDES Permit Re-Application Project.

The Implementation Plan was developed as a management tool or "roadmap" to define, document, and direct the Project objectives, summarize organization responsibilities, work plan activities, safety and training requirements, and cost and schedule for compilation of this Permit Re-Application document and future re-application submittals. See Appendix P for a copy of the Executive Summary from the Laboratory's NPDES Permit Re-Application Project Implementation Plan (dated March 11, 1998).

8. NPDES PERMIT RE-APPLICATION FORMS

The NPDES Permit Re-Application requires detailed information be provided for each point source outfall. The information required includes the location of the outfall, a detailed description of all sources and processes that contribute to the discharged waste stream, the volume and frequency of the discharge, and analytical data on the waste stream. A "fact sheet" which provides a brief biography of the required information has been created and provided for each Form 2C for each of the existing 34 outfalls included in this re-application.

8.1 General Form 1

Form 1 is used to present general information such as the nature of business, name, mailing address, location, and existing permit numbers regarding EPA programs that apply to LANL.

The information to be contained in this form did not vary significantly from that which was provided in the 1990 re-application. The most notable change from the 1990 permit re-application is the December 29, 1997, approval by EPA to discontinue the Laboratory's Permit No. NM0028576 for the TA-57 Fenton Hill Geothermal Site.

The greatest effort required to complete this portion of the application was in generating an updated topographical map of the facility. The Laboratory's Ecology Group (ESH-20) and Facility for Information, Management, Analysis, and Display Group (FIMAD) assisted ESH-18 in preparing this map. The requirements for the map include, but are not limited to:

- denoting legal boundaries of facility and extending at least one mile past these boundaries;
- location and serial number of each intake/discharge structure;
- location of hazardous waste management facilities; and,
- springs, surface water bodies, and drinking water wells.

Appendix F provides a topographical map of the Laboratory which denotes the legal boundaries within at least one mile past the exterior boundary. This map also provides the locations of the 34 outfalls to remain on the Laboratory's NPDES Permit. Also included in this map are the locations of the Laboratory's production wells (intake structures) which are denoted with an 04A category designation.

Refer to Appendix T for copies of the 12 hazardous waste management facilities located at the Laboratory. Also provided in Appendix T is a listing of the relevant hazardous waste treatment process codes denoted on the maps provided. Appendix B provides a topographical map which depicts all springs and surface water bodies located within the area of the Laboratory.

Section VI of Application Form 1 - General Information also requests information regarding "prevention of significant deterioration permits under the Clean Air Act (CAA)." The Laboratory is currently undergoing review and approval by the NMED Air Quality Bureau for the Title V Operating Permit Application. The Application and anticipated permit will place federally enforceable limits on criteria pollutant emissions from the Laboratory regulated under the CAA well below 250 tons per year.

Section VII of the Application Form 1 - General Information also requests the appropriate 4-digit Standard Industrial Classification (SIC) Codes which best describe the facility in terms of the principal products or services it produces or provides, or the activities covered by the permit re-application. SIC Codes provided in this re-application for the Laboratory include: 9711 - National Security, 9661- Space Research and Technology, 9922 - Scientific Research, and 9611 - Energy Development. The noted SIC Codes were confirmed via use of the "*Standard Industrial Classification Manual*" published 1987 by Superintendent of Documents, U. S. Government Printing Office., Washington, D. C.

Section X, of the Application Form 1 - General Information also requires that all existing environmental permits be noted. Currently at the Laboratory, in addition to NPDES Industrial Permit No. NM0028355, the Laboratory has an existing permit for its storm water discharges, a permit for generation and treatment of hazardous wastes, an application submitted for air emissions from proposed sources, and several Dredge and Fill Permits granted by the U.S. Army Corps of Engineers (COE) under Section 404 of the CWA. Following is a brief description of each.

Regarding storm water discharges, the Laboratory currently has one NPDES Baseline General Permit for Industrial Activities, and six NPDES Baseline General Permits for Construction Activities. The NPDES Storm Water Baseline General Permit for Industrial Activity expired on September 9, 1997, and under EPA guidance the Laboratory has applied for an extension of the Baseline General Permit until the modified Multi-Sector General Permit is published by EPA. SIC Codes provided for the storm water permit re-application in 1992 included: 9711 - National Defense R&D; 9661 - Space Research and

Technology; 9922 - Scientific Research; and, 9611 - Energy Development. The Laboratory has received coverage under the Character Codes of: HZ for hazardous waste treatment, storage, or disposal facilities; LF for landfills, land application and open dumps; SE for steam electric power generating facilities; and, SIC Code 4581 for airports, flying fields, and airport terminal services.

The Laboratory also generates a variety of hazardous wastes, most of which are produced in small quantities. On November 8, 1989, the DOE and UC were issued a Hazardous Waste Facility RCRA Part A Permit (No. NM0890010515-1) by the NMED. The 10 year Permit expires in November, 1999, and the Laboratory must submit the application for renewal six months in advance. The Laboratory also submitted a proposed General Part B Application to the Hazardous and Radioactive Materials Bureau of NMED in August, 1996.

The Laboratory is currently undergoing review and approval by the NMED Air Quality Bureau for the Title V Operating Permit Application. The Application and anticipated permit will place federally enforceable limits on criteria pollutant emissions regulated under the CAA. To-date, the NMED has not assigned an air permit number to the Laboratory's request.

The Laboratory currently has eight active and one pending 404/401 Dredge and Fill Permits. These Permits are issued by the COE and certified for water quality by the Nonpoint Source Section of the Surface Water Quality Bureau of the NMED under Section 401 of the CWA. The nine Permits are associated with several activities including: maintenance and/or improvements to existing structures; construction of new projects; wetland or stream restoration; and, watershed monitoring and sampling activities. Refer to Appendix X for a listing of the nine 404/401 Dredge and Fill Permits.

8.2 Standard Form A Preparation

Standard Form A is the section of the application used for documenting discharges from a publicly or privately owned activity or wastewater treatment system or facility. The Laboratory does not own or operate a municipal wastewater system or POTW.

On February 2, 1998, the EPA Region 6 Permit Writer indicated that the Laboratory *would not* be required to submit a Standard Form A with submitted permit re-application materials. However, it was agreed by both the Laboratory and EPA, that a copy of the Laboratory's Sludge O&M Plan for the TA-46 SWSC Facility should be provided. Please see Appendix M for a copy of the Laboratory's plans entitled "*Administrative Procedure LANL-ESH-18-602, Handling Disposal, and Reuse of Sanitary Treatment Solids,*" and Draft "*Interim Management Procedures for SWSC Facility Sanitary Solids.*"

8.3 Form 2C Preparation

Form 2C is the section of the application used for renewal of expiring NPDES industrial permits. Form 2C requires detailed information on location of outfalls, sources of intake water, production levels, and detailed testing data for pollutants contained in effluent. The items required to complete the Form 2C included:

- location of each outfall (latitude/longitude);
- a line drawing showing all outfall sources, operations, and discharge locations;
- physical characterization of a discharge including a description of all wastewater sources and flow estimates associated with the outfall discharge;
- a description of the discharge frequency;
- a description of any effluent guidelines for the discharge; and,
- chemical characterization of the discharged waste stream.

To enable compilation of the required data for the 34 existing outfalls included in this re-application, a comprehensive physical and chemical "characterization" of each outfall discharge was conducted to ensure that the most up-to-date information was provided in the enclosed Forms 2C. This "characterization" consisted of a survey of the outfall, a flow study to accurately determine or measure flow values, and special sampling and analysis of outfall effluent for specific re-application parameters. A data research effort to summarize pre-existing NPDES Permit compliance data (from DMRs) and radiochemical data was performed to provide comparison data.

In addition to the Form 2C, miscellaneous supporting documentation is provided for each existing outfall. The supporting document includes:

- a Fact Sheet which provides a brief overview of information relative to each outfall;
- an outfall process flow diagram which depicts chemical treatment and flow information;
- outfall MSDS sheets which provide chemical inventory information for each discharge;
- outfall location map, which illustrates where the outfall is currently located at Laboratory technical areas and buildings; and,
- an updated NOI was prepared for each of the 34 outfalls per State of New Mexico Ground and Surface Water Quality Protection Regulations (20 NMAC 6.2. Refer to Appendix U for copies of NOIs previously submitted to NMED.

8.4 Form 2D Preparation

Form 2D is used for new applications for NPDES industrial wastewater permits. Form 2D required less data than Form 2C. The activities required to complete this form include:

- location of each outfall (latitude/longitude);
- a line drawing showing all sources, operations and discharge locations associated with the outfall;
- physical characterization of a discharge including: a description of all wastewater sources, including storm water and flow estimates associated with the outfall discharge;
- a description of the discharge frequency;
- date discharge is expected to begin; and,
- chemical characterization of the discharged waste stream.

On January 30, 1998, at a meeting with EPA Region 6 representatives, the Laboratory requested clarification regarding NPDES permitting requirements for mechanical equipment discharges to floor drains from water supply facilities. Currently, the floor drains can receive intermittent flows of bearing cooling water during pump operation and from leaks from potable water pipes, sand samplers, and pumps. These discharges do not include the larger blowdown flows from the well pumps. The larger blowdown flows are piped separately from these floor drains and are presently covered under the Laboratory's NPDES Permit (Category 04A Outfalls). The make-up of the bearing cooling water is the same as the larger blowdown flows. The EPA stated they will require that Form 2Ds be submitted for the floor drain discharges. The Laboratory has prepared and provided Form 2Ds in this re-application for these flows as directed. Additionally, information regarding the bearing cooling water discharges to floor drains has previously been submitted to the NMED in an NOI.

Form 2Ds are submitted in this re-application for 13 discharges. The 13 outfall discharges included in this re-application are as follows:

1. Four outfalls associated with the Guaje Well Replacement Project (Outfalls 04A187, 04A188, 04A189, and 04A190). The Form 2Ds have been previously submitted (December 12, 1996) for these discharges, and are again being re-submitted so they will be considered during this re-application process.
2. One outfall associated with the Omega Site (TA-2-1) basement sump discharge. Although a Form 2D was previously submitted (July 12, 1993) for this groundwater discharge, a copy will again be provided for reference and potential inclusion into the Laboratory's NPDES Permit.

3. Eight outfalls with bearing cooling water discharges to floor drains at potable water well houses. The Laboratory is evaluating re-engineering options in order to eliminate these discharges to the environment.

In addition to submittal of the EPA Form 2D, per State of New Mexico Ground and Surface Water Quality Protection Regulations (20 NMAC 6.2), an updated NOI has been prepared and provided for each outfall included in the re-application with a corresponding Form 2D. Please see Appendix U for copies of NOIs previously submitted to NMED.

9. SUMMARY

The required and supplemental information contained in this re-application is provided to assist the EPA Permit Writer in the development of an NPDES industrial wastewater discharge permit for the Laboratory.

The information provided in this re-application document represents the best information available to the applicants at the present time. The Laboratory is aware that additional information may be requested and will provide it to the requester if available.

In January, 1998, Laboratory staff extended an invitation to the assigned EPA Permit Writer to visit the Laboratory site. The Laboratory believes a site visit in addition to the information provided herein, would assist the Permit Writer in becoming better acquainted with the Laboratory's diverse facilities, operations, and industrial wastewater discharge activities.

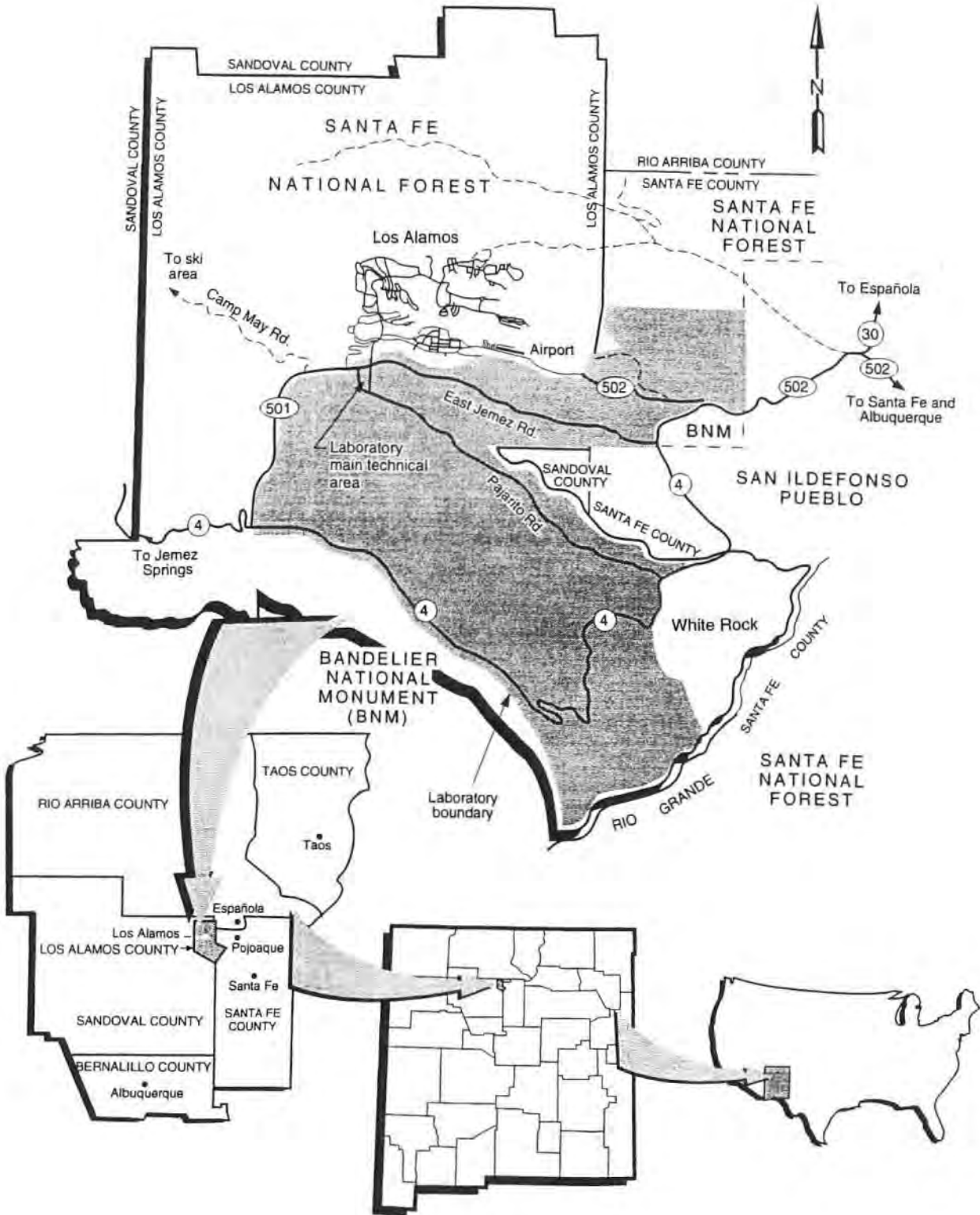


Figure 1. Regional Location of Los Alamos National Laboratory

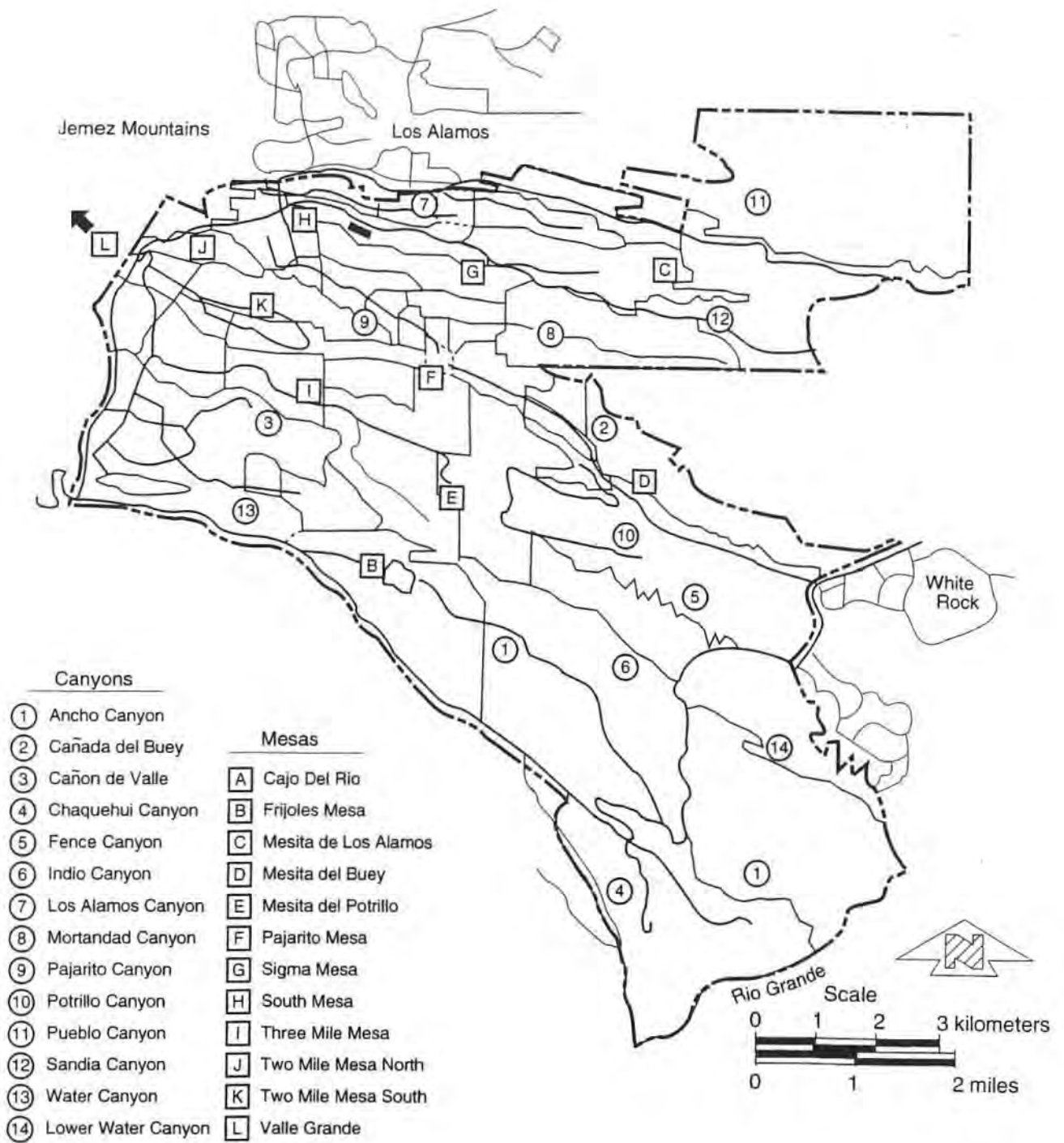


Figure 2. Major Canyons and Mesas.

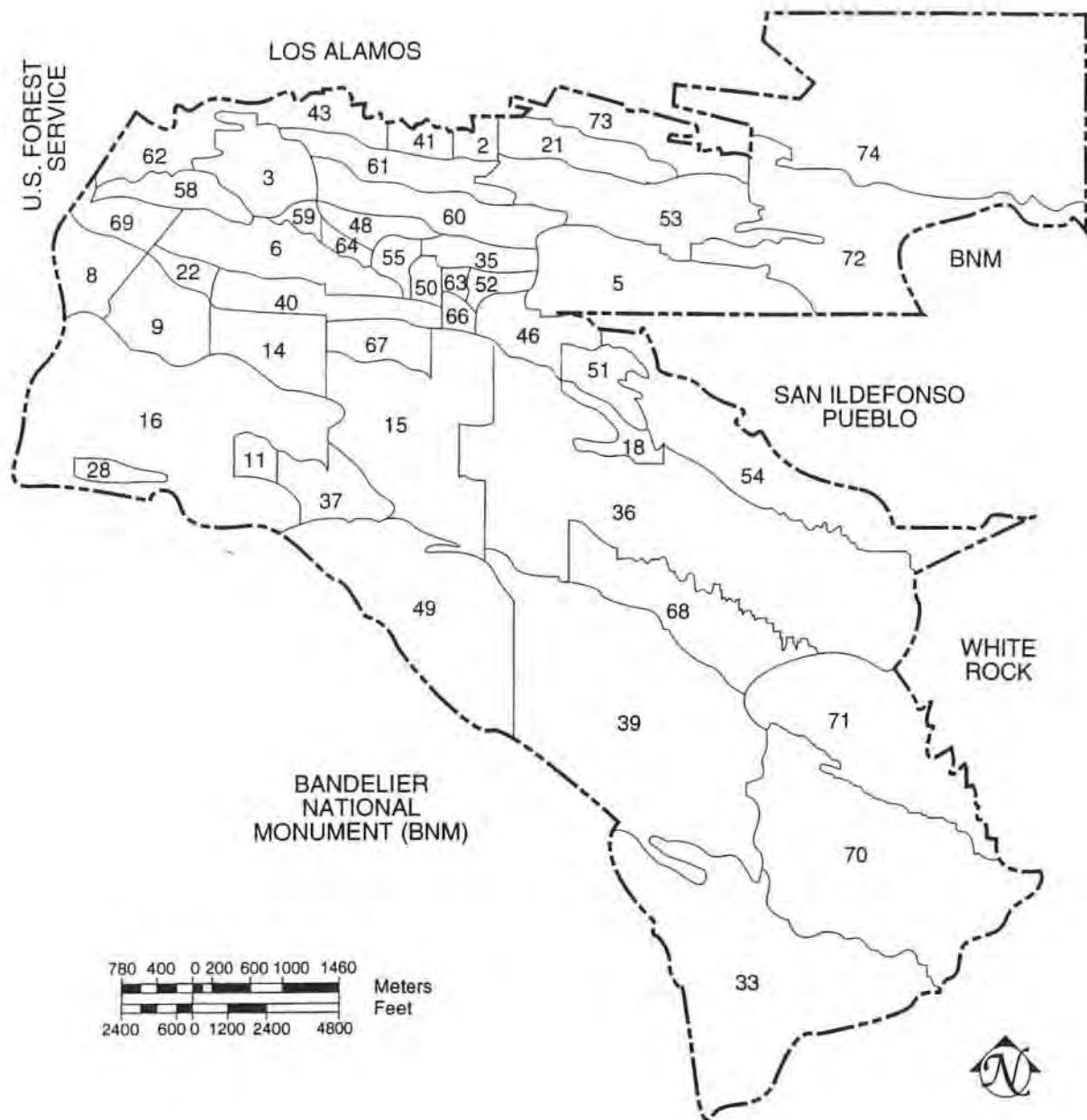
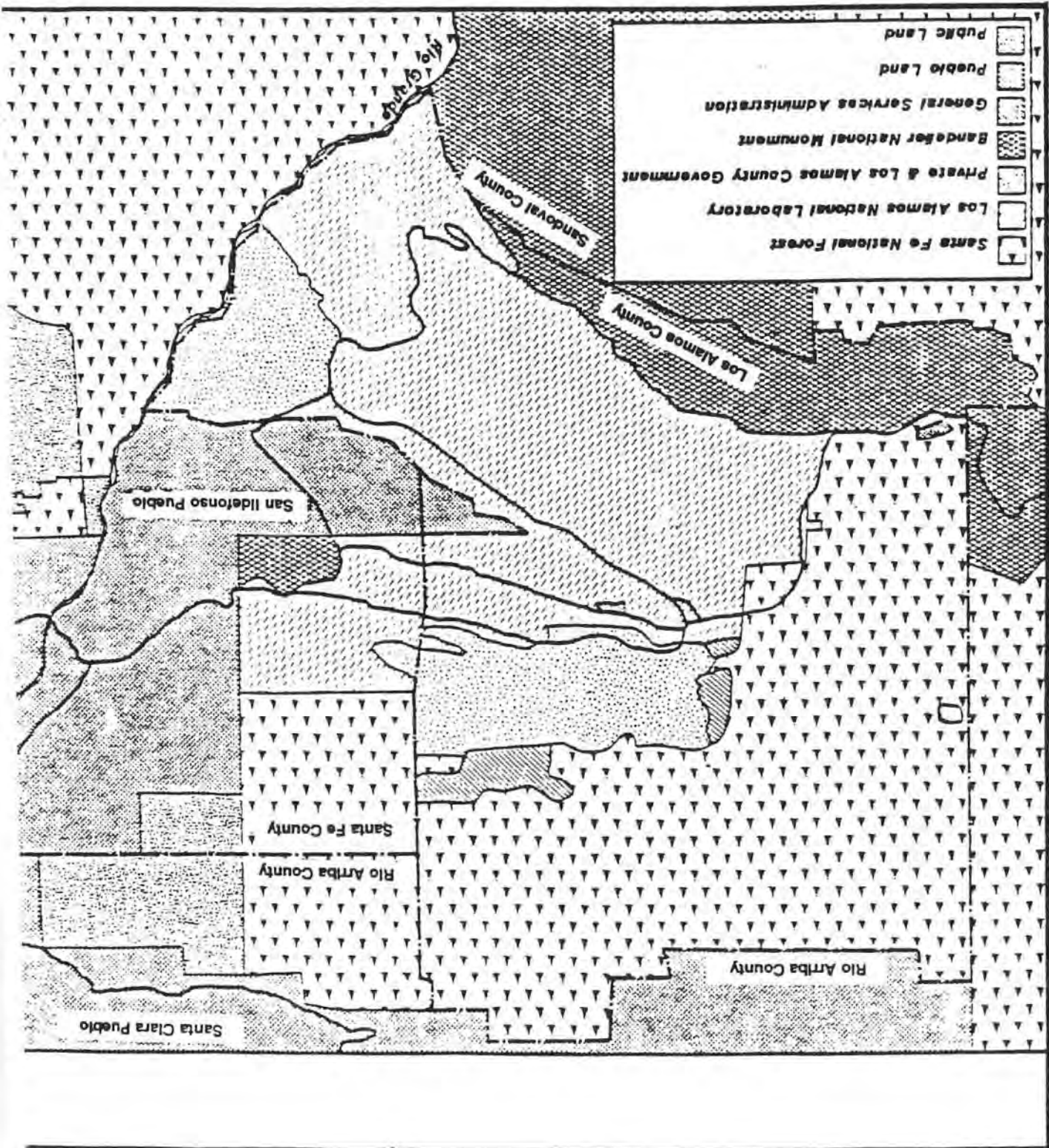


Figure 3. Technical Areas of Los Alamos National Laboratory in Relation to Surrounding Landholdings.

LOS ALAMOS COUNTY LAND OWNERSHIP

FIGURE 4



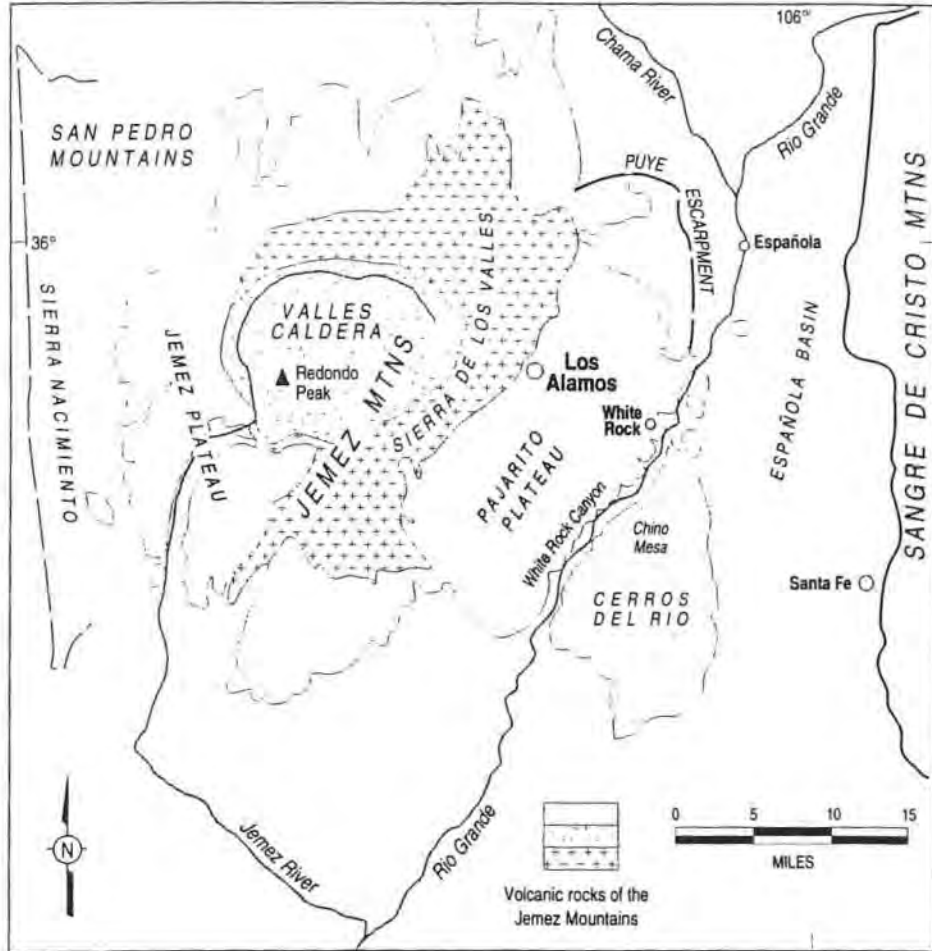


Figure 5. Location Map Showing Geologic and Topographic Features near Los Alamos and the Pajarito Plateau.

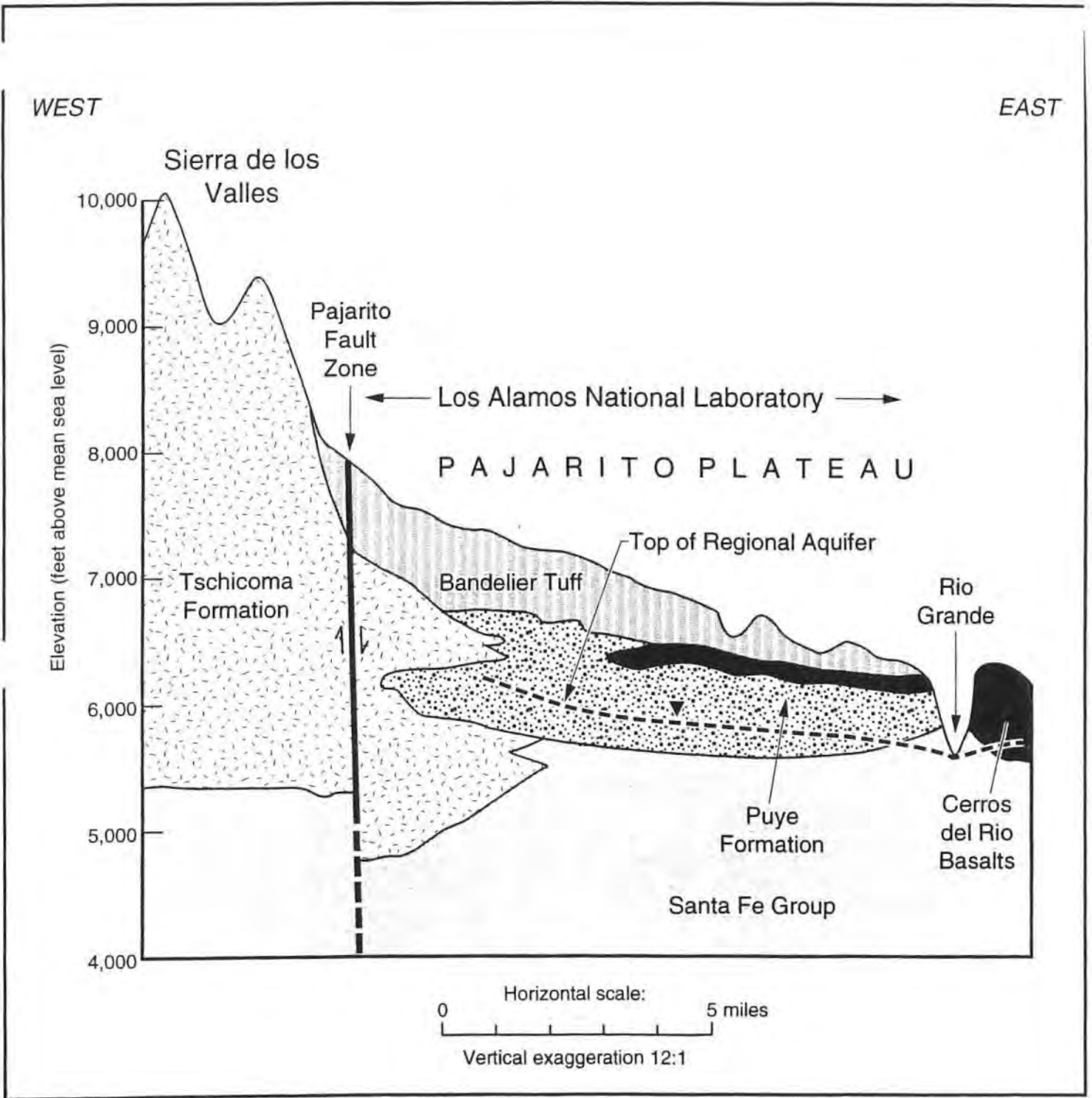


Figure 6. Generalized Geologic Cross Section across the Pajarito Plateau.

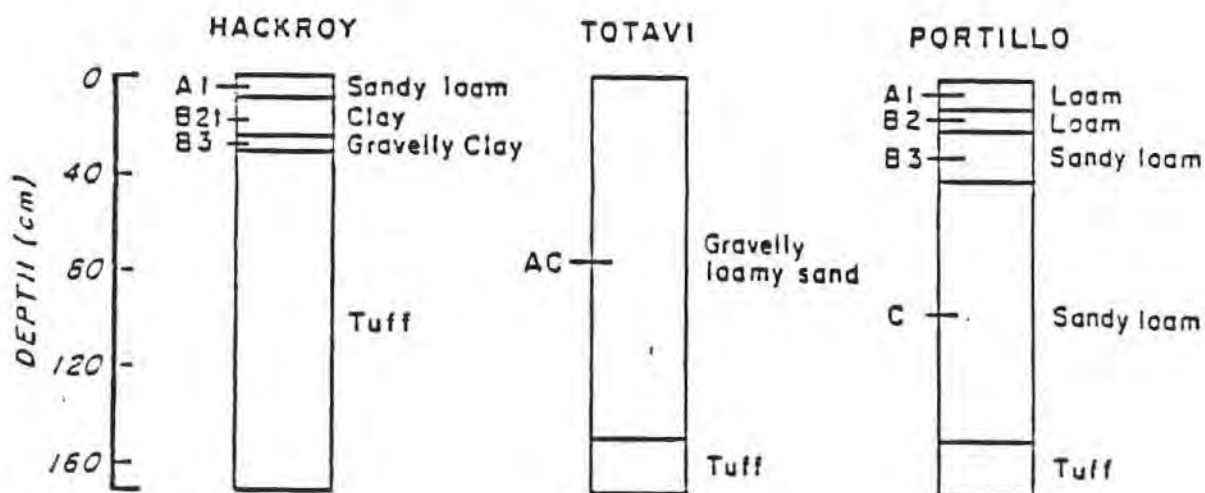
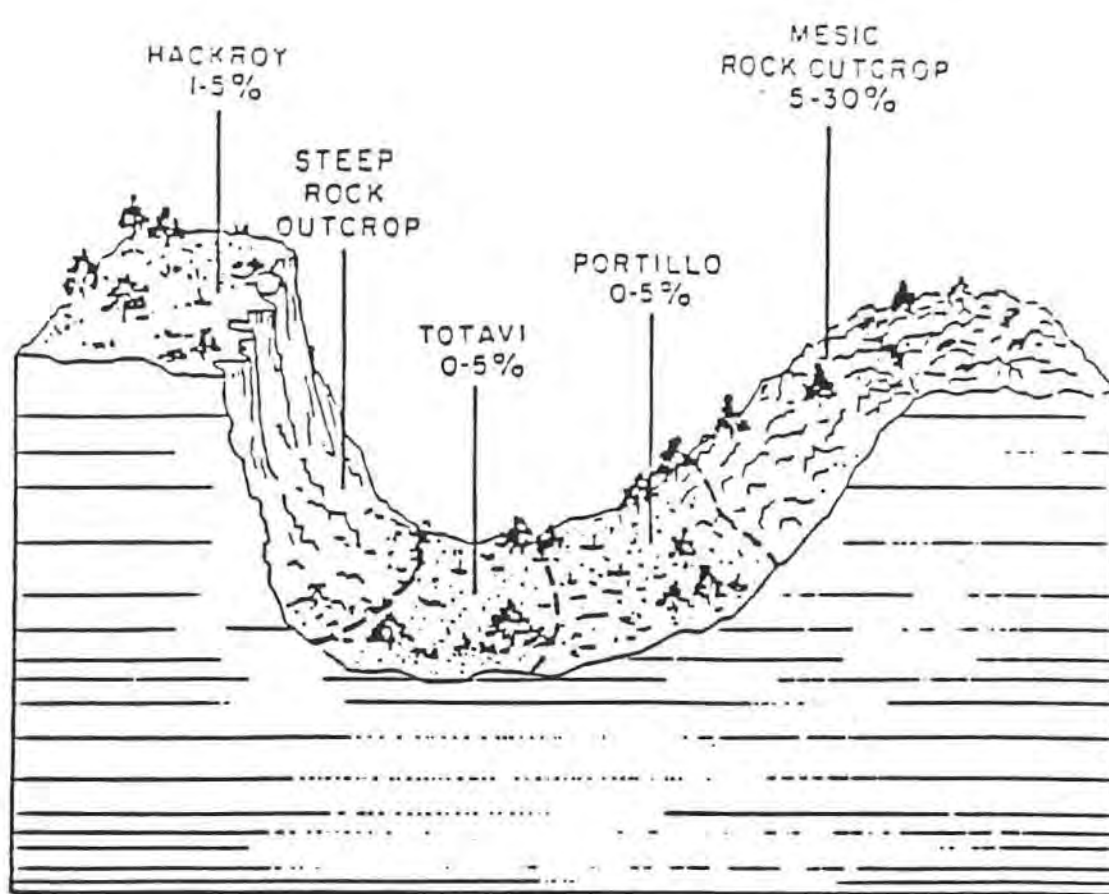


FIGURE 7

**RELATIONSHIPS OF SLOPE, VEGETATION,
AND PARENT MATERIAL
TO HACKROY, TOTAVI, AND PORTILLO SOILS**

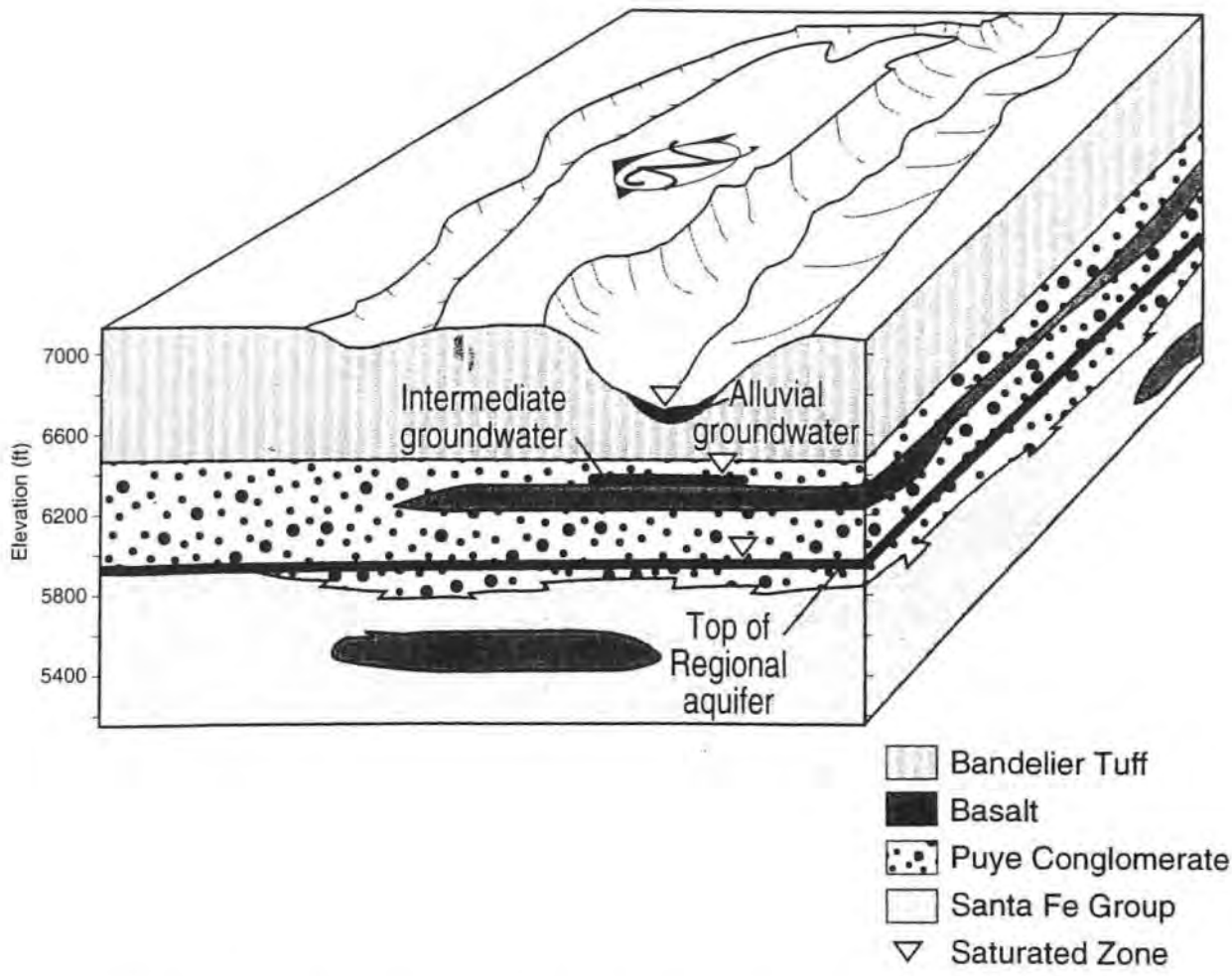


Figure 8. Illustration of Geologic and Hydrologic Relationships in the Los Alamos Area, Showing the Three Modes of Groundwater Occurrence.