DOE/EA-1409

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Environmental Assessment for the Proposed Issuance of an Easement to Public Service Company of New Mexico for the Construction and Operation of a 12-inch Natural Gas Pipeline within Los Alamos National Laboratory, Los Alamos, New Mexico

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July 24, 2002

Department of Energy
National Nuclear Security Administration
Office of Los Alamos Site Operations

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ACRONYMS AND TERMS

ac	acres
AEI	area of environmental interest
AHF	Advanced Hydrotest Facility
^{241}Am	americium-241
BACMs	best achievable control measures
BMPs	best management practices
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeters
^{137}Cs	cesium-137
CSP	Comprehensive Site Plan
dB	decibel
dBA	A-weighted noise or sound frequency scale
DOE	(U.S.) Department of Energy
DOI	(U.S.) Department of the Interior
EA	environmental assessment
EPA	Environmental Protection Agency
ft	feet
FY	Fiscal Year
ha	hectares
HMP	(LANL) Habitat Management Plan
in.	inch
kg/cm^2	kilograms per square centimeter
km	kilometers
km^2	square kilometers
LANL	Los Alamos National Laboratory
m	meters
m^2	square meters
m^3	cubic meters
m^3/s	cubic meters per second
mi	miles
mi^2	square miles
NEPA	*National Environmental Policy Act of 1969*
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
NMAC	New Mexico Administrative Code
NPDES	National Pollutant Discharge Elimination System
OCD	Oil Conservation Division
OEL	occupational exposure limit
OWF	Omega West Facility
PNM	Public Service Company of New Mexico
PPE	personal protective equipment
PRSs	potential release sites
psi	pounds per square inch
^{238}Pu	plutonium-238
^{239}Pu	plutonium-239
^{240}Pu	plutonium-240
R&D	research and development
RCRA	*Resource Conservation and Recovery Act*
ROD	Record of Decision
ROW	right-of-way
SEA	Special Environmental Analysis
SHPO	New Mexico State Historic Preservation Office
SR	State Road
^{90}Sr	strontium-90
SWEIS	Site-Wide Environmental Impact Statement
SWPP	Storm Water Pollution Prevention
TA	Technical Area (at LANL)
UC	University of California
U.S.	United States
yd^3	cubic yards

EXPONENTIAL NOTATION: Many values in the text and tables of this document are expressed in exponential notation. An exponent is the power to which the expression, or number, is raised. This form of notation is used to conserve space and to focus attention on comparisons of the order of magnitude of the numbers (see examples):

1×10^4	=	10,000
1×10^2	=	100
1×10^0	=	1
1×10^{-2}	=	0.01
1×10^{-4}	=	0.0001

Metric and Other Conversions Used in this Document

Multiply	By	To Obtain
Length		
inch (in.)	2.50	centimeters (cm)
feet (ft)	0.30	meters (m)
yards (yd)	0.91	meters (m)
miles (mi)	1.61	kilometers (km)
Area		
acres (ac)	0.40	hectares (ha)
square feet (ft^2)	0.09	square meters (m^2)
square yards (yd^2)	0.84	square meters (m^2)
square miles (mi^2)	2.59	square kilometers (km^2)
Volume		
gallons (gal.)	3.79	liters (L)
cubic feet (ft^3)	0.03	cubic meters (m^3)
cubic yards (yd^3)	0.76	cubic meters (m^3)
Flow Rate Volume		
cubic feet/second (cfs)	0.028	cubic meters/second (m^3/s)
Weight		
ounces (oz)	28.35	grams (g)
pounds (lb)	0.45	kilograms (kg)
short ton (ton)	0.91	metric ton (t)
Pressure		
pounds/in^2 (psi)	0.0703	kilograms/square centimeters (kg/cm^2)
Other		
square feet (ft^2)	0.000023	acre (ac)
decatherms	1×10^6	British thermal units (BTUs)

EXECUTIVE SUMMARY

The National Nuclear Security Administration (NNSA)[1] has assigned a continuing role to Los Alamos National Laboratory (LANL) in carrying out NNSA's national security mission. To enable LANL to continue this enduring responsibility requires that NNSA maintain the capabilities and capacities required in support of its national mission assignments at LANL. To carry out its Congressionally assigned mission requirements, NNSA must maintain a safe and reliable infrastructure at LANL. Upgrades to the various utility services at LANL have been ongoing together with routine maintenance activities over the years. However, the replacement of a certain portion of natural gas service transmission pipeline is now necessary as this delivery system element has been operating well beyond its original design life for the past 20 to 30 years and components of the line are suffering from normal stresses, strains, and general failures.

The Proposed Action is to grant an easement to the Public Service Company of New Mexico (PNM) to construct, operate, and maintain approximately 15,000 feet (4,500 meters) of 12-inch (in.) (30-centimeter [cm]) coated steel natural gas transmission mainline on NNSA-administered land within LANL along Los Alamos Canyon. The new gas line would begin at the existing valve setting located at the bottom of Los Alamos Canyon near the Los Alamos County water well pump house and adjacent to the existing 12-in. (30-cm) PNM gas transmission mainline. The new gas line (owned by PNM) would then cross the streambed and continue east in a new easement obtained by PNM from the NNSA, paralleling the existing electrical power line along the bottom of the canyon. The gas line would then turn northeast near State Road (SR) 4 and be connected to the existing 12-in. (30-cm) coated steel gas transmission mainline, located within the right-of-way (ROW) of SR 502.

The Proposed Action would also involve crossing a streambed twice. PNM would bore under the streambed for pipe installation. PNM would also construct and maintain a service road along the pipeline easement. In addition, when construction is complete, the easement would be reseeded. Portions of the Proposed Action are located within potential roosting and nesting habitat for the Mexican spotted owl (*Strix occidentalis lucida*), a Federally protected threatened species. Surveys over the last seven years have identified no owls within this area. The Proposed Action would be conducted according to the provisions of the LANL Threatened and Endangered Species Habitat Management Plan. Effects would not be adverse to either individuals or potential critical habitat for protected species. Cultural resources within the vicinity of the proposed easement would be avoided with the exception of an historic trail. However, the original trail has been affected by previous activities and no longer has sufficient historical value to be eligible for listing on the National Register of Historic Places. Minimal undisturbed areas would be involved in the Proposed Action. Most of the proposed easement follows an established ROW for the existing electrical power line. There are several potentially contaminated areas within Los Alamos Canyon; however, these areas would be avoided, where possible, or, if avoidance isn't possible or practicable under the Proposed Action, the contaminated areas would be sampled and remediated in accordance with New Mexico Environment Department requirements before construction.

[1] The NNSA is a separately organized agency within the Department of Energy (DOE) established by the 1999 *National Nuclear Security Administration Act* [Title 32 of the *Defense Authorization Act* for Fiscal Year 2000 (Public Law 106-65)].

Construction wastes would be trucked to a licensed commercial landfill or, in the case of excavated soils, could be reused for backfilling. Vegetation removed from the easement would be chipped and placed on site in such a way that it would not re-enter the floodplain. Construction activities for the proposed gas pipeline would be expected to produce only temporary and localized air emissions. Once construction is complete, operational emissions would return to background levels. Construction, operation, and maintenance of the new gas pipeline under the Proposed Action would have no effects on utilities and infrastructure, land use, transportation and traffic, and would have no adverse health effects on LANL employees or construction workers. There would be slight temporary effects to wetlands and floodplains.

Effects, if any, on the local geology as a result of the Proposed Action are expected to be minor and would consist of possible slope instability and increased erosion and sediment load. The Proposed Action may have slight short-term effects on water quality. Water used for leak testing the pipeline would be analyzed and found to be free of contaminants before being released on the easement. Best Management practices derived from the Storm Water Pollution Prevention Plan would be implemented to prevent erosion and to prevent fill material from entering the stream channel. Effects on visual resources would be minor and temporary. The Proposed action would result in limited short-term noise levels. Following completion of construction activities, the noise levels would return to preconstruction levels. LANL waste management would be slightly affected by the Proposed Action. PNM or their subcontractors would be responsible for site waste removal and disposition. LANL would accept only radioactive waste, if any.

Cumulative effects of the Proposed Action on LANL and surrounding lands, along with past, present, and reasonably foreseeable actions, are anticipated to be negligible. Portions of the easement that are located within tracts of land designated for Conveyance and Transfer would either be used for cultural preservation were they to be transferred to San Ildefonso Pueblo; or kept as natural areas or used for transportation and utility improvements were they to be transferred to Los Alamos County. The feasibility and definition of an Advanced Hydrotest Facility is still insufficiently determined for NNSA DOE to propose such a facility. Hence there would not be any cumulative effects. Likewise, no cumulative effects are expected from the demolition and disposition of the Omega West Facility located approximately 2 miles (3 kilometers) upstream from the Proposed Action. Post Cerro Grande Fire and Technical Area 21 cleanup activities are expected to have long-term beneficial effects by reducing the likelihood of contaminant transport downstream. No increases in LANL operations are anticipated as a result of this action.

The No Action Alternative was also considered. Under this alternative PNM would not be granted an easement and would not construct and operate a new gas pipeline at LANL.

1.0 PURPOSE AND NEED

Chapter 1 presents the Department of Energy (DOE), National Nuclear Security Administration's (NNSA[2]) requirements under the *National Environmental Policy Act of 1969* (NEPA), background information on the proposal, the purpose and need for agency action, and a summary of public involvement activities.

1.1 Introduction

NEPA requires Federal agency officials to consider the environmental consequences of their proposed actions before decisions are made. In complying with NEPA, NNSA follows the Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] 1500–1508) and DOE's NEPA implementing procedures (10 CFR 1021). The purpose of an environmental assessment (EA) is to provide Federal decision makers with sufficient evidence and analysis to determine whether to prepare an environmental impact statement or issue a Finding of No Significant Impact.

At this time, the NNSA must make a decision regarding the issuance of an easement to the Public Service Company of New Mexico (PNM) for the purpose of installing, operating, and maintaining a natural gas service pipeline at Los Alamos National Laboratory (LANL). LANL is a Federal facility located at Los Alamos, New Mexico, that comprises 43 square miles (mi^2) (111 km^2) of buildings, structures, and forested land (Figure 1). It is administered by NNSA, for the Federal government, and managed and operated under contract by the University of California (UC). This EA has been prepared to assess the potential environmental consequences of the issuance of this proposed easement for the purpose of installing and operating a new natural gas pipeline, together with the No Action Alternative.

The objectives of this EA are to (1) describe the underlying purpose and need for DOE action; (2) describe the Proposed Action and identify and describe any reasonable alternatives that satisfy the purpose and need for Agency Action; (3) describe baseline environmental conditions at LANL; (4) analyze the potential indirect, direct, and cumulative effects to the existing environment from implementation of the Proposed Action, and (5) compare the effects of the Proposed Action with the No Action Alternative and other reasonable alternatives. For the purposes of compliance with NEPA, reasonable alternatives are identified as being those that meet DOE's purpose and need for action by virtue of timeliness, appropriate technology, and applicability to LANL. The EA process provides DOE with environmental information that can be used in developing mitigative actions, if necessary, to minimize or avoid adverse effects to the quality of the human environment and natural ecosystems should DOE decide to proceed with implementing the construction and operation of a new gas pipeline at LANL.

Ultimately, the goal of NEPA, and this EA, is to aid DOE officials in making decisions based on an understanding of environmental consequences and taking actions that protect, restore, and enhance the environment.

[2] The NNSA is a separately organized agency within the DOE established by the 1999 *National Nuclear Security Administration Act* [Title 32 of the *Defense Authorization Act* for Fiscal Year 2000 (Public Law 106-65)].

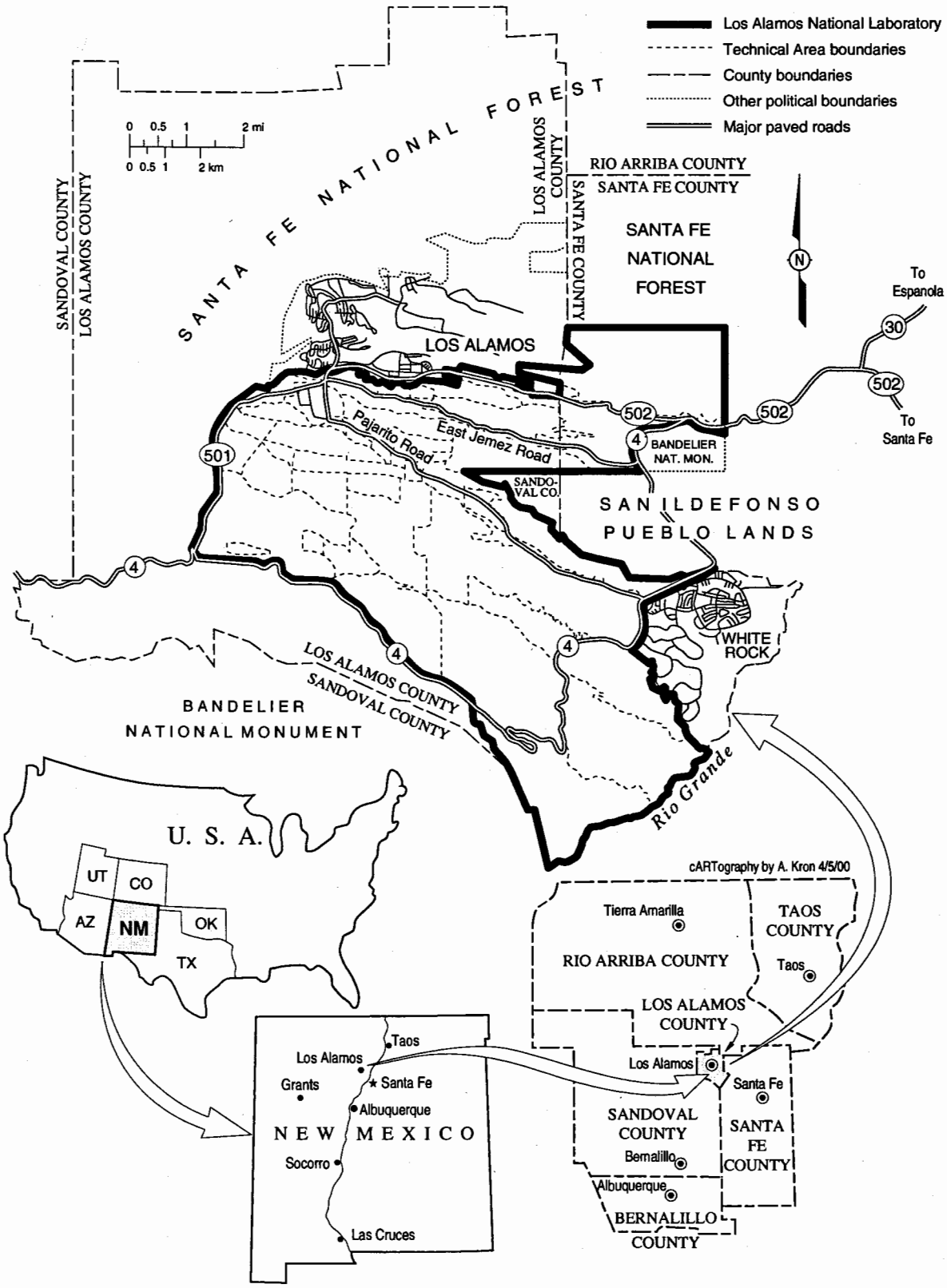

Figure 1. Location of Los Alamos National Laboratory.

1.2 Background

The United States (U.S.) National Security Policy requires the DOE NNSA to maintain core intellectual and technical competencies in nuclear weapons and to maintain a safe, and reliable, national nuclear weapons stockpile. NNSA fulfills its national security nuclear weapons responsibilities, in part, through activities performed at LANL. LANL is one of three national security laboratories that support DOE's responsibilities for national security, energy resources, environmental quality, and science. The DOE NNSA's national security mission includes the safety and reliability of the nuclear weapons in the stockpile; maintenance of the nuclear weapons stockpile in accordance with Executive directives; stemming the international spread of nuclear weapons materials and technologies; developing technical solutions to reduce the threat of weapons of mass destruction; and production of nuclear propulsion plants for the U.S. Navy. The energy resources mission of DOE includes research and development (R&D) for energy efficiency, renewable energy, fossil energy, and nuclear energy. The DOE's environmental quality mission includes treatment, storage, and disposal of DOE wastes; cleanup of nuclear weapons sites; pollution prevention; storage and disposal of civilian radioactive waste; and development of technologies to reduce risks and reduce cleanup costs. DOE's science mission includes fundamental research in physics, materials science, chemistry, nuclear medicine, basic energy sciences, computational sciences, environmental sciences, and biological sciences, and often contributes to the other three DOE missions. LANL provides support to each of these departmental missions, with a special focus on national security.

To carry out its Congressionally assigned mission requirements, DOE NNSA must maintain a safe and reliable infrastructure at each of the national security laboratories. The 1999 *Final Site-Wide Environmental Impact Statement for Continued Operations of the Los Alamos National Laboratory* (SWEIS) (DOE 1999a) discusses each of the previously identified DOE missions in greater detail and analyzes four different levels of operations at LANL that support these missions. The SWEIS identified the various technical areas at LANL and their associated activities and buildings. The SWEIS also identified the existing circumstances of the natural and human-created environment at LANL. Part of the discussion of infrastructure at LANL includes the following statement (Chapter 3, page 3-58, Section 3.6.2.9): "Natural gas demand is not projected to change across the [SWEIS] alternatives, and this demand is within the existing supply of natural gas to the area; however, the age and condition of the existing supply and distribution system would continue to be a reliability issue for LANL and for residents and other businesses in the area."

Many of the buildings, structures, and infrastructure at LANL were built in the mid-1900s during and after World War II. The original installation for the R&D of the world's first nuclear weapon was established at Los Alamos, New Mexico, in 1943 by the Manhattan District of the U.S. Army Corps of Engineers. At that time it was constructed and equipped as a temporary short-term use facility. This installation has evolved over the past nearly 60 years into the LANL facility of today currently under the administration of the DOE NNSA. LANL was designated as a national security laboratory in 1999 when the NNSA was established by the *1999 National Nuclear Security Administration Act.*

Upgrades to the various utility services at LANL have been ongoing together with routine maintenance activities over the years. However, the replacement of large portions of various

pipe and service transmission lines are now necessary as these delivery system elements have been operating well beyond their original design lives for the past 20 to 30 years and their components are suffering from normal stresses, strains, and general failures.

The reliability of utility service to LANL and to the residents and commercial businesses of the Los Alamos town site, White Rock community, and to residences and businesses beyond Los Alamos County depends upon having intact supply and delivery systems (systems that do not leak product or lose transmission capacity). Reliability of the utility supply and delivery systems also depends upon having redundant system networks. When repair is necessary on isolated portions of a utility system it is necessary to reroute service delivery through other portions of the service systems (much like rerouting traffic over area neighborhood roads when mid-block road repairs force the closure of streets to traffic). Otherwise, without reliable redundant "loops" built into the supply and delivery systems, a total failure of the service to its receptors can result from a single point of failure. As the service lines and pipes at LANL and in the surrounding communities have aged, the frequency of repairs to the systems has increased. In some cases it has become more difficult or impossible to avoid service delivery interruptions while repairs are made due to a lack of redundant loops in segments of the systems. New development of residential and commercial neighborhoods of Los Alamos County, and the permanency and growth of LANL over the past 50 years, together with growth of communities within the Española valley and in the Santa Fe area, have all served to tax the various utility service supply and delivery systems in many ways. Population growth within Los Alamos County has been far exceeded by population growth of Rio Arriba and Santa Fe Counties over the past 30 years (BOC 2002). Expectations are for this upward trend in population growth to continue over the next several decades. The pipeline that brings natural gas into LANL and Los Alamos County also services residences and commercial business beyond in Rio Arriba and Santa Fe Counties and forms part of the redundancy loop for these communities. The continued comfortable lifestyle enjoyed by residents of Los Alamos, Rio Arriba, and Santa Fe Counties and the ability of DOE NNSA to continue to meet its Congressionally mandated missions through activities conducted at LANL depend upon the availability of adequate utilities services and their reliable delivery, including natural gas services.

Natural gas supply at LANL and the surrounding residential and commercial neighborhoods is purchased from the Defense Energy Support Center (for LANL) and the Meridian Oil Company (for Los Alamos County) in the San Juan Basin of northwestern New Mexico, respectively. In the 1990s, DOE transferred to PNM the Federally-owned branch of the main gas supply pipeline feeding into LANL, Los Alamos town site, and beyond into the city of Española. DOE granted easements across LANL to PNM for the purpose of servicing and repairing the existing supply and delivery pipelines. UC uses most of the natural gas supply provided by PNM to Los Alamos County. About 80 percent of the gas is used for heating (both steam and hot air) with the remainder of the gas being used to produce steam for electrical power. LANL has been contemplating upgrading the capacity of its electric power generators at Technical Area (TA) 3 for the past 10 to 20 years or more. A proposal for this effort is now under consideration by DOE NNSA under a separate NEPA analysis. The current expectation is that natural gas usage at LANL would either remain unchanged or decrease should a new electrical power generator(s) be installed at LANL (DOE 1999a). However, with the 1997 DOE decision to convey and transfer land tracts at LANL to the County of Los Alamos and to the Secretary of the Interior, in trust for San Ildefonso Pueblo, per the requirements of Public Law 105-119, natural gas

consumption of Los Alamos County may increase slightly over the next several decades. Future increases in natural gas service requirements by communities within Rio Arriba and Santa Fe Counties are also partially dependent upon the service transmission line that brings natural gas to LANL and Los Alamos County.

Several segments of natural gas transmission and delivery pipelines have been upgraded and redundant loops of pipeline have been installed across LANL and across New Mexico in general over the past two decades. The most recent major upgrades to the natural gas transmission line to LANL and Los Alamos County, which included the installation of relocated segments of redundant loops, occurred in the early to mid-1990s. Within that time frame, several additional segments of the aged supply pipeline, without redundant portions, were identified across northern New Mexico. Plans to provide redundant service supply were undertaken by PNM to correct this multi-community supply system deficiency.

PNM has identified a certain segment of 8.1-inch (in.) (20.3-centimeter [cm]) pipeline in Los Alamos County and within LANL's boundaries as being one that is of high carbon content steel. This approximately 3-mile (mi) (5-kilometer [km]) -long pipeline segment located under State Road (SR) 502 is of a non-standard size and is constructed of high carbon content pipe which has a reduced impact strength compared to modern pipes. This existing line segment is a critical portion of pipeline that forms part of the northern New Mexico redundancy loop to ensure continued adequate supply to many communities and businesses in the northern part of the state and is a limiting factor for increasing the total system's pressure. The size of the line, 8.1 in. (20.3 cm), and the impact-withstanding properties of its composition, make this pipeline segment a choke point for service delivery to LANL and to communities in northwestern New Mexico if repairs are needed on other, larger diameter portions of the pipeline delivery system and service is rerouted through this smaller diameter segment. By virtue of the pipeline's location beneath SR 502, which is a two-lane road also known locally as the "Main Hill Road," necessary repairs result in the need to close the road or restrict traffic to a single lane. Road closure may last for a few hours or several days. In the event of an emergency such as the Cerro Grande Fire (May 2000) when the population of Los Alamos town site was evacuated, having SR 502 closed to traffic would greatly hinder emergency evacuation efforts and could also hinder emergency response efforts as well. Several LANL facilities share a mesa-top location with a heavily populated portion the Los Alamos town site; SR 502 is the main transportation artery for the town site and these LANL facilities.

1.3 Statement of Purpose and Need for Agency Action

The DOE NNSA has assigned a continuing role for LANL in carrying out its national security mission. To enable LANL to continue this enduring responsibility requires that NNSA maintain the capabilities and capacities required in support of its national mission assignments at LANL. To accomplish its mission support activities, a reliable natural gas service supply system is necessary. Additionally, NNSA must provide adequate emergency response actions necessary at LANL facilities. NNSA needs to ensure that adequate maintenance is performed and the redundancy of the natural gas supply line is assured so that natural gas delivery to LANL does not suffer interruption and that emergency response actions can be conducted at LANL facilities in a reasonable fashion.

1.4 Scope of This EA

A sliding-scale approach (DOE 1993) is the basis for the analysis of potential environmental an socioeconomic effects in this EA. That is, certain aspects of the Proposed Action have a greate potential for creating environmental effects than others; therefore, they are discussed in greater detail in this EA than those aspects of the action that have little potential for effect. For exampl implementation of the Proposed Action would affect water quality, biological, and cultural resources in the LANL area. This EA, therefore, presents in-depth descriptive information on these resources to the fullest extent necessary for effects analysis. On the other hand, implementation of the Proposed Action would cause only a minor effect on socioeconomics at LANL. Thus, a minimal description of socioeconomic effects is presented.

When details about a Proposed Action are incomplete, as a few are for the Proposed Action evaluated in this EA (for example, the exact amount of waste generated), a bounding analysis is often used to assess potential effects. When this approach is used, reasonable maximum assumptions are made regarding potential aspects of project activities (see Sections 2.0 and 3.0 of the EA). Such an analysis usually provides an overestimation of potential effects. In addition, any proposed future action(s) that exceeds the assumptions (the bounds of this effects analysis) would not be allowed until an additional NEPA review could be performed. A decision to proceed or not with the action(s) would then be made.

1.5 Public Involvement

NNSA provided written notification of this NEPA review to the State of New Mexico, the four Accord Pueblos (San Ildefonso, Santa Clara, Jemez, and Cochiti), Acoma Pueblo, the Mescalero Apache Tribe, and to over 30 stakeholders in the area on August 27, 2001. In addition, upon release of this draft EA, NNSA will allow for a 21-day comment period. Where appropriate and to the extent practicable, concerns and comments will be considered in the final EA.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This section discusses the Proposed Action and the No Action Alternative. Section 2.1 describes the Proposed Action for the EA that would allow NNSA to meet its purpose and need for agency action. The No Action Alternative is presented in Section 2.2 as a baseline for comparison with the consequences of implementing the Proposed Action. Alternatives that were considered but dismissed from further analysis in this EA are discussed in Section 2.3, and related actions are discussed in Section 2.4.

2.1 Proposed Action

NNSA is considering granting a new easement to PNM to allow construction, operation, and maintenance of approximately 15,000 feet (ft) (4,500 meters [m]) of 12-in. (30-cm) of coated steel natural gas transmission mainline within LANL boundaries in Los Alamos Canyon (Figure 2). The technical areas affected include TA-21, TA-53, TA-73, and TA-72 (Figure 2). The new gas line would begin at the existing valve located in the bottom of Los Alamos Canyon, adjacent to the existing 12-in. (30-cm) PNM gas transmission mainline (Figure 3). The new gas line would cross the canyon southward and continue east paralleling the existing electrical power line

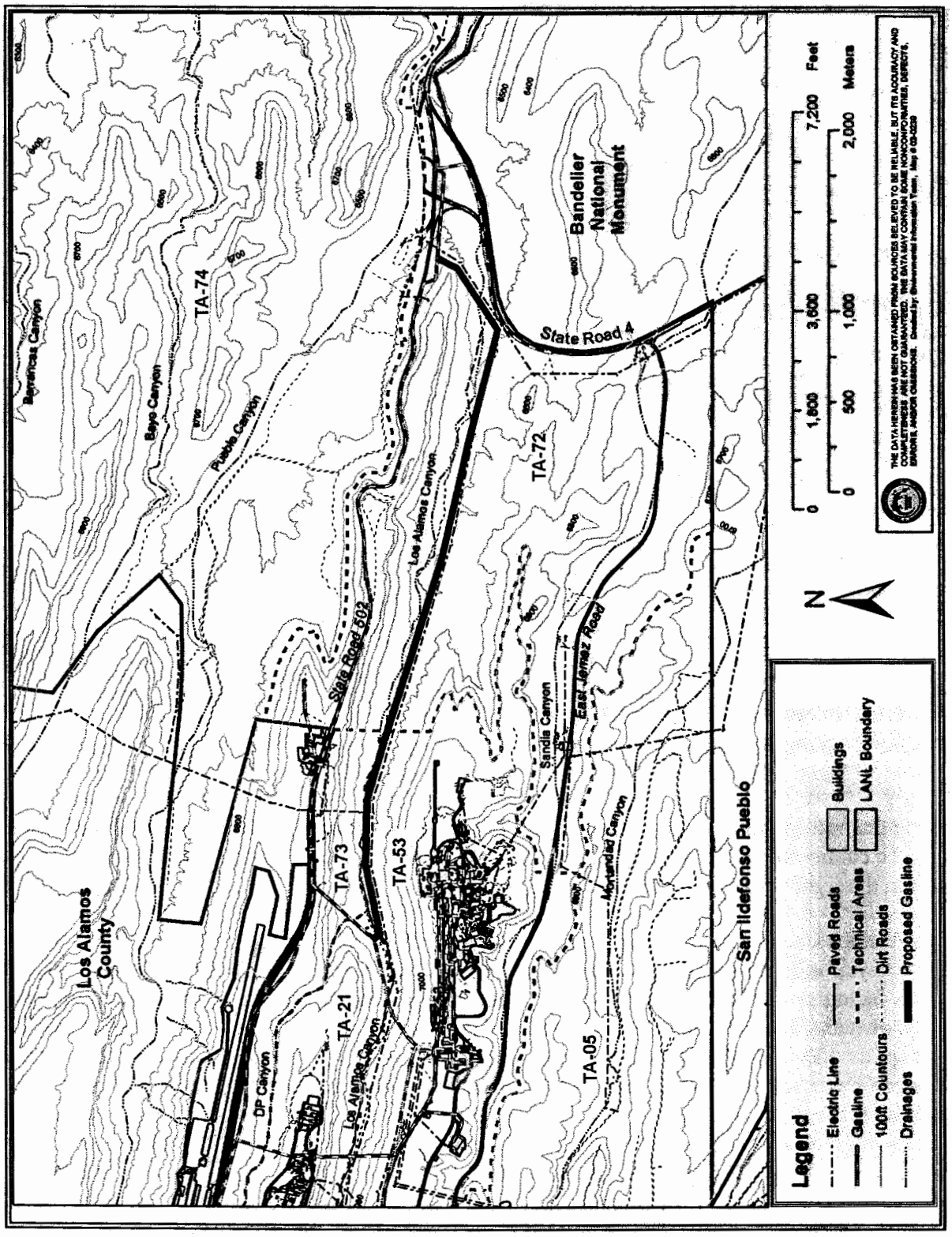

Figure 2. Proposed location of new 12-in. (30-cm) gas line in Los Alamos Canyon.

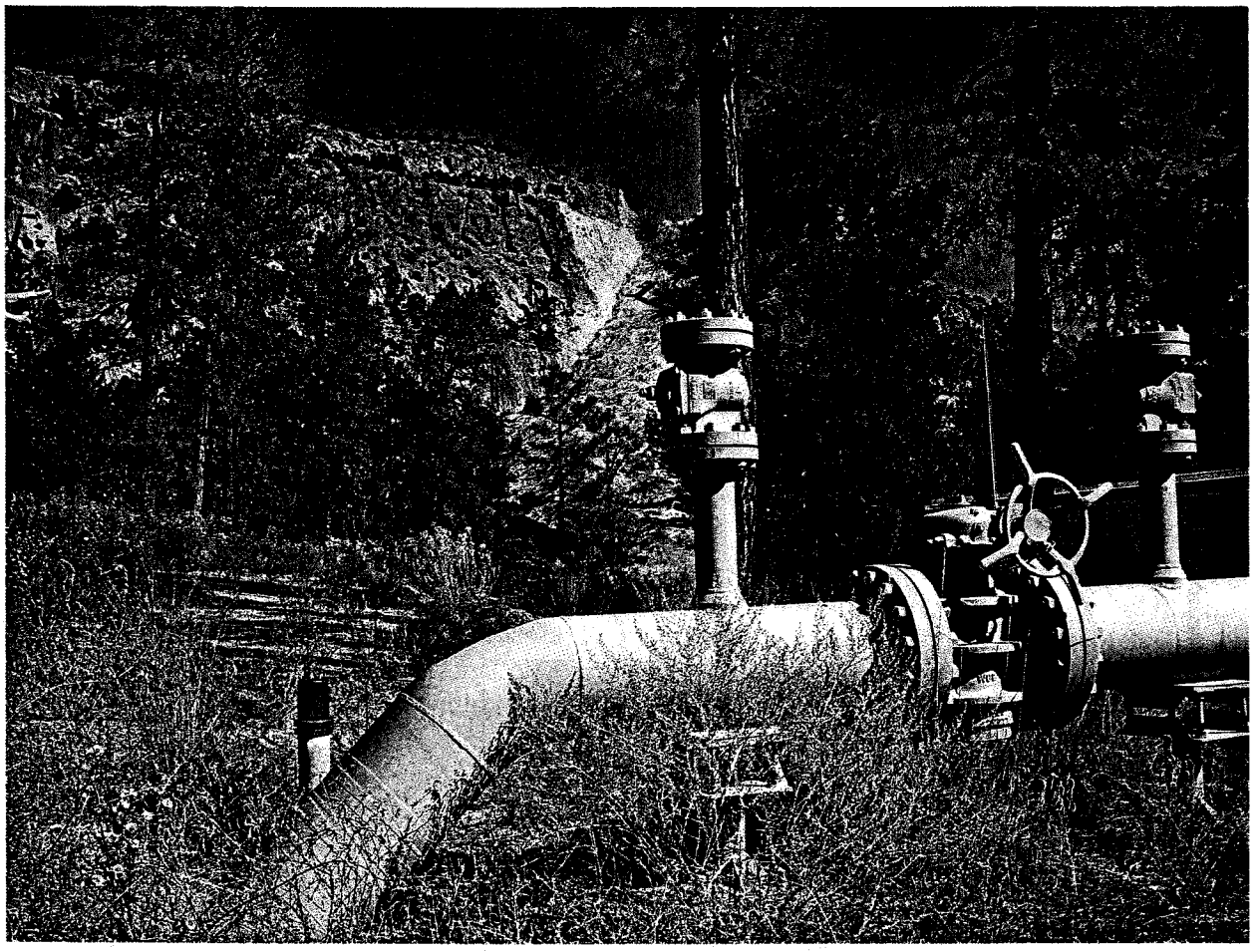

Figure 3. Existing aboveground 12-in. (30-cm) PNM gas mainline valve in Los Alamos Canyon.

along the bottom of the canyon (see Figure 2). The gas line would turn northeast near SR 4 and then be connected to the existing 12-in. (30-cm) coated steel gas transmission mainline, located within the right-of-way (ROW) of SR 502.

Los Alamos Canyon runs east-west and is roughly 300 ft (90 m) deep with steep canyon walls. The canyon is heavily wooded with piñon (*Pinus edulis* Engelm.)-juniper (*Juniperus* L.) on the south-facing slopes and ponderosa-mixed conifer on the valley floor and north-facing slopes. Cottonwood (*Populus fremontii* S. Wats.) and other scattered deciduous trees occur along a floodplain and streambed located at the bottom of the canyon. The access road leading into Los Alamos Canyon from the east end of the canyon is gated and closed to non-LANL vehicular traffic.

2.1.1 Construction

Construction work would be planned, managed, and performed to ensure that standard worker safety goals are met and that work would be performed in accordance with good management practices, regulations promulgated by the Occupational Safety and Health Administration, and LANL resource management plans, including the Wildfire Hazard Reduction Program. To prevent serious injuries, all site workers (including contractors, subcontractors, lessees and

permit or easement holders or their contractors and subcontractors) are required to submit and adhere to a Construction Safety and Health Plan. This plan is reviewed by UC staff before construction activities begin. Various DOE orders involving worker and site safety practices and environmental regulations and other laws may also apply.

Appropriate engineering controls and design features would be installed during the construction of the gas pipeline project. Engineering best management practices (BMPs) would also be implemented for the construction site as part of a site Storm Water Pollution Prevention (SWPP) Plan prepared by PNM and executed under a National Pollutant Discharge Elimination System (NPDES) construction permit obtained by PNM. These BMPs could include the use of straw bales, plywood, or synthetic sedimentation fences with appropriate supports installed to contain excavated soil and surface water discharge during construction of the pipeline. No fueling of vehicles would occur within the floodplain areas of the easement. No activities outside of the designated easement, except along the existing canyon access road, would be allowed within Los Alamos Canyon.

The proposed easement would be 50 ft (15 m) wide and for most of its length it would parallel the existing electrical power line within the canyon. The easement would avoid previously identified cultural resource sites. These cultural resources would be flagged and may be fenced to facilitate avoidance by construction activities. Similarly, small wetland areas scattered within the canyon would be identified and avoided during construction of the new gas pipeline. Mature ponderosa pine (*Pinus ponderosa* P. & C. Lawson) trees and other vegetation would be required to be removed from the easement, and a maintenance road would be constructed to allow installation and servicing of the new pipeline. Most of the easement would be located on a natural bench elevated above the floodplain. As such, contaminated soils are unlikely to be present. However, any suspected areas of potential site contamination due to prior LANL activities would be evaluated to identify procedures for working within that site area and to determine the need to remove site contamination. Contaminated soils would be removed as necessary to protect worker health or the environment before construction was initiated. The contaminated soil would either be stored outside the floodplain area and then returned to the site as fill material or characterized and disposed of appropriately at LANL or off site.

The new pipeline would be constructed by a subcontractor(s) selected by PNM. A PNM inspector would be on-site full time during construction. It is estimated that it would take approximately six months to construct the new pipeline. Work would probably start in the spring of 2003. The exact start-up time would be determined, in part, according to provisions of the LANL Threatened and Endangered Species Habitat Management Plan (HMP). Twenty to thirty people would be working on the project at any given time and would work 10 to 12 hours per day, 7 days per week. Construction workers would be drawn from communities across New Mexico. Several passenger vehicles would be present each day. Other equipment that would be used on site is listed in Table 1. Portable nondestructive radiographic equipment would be used to radiograph all welds in order to verify the integrity of the welds. Vehicles and equipment would be operated during the daylight hours and would be locked and secured onsite over night. No nighttime site illumination would be required.

Table 1. Equipment to be Used to Construct and Test Natural Gas Pipeline in Los Alamos Canyon

Equipment	Number of Units	Fuel Type
Bull Dozer	3	Diesel
Excavator	3	Diesel
Backhoe	1	Diesel
Side Boom	1–3	Diesel
Tamper Compactor	2	Gasoline
Trencher	1	Diesel
Three-quarter ton Pickup	6-8	Gasoline
1 ton Welding Truck	5	Diesel
Arc Welder	5	Diesel
Water Truck	1–2	Diesel
Graders	2	Diesel
Boring Machine	1	Diesel
Wood Chippers	3	Gasoline
Dump Trucks	2	Diesel

Not all equipment to install the pipeline would be operating at the same time. Typically, the bulldozer would clear the easement and would not be used again until it was needed to backfill the trench. The trencher or excavator and backhoe could be operating at the same or at different times from the operation of the track-mounted side boom and the welding trucks. The arc welders would only be operating during the welding process. The three-quarter ton pickups would be used for workers commuting to and from the construction site.

Construction materials would be procured primarily from New Mexico suppliers. Pipe and other supplies would be delivered to, and stored in, a fenced staging area within Los Alamos Canyon. PNM would use an existing 1.2-acre (ac) (0.5-hectare [ha]) staging area approximately 1,500 ft (450 m) southwest along SR 4 from the locked gate at the eastern end of the easement. About 20 trucks would be required to deliver pipe to the job site. The delivery and off loading of the pipe would take approximately one week. The exact material, supplies, and equipment that would be stored in the fenced staging area would be left to the discretion of the contractor but would minimally include lengths of pipe and various construction equipment. No *Resource Conservation and Recovery Act-* (RCRA-) regulated materials would be stored onsite.

Chain saws and chippers would be used to clear the 50-ft-wide easement of woody vegetation. Trees would be chipped and then spread on the ground within the easement. Dozers, backhoes, or graders may be used to remove tree stumps and rocks and to smooth the surface of the easement. Tree stumps would be chipped and then spread on the ground within the easement. Rocks would remain on site, although they would likely be moved around the easement so that they would not impede the proposed pipeline installation. The length of time required to clear the 17.5 ac (7.0 ha) of easement would likely be accomplished over a one-week period. Clearing or excavation activities during site construction have the potential to generate dust and to encounter previously buried materials. If buried material or cultural remains are encountered during construction, activities would cease until their significance was determined and

appropriate subsequent actions taken. Standard dust suppression methods (such as water spraying or soil tackifiers[3]) would be used to minimize the generation of dust during construction activities. New Mexico Environment Department (NMED) does not regulate dust from excavation or construction, but best achievable control measures (BACMs) would be used when appropriate to control fugitive dust and particulate emissions.

Once the easement is cleared, a 4- to 8-ft-deep by 2-ft-wide (1.2- to 2.4-m-deep by 0.6-m-wide) trench would be dug along the length of the easement. Equipment involved in trenching would include a trencher, backhoe, and possibly a trackhoe. Soil would be placed next to the trench for use in backfilling once the pipe is laid. No placement of excavation spoils in or near drainage swales or streambeds would occur. Excavated materials that were unsuitable for backfilling along the trench (such as large rocks) would be properly disposed of either along the easement or at an appropriate receiving site elsewhere within LANL or offsite. Where the pipeline crosses the floodplain and streambed, a boring machine would be used to bore under the streambed. The hole would be slightly bigger than the 12-in. (30 cm) pipe and would not need to be packed with a clay slurry material known as "drilling mud." However, drilling mud would be used as a lubricant for the boring machine. The trenching work would also require the use of a variety of hand tools (such as shovels). Noise at the site would be audible primarily to the involved workers. Involved site workers would be required to wear appropriate personal protective equipment (PPE), including hearing protection. The length of time necessary to dig the entire trench would depend upon several factors such as terrain, access, and compaction of the soil. It would likely be accomplished over a one- to two-month period.

Sections of pipe would be placed along the trench and then several of these pipe sections would be welded together. Welding trucks would be used for this purpose. Generally, three lengths of 40-ft (12-m) pipe would be welded together before being placed into the trench with three side booms (truck-mounted cranes). Once in the trench, the newly welded section would then be welded to the previous section. The length of welded pipe that could be placed into the trench in one piece depends upon the number of side booms available. Before placement of the welded section of pipe into the trench, the welds would be radiographed to ensure a proper weld. The portable radiographic equipment would be mounted in a pick-up truck. Re-welding would be performed if needed. The amount of time necessary to perform all of the welds would depend upon a number of issues such as the equipment available, number of bends or curves in the pipeline, and the nature of the soils and excavations; the period of performance is estimated to be two months or less. Because of the short length of pipeline (about 3 mi [5 km]) in a remote area, no new valves would be required for the pipeline except for the existing valve in Los Alamos Canyon.

Before the new pipeline would be placed into service, it would undergo hydrostatic tests. Approximately 91,000 gallons (344,890 liters) of potable water (obtained from a commercial supplier and delivered to the site in tanker trucks) would be pumped into the new pipeline. Pressure readings would be taken automatically, with a pressure recording chart, each hour for 24 hours to determine if there are any leaks within the pipeline. If leaks were found, they would be repaired be re-welding the leaking area.

[3] Tackifiers are chemical dust suppressants often added to water that acts to disperse the chemicals, then evaporates after application. The chemicals that are left behind bind the soil particles together into larger particles that are less easily blown into the air.

The hydrostatic test will be conducted in accordance with PNM's 5-Year Renewable Hydrostatic Test Waters Discharge Permit HBP-NM-007 from the New Mexico Energy, Minerals, and Natural Resources Department Oil Conservation Division (OCD). PNM is required to notify the OCD annually of any discharges under this permit. Testing the water quality prior to discharge is not required by the OCD as a fresh water supply system or other potable source shall be used. No test waters will be discharged to any lakes, perennial streams, rivers, or any surface bodies of water or their respective tributaries. The test water will be released upon the ground within the easement using BMPs in such a way that there would be no erosion.

Connecting the new pipeline to the existing pipelines would require the excavation of the existing line at the connection points. Backhoes would be used for excavation. Gas service would be stopped in the existing line at the point of connection using specialized "stopple" equipment. Basically, plugs (also known as "stops') would be placed within the existing line to stop the flow of gas at the connection point. The existing line would then be cut with a welder and the new pipeline welded to the existing line. The welds would be radiographed and, if acceptable, the plugs would be removed from the gas line resuming the flow of gas. It is estimated to take approximately eight hours to make this type of connection.

Upon completion of the new pipeline installation and successful testing, the trench would be backfilled using backhoes. The soil would be roller compacted and the easement would be graded and reseeded with native grasses. A maintenance service road would remain on the easement to facilitate future servicing of the pipeline. The width of the service road would not exceed 10 ft (3 m). Signs designating a buried gas pipeline would be placed along the easement, directly above the pipeline at a frequency determined by line-of-sight (each sign must be visible from the next one). Cathodic protection[4] test stations would also be placed above the pipeline approximately every 1,000 ft (300 m). These test stations would have sacrificial magnesium cathodic protection anodes, which would be replaced over the years of pipeline operation as necessary.

The existing 8.1-in. (20.3-cm) high carbon steel gas line under SR 502 would be capped and left in place. This gas pipeline would be exposed at each end by excavation with a backhoe. The gas line would be cut with welders and then would be purged with air. Once all of the gas has been removed from the pipeline, steel end caps would be welded on each end and the trenches backfilled. No concrete grout material would be placed within the pipeline. It is anticipated that this work could be accomplished without damage to the existing road surface but traffic may need to be temporarily re-routed for a period of a few hours while this action is performed. PNM would also legally abandon the ROW along this pipeline.

2.1.2 Operation and Maintenance of New Pipeline

The new pipeline easement would be monitored by PNM to ensure seed germination and would be reseeded as necessary. The 10-ft- (3-m-) wide service road would be maintained for the useful life of the pipeline within the easement for access to the pipeline for maintenance activities. PNM would repair soil erosion and would remove trees and brush within the easement

[4] Cathodic protection is the elimination or reduction of corrosion on pipe by attachment of an anode. An anode is the negatively charged terminal of a primary cell or of a storage battery that is supplying current.

as part of their continuing maintenance of the pipeline. Equipment used for these purposes would likely include backhoes, shovels, chain saws, and handheld pruners and trimmers.

The pipeline would be operated at a maximum allowable operating pressure of 600 pounds per square inch (psi) (42 kilograms per square centimeters [kg/cm^2]). The pipeline would be leak surveyed once every year by personnel walking the length of the pipeline. These personnel would survey the pipeline trench area with hand-held natural gas detectors. The pipeline would also be monitored for corrosion and vegetation regrowth. The pipeline would be maintained cathodically and the magnesium anodes serviced once a year or sooner if needed.

No utility service would be required for the operation and maintenance of the new gas pipeline. Any power generators, welding trucks, water trucks, or other equipment needed for required maintenance activities would be brought in by PNM on an "as needed" basis.

The expected operational lifetime of the new pipeline would be at least 50 years. At the end of the pipeline's useful life, it would be purged and capped (as described previously for the existing gas line present underneath SR 502), and may be abandoned in place or removed. Additional NEPA compliance review may be necessary at that time.

2.2 No Action Alternative

The No Action Alternative provides a description of the potential effects of taking no action to compare to the potential effects of the Proposed Action. This alternative must be considered even if DOE is under a court order or legislative command to act [10 CFR 1021.32 (c)]. Under the No Action Alternative, NNSA would not grant an easement in Los Alamos Canyon and PNM would not construct a new 12-in. (30-cm) natural gas pipeline as described in the Proposed Action. No disturbance of the canyon floor in Los Alamos Canyon would occur. The existing 8.1-in. (20.3-cm) gas line under SR 502 would continue to be used and maintained. Maintenance and repairs of the existing gas line would remain problematic. Traffic disruption would be required to maintain the gas line. Natural gas service to LANL, Los Alamos County, and surrounding communities would continue to be limited by the diameter of this pipe and service could not be increased through this pipeline. If any of the pipeline beneath SR 502 failed, major disruption of gas service could occur for a period of time over days or weeks before a repair could occur. Traffic would have to be routed to the other three roads that lead out of Los Alamos County.

2.3 Alternatives Considered but Dismissed from Further Consideration

2.3.1 Replace Existing Pipeline Under SR 502

Replacement of the existing 8.1-in. (20.3 cm) pipeline under SR 502 with a new 12-in. (30 cm) pipeline would disrupt traffic along this main artery into Los Alamos for a period of more than six months. There is no room outside of the narrow road for the pipeline. Replacing the pipeline under the road would require that the existing road surface be partially or wholly removed. After placement of the new pipe, a new road surface would have to be installed. Future maintenance and repairs would also disrupt the traffic flow at both scheduled and at unpredictable times. This alternative was considered to be unreasonable and was not analyzed further in this EA.

2.3.2 Install Pipeline in Pueblo Canyon

Under this alternative, a new pipeline would be installed in the canyon floor along the south side of Pueblo Canyon from the intersection of SR 4 and SR 502 to approximately 6,000 ft (1,800 m) to the west. From here the pipeline would traverse the canyon wall to the south and then continue west along the mesa top to the existing 12-in. (30 cm) mainline tie-in at East Gate. Building a pipeline up the steep canyon wall would significantly increase costs, would require that the pipeline traverses the canyon wall, and be exposed (not buried). Exposed pipelines increase the risk of vandalism and reliability issues. This alternative was considered to be unreasonable due to pipeline exposure and costs and was not analyzed further in this EA.

2.3.3 Install Pipeline Under Existing Gravel Roadway in Los Alamos Canyon

Another alternative would be to install the new pipeline under the existing gravel road in Los Alamos Canyon. This road has numerous turns that would require bending the pipeline or the installation of fittings to allow for curves in the pipeline. Additionally, the road would have to be improved and widened and vegetation would need to be removed at some locations. This road also crosses the streambed more than six times, thus adverse effects to the streambed and floodplain would be greater than if the pipeline were constructed as described in the Proposed Action. The numerous curves in the pipeline would also increase the duration of construction and costs. This alternative was considered to be unreasonable and was not analyzed further in this EA.

2.3.4 Install Pipeline in Sandia Canyon

Installing the new pipeline in Sandia Canyon instead of Los Alamos Canyon would result in a much longer pipeline being required thereby increasing installation and maintenance costs. Much of the pipeline would need to be installed under East Jemez Road. This would increase costs and disrupt traffic along this road, which is one of the four roads to LANL and the Los Alamos town site. Truck traffic is routed along this road and inspections of delivery trucks are performed. Closing this road for an extended period of time could potentially delay shipments of goods into LANL. There are also potential release sites (PRSs) and a radioactive waste line nearby which would have to be avoided, thus increasing the length of the pipeline and the number of curves it would require. This alternative was also considered to be unreasonable and was not analyzed further in this EA.

2.4 Related Actions

2.4.1 Site-Wide Environmental Impact Statement

The SWEIS (DOE 1999a), dated January 1999, was issued in February of that year. A Record of Decision (ROD) was issued in September 1999, and a Mitigation Action Plan was issued in October 1999. In the ROD, DOE decided to continue operating LANL at the level of Expanded Operations analyzed in the SWEIS. The SWEIS included the information that portions of the existing gas distribution system are over 50 years old and would require modification and upgrades in the future.

2.4.2 Land Conveyance and Transfer

A portion of the proposed alignment of the 12-in. (30-cm) gas pipeline is located within the White Rock Y Tract identified in the ROD for the *Conveyance and Transfer of Certain Lands Administered by the DOE and Located at Los Alamos National Laboratory, Los Alamos and Santa Fe Counties, New Mexico* (DOE 1999b). To be conveyed or transferred, these tracts must not be necessary for required DOE mission-related use and must have undergone any necessary environmental restoration or remediation activities. If transferred, it is anticipated that these lands would be used for natural areas or used for transportation and utility improvements by Los Alamos County. However, DOE determined that part of the White Rock Y Tract considered for the proposed easement to PNM should be retained by the DOE. This part of the White Rock Y Tract would serve as a health and safety buffer area for the proposed Advanced Hydrotest Facility (AHF) if NNSA decides to build the facility at LANL's TA-53. Should this conveyance decision change, any utility easements would be transferred with the land. The proposed gas pipeline would be buried from 4 ft to 8 ft (1.2 m to 2.4 m) deep and would not be expected to affect or be affected by the AHF project if it were constructed at LANL.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Chapter 3.0 describes the natural and human environment that could be affected by the Proposed Action and the No Action Alternative and the potential environmental consequences of those actions. Based on the Proposed Action description, environmental resources that may potentially be affected as a result of implementing the Proposed Action have been considered. Environmental issues were identified and either addressed in this section or not, based on the "Sliding Scale Approach" discussed earlier in this EA (Section 1.4). Table 2 identifies the subsection where potential environmental issues are discussed in this document. Table 3 identifies the environmental issues that were dismissed from further consideration.

Table 2. Potential Environmental Issues

Environmental Category	Applicability	Subsection
Land Use	Yes	3.2.1
Geologic Setting	Yes	3.2.2
Water Resources	Yes	3.2.3
Floodplains/Wetlands	Yes	3.2.4
Biological Resources	Yes	3.2.5
Air Quality	Yes	3.2.6
Visual Resources	Yes	3.2.7
Cultural Resources	Yes	3.2.8
Utilities and Infrastructure	Yes	3.2.9
Noise	Yes	3.2.10
Human Health	Yes	3.2.11
Waste Management/Environmental Restoration	Yes	3.2.12
Transportation and Traffic	Yes	3.2.13

3.1 Regional Setting

The Proposed Action would be located within the areas of Los Alamos and Santa Fe Counties that include LANL. LANL comprises a large portion of Los Alamos County and extends into Santa Fe County. LANL is situated on the Pajarito Plateau along the eastern flank of the Jemez

Table 3. Environmental Issues Dismissed

Environmental Category	Application	Subsection
Socioeconomics	The proposed natural gas pipeline would be constructed over a period of six months. The additional revenue generated by the gas line construction project would be limited in scope and duration. There would be no increase in the number of UC employees as a result of this project. The 13 or so construction jobs for this six-month task would be filled by employees from the regional work force or from elsewhere in New Mexico. Because these temporary jobs would be filled by existing regional work force, there would be no effect on area population or increase in the demand for housing or public services in the region. Therefore, pipeline construction activities would have a negligible effect on the socioeconomic character of the surrounding communities.	N/A
Environmental Justice	Although populations that are subject to environmental justice considerations are present within 50 mi (80 km) of LANL, none of the gas pipeline routes associated with the Proposed Action are located in populated areas, therefore implementation of the Proposed Action is not expected to result in any disproportionately high and adverse human health or environmental effects on minority and low-income populations.	N/A

Mountains and consists of 49 technical areas. The Pajarito Plateau slopes downward towards the Rio Grande along the eastern edge of LANL and contains several fingerlike mesa tops separated by relatively narrow and deep canyons.

Commercial and residential development in Los Alamos County is confined primarily to several mesa tops lying north of the core LANL development, in the case of the Los Alamos town site, or southeast, in the case of the communities of White Rock, La Senda, and Pajarito Acres. The lands surrounding Los Alamos County are largely undeveloped wooded areas with large tracts located to the north, west, and south of LANL that are administered by the Department of Agriculture, Santa Fe National Forest, and the Department of the Interior (DOI), National Park Service, Bandelier National Monument; and to the east by the DOI, Bureau of Land Management.

Detailed descriptions of LANL's natural resources environment, cultural resources, socioeconomics, waste management, regulatory compliance record, and general operations are described in the SWEIS (DOE 1999a). Additional information is available in the most recent annual Environmental Surveillance Report (LANL 2001a) and the *Special Environmental Analysis for the Department of Energy, National Nuclear Security Administration, Actions taken in Response to the Cerro Grande Fire at Los Alamos National Laboratory, Los Alamos, New Mexico* (SEA) (DOE 2000a). These documents may be found in the Public Reading Room at 1619 Central Avenue, Los Alamos, New Mexico.

3.2 Potential Environmental Issues and Effects Discussions

This section addresses the issues listed in Table 2. The first part of each subsection describes the resources potentially affected by the Proposed Action or No Action Alternative. The second part analyzes the effects of the Proposed Action on that resource, and the third part describes the effect of the No Action Alternative.

3.2.1 Land Use

3.2.1.1 Affected Environment

The LANL SWEIS (DOE 1999a Volume 1 Section 4.1.1.2) notes that, "Over the years, land on LANL has been developed in response to the specific needs of a variety of users...This has led to a pattern of mixed land uses throughout the property...This makes 'absolute' classification of land use on LANL difficult." The SWEIS characterized land use into six categories based on the most hazardous activities occurring in each of the 49 LANL technical areas as support, R&D, R&D/waste disposal, explosives, explosives/waste disposal, or buffer. The LANL Comprehensive Site Plan 2000 (CSP) (LANL 2000) incorporated this hazard-based land use approach and augmented it by describing and mapping 10 land use categories. The entire LANL site is designated as being in one of the following land uses: administration, experimental science, high-explosives R&D, high-explosives testing, nuclear materials R&D, physical/technical support, public/corporate interface, reserve, theoretical/computational science, and waste management.

Los Alamos Canyon falls partially within the "Omega West" Planning Area described in the CSP (LANL 2000). The plan designates this planning area as primarily reserve land. East of the LANL boundary, Los Alamos Canyon crosses the Tsankawi Unit of Bandelier National Monument, which is adjacent to, and southeast of, SR 4, and then enters San Ildefonso Pueblo land beyond. The general public uses SR 4 and the Tsankawi Unit of Bandelier National Monument.

Los Alamos Canyon is currently designated as a "reserve" in the CSP. These "reserves" are undeveloped lands that may be environmental core and buffer areas, or have other unique physical constraints such as steep slopes, wetlands, floodplains, or faults. The Los Alamos Canyon bottom is used for environmental monitoring and research and there is a Los Alamos County water well pump house building in this part of the canyon. Utility lines can be located in reserve areas. The SWEIS designates this area for support because it is undeveloped and free of hazardous activities.

3.2.1.2 Proposed Action

Land use in Los Alamos Canyon would not change if the Proposed Action were implemented. Los Alamos Canyon would continue to be used as a "reserve" for LANL. Placing a 12-in (30-cm) gas line along the floor of Los Alamos Canyon would not interfere with other existing land uses.

3.2.1.3 No Action Alternative

The No Action Alternative would result in the 12-in. (30-cm) gas line not being constructed and operated within Los Alamos Canyon. No change in land use would occur within Los Alamos Canyon or along SR 502.

3.2.2 Geologic Setting

3.2.2.1 Affected Environment

The Jemez Mountains volcanic field is located in northern New Mexico at the intersection of the western margin of the Rio Grande rift and the Jemez Lineament (Figure 4) (Gardner et al. 1986,

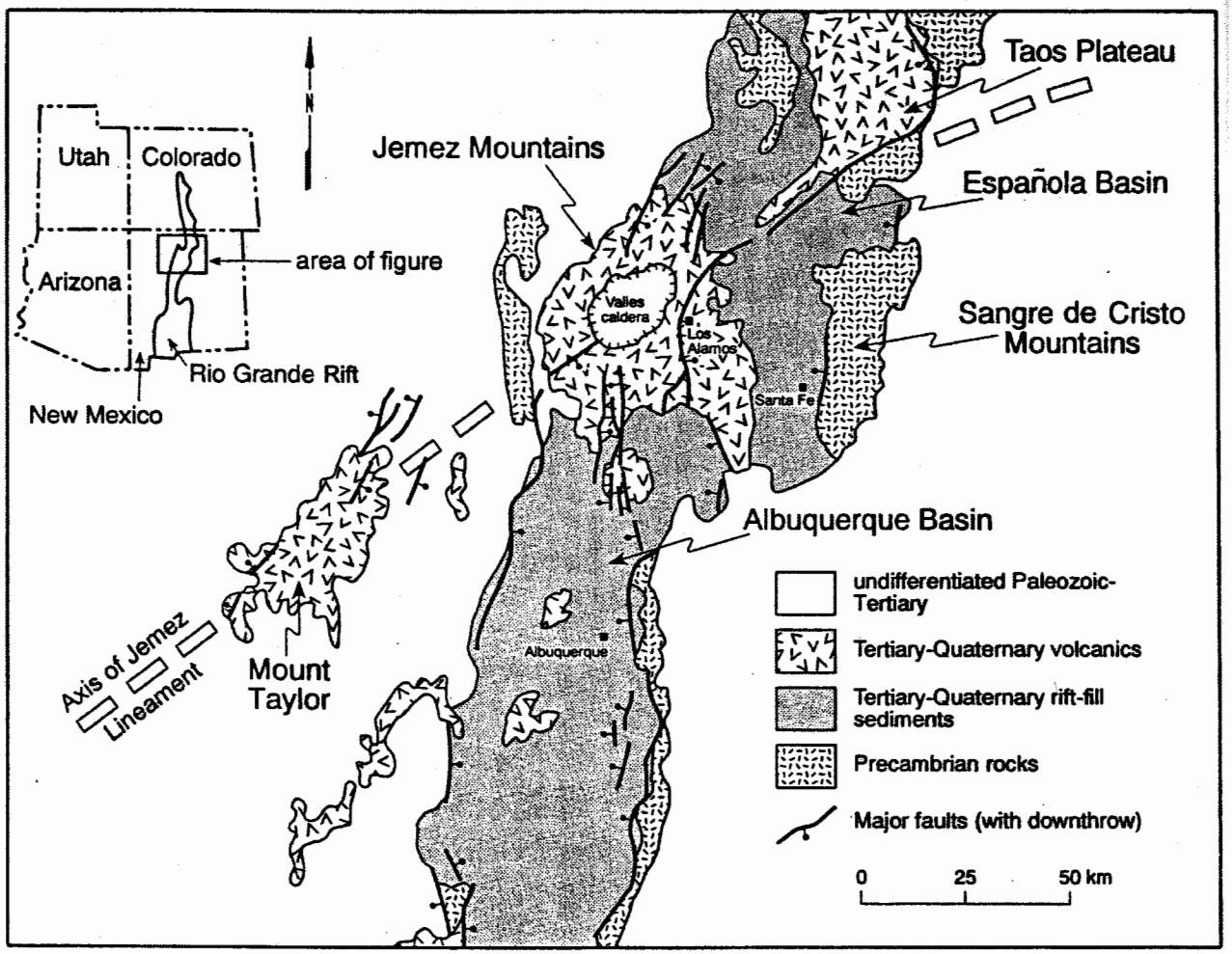

Figure 4. Generalized geologic map of the Rio Grande rift in the vicinity of the Jemez Mountains volcanic field. From Self and Sykes (1996).

Heiken et al. 1996). The Jemez Lineament is a northeast-southwest trending alignment of young volcanic fields ranging from the Springerville volcanic field in east-central Arizona to the Raton volcanic field of northeastern New Mexico (Heiken et al. 1996). The Jemez Mountains volcanic field is the largest volcanic center along this lineament (ERP 1992). Volcanism in this volcanic field spans a roughly 16-million-year period beginning with the eruptions of numerous basaltic lava flows. Various other eruptions of basaltic, rhyolitic, and intermediate composition lavas and ash flows occurred sporadically during the next 15 million years with volcanic activity culminating in the eruption of the rhyolitic Bandelier Tuff at 1.79 and 1.23 million years ago (Self and Sykes 1996). All of LANL property is within this volcanic field and is sited along the western edge of the Rio Grande rift. Most of the bedrock immediately underlying LANL is composed of Bandelier Tuff.

The geologic structure of the area is dominated by the north-south trending Pajarito Fault system. The Pajarito Fault system forms the western structural boundary of the Rio Grande rift, along the western edge of the Española Basin, and the eastern edge of the Jemez Mountains volcanic field. The Pajarito Fault system consists of three major faults and numerous secondary faults with

vertical displacements ranging from 80 ft to 400 ft (24 m to 120 m). Estimates of the timing of the most recent surface rupturing paleoearthquakes along this fault range from 3,000 to 24,000 years ago (Gardner et al. 2001).

Los Alamos Canyon cuts through the upper Tshirege Member of the Bandelier Tuff, the Cerro Toledo Interval, and into the lower Otowi Member of the Bandelier Tuff (Figure 5). Near SR 4, the canyon cuts down through the base of the Otowi Member and into the underlying Cerros del Rio basalts. The Otowi Member tends to be a slope former and the upper Tshirege Member composes the near-vertical cliffs of the canyon walls.

Rockfalls, landslides, and slope instability are triggered by any process that might destabilize supporting rocks. These are the most likely geo-hazards that could affect the Proposed Action. The natural jointing (cooling cracks) within the tuff provides pathways for water, increasing the likelihood of freeze-thaw cycles or excessive rainfalls contributing to rockfalls. Preferential erosion of weaker portions of the tuffs (by streams or rainfall) could undermine the overlying, more densely welded layers (Figure 5) resulting in rockfalls or landslides. Construction activity along the canyon sides (such as creating roads and trenches) could also contribute to slope instability. A study on potential mesa-edge stability at Pajarito Mesa (Reneau 1995) indicates that north rims display large-scale mass movement features in a zone typically 100 to 200 ft (30 to 60 m) wide. In contrast, mass wasting on south rims is dominated by infrequent failure of narrow fracture-bounded tuff blocks. The same conditions exist in Los Alamos Canyon. The frequency of failure is unknown but seismic shaking may provide a triggering mechanism.

3.2.2.2 Proposed Action

Construction, maintenance, grading, and other activities related to access roads and pipeline construction in and out of Los Alamos Canyon may have a slight effect on local geology. The current access road would need to be upgraded to support heavy truck traffic associated with the construction of the pipeline. An additional service road would also be constructed along the easement for service and maintenance of the pipeline. These activities could have a slight effect on the overall stability of the south side of the canyon. However, in general, the southern parts of the canyons tend to have more gentle slopes than north canyon walls and also have more vegetation, which acts to stabilize these southern canyon slopes. While upgrades to these roads and pipeline construction would not likely affect slope stability of the canyon walls, it is possible that road maintenance and improvements could increase the potential for soil erosion. Appropriate engineering controls and design features, as well as BMPs, installed as part of the pipeline project would contribute to slope stability and minimize erosion.

3.2.2.3 No Action Alternative

Under the No Action Alternative, roads would not be upgraded and the pipeline would not be installed. Thus, there would be no effects to local geology in Los Alamos Canyon other than the naturally occurring erosion processes.

3.2.3 Water Resources

3.2.3.1 Affected Environment

Surface water at LANL 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

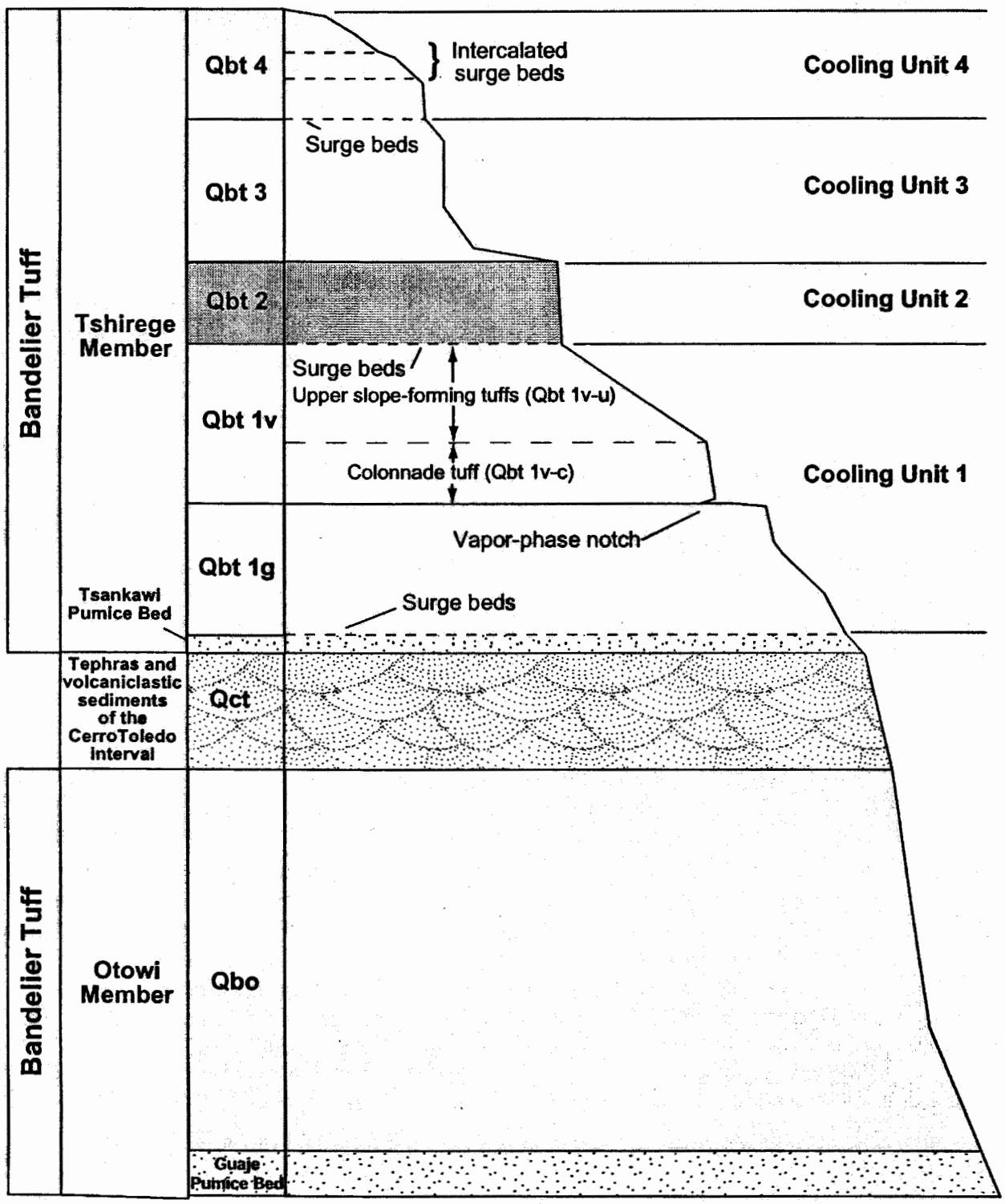

Figure 5. Stratigraphy of the Bandelier Tuff (Broxton and Reneau 1995).

of some canyons, but the volume is insufficient to maintain surface flows across LANL. Runoff from heavy thunderstorms or heavy snowmelt can reach the Rio Grande. Effluents from sanitary sewage, industrial water treatment plants, and cooling tower blow-down enter some canyons at

rates sufficient to maintain surface flows for varying distances (DOE 1999a). Surface waters at LANL are monitored by LANL and the NMED to survey the environmental effects of LANL operations. Planned releases from industrial and sanitary wastewater facilities within LANL boundaries are controlled by NPDES permits. Construction, maintenance, and environmental activities conducted within water courses are carried out under permits pursuant to sections 404 and 401 of the *Clean Water Act* (Public Law 92-500, October 18, 1972) as administered by the Surface Water Bureau of the NMED. The NMED also requires the application of BMPs to ensure compliance with New Mexico stream standards.

The nature and extent of groundwater within the LANL region have not been fully characterized. Current data indicate that groundwater bodies occur near the surface in the canyon bottom alluvium, perched at deeper levels within the alluvium, and at still deeper levels in the regional aquifer (Purtymun 1995). Alluvial groundwater bodies have been identified primarily by drilling wells in locations where impacts from LANL operations are most likely to occur (DOE 1999a). On LANL property, continually saturated alluvial groundwater bodies occur in Mortandad, Los Alamos, Pueblo, Sandia, and Pajarito Canyons. The depth to these alluvial groundwater bodies varies from approximately 90 ft (27 m) in the middle of Pueblo Canyon to 450 ft (135 m) in lower Sandia Canyon (LANL 1993). The main aquifer is separated from the alluvial groundwater bodies by 350 to 620 ft (105 to 186 m) of unsaturated volcanic tuff and sediments (Purtymun 1995). Recharge of the aquifer is not fully understood nor characterized and it is not strongly interconnected across its extent. Groundwater within the LANL area is monitored to provide indications of the potential for human and environmental exposure from contaminants (DOE 1999a). Groundwater protection and monitoring requirements are included in DOE Order 5400.1, General Environmental Protection Program.

Data and analysis of LANL surface and groundwater quality samples taken from test wells indicate that past LANL operations and activities have affected the surface water within LANL boundaries and some of the alluvial groundwater zones in the LANL region as well. Details on the surface and groundwater quality can be found in the annual LANL Environmental Surveillance and Compliance Report (LANL 2001a).

The LANL Environmental Restoration Program has produced detailed reports on the amount of contamination in Los Alamos Canyon (LANL 1998) and DP Canyon (LANL 1999), a tributary of Los Alamos Canyon. The following summary, contained in the next paragraph, is derived from these reports.

Several former LANL sites within the DP Canyon and Los Alamos Canyon watersheds contributed or may have contributed contaminants to these canyons beginning in 1943. Contaminants include americium-241 (^{241}Am), plutonium-238 (^{238}Pu), plutonium-239 (^{239}Pu), plutonium-240 (^{240}Pu), cesium-137 (^{137}Cs), strontium-90 (^{90}Sr), tritium, uranium isotopes, metals, various organic compounds, diesel range organic hydrocarbon contamination, septic tank outfalls, and surface water runoff from the Los Alamos town site. The most significant contaminant from a human health perspective is ^{137}Cs in the sediments of upper Los Alamos Canyon. These contaminants have been distributed by floods along the full length of upper Los Alamos Canyon and have been dispersed laterally away from the stream channel from 16 to 83 ft (5 to 25 m). Radionuclide concentrations are generally higher in fine-grained sediments. In Los Alamos Canyon, the highest concentrations of ^{241}Am, ^{238}Pu, ^{137}Cs, ^{90}Sr, and tritium are found

close to DP Canyon with much lower concentrations downstream near the White Rock Y (LANI 1998). Soils within the canyon bench areas are not expected to be contaminated to the same degree as floodplain sediments (if at all).

High- and moderate-severity fire increases the potential for surface runoff and soil erosion by removing vegetation and surface organic layers and increasing soil hydrophobicity. The Cerro Grande Fire increased the potential for storm water runoff through the canyons. For example, in Pueblo Canyon (one of the most severely burned areas), peak flows increased 16 times over pre-fire conditions. Details of flow rate increases can be found in the SEA (DOE 2000a). Studies are currently underway using data obtained from gauging stations, rainfall, vegetation regrowth, and other sources to model how water flows and sedimentation rates would change over the years as the forests recover from the fire. Currently, only one year's worth of data have been collected and thus there is insufficient information to perform predictive modeling. The data collected so far show little recovery. Peak observed flows before the Cerro Grande Fire were usually less than 20 to 30 cubic feet per second (cfs) (0.6 to 0.8 cubic meters per second [m^3/s]). Peak flows after the fire can be as high as 1,300 cfs (36 m^3/s) as determined by modeling of a 100-year design event (Springer 2002) but a stabilization of the watershed ecology along the burned area of the Pajarito Plateau will likely occur within the next decade. An absolute return to "pre-fire" conditions could take decades (Springer 2002). With increased runoff and erosion, the potential for the migration of contaminants throughout the canyons has increased. The most recent floodplain modeling efforts (LANL 2002) indicate that the post-fire floodplain in the vicinity of the pipeline is no longer estimated as being from canyon-wall-to-canyon-wall. A map of the current floodplain can be found in the appendix.

3.2.3.2 Proposed Action

Construction of the natural gas pipeline may have a slight temporary, short-term effect on surface water quality in Los Alamos Canyon. The Proposed Action would involve heavy machinery to improve access roads, trenching, and leak testing of the newly constructed pipeline. Leak testing the pipeline with water could result in the release of thousands of gallons of water onto the easement. This water would be tested for contaminants and hazardous constituents before release. Where the proposed pipeline route crosses the streambed, PNM (or their subcontractor) would bore under the streambed in order to place pipe without disturbing the streambed and floodplain sediments. The stream channel could be affected by equipment crossing the channel or by the introduction of fill into the channel. When setting up the equipment to bore under the streambed, PNM or their subcontractor would use BMPs to keep any fill from being introduced into the channel.

BMPs derived from the SWPP Plan would also be implemented to prevent erosion and migration of disturbed soil from along the pipeline caused by storm water or other water discharges. If soil and sediment contamination levels in the proposed easement within Los Alamos Canyon are relatively low, as expected, erosion and transportation of these sediments may have a inconsequential effect, if any, on water quality.

3.2.3.3 No Action Alternative

There would be no effects to water quality under the No Action Alternative. No construction activities would be undertaken. BMPs to prevent erosion effects are already in place along SR 502.

3.2.4 Floodplains/Wetlands

3.2.4.1 Affected Environment

Los Alamos Canyon is approximately 20 mi (32 km) long (from its headwaters to the Rio Grande), and from 1,387 ft (416 m) (minimum) to 2,434 ft (730 m) (maximum) wide (within the area of the gas line route). There are scattered wetlands, potential wetlands, and riparian vegetation in the streambed and along the stream sides throughout the canyon. The stream is intermittent in nature and usually flows only during spring runoff and storm events. The wetland and riparian vegetation, although scant, helps retain soil and serves to slow streambed erosion. There is a small (0.5 ac [0.2 ha]) potential wetland area that may be developing at the low-head weir detention basin located near the intersection of SR 502 and SR 4 (see appendix). The low-head weir was constructed in 2000 after the Cerro Grande Fire. The vegetation in this area is primarily piñon-juniper (*Pinus edulus* Englem.)-(*Juniperus monosperma* L.); however, the settling basin was planted with cottonwood (*Populus fremontii* S. Wats.) and willow (*Salix exigua* Nutt.) seedlings. The new vegetation may or may not become established over time; as the upper portions of the watershed recover and stabilize, the amount of storm water runoff down the canyons is expected to decrease. There likely will not be enough water to sustain wetland species this far downstream within Los Alamos Canyon.

The SEA (DOE 2000a) describes all the actions taken by NNSA in response to the Cerro Grande Fire, particularly for floodwater control. As a result of the fire, the potential for soil erosion, debris, water, ash, and silt has increased exponentially compared to pre-fire ratios. Mitigation measures for these conditions include revegetation, channel work, and debris clean up in floodplains, all of which are being conducted at LANL.

DOE's 10 CFR Part 1022.4 defines a flood or flooding as ". . . a temporary condition of partial or complete inundation of normally dry land areas from . . . the unusual and rapid accumulation of runoff of surface waters. . . ." The base floodplain is the area inundated by a flood having a 1.0 percent chance of occurrence in any given year (referred to as the 100-year floodplain [LANL 2002]). The critical-action floodplain is the area inundated by a flood having a 0.2 percent chance of occurrence in any given year (referred to as the 500-year floodplain).

3.2.4.2 Proposed Action

No long-term effects to the floodplain or the wetland areas (or potential wetland areas) in Los Alamos Canyon would be likely. The gas pipeline easement would be adjacent to, and south of, the Los Alamos Canyon floodplain (the floodplain extends for the entire length of the canyon with variable widths [LANL 2002]) and the streambed areas. A floodplain/wetland assessment is included as an appendix in this EA. The proposed construction would consist of trenching in Los Alamos Canyon mostly along a natural bench above the floodplain area. During construction, a loss of approximately 17.5 ac (7.0 ha) of vegetated area, along with an expected average of a 50-ft- (15-m-) wide corridor is expected. Part of the pipeline construction would bore under the streambed so that the streambed would not be directly disturbed. BMPs and

mitigation actions would be implemented during and after the construction phase to reduce or eliminate erosion. Removal of canyon slope habitat would not occur.

Vegetation removal and trenching would expose mineral soils because of excavation and the use of heavy equipment. BMPs for runoff control, such as silt barriers, would be used during this project. Siltation into the stream would be minor and temporary in nature. Wetland areas would be avoided and the pipeline would be bored under the streambed thereby avoiding disturbance to riparian vegetation. Downstream floodplain and wetland values potentially effected by the proposed gas line project could include a slight alteration of flood-flow retention times; a slight alteration of wildlife nesting, foraging, or resting habitat; a slight redistribution of sediments and sediment retention-time changes. However, with the use of BMPs, no adverse effects to wetlands functions downstream of the pipeline would be likely.

3.2.4.3 No Action Alternative

Under the No Action Alternative, the new gas line would not be installed in Los Alamos Canyon. There would be no effect on floodplains or wetlands under the No Action Alternative.

3.2.5 Biological Resources

3.2.5.1 Affected Environment

A number of regionally protected and sensitive (rare or declining) species have been documented in the LANL region. These include three Federally-listed endangered species (the whooping crane [*Grus americana*], the southwestern willow flycatcher, and the black-footed ferret [*Mustela nigripes*]) and two Federally-listed threatened species (the bald eagle [*Haliaeetus leucocephalus*] and the Mexican spotted owl). Under the *Endangered Species Act of 1973* (16 U.S.C. 1531 et seq.) as amended, government agencies are required to consider the potential effects of all its activities on Federally-listed threatened and endangered species and their critical habitat.

The LANL Threatened and Endangered Species HMP establishes areas of environmental interest (AEIs) that are being managed and protected because of their significance to biological or other resources. Potential or known occupied habitats of threatened or endangered species that occur or may occur at LANL are designated as AEIs. In general, an AEI consists of a core area that contains important breeding or necessary survival habitat for a specific species and buffer area around the core area. The core and buffer areas are protected from disturbances for certain activities, including construction. For instance, activities are restricted in a core and buffer area during breeding season until it is determined that the habitat is not occupied by individuals of a listed species for that year. LANL UC personnel perform annual surveys of the AEI early in the breeding season to determine the presence of listed species breeding pairs. If the habitat is occupied, the restrictions remain in place until the completion of the breeding season. Any activities that cannot be conducted within the guidelines of the HMP require further consultation with the U.S. Fish and Wildlife Service.

Seven years of Mexican spotted owl surveys have been conducted within Los Alamos Canyon (Keller 2002). These surveys did not locate Mexican spotted owls, but potential habitat necessary for this species exists within the project area.

The proposed pipeline route transects areas of ponderosa pine forest on the western end and piñon/one-seed juniper woodland in the eastern end of the canyon; native understory species are present along the entire route. There has been previous disturbance along the south side of the canyon bottom where electric power lines were installed many years ago. Ponderosa pines have grown up around and under most of the existing power line easement. Although these pines are not as large as other pines found on the south side of the canyon bottom, this area is heavily forested and will be subjected to tree thinning procedures under LANL's Wildfire Hazard Reduction Program. Most of the north-facing slope (south side of the canyon) is heavily vegetated all the way up the canyon wall.

Larger wildlife species, such as elk and deer, move through Los Alamos Canyon including the proposed gas line construction area and the existing utility easement. A variety of small mammals, birds, reptiles, and insects occupy Los Alamos Canyon including the area around the proposed pipeline easement.

3.2.5.2 Proposed Action

Implementation of the Proposed Action is not expected to result in any adverse effects to individuals of Federally-protected threatened or endangered species or their critical habitat. Minimal short-term and long-term effects to vegetation and biota are expected from construction and operation of the proposed gas pipeline.

Under the Proposed Action, vegetation within the canyon bottom would be disturbed and cleared within a 50-ft- (15-m-) wide corridor for the length of the proposed gas line. The land proposed for the construction activity is approximately five percent unvegetated with the remainder of the proposed easement corridor covered with native vegetation. A 10-ft (3-m) -wide access road would be constructed within the easement along the length of the pipeline for maintenance after the pipeline is installed. Once the project is completed, native species of grasses would be reseeded along the easement. Effects to non-woody vegetation would be short term.

Trees would be removed within the existing electric utility easement along the proposed gas line easement. Reforestation of the area would likely occur over the next several decades but trees would be removed and the area would be maintained in a fashion that is conducive to effective wildfire hazard management. PNM personnel conducting annual leak surveys of the new gas pipeline would monitor vegetation regrowth along the easement during these surveys. The long term maintenance of the proposed gas line would be expected to have minimal long-term effects on woody vegetation.

Large mammal migration would be temporarily disturbed during the construction activities. Most of these species, however, would likely continue using the canyon corridor for foraging and migration purposes after the construction of the gas line was finished. Similarly, small mammals in the project area would avoid the site during the construction phase, but would return to the pipeline area after construction was completed. This avoidance of the area by large and small mammals would be a short-term, temporary effect.

Of the Federally-listed threatened or endangered species potentially present at LANL, the project area falls within an AEI for the Mexican spotted owl. Tree removal would decrease the potential Mexican spotted owl habitat within Los Alamos Canyon. Removal of overstory trees would also

open the canopy and increase light and heat penetration. The area of sensitive habitat disturbed would be less than approximately 1.75 ac (0.7 ha) if an expected 50-ft (15-m) -wide corridor is maintained. This is less than one percent of the total available foraging and roosting habitat at this LANL AEI. Site-specific surveys would be preformed before the beginning of construction activities to determine if owls are using the Los Alamos Canyon AEI. If owls are not present in the construction zone, the work would be allowed to commence and continue until completed. If owls are present in the project area, time restrictions on initiation of work activities would be imposed and construction would not be allowed to occur between March 15th and May 30th, and may be restricted further until September 1st depending on owl activity within the AEI. All provisions of the LANL Threatened and Endangered Species HMP would be followed so that no adverse effects to individual Mexican spotted owls or their critical habitat would be expected.

The Proposed Action area has also been designated as a potential bald eagle foraging habitat. However, the Proposed Action represents a small fraction of the total foraging habitat available to this species throughout LANL. Disturbance to the bald eagle foraging habitat would be temporary in nature and would only occur during the gas line construction so that the overall effect to the foraging area available to this species would be minor and is not expected to be adverse.

3.2.5.3 No Action Alternative

Under the No Action Alternative, a new gas line would not be installed in Los Alamos Canyon. There would be no habitat disturbances and, therefore, no effects on biological resources.

3.2.6 Air Quality

3.2.6.1 Affected Environment

Air quality is a measure of the amount and distribution of potentially harmful pollutants in ambient air[5]. Air surveillance at Los Alamos includes monitoring emissions to determine the air quality effects of LANL operations. UC staff calculate annual actual LANL emissions of regulated air pollutants and report the results annually to the NMED. The ambient air quality in and around LANL meets all Environmental Protection Agency (EPA) and DOE standards for protecting the public and workers (LANL 2001a).

Both EPA and NMED regulate nonradioactive air emissions. NMED does not regulate dust from excavation or construction, but BACMs must be used when appropriate to control fugitive dust and particulate emissions. Annual dust emissions from daily windblown dust are generally higher than short-term construction-related dust emissions.

Excavation and construction activities are not considered stationary sources of regulated air pollutants under the New Mexico air quality requirements. Mechanical equipment associated with the construction phase of this project, including bulldozers, trenchers (trackhoes), excavators, side booms, tamper compactors, forklifts, and backhoes are exempt from permitting.

[5] Ambient air is defined in 40 CFR 50.1 as "that portion of the atmosphere external to buildings, to which the public has access." It is defined in the New Mexico Administrative Code (NMAC) Title 20, chapter 2, part 72, as "the outdoor atmosphere, but does not include the area entirely within the boundaries of the industrial or manufacturing property within which the air contaminants are or may be emitted and public access is restricted within such boundaries."

Mobile sources, such as automobiles and construction vehicles, are additional sources of air emissions; however, mobile sources and diesel emissions from conveyance vehicles are not regulated by NMED.

3.2.6.2 Proposed Action

Construction of the Los Alamos Canyon gas line would result in short-term, temporary, localized emissions associated with vehicle and equipment exhaust as well as particulate (dust) emissions from excavation and construction activities. The air emissions would not be expected to exceed either the National Ambient Air Quality Standards or the New Mexico Ambient Air Quality Standards. The new gas line would not result in additional air emissions from existing gas-fired equipment at LANL. Effects of the Proposed Action on air quality would be negligible compared to annual air emissions from LANL as a whole.

3.2.6.3 No Action Alternative

No construction activities would occur under the No Action Alternative. There would be no change from ambient air quality effects associated with implementing the No Action Alternative.

3.2.7 Visual Resources

3.2.7.1 Affected Environment

Los Alamos Canyon is relatively undeveloped. Although there are no vistas from the bottom of the canyon, the area possesses desirable aesthetic qualities. The vegetation within the canyon is mixed. The canopy cover on the south side of the canyon along the existing electric distribution line contains sparse to moderately dense small-diameter ponderosa pine trees. The north side of the canyon contains more mature piñon-juniper woodland.

The principal humanmade features that contrast with the existing natural environment are an electric distribution line along the south side of the canyon, a dirt road that meanders along the canyon bottom, and a scar on the north face of the canyon where the existing gas pipeline crosses the canyon at the western end of the proposed gas pipeline easement.

Vehicles traveling on SR 4 cross an open area of Los Alamos Canyon at the eastern LANL boundary. Most of the area in which the proposed pipeline would be constructed is largely screened from vehicular traffic but is visible by hikers using nearby trails along the mesa top and canyon side as well as people passing along the road through the canyon bottom.

3.2.7.2 Proposed Action

Heavy equipment, hauling operations, staging areas, and site preparation activities would create local temporary adverse visual effects, particularly near the intersection of Los Alamos Canyon with SR 4. Over the long term, the aesthetic qualities of the canyon would be restored to a large extent by reseeding of the areas affected by construction. Short term, clearing the trees within the easement could cause an adverse effect on area aesthetic qualities. Along segments of pipeline constructed in forest areas, this effect would be less noticeable after tree thinning occurred in the canyon area as part of the LANL Wildfire Hazard Reduction Program. Long term, this visual quality effect would not likely be adverse.

Construction could temporarily create a linear area of cleared vegetation that would expose more of the canyon to the view of travelers driving on SR 4. This lineal feature could disrupt the visual quality of the canyon to both travelers on SR 4 and to hikers on the Breakneck Trail, particularly in the short term. As vegetation is reestablished, the aesthetic qualities of the canyon would be largely restored. Views of Los Alamos Canyon from the mesa top Anniversary Trail would be more affected because the south side of Los Alamos Canyon is more visible from the Anniversary Trail than is the north side of the canyon.

3.2.7.3 No Action Alternative

There would be no effects to visual resources under the No Action Alternative. No changes in the vegetation or constructed features in the canyon bottom would occur under this alternative.

3.2.8 Cultural Resources

3.2.8.1 Affected Environment

Cultural resources include any prehistoric sites, buildings, structures, districts, or other places or objects considered to be important to a culture or community for scientific, traditional, religious, or any other reason. They combine to form the human legacy for a particular place (DOE 1999a). To date, over 1,950 archaeological sites and historic properties have been recorded at LANL.

The criteria used for evaluating cultural resources depend upon their significance as sites eligible for listing to the National Register of Historic Places as described in the *National Historic Preservation Act* (16 United States Code 470). These determinations of significance are met by evaluating each cultural resource based on it meeting any one or more of the following criteria:

- association with events that have made a significant contribution to the broad pattern of our history,
- association with the lives of persons significant in our past,
- illustration of a type, period, or method of construction; for its aesthetic values or for its representation of the work of a master; or if it represents a significant and distinguished entity whose components may lack individual distinction, and
- it has yielded, or may be likely to yield, information important in prehistory or history.

3.2.8.2 Proposed Action

There are 13 prehistoric sites and one historic trail located within 250 ft (75 m) of the proposed gas pipeline easement. The prehistoric sites consist of one garden plot, two pueblo room blocks, eight one- to three-room structures, one lithic scatter, and one rock and wood enclosure. These prehistoric sites are predominantly from the Coalition or Classic Periods (Ancestral Pueblo). A Homestead Period historic trail traverses the floor of Los Alamos Canyon in an east-west direction. The pipeline easement would be sited so that it would avoid prehistoric cultural resources. Therefore, the construction, operation, and maintenance of the new gas mainline in Los Alamos Canyon would not affect the recorded prehistoric archaeological sites in the area.

At two locations the proposed gas line would cross the original location of the Los Alamos Canyon Trail, which was one of the original routes from the Rio Grande to Los Alamos Mesa.

However, in previous years the trail location has been bladed and it currently serves as the Los Alamos Canyon access road. As a result, the original trail has been destroyed and the trail is no longer of historic value.

All of the significant and potentially significant cultural resources in the vicinity of the proposed easement would be protected by avoidance. Under the Programmatic Agreement (DOE 2000b) between NNSA and the New Mexico State Historic Preservation Office (SHPO), the SHPO would be notified that there would be no effect to cultural resources by the Proposed Action if NNSA decides to proceed with the granting of the easement to PNM.

3.2.8.3 No Action Alternative

Implementing the No Action Alternative would result in no affect to cultural resources within Los Alamos Canyon. No construction activity would occur under this alternative.

3.2.9 Utilities and Infrastructure

3.2.9.1 Affected Environment

Section 4.9.2 of the 1999 LANL SWEIS (DOE 1999a) describes utility and infrastructure services at LANL. The utilities and infrastructure in and around LANL under the Preferred Alternative selected in the SWEIS ROD are described in detail in Section 5.5.9.2 of the SWEIS. Utility systems at LANL include electrical service, natural gas pipeline, communications lines, steam lines, potable water lines, sanitary wastewater and storm water lines, and refuse collection. The CSP (LANL 2000) documents that portions of the existing 62 mi (100 km) of gas distribution lines at LANL are about 50 years old or older, and that building redundancy into the system is necessary to avoid potential curtailment of a large percentage of LANL operations in the event of a disruption.

The SWEIS Yearbook–2000 (LANL 2001d) notes that total gas consumption in FY 2000 was less than projected by the SWEIS ROD (1.84 million decatherms) because of warmer than normal weather; however, more gas than anticipated was used for electric generation at the TA-3 power plant. According to the Yearbook, LANL used about 1.43 million decatherms of natural gas in FY 2000 and approximately 90 percent of this was used for heating (both steam and hot air). The remainder was used for electrical production to provide the difference between peak load demands and electric contractual import rights.

The SWEIS ROD issued by the DOE in 1999 required the preparation of a Mitigation Action Plan for assuring electrical power availability to carry out the mission requirements of the expanded operations alternative. NNSA is considering the installation of a third electric transmission line and a 20-megawatt natural gas combustion turbine within the TA-3 South Mesa 22 Power Plant complex to provide reliable, onsite electricity to LANL. A separate EA for the proposed electric line was issued together with a Finding of No Significant Impact on March 9, 2000. The EA for the proposal to install a new gas combustion turbine is under preparation.

3.2.9.2 Proposed Action

There is an existing electrical distribution power line easement alongside the proposed alignment of the new 12-in. (30-cm) gas transmission line up Los Alamos Canyon. There is also a water supply well that is located along the south wall of the canyon near the proposed tie-in with the

existing gas transmission mainline. The proposed gas transmission line would not affect either the electrical distribution line or the water supply well located in Los Alamos Canyon. The proposed gas transmission line would enhance the reliability of gas supply at LANL by providing system redundancy in the event of service disruptions. Since natural gas is used to generate some onsite electricity at LANL, the new gas line would also ensure the reliability of adequate electric power production and supply at LANL.

3.2.9.3 No Action Alternative

Under the No Action Alternative, the proposed 12-in. (30-cm) gas transmission line would not be built and therefore the existing electrical distribution line or the water supply well located in Los Alamos Canyon would not be affected. The No Action Alternative would also mean that LANL would not have the desired redundancy in gas supply. This could affect the reliability of natural gas supplies to LANL and the Los Alamos town site in the event of a service disruption. This could, in turn, affect the ability to heat buildings and generate onsite electricity using gas-fired steam generators and turbines.

3.2.10 Noise

3.2.10.1 Affected Environment

Noise is defined as unwanted sound. Noise is categorized into two types: *steady-state noise,* which is characterized as longer duration and lower intensity, such as a running motor, and *impulse or effect noise,* which is characterized by short duration and high intensity, such as the detonation of high explosives. The intensity of sound is measured in decibel (dB) units. In sound measurements relative to human auditory limits, the dB scale is modified into an A-weighted frequency scale (dBA).

Noise measured at LANL is primarily from occupational exposures. Occupational exposure data are compared against an established occupational exposure limit (OEL). At LANL, the OEL is administratively defined as noise to which a worker may be exposed for a specific work period without probable adverse effects on hearing acuity. The maximum permissible OEL for steady-state noise is 84 dBA for each 8-hour work period. The OEL for impulse and effect noise is not fixed because the number of effects allowed per day varies depending on the dBA of each effect. DOE also requires that Action Levels (levels of exposure to workplace hazards that are below the OEL but require monitoring or the use of PPE) be established for noise in the workplace. Action levels at LANL for steady-state noise and impulse and effect noise are 80 dBA and 140 dBA for each 8-hour day, respectively.

Environmental noise levels at LANL are measured outside of buildings and away from routine operations. The following are typical examples of sound levels (dBA) generated by barking dogs (58), sport events (74), nearby vehicle traffic (63), aircraft overhead (66), children playing (65), and birds chirping (54). Sources of environmental noise at LANL consist of background sound, vehicular traffic, routine operations, and periodic high explosives testing. Measurements of environmental noise in and around LANL facilities and operations average below 80 dBA.

The averages of measured values from limited ambient environmental sampling in Los Alamos County were found to be consistent with expected sound levels (55 dBA) for outdoors in residential areas. Background sound levels at the White Rock community ranged from 38 to 51

dBA (Burns 1995) and from 31 to 35 dBA at the entrance of Bandelier National Monument (Vigil 1995). The minimum and maximum values for Los Alamos County ranged between 38 dBA and 96 dBA, respectively. Because of the isolated location of the proposed gas line in Los Alamos Canyon, ambient noise levels in the vicinity of the line are typical of undeveloped outdoor areas.

3.2.10.2 Proposed Action

The Proposed Action would result in limited short-term increases in noise levels associated with pipeline construction activities. Following the completion of these activities, noise levels would return to preconstruction levels. Noise generated by the Proposed Action is not expected to have an adverse effect on either UC and non-UC construction workers or on PNM maintenance workers.

The construction of the gas pipeline would require the use of heavy equipment for clearing of the easement, removal of dirt, rock, and vegetation, and for hauling and placing pipe. Heavy equipment such as front-end loaders and backhoes would produce intermittent noise levels at around 73 to 94 dBA at 50 ft (15 m) from the work site under normal working conditions (Canter 1996, Magrab 1975). Truck traffic would occur frequently but would generally produce noise levels below that of the heavy equipment. No high explosives or other noise generating operations or equipment would be used during construction or to perform routine maintenance. Workers would be required to have hearing protection if site-specific work produced noise levels above the LANL action level of 80 dBA for steady-state noise. Based upon a number of physical features, such as attenuation factors, noise levels should return to background levels within about 200 ft (66 m) of the noise source (Canter 1996). Since sound levels would be expected to dissipate to background levels before reaching publicly accessible areas or undisturbed wildlife habitats, they should not be noticeable to nearby workers or members of the public, nor should they disturb local wildlife. In addition, any elevated noise levels would occur for a short duration only (six months at the most). Traffic noise from pipeline construction workers (about 13 workers) would not increase the present traffic noise level on roads at LANL. Therefore, noise levels are not expected to exceed the established OEL.

No adverse effects on either UC or PNM maintenance workers, the public, or the environment would be expected from noise levels generated by routine maintenance operations under the Proposed Action. Noise generated by these activities would be very short term in duration, of low intensity, and highly localized in remote and unoccupied areas at LANL.

3.2.10.3 No Action Alternative

Under the No Action Alternative, ambient noise levels would remain unchanged in the vicinity of the proposed pipeline corridor in Los Alamos Canyon. Noise from construction activities associated with the Proposed Action would not occur. Environmental noise levels in and around Los Alamos Canyon and the existing gas pipeline under SR 502 would be expected to remain below 80 dBA on average.

3.2.11 Human Health

3.2.11.1 Affected Environment

This section considers the health of UC workers, non-UC workers, and PNM construction an maintenance workers. These two categories are considered in this EA because each category worker would either be involved in the site inspections or the construction and maintenance o the new gas line under the Proposed Action. Members of the public are not considered becau they are not likely to be affected by construction activities, routine maintenance, or any credit accident scenarios that could result from the Proposed Action.

The health of LANL workers is routinely monitored depending upon the type of work performed. Health monitoring programs for LANL workers consider a wide range of potentia concerns including exposures to radioactive materials, hazardous chemicals, and routine workplace hazards. In addition, LANL workers involved in hazardous operations are protecte by engineering controls and required to wear appropriate PPE. Training is also required to identify and avoid or correct potential hazards typically found in the work environment and to respond to emergency situations. Because of the various health monitoring programs and the requirements for PPE and routine health and safety training, LANL workers are generally considered to be a healthy workforce with a below average incidence of work-related injuries and illnesses.

UC staff monitor environmental media for contaminants that could affect non-UC workers or members of the public. This information is reported to regulatory agencies, such as the NMED and to the public through various permit requirements and reporting mechanisms and it is used assess the effects of routine operations at LANL on the general public. For detailed informatio about environmental media monitoring and doses to the public, see LANL's Environmental Surveillance Report for 2000 (LANL 2001a). For those persons who work within the boundari of LANL as subcontractors or utility workers and could be exposed to radioactive or other hazardous materials, their exposures are monitored in the same manner as UC workers. In addition, site-specific training and PPE requirements would also apply to these workers.

The preliminary assessments of potential human health (including risks for construction workers[6]) and ecological risk presented in the LANL Environmental Restoration Program repor regarding Los Alamos Canyon and DP Canyon (LANL 1998 and 1999, respectively) indicate that levels of contamination in the floodplain sediments of upper Los Alamos Canyon and DP Canyon do not pose an unacceptable human health or environmental risk or require immediate remedial actions with regard to present-day land use (including "construction worker").

[6] The construction worker scenario in the human health risk assessment is based upon a 250-day work year with eight-hour days. The duration of the scenario is one year, and all activities occur within sediment layers that contair contaminants above background values. The involved individual worker ingests soil at a rate of 480 mg/day and inhales soil as airborne dust at a rate of 2 mg/day. Possible construction activities in upper Los Alamos Canyon under present-day land use conditions include the construction or maintenance of roads and the excavation of trenches for sewer lines or other purposes. These activities would likely involve uncontaminated parts of the canyo floor as well as contaminated areas and would likely have actual durations of less than one year; therefore, this assessment provides conservative estimates of risk (LANL 1998).

3.2.11.2 Proposed Action

Pipeline construction and maintenance work planned under the Proposed Action would not be expected to have any adverse health effects on UC workers. UC workers would not be directly involved in the construction of the proposed gas pipeline. Non-UC support and maintenance contractors would be actively involved in the construction activities, routine site inspections, and testing of the pipeline. Approximately five UC workers would perform site inspections or monitor construction activities during periods of peak activity. Applicable safety and health training and monitoring, PPE, and work-site hazard controls would be required for all site workers.

The Proposed Action is not expected to result in adverse effects on the health of non-UC construction or maintenance workers. Approximately 20 to 30 construction workers would be actively involved in potentially hazardous activities such as heavy equipment operations, including several heavy debris removal vehicles, and removal of excess dirt and vegetation from pipeline construction activities. Construction activities could begin in early 2003 and would last for about six months. Potentially serious exposures to various hazards or injuries are possible during the pipeline construction and testing under the Proposed Action. Risks of incidents and injuries that could occur range from relatively minor incidents (e.g., respiratory irritation, cuts, or sprains) to major injuries (e.g., broken bones or asphyxiation). To prevent serious injuries, all site workers are required to submit and adhere to a Construction Safety and Health Plan. This plan is reviewed by UC staff before construction activities can begin. Following review of this plan, UC site inspectors would routinely verify that site workers are adhering to the plan, including applicable Federal and state health and safety standards. In addition, UC staff would provide site-specific hazard training to construction contractors as needed. Adherence to a reviewed plan, use of PPE and engineered controls, and completion of appropriate hazards training are expected to help prevent adverse health effects on construction workers.

Routine maintenance of the new gas pipeline would be performed primarily through site visits that include driving or walking the length of the line, and cathodic and leak testing of the pipeline itself. For maintenance that requires the repair or removal of any portion of the pipeline, soil and pipe excavation could be required and some heavy equipment may be needed. Hazards associated with the routine maintenance of the pipeline would pose no hazard to UC workers and only a minimal health risk to non-UC maintenance workers employed by PNM or their subcontractors. Adherence to required and applicable hazard control plans, monitoring of potential hazards, and completion of appropriate worker training would help to prevent adverse health effects on these workers.

3.2.11.3 No Action Alternative

Under the No Action Alternative, there would be no potential for injuries to UC or non-UC construction or maintenance workers. There would also not be any potential for injuries to members of the public from construction and operation of the proposed gas pipeline. No exposures to hazardous working conditions would occur on DOE-administered lands because no construction activities would take place. However, routine maintenance of the existing gas pipeline under SR 502 would continue and would probably increase over time because of the condition of the pipeline. An increase in maintenance activities would increase the potential for adverse health effects to maintenance workers. With the use of appropriate worksite controls

and monitoring, PPE, and worker training programs, an increase in actual PNM maintenance worker injuries would be unlikely.

3.2.12 Waste Management/Environmental Restoration

3.2.12.1 Affected Environment

LANL generates solid waste[7] from construction, demolition, and facility operations. These wastes are managed and disposed of at appropriate solid waste facilities. Both UC-LANL and Los Alamos County use the same solid waste sanitary landfill located within LANL boundaries. The Los Alamos County Landfill also accepts solid waste from other neighboring communities. The Los Alamos County Landfill receives about 52 tons per day (47 metric tons per day), with LANL contributing about 8 tons per day (7 metric tons per day), or about 15 percent of the total. Current plans (as of May 8, 2002) are to close the Los Alamos County Landfill by June 30, 2004. Several possible landfills located within New Mexico could be used by UC-LANL and Los Alamos County after 2004.

Building debris storage yards on Sigma Mesa (TA-60) or other approved areas are used by LANL to store concrete, soil, and asphalt debris for future use at LANL. Low-level radioactive waste is disposed of at LANL, in Area G at TA-54, or may be shipped to appropriate permitted facilities. Hazardous waste[8] regulated under RCRA is transported to TA-54 at LANL for proper management, which is carried out in accordance with applicable laws, regulations, and DOE

Orders. Hazardous waste and mixed wastes are treated and disposed of offsite because LANL has no onsite disposal capability for these waste types. The offsite disposal locations are located across the U.S. and are audited for appropriate regulatory compliance before UC-LANL sends waste to these disposal site locations.

3.2.12.2 Proposed Action

LANL waste management would be slightly affected by implementing the Proposed Action. PNM or their subcontractors would be responsible for site waste removal and disposition. LANL waste management would accept waste generated by the project only in the case of radioactive waste. The Proposed Action would generate solid waste such as spent welding rods and waste paper products. This material would be removed from the construction site and disposed of at the Los Alamos County Landfill or another permitted facility. Excess pipe would be removed by PNM for future use elsewhere. Any brush, trees, or vegetation waste resulting from the Proposed Action would be chipped onsite and spread on the easement. Chipped material would not be spread in or near any waterway. Since the bulk of the proposed pipeline route is not located within the floodplain, it would be possible to arrange for none of the chipped material to be placed within the floodplain. Chipped material would be placed on the easement

[7] Solid waste, as defined in CFR 40 CFR 261.2 and in 20 NMAC 9.1, is any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities.

[8] Hazardous waste, as defined in 40 CFR 261.3, which addresses RCRA regulations, and by reference in 20 NMAC 4.1, is waste that meets any of the following criteria: a) waste exhibits *any* of the four characteristics of a hazardous waste: ignitability, corrosivity, reactivity, or toxicity; b) waste is specifically *listed* as being hazardous in one of the four tables in Subpart D of the CFR; c) waste is a mixture of a *listed* hazardous waste item and a nonhazardous waste; d) waste has been *declared* to be hazardous by the generator.

just south of the floodplain and stabilized to prevent it from entering the floodplain. Excavated soil and rock material would be returned to the trench whenever practicable. Excess excavated material generated in the floodplain would be analyzed for suspected radioactive contamination. Material determined to be low-level radioactive waste would be removed and disposed of at Area G, TA-54. Material that was not radioactively contaminated could remain on site.

3.2.12.3 No Action Alternative

There would be no change in waste management associated with implementing the No Action Alternative. No waste would be generated under this alternative.

3.2.12.4 Environmental Restoration

Los Alamos Canyon has received contaminants from PRSs within the watershed (see Section 3.2.3). The area of the highest elevated constituents in the construction area is expected to be at the western end of the easement at the confluence of Los Alamos and DP Canyons. Evaluation of these sediments has found increased concentrations of ^{241}Am, ^{238}Pu, ^{90}Sr, and ^{137}Cs. However, much of this sediment was removed during revegetation activities after the Cerro Grande Fire. The levels of contamination in Los Alamos Canyon sediments do not present an unacceptable human health risk under the conditions of present-day land use, including a scenario for "construction worker" (LANL 1998) as described in Section 3.2.11.1. However, data are not sufficient to rule out the possibility of a higher potential health risk from contamination encountered in an unsampled area. Since most of the pipeline route is south of the floodplain on an elevated natural bench, radioactive contamination of the easement area is expected to be minimal (LANL 1998). Radiation surveys would be conducted by LANL workers prior to and during construction to evaluate areas of concern.

3.2.13 Transportation and Traffic

3.2.13.1 Affected Environment

Section 4.10 of the 1999 LANL SWEIS (DOE 1999a) describes transportation services at LANL. The impacts on transportation in and around LANL under the Preferred Alternative selected in the SWEIS ROD are described in detail in Section 5.3.10 of the SWEIS. Regional and site transportation routes are the primary methods used to transport LANL-affiliated employees, commercial shipments, and hazardous and radioactive material shipments. Bladed (unpaved) fire roads are located in many areas of LANL and are often used as access roads for maintaining utility services. The existing gas transmission line is buried beneath SR 502, which serves as the most direct access to Los Alamos town site from Santa Fe and the Española Valley. It is not subject to closure by the NNSA; it is under the control of the County Highway Department.

3.2.13.2 Proposed Action

Traffic along SR 502 would not be affected by the Proposed Action. The existing gas transmission line buried under SR 502 would be taken out of service and abandoned in place. A very short period (hours) of traffic control would be required for this activity but the road surface would not be disturbed and all traffic into and out of the area would be stopped for a very short period of time. Construction of the new gas transmission line in Los Alamos Canyon would not appreciably affect traffic along SR 4 because the project would only involve 20 to 30 people

working up to six months duration. Construction equipment would be confined to working in Los Alamos Canyon and not interfere with traffic on SR 4 or SR 502. The existing unpaved access road into Los Alamos Canyon may require some grading to enhance its functioning as a fire and maintenance road once the gas line project was completed.

3.2.13.3 No Action Alternative

Under this alternative, the existing gas transmission line buried under SR 502 would not be abandoned and implementing the No Action Alternative would result in the existing gas line continuing to be used. SR 502 could be damaged and possibly closed to traffic for an indeterminate length of time in the event of a gas line failure. Loss of the use of SR 502 to access the Los Alamos town site would cause all traffic coming into and out of Los Alamos and LANL to divert to SR 4, East Jemez Road, or Pajarito Road. If NNSA restricted traffic along East Jemez or Pajarito Roads then traffic would encounter a considerable diversion in miles and time traveling past White Rock and Bandelier National Monument. There would be more congestion along West Jemez Road especially through TA-3 and at the Diamond Drive and Jemez Road intersection and northbound across the Los Alamos Canyon bridge during peak commute periods. These delays would present safety problems of various magnitudes during emergencies.

4.0 ACCIDENT ANALYSIS

The Proposed Action of constructing approximately 3 mi (5 km) of new 12-in. (30-cm) natural gas transmission line from the White Rock intersection to Los Alamos Canyon consists of activities that are performed on a routine basis in utility line installation and, thus, are a common practice in this standardized public utility industry. Therefore, specialized accident types that are considered at DOE nuclear facilities are not a consideration. The most serious potential accident considered for the Proposed Action would be a fatality during installation of the transmission line. The activities are considered a form of construction and, so, potential fatalities can be considered by comparing national statistics on construction with project worker information for the Proposed Action. No fatalities are likely to result from the proposed construction.

The estimated number of workers was compared to recent risk rates of occupational fatalities for construction. Up to 30 full-time workers could be employed, working up to 12 hours per day and up to 7 days per week for about a 6-month duration. This equates to about 110 percent of a normal work year. The average fatality rate in the U.S. for industries that include causes of falls exposure to harmful substances, fires and explosions, and being struck by objects, equipment, or projectiles is 1.9 per 100,000 workers per year (Saltzman 2001). No deaths (0.00062) from thes causes are expected from implementing the Proposed Action.

Transportation activities are expected to include the transport of materials (such as pipes and welding materials) to the site and waste and debris away from the site. Of the different types of transportation occupations nationwide, truck drivers of all types of trucks experience the highest fatality rate (26 deaths per 100,000 full-time workers per year) (Saltzman 2001). The transportation activities for the Proposed Action are expected to constitute a minor fraction of th amount of travel on which transportation fatality rates for industry are based. No statistics were found for trucks hauling materials on special roads such as the pipeline access road; however, th

long distances and higher speeds that are included in the national statistics would be uncommon in this project and the number of driver-years would be very low, therefore no transportation fatalities are expected for this project.

The nonfatal occupational injury and illness rate in the U.S. for the occupational category including public utilities is 8.7 per 100 workers per year. At this rate and assuming the worker statistics previously mentioned for the Proposed Action, about three nonfatal injuries/illnesses can be expected for the project.

5.0 CUMULATIVE EFFECTS

Cumulative effects are caused by the aggregate of past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes them. These effects can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1508.7).

This section considers the Proposed Action and possible effects on resources in context to any ongoing or reasonably foreseeable future actions. The cumulative effects on resources are discussed further in this section. This analysis concludes that there could be cumulative effects on land use, transportation, infrastructure, visual, noise, health effects, cultural resources, water quality, air quality, and PRSs or other aspects of the environment.

5.1 Activities in the Vicinity of the Proposed Gas Pipeline Easement

5.1.1 Conveyance and Transfer

A portion of the proposed easement of the 12-in. (30-cm) gas pipeline is located within the White Rock Y Tract identified in the Record of Decision for the *Conveyance and Transfer of Certain Lands Administered by the Department of Energy and Located at Los Alamos National Laboratory, Los Alamos and Santa Fe Counties, New Mexico* (DOE 1999b). It is anticipated that these lands would be used for either cultural preservation were they to be transferred to San Ildefonso Pueblo; or kept as natural areas or used for transportation and utility improvements were they to be transferred to Los Alamos County. Consequently, there could be other future construction or operational activities that would contribute to cumulative effects on land use, transportation, infrastructure, visual, noise, health effects, water quality, air quality, and PRSs in Los Alamos Canyon or adjacent areas if DOE modified its original Record of Decision to allow the transfer or conveyance of this land tract.

5.1.2 Advanced Hydrotest Facility

The conceptualized AHF would be the next generation hydrodynamic test facility following the Dual-Axis Radiographic Hydrodynamic Test Facility at LANL. AHF would be an improved radiographic facility that would provide for imaging on more than two axes, each with multiple time frames, though the number of axes and time frames needed for such imaging is still subject to requirements definition and design evolution. The facility would be used to better reveal the evolution of weapon primary implosion symmetry and boost-cavity shape under normal conditions and in accident scenarios (DOE 1996).

Currently, the feasibility and definition of an AHF is still insufficiently determined for NNSA DOE to propose such a facility and analyze potential environmental effects that would be associated with its construction and operation. Performance requirements and specifications have not been fully established. The type of technology to provide the basis for the facility has not been determined, and concepts for the resultant physical plant would vary accordingly (DO 1996). As a result, there currently would not be any known cumulative effects associated with the AHF project with regard to the Proposed Action.

5.1.3 Omega West Demolition

The Omega West Facility (OWF) is located in Los Alamos Canyon approximately 2 mi (3.2 km west (upstream) of the natural gas valve setting where the new gas pipeline would be connected to the existing pipeline. The OWF and associated structures were originally constructed in 194 and are of advanced age and not in a condition suitable for renovation. The OWF remains vulnerable to damage from the increased risk of flooding and mudflows as a result of the Cerro Grande Fire in 2000. Any structural damage could lead to the spread of radiological contamination. Consequently, the entire OWF is to be demolished and the wastes properly disposed of.

Emissions associated with vehicle and equipment exhaust as well as radiological and particulate (dust) emissions could result from demolition activities. Disturbed contaminated soils could potentially cause an increase in the transportation of tritium and other radiological contaminants downstream during flooding events.

An EA for the demolition of the OWF has been prepared (DOE/EA-1410) in which these effects were analyzed. The conclusions reached in this EA indicate that no discernable effects on air quality would result and adverse effects on water quality and soils are not anticipated. Therefore, no cumulative effects would be anticipated from the demolition of the OWF.

5.1.4 Post Cerro Grande Fire Cleanup

Approximately 915 cubic yards (yd^3) (700 cubic meters [m^3]) of contaminated surface silt and soil were removed from a 2.5-ac (1.0-ha) site in Los Alamos Canyon east of the confluence of DP and Los Alamos Canyons in June of 2000 (DOE 2000a). The soil was removed to minimize the overall potential for contaminant migration in the event of a severe flood. Removal of this soil and disturbance of the site is not expected to have resulted in adverse effects on water quality and, therefore, there should be no anticipated cumulative effects. Removal of the contaminated soil could have a long-term beneficial effect by reducing the likelihood of contaminant transport downstream.

5.1.5 TA-21 PRS Cleanup

Thirteen PRSs have been identified within the TA-21 "West" tract slated for transfer to Los Alamos County. Seven of these PRSs would need to be cleaned up or proposed for no further action before the transfer can take place. The other six require no further action. All cleanup work for this tract is expected to be complete by November 2003. Cleanup of these PRSs will minimize migration of contaminants into DP Canyon; a tributary of Los Alamos Canyon. Thus, these remediation activities would have a beneficial cumulative effect on Los Alamos Canyon by reducing the overall contaminant load.

6.0 AGENCIES CONSULTED

Since all of the significant and potentially significant cultural resources will be protected by avoidance, there is no need for consultation with the SHPO. However, the SHPO will be notified that the proposed pipeline would cross the Los Alamos Trail and will be given the opportunity to comment.

NNSA has determined that informal consultation with the U.S. Fish and Wildlife Service regarding the potential affect of the Proposed Action on Federally protected threatened or endangered species or their critical habitat is necessary. No adverse affect to these individual Mexican spotted owls or bald eagles, or to their critical habitat is expected from the Proposed Action. The U.S. Fish and Wildlife Service, in a letter dated May 23, 2002, concurred with this determination that the Proposed Action "may affect, not likely to adversely affect" Mexican spotted owls or bald eagles.

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APPENDIX: A FLOODPLAINS AND WETLANDS ASSESSMENT FOR THE POTENTIAL EFFECTS OF THE LOS ALAMOS CANYON GAS LINE

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Title

A Floodplains and Wetlands Assessment for the Potential Effects of the Los Alamos Canyon Gas Line

Compiled by

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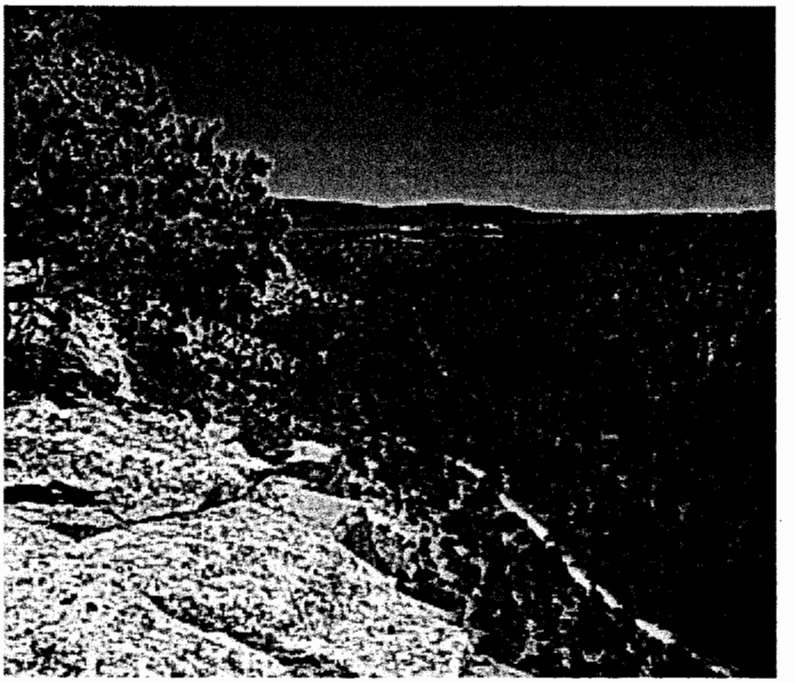

July 24, 2002

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A Floodplains and Wetlands Assessment for the Potential Effects of the Los Alamos Canyon Gas Line

Summary

The Department of Energy proposes to construct the Los Alamos Canyon Gas Line (LAGL) on Los Alamos National Laboratory property starting during the 2002-2003 fiscal years. The Public Service Company of New Mexico will conduct the actual construction of this line. This assessment documents potential impacts of the floodplains and wetlands associated with the area. Site-specific best management practices are included to ensure that impacts do not occur to floodplains and wetlands that may exist in the area of the proposed construction site. No potential loss of life or property has been identified with respect to the floodplains and wetlands for the proposed project. Concerns about siltation, erosion, and excessive storm water runoff will be addressed with specific mitigation implemented as part of careful project planning. Although there may be some effect to floodplains and wetlands, the potential impacts from the LAGL project are expected to be minor.

1.0 Proposed Action

The NNSA U.S. Department of Energy (DOE) proposes to grant an easement to the Public Service Company of New Mexico (PNM) for the construction and operation of a new 30-cm (12-in.) gas line on Los Alamos National Laboratory (LANL). PNM will conduct the actual construction of the Los Alamos Canyon Gas Line (LAGL). PNM will follow LANL/DOE regulations and requirements during the LAGL construction on LANL/DOE property. This project is located in Technical Areas (TA) 53, TA-21, TA-73, and TA-72 in the central portion of LANL in Los Alamos Canyon. The construction of this line is scheduled to begin in fiscal years 2002-2003. The proposed construction will consist of trenching along the canyon bottom, mostly along an existing electric utility corridor. The project area will be approximately 4.5 km (3.0 mi) long and 15 m (50 ft) wide. The project area, in sensitive spotted owl habitat, will be approximately 1.43 km (0.90 mi). The average width of the disturbance will be approximately 15 m (50 ft). There will be no removal of vegetation or rock features on the slopes of Los Alamos Canyon as a result of this project. The proposed line will be placed under the canyon streambed

through directional drilling rather than being placed on the surface. The LAGL will provide additional capacity for future regional growth, add redundancy to existing gas supplies, and replace the existing 20.6-cm (8.1-in.) high-carbon steel pipeline that is located under State Highway 502. The existing pipeline is over 50 years old, is a nonstandard size, is difficult to weld and work on, and has reduced impact strength compared to modern pipe because of the high carbon content.

2.0 Environmental Baseline

2.1 Regional Description

2.1.1 Location within the State

LANL and the associated residential areas of Los Alamos and White Rock are located in Los Alamos County, north-central New Mexico, approximately 100 km (60 mi) north-northeast of Albuquerque and 40 km (25 mi) northwest of Santa Fe (Figure 1). The 11,596-ha (28,654-ac) LANL site is situated on the Pajarito Plateau. This plateau is a series of finger-like mesas separated by deep east-to-west-oriented canyons cut by intermittent streams. Mesa tops range in elevation from approximately 2,400 m (7,800 ft) on the flanks of the Jemez Mountains to about 1,900 m (6,200 ft) at their eastern termination above the Rio Grande.

Most LANL and community developments are confined to mesa tops. The surrounding land is largely undeveloped. Large tracts of land north, west, and south of the LANL site are held by the Santa Fe National Forest, Bureau of Land Management, Bandelier National Monument, General Services Administration, and Los Alamos County. The Pueblo of San Ildefonso borders LANL to the east.

2.1.2 Geologic Setting

Most of the finger-like mesas in the Los Alamos area are composed of Bandelier Tuff, which consists of ash fall, ash fall pumice, and rhyolite tuff. The tuff, ranging from nonwelded to welded, is more than 300 m (1,000 ft) thick in the western part of the plateau and thins to about 80 m (260 ft) eastward above the Rio Grande (Broxton et al., 1995). It was deposited after major eruptions in the Jemez Mountains Volcanic Field about 1.2 to 1.6 million years ago (Self and Sykes 1996).

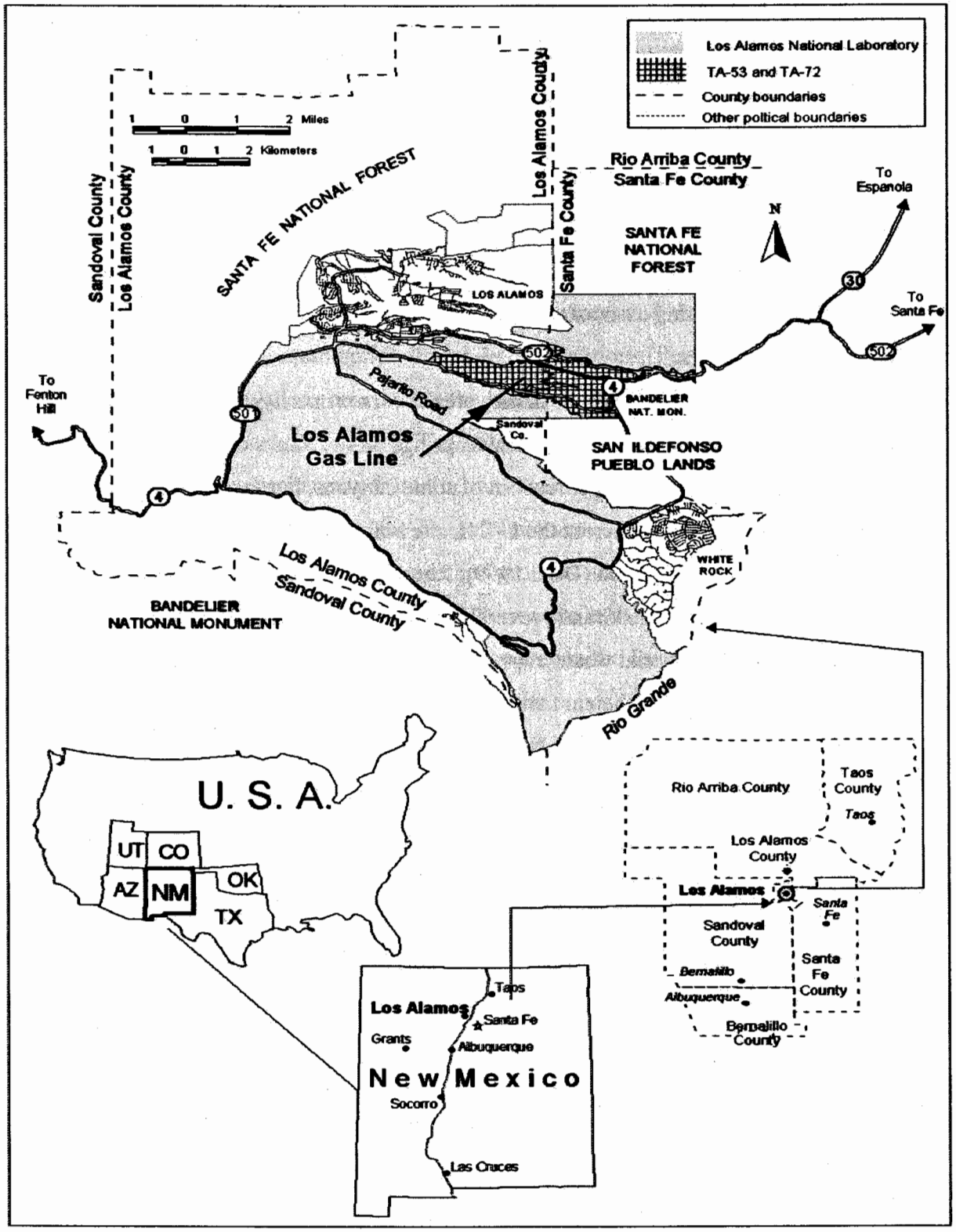

Figure 1. Location of Los Alamos National Laboratory and the area of the LAGL project.

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 (Self and Sykes 1996). The conglomerate of the Puye Formation underlies the tuff in the central plateau and near the Rio Grande. Chino Mesa basalts interfinger with the conglomerate along the river. These formations overlay the sediments of the Santa Fe Group, which extend across the Rio Grande valley and are more than 1,000 m (3,300 ft) thick. LANL is bordered on the east by the Rio Grande, within the Rio Grande rift. Because of the faulting associated with the rift, the area experiences frequent minor seismic disturbances.

Surface water in the Los Alamos area 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 LANL site before they are depleted by evaporation, transpiration, and infiltration (DOE 1999). Runoff from heavy thunderstorms or heavy snowmelt reaches the Rio Grande several times a year in some drainages. 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.

Groundwater in the Los Alamos area occurs in three forms: (1) water in shallow alluvium in canyons, (2) 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 main aquifer of the Los Alamos area. Ephemeral and intermittent streams have filled some parts of canyon bottoms with alluvium that ranges from less than 1 m (3 ft) to as much as 30 m (100 ft) in thickness. Runoff in canyon streams percolates through the alluvium until its downward movement is impeded by layers of weathered tuff and volcanic sediment that are less permeable than the alluvium. This process creates shallow bodies of perched groundwater that move downgradient within the alluvium. As water in the alluvium moves down the canyon, it is depleted by evapotranspiration and movement into underlying volcanics (Purtymun et al., 1977). The chemical quality of the perched alluvial groundwaters shows the effects of discharges from LANL.

In portions of Pueblo, Los Alamos, and Sandia canyons, perched groundwater occurs beneath the alluvium at intermediate depths within the lower part of the Bandelier Tuff and within the underlying conglomerates and basalts. Perched groundwater has been found at depths of about 37 m (120 ft) in the midreach of Pueblo Canyon to about 137 m (450 ft) in Sandia Canyon near the eastern boundary of LANL (Purtymun 1995a). This intermediate-depth perched water discharges at several springs in the area of Basalt Spring in Los Alamos Canyon. These intermediate-depth groundwaters are formed in part by recharge from the overlying perched alluvial groundwaters and show evidence of radioactive and inorganic contamination from LANL operations (Purtymun 1995a).

Perched water may also occur within the Bandelier Tuff in the western portion of LANL, just east of the Jemez Mountains. The source of this perched water might be infiltration from streams discharging from the mouths of canyons along the mountain front and underflow of recharge from the Jemez Mountains. Industrial discharges from LANL operations may also contribute to perched groundwater in the western portion of LANL. Perched groundwater in the Tschicoma Formation is the source of water supply for the ski area located just west of the LANL boundary in the Jemez Mountains.

The main aquifer of the Los Alamos area is the only aquifer in the area capable of serving as a municipal water supply (Griggs 1964). The surface of the aquifer rises westward from the Rio Grande within the Tesuque Formation (part of the Santa Fe Group) into the lower part of the Puye Formation beneath the central and western part of the plateau. Depth to the main aquifer is about 300 m (1,000 ft) beneath the mesa tops in the central part of the plateau. The main aquifer is separated from alluvial and perched waters by about 110 to 190 m (350 to 620 ft) of tuff and volcanic sediments with low (less than 10 percent) moisture content (Griggs 1964).

Water in the main aquifer is under artesian conditions under the eastern part of the Pajarito Plateau near the Rio Grande (Purtymun and Johnson 1974). The source of recharge to the aquifer is presently uncertain. Early research studies concluded that major recharge to the main aquifer is probably from the Jemez Mountains to the west because the piezometric surface slopes downward to the east, suggesting easterly groundwater flow beneath the Pajarito Plateau (Purtymun 1995b). However, the small amount of recharge available from the Jemez Mountains relative to water supply pumping

quantities, along with differences in isotopic and trace element composition, appear to rule this out. Further, isotopic and chemical composition of some waters from wells near the Rio Grande suggest that the source of water underlying the eastern part of the Pajarito Plateau may be the Sangre de Cristo Mountains (Blake et al., 1995).

Groundwater flow along the Rio Grande rift from the north is another possible recharge source. The main aquifer discharges into the Rio Grande through springs in White Rock Canyon. The 18.5-km (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 5.3 to 6.8×10^6 m^3 (4,300 to 5,500 acre-ft) annually from the aquifer (Griggs 1964).

2.1.3 Topographic Setting

LANL and its surrounding environments encompass a wide range of environmental conditions. This is due in part to the prominent elevational gradient in the east-west direction. This is also attributable to the complex, local topography that is found throughout much of the region.

The spectacular scenery that is a trademark of the Los Alamos area is largely a result of this regional gradient. The difference between its lowest elevation in the eastern extremities and its highest elevation on the western boundaries represents a change of approximately 1,568 m (5,146 vertical feet). At the lowest point along the Rio Grande, the elevation is approximately 1,631 m (5,350 ft) above mean sea level. At the opposite elevational extreme, the Sierra de los Valles, which is part of the more extensive Jemez Mountains, forms a continuous backdrop to the landscapes of the region being studied. The tallest mountain peaks in the Sierra include Pajarito Mountain at 10,441 ft (3,182 m), Cerro Rubio at 10,449 ft (3,185 m), and Caballo Mountain at 10,496 ft (3,199 m).

In addition to the prominent elevational gradient, the Los Alamos region is also topographically complex. Within Los Alamos County, there are three main physiographic systems (Nyhan et al., 1978). From east to west, these systems are the White Rock Canyon, the Pajarito Plateau, and the Sierra de los Valles. White Rock Canyon is 1,890 m (6,200 ft) above mean sea level. This rugged canyon is approximately 1.6 km (1 mi) wide and extends to a depth of nearly 275 m (900 ft). White Rock Canyon occupies about 5 percent of Los Alamos County. The Pajarito Plateau is the largest of the three physiographic systems, occupying nearly 65 percent of Los Alamos County. The Pajarito

Plateau is a broad piedmont that slopes gently to the east and southeast. At a more localized scale, the Pajarito Plateau is also topographically complex. The surface of the plateau is dissected into narrow mesas by a series of east-west-trending canyons. Above 2,377 m (7,800 ft), the Sierra de los Valles rises to the western extremity of the study region. These mountains occupy approximately 30 percent of Los Alamos County. The Sierra is also dissected into regularly spaced erosional features, although these canyons in the mountains are not so prominent as the canyons on the Pajarito Plateau.

2.1.4 Weather and Climate

Los Alamos has a temperate, semiarid mountain climate. However, its climate is strongly influenced by elevation, and large temperature and precipitation differences are observed in the area because of the topography.

Los Alamos has four distinct seasons. Winters are generally mild, but occasionally winter storms produce large amounts of snow and below-freezing temperatures. Spring is the windiest season of the year. Summer is the rainy season in Los Alamos, when afternoon thunderstorms and associated hail and lightning are common. Fall marks the end of the rainy season and a return to drier, cooler, and calmer weather. The climate statistics discussed below summarize analyses given in Bowen (1990 and 1992).

Several factors influence the temperature in Los Alamos. An elevation of 2,256 m (7,400 ft) helps to counter its southerly location, making for milder summers than nearby locations with lower elevations. The sloping nature of the Pajarito Plateau causes cold-air drainage, making the coolest air settle into the valley. The Sangre de Cristo Mountains to the east act as a barrier to arctic air masses affecting the central and eastern United States. The temperature does occasionally drop well below freezing, however. Another factor affecting the temperature in Los Alamos is the lack of moisture in the atmosphere. With less moisture, there is less cloud cover, which allows a significant amount of solar heating during the daytime and radiative cooling during the nighttime. This heating and cooling often causes a wide range of daily temperature.

Winter temperatures range from 30°F to 50°F (-1°C to 10°C) during the daytime to 15°F to 25°F (-9°C to -4°C) during the nighttime. The record low temperature recorded in Los Alamos (as of 1992) is -18°F (-28°C). Winter is usually not particularly

windy, so extreme wind chills are uncommon at Los Alamos. Summer temperatures range from 70°F to 88°F (21°C to 31°C) during the daytime to 50°F to 59°F (10°C to 15°C) during the nighttime. Temperatures occasionally will break 90°F (32°C). The highest temperature ever recorded (as of 1992) in Los Alamos is 95°F (35°C).

The average annual precipitation in Los Alamos is 47.57 cm (18.73 in.). The average snowfall for a year is 149.6 cm (58.9 in.). Freezing rain and sleet are rare at Los Alamos. Winter precipitation in Los Alamos is often caused by storms entering the United States from the Pacific Ocean, or by cyclones forming or intensifying in the lee of the Rocky Mountains. When these storms cause upslope flow over Los Alamos, large snowfalls can occur. The snow is usually a dry, fluffy powder, with an average equivalent water-to-snowfall ratio of 1:20.

The summer rainy season accounts for 48 percent of the annual precipitation. During the July–September period, orographic thunderstorms form when moist air from the Gulf of Mexico and the Pacific Ocean moves up the sides of the Jemez Mountains. These thunderstorms can bring large downpours, but sometimes they only cause strong winds and lightning. Hail frequently occurs from these rainy-season thunderstorms.

Winds in Los Alamos are also affected by the complex topography, particularly in the absence of a large-scale disturbance. There is often a distinct daily cycle of the winds around Los Alamos. During the daytime, upslope flow can produce a southeasterly wind on the plateau. In the evening, as the mountain slopes and plateau cool, the flow moves downslope, causing light westerly and northwesterly flow. Cyclones moving through the area disturb and override the cycle. Flow within the canyons of the Pajarito Plateau can be quite varied and complex.

2.1.5 Plant Communities

The Pajarito Plateau, including the Los Alamos area, is biologically diverse. This diversity of ecosystems is due partly to the dramatic 5,000-ft (1,500-m) elevation gradient from the Rio Grande on the east to the Jemez Mountains 20 km (12 mi) to the west, and partly to the many steep canyons that dissect the area. Five major vegetative cover types are found in Los Alamos County: juniper (*Juniperus monosperma*)-savanna, piñon (*Pinus edulis*)-juniper, ponderosa pine (*Pinus ponderosa*), mixed conifer, and spruce-fir All of the communities and their distribution are cited in Balice (1998). The juniper-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 1,700 to 1,900 m (5,600 to 6,200 ft). The piñon-juniper cover type, generally in the 1,900- to 2,100-m (6,200- to 6,900-ft) elevation range, covers large portions of the mesa tops and north-facing slopes at the lower elevations. Ponderosa pines are found in the western portion of the plateau in the 2,100- to 2,300-m (6,900- to 7,500-ft) elevation range. These three cover types predominate, each occupying roughly one-third of the LANL site. The mixed conifer cover type, at an elevation of 2,300 to 2,900 m (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-fir is at higher elevations of 2,900 to 3,200 m (9,500 to 10,500 ft). Twenty-seven wetlands and several riparian areas enrich the diversity of plants and animals found on LANL lands.

2.1.6 Post-Fire Plant Communities

In May 2000, the Cerro Grande Fire burned over 43,000 acres of forest on and around LANL. Most of the habitat damage occurred on Forest Service property to the west and north of LANL. An assessment of fire-induced vegetation mortality was made by the Burned Area Emergency Rehabilitation Team (BAER 2000) and is discussed for threatened and endangered species in the Los Alamos Canyon Gas Line Biological Assessment (Keller 2002). Some vegetation was burned in floodplains, but not in wetlands.

2.1.7 Pre- and Post-Fire Hydrology

McLin (1992) modeled all major 100-year floodplains for LANL using U.S. Army Corps of Engineers Hydrologic Engineering Center HEC-1 and HEC-2 computer-based models. These data represent pre-fire flow rates for all of the floodplains on LANL. Post-fire analyses have been completed (McLin et al., 2001). Figure 2 shows the extent of the current floodplain in Los Alamos Canyon.

3.0 Project Description

3.1 Project Area

All activities associated with this project will occur on LANL property (see Figure 1).

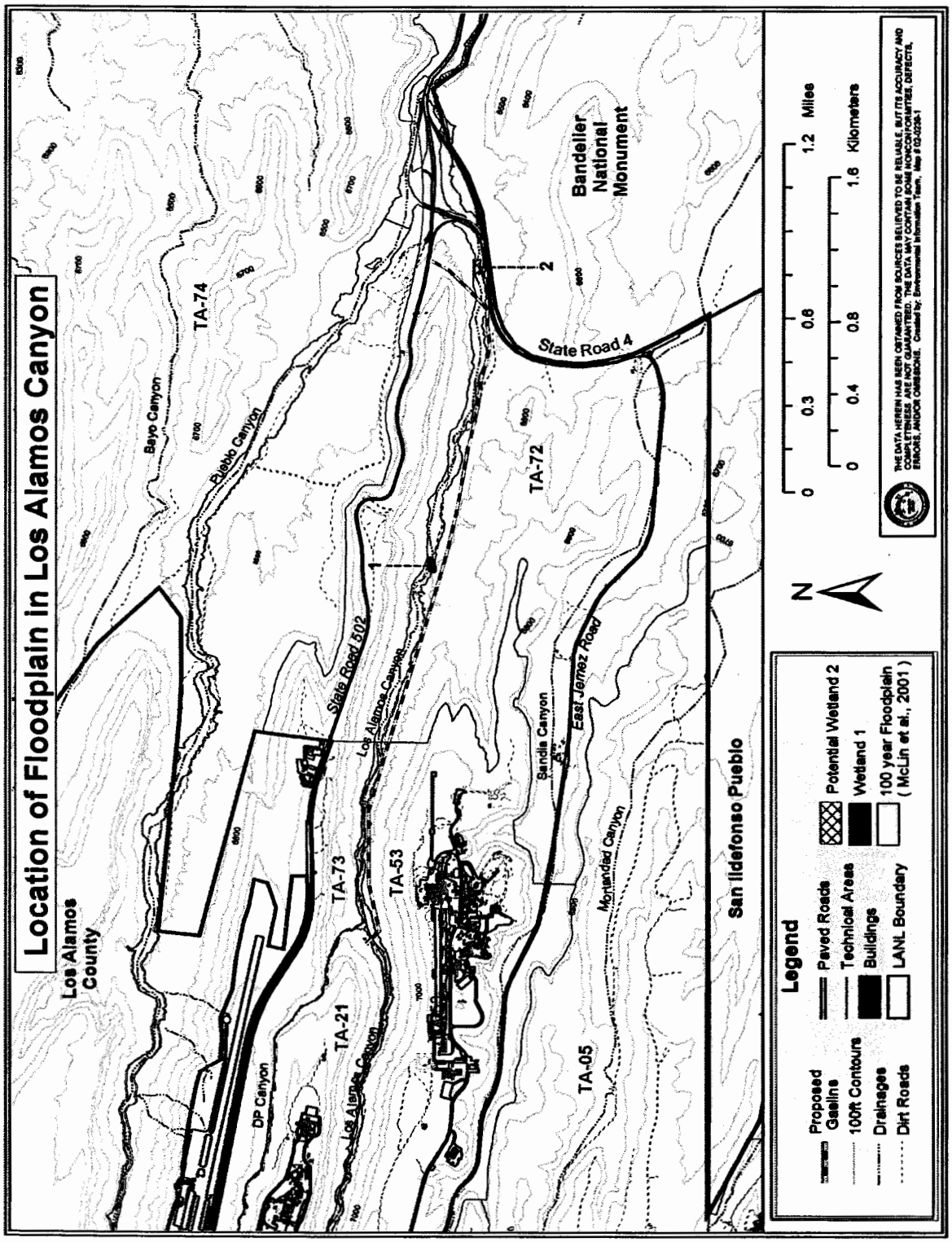

Figure 2. Extent of floodplains and wetlands within the project area.

The LAGL will consist of a trench and an easement 15 m (50 ft) wide along a majority of the route. Disturbed areas left by the trenching of the proposed LAGL will be restored and re-vegetated following the completion of the project. An access road (3 m [10 ft] wide) will remain within the easement and be maintained by PNM

This new construction will be mostly adjacent to an existing electrical power line. During construction, a loss of up to 7.0 ha (17.5 ac) of habitat could occur. Approximately 5 percent of the proposed project area is disturbed; 100 percent of the proposed project area is suitable for use by foraging wildlife.

3.1.1 Location

The proposed LAGL will be located in the central portion of the Laboratory in TA-21, TA-53, TA-72, and TA-73. This gas line will be trenched up Los Alamos Canyon. The proposed project will not remove canyon slope habitat or cross the canyon streambed above the ground surface.

3.1.2 Elevation

The proposed LAGL project will be approximately 4.5 km (3 mi) long, will begin at TA-53 at an elevation of 2,018 m (6,620 ft), and will proceed to the eastern end of Los Alamos Canyon of TA-72 at an elevation of 1,926 m (6,320 ft).

3.1.3 Plant Communities

The project area is 51 percent ponderosa pine forest, 40 percent piñon-juniper woodland, 6 percent bare soil, and 3 percent mixed conifer forest. None of the project area was burned in the Cerro Grande Fire. The gas line route will be almost exclusively in ponderosa pine with the eastern portion of the project area in piñon-juniper habitat. The only mixed conifer habitat, Douglas fir (*Pseudotsuga menziesii*) and white fir (*Abies concolor*), in the project area is on the north-facing slope of the canyon and will not be removed. The shrub layer of the area surrounding the site consists of Gamble's oak (*Quercus gambelii*), skunkbush sumac (*Rhus trilobata*), wild rose (*Rosa woodsii*), and New Mexico locust (*Robinia neomexicana*). The understory of the area surrounding the site consists of smooth brome (*Bromus inermis*), redtop (*Agrostis alba*), little blue stem (*Schizachyrium scoparium*), and blue grama (*Bouteloua gracilis*) grasses with hairy aster

(*Heterotheca villosa*), broom snakeweed (*Gutierrezia sarothrae*), and New Mexico lupine (*Lupinus neomexicanus*). Along the primary waterway through the bottom of the canyon are willow (*Salix exigna*), narrow leaf cottonwood (*Populus angustifolia*), and patchy areas of rush (*Juncus* sp.) and grasses.

3.1.4 Levels of Disturbance

The proposed LAGL project location is approximately 5 percent disturbed along the existing electrical line with the remainder of the location having a cover of native vegetation. Currently, the site consists of an electric power line at the edge of the proposed gas line route along most of its length with the remainder of the site having a scattered ponderosa pine woodland and native understory species. The site is mostly within the existing utility corridor for the high-power electric utility line, but the vegetation in this corridor is well developed with ponderosa pine up to about 20 cm (8 in.) in diameter.

4.0 Description and Effects on Floodplains and Wetlands

Pursuant to Executive Order 11988, Floodplain Management, each Federal agency is required, when conducting activities in a floodplain, to take actions to reduce the risk of flood damage; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. DOE's 10 CFR Part 1022.4 defines a flood or flooding as ". . . a temporary condition of partial or complete inundation of normally dry land areas from . . . the unusual and rapid accumulation of runoff of surface waters . . . ." DOE's 10 CFR Part 1022.4 identifies floodplains that must be considered in a floodplain assessment as the base floodplain and the critical-action floodplain. The base floodplain is the area inundated by a flood having a 1.0 percent chance of occurrence in any given year (referred to as the 100-year floodplain). The critical-action floodplain is the area inundated by a flood having a 0.2 percent chance of occurrence in any given year (referred to as the 500-year floodplain). Critical action is defined as any activity for which even a slight chance of flooding would be too great. Such actions could include the storage of highly volatile, toxic, or water-reactive materials.

Pursuant to Executive Order 11990, Protection of Wetlands, each Federal agency is to avoid, to the extent practicable, the destruction or modification of wetlands, and to avoid direct or indirect support of new construction in wetlands if a practicable alternative exists. DOE 10 CFR Section 1022.4(v): Wetlands means those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflow, mudflats, and natural ponds.

According to 10 CFR 1022.12(a)(2), a floodplain/wetland assessment is required to discuss the positive and negative, direct and indirect, and long- and short-term effects of the proposed action on the floodplain and/or wetlands. In addition, the effects on lives and property and on natural and beneficial values of floodplains must be evaluated. For actions taken in wetlands, the assessment should evaluate the effects of the proposed action on the survival, quality, and natural and beneficial values of the wetlands. If DOE finds no practicable alternative to locating activities in floodplains or wetlands, DOE will design or modify its actions to minimize potential harm to or in the floodplains and wetlands. The floodplains and wetlands that are assessed herein are those areas in canyons or drainages that are seasonally inundated with perennial or intermittent streams from runoff during 100-year floods.

4.1 General

Wetland functions are naturally occurring characteristics of wetlands such as food web production; general, nesting, resting, or spawning habitat; sediment retention; erosion prevention; flood and runoff storage; retention and future release; groundwater discharge or recharge; and land-nutrient retention and removal. Wetland values are ascribed by society based on the perception of significance and include water-quality improvement, aesthetic or scenic value, experiential value, and educational or training value. These values often reflect concerns regarding economic values; strategic locations; and in arid regions, the location relative to other landscape features. Thus, two wetlands with similar size and shape could serve the same function but have different values to society. For example, a wetland that retains or changes flood flow timing of a flood high

in the mountains might not be considered as valuable as one of similar size that retains or changes flood-flow timing of a flood near a developed community. Wetlands were addressed in the LANL Site-Wide Environmental Impact Statement as follows (DOE 1999):

> "Wetlands in the general LANL region provide habitat for reptiles, amphibians, and invertebrates and potentially contribute to the overall habitat requirements of the peregrine falcon, Mexican spotted owl, southwestern willow flycatcher, and spotted bat. Wetlands also provide habitat, food, and water for many common species such as deer, elk, small mammals, and many migratory birds and bats. The majority of the wetlands in the LANL region are associated with canyon stream channels or are present on mountains or mesas as isolated meadows containing ponds or marshes, often in association with springs."

Wetlands within LANL have been broadly mapped by the U.S. Fish and Wildlife Service. This information is available in the National Wetlands Inventory in a Geographic Information System-based format. This hierarchical system follows Cowardin et al. (1979) and is based entirely on aerial photography. Small wetlands, or those in steep canyons, may not be detected using this method. Additional on-site surveys and internal University of California databases were also used to gather information regarding these resources.

Figure 2 shows the location of wetlands and riparian areas in Los Alamos Canyon. Wetland vegetation indicators exist throughout the stream reach for the canyon, particularly willow (*Salix exigna*), which is listed as an obligate on the National Wetlands Inventory plant list. However, in our region it behaves also as a facultative species. Another common riparian species with the willow is narrow leaf cottonwood (*Populus angustifolia*). Together these two species, along with areas of scattered grasses, mosses, and rushes, maintain the integrity of the streambed. In the area where pooling has led to seasonal wetland conditions, there is a greater density of willow (*Salix exigna*) and rushes (see Figure 2). Throughout this system, there is the potential for localized and scattered areas of hydric soils as are associated with intermittent stream systems. The Los Alamos

Canyon weir area is being monitored for the formation of a wetland. Signs of natural wetland formation are present, including hydric vegetation such as cattails and rushes. Willow (*Salix exigna*) and cottonwood (*Populus* sp.) have been planted by LANL staff to decrease soil erosion. The formation of a wetland in this area will depend upon future presence of wetland indicators.

Within the Los Alamos Canyon section there is discussion of the direct and indirect (both primary and secondary) effects of the proposed project on floodplain and wetlands resources located in the canyon. The effect of proposed floodplain actions on lives and property and on natural and beneficial floodplain values is evaluated.

4.2 Canyon Area Issues and Concerns

The canyon areas on LANL land are comprised primarily of mixed conifer and ponderosa pine. The majority of these canyons, especially in the northern region of LANL property, have been identified as core habitat for the Mexican spotted owl (Keller 2002).

Treatments in floodplains within habitat areas, such as potential habitat for the Mexican spotted owl, will follow the LAGL Biological Assessment (Keller 2002) and the actions agreed upon within the Threatened and Endangered Species Habitat Management Plan (HMP) (LANL 1998). In all cases, erosion, sediment transfer, and movement of contaminants are a concern, for work on mesa tops as well as within floodplains, particularly during rain events and the monsoon season.

Cumulative erosion of ash and soils from severely burned headlands above the project site is also a potential concern. The potential for downstream floodplain/wetland values to be impacted by the proposed project exists for the canyon. Potential downstream impacts are discussed for Los Alamos Canyon.

5.0 Canyon Specific Assessment

5.1 Los Alamos Canyon

5.1.1 Description

The primary tree cover for Los Alamos Canyon is mixed conifer in the upper sections and ponderosa pine for much of the length down to the lower elevations where it

blends with piñon-juniper. There are wetlands associated with the canyon streambed, and the floodplain extends for the entire length. The headlands were severely burned, which may increase runoff during the monsoons. There is an established road running the entire length of the canyon.

5.1.2 Floodplains and Wetlands Description and Potential Impacts from Proposed Los Alamos Gas Line

Floodplains

The 100-year floodplain is illustrated in Figure 2.

Wetlands

There are scattered wetlands associated with this canyon (Figure 2). Wetland 1 (Fig. 2) shows signs of seasonal pooling associated with clustered dominant vegetation of willow (*Salix exigna*) and rush (*Juncus* sp.). Wetland 2 (Fig. 2) is a naturally developing potential wetland due to water pooling at the Los Alamos weir.

Summary of Impacts

No potential for loss of life or property has been identified with respect to floodplains or wetlands in this canyon, as long as previously approved best management practices are considered. Possible primary direct effects of the gas line project are a reduction in vegetation cover, exposure, and compaction of mineral soils due to excavation and heavy equipment. Possible secondary direct effects are the potential for the increase of erosion and storm water runoff.

Primary indirect impacts (within the canyon) to floodplains and wetlands resulting from the gas line project have not been identified. If work conducted in Los Alamos Canyon contributed to increased sediment movement, there may be some retention of those sediments by the wetlands. Best management practices for runoff control would be installed to minimize these impacts.

Secondary indirect impacts (outside of the project area) resulting from the gas line project would result in possible impacts to floodplains and wetlands not associated with the project area (e.g., downstream to the Rio Grande). Downstream floodplain and wetland values potentially effected by the proposed gas line project could include a slight

alteration of flood-flow retention times; a slight alteration of wildlife nesting, foraging, or resting habitat; a slight redistribution of sediments and sediment retention-time changes.

At a minimum, best management practices for runoff control, such as silt barriers, should be in place to mitigate runoff effects during the project. These best management practices would incorporate considerations of the National Pollutant Discharge Elimination System permit program and Environmental Protection Agency requirements for a Storm Water Pollution Prevention Plan and under sections 401 and 404 of the Clean Water Act.

6.0 Alternatives and Mitigations for the Proposed Project

6.1 Alternatives

There were a number of alternatives considered for the LAGL project. These include replacing the existing pipeline under SR 502, installing a pipeline in Pueblo Canyon, installing a pipeline under the existing gravel roadway in Los Alamos Canyon, and installing a pipeline in Sandia Canyon. All of these alternatives were dismissed for the following reasons: traffic disruption, floodplains and/or wetlands issues, increased costs, and no discernable improvements to the Proposed Action (for further details see DOE 2002).

The No Action Alternative, where the LAGL would not be constructed was also considered. Although no activity would be taken within the Los Alamos Canyon floodplain under this alternative, this action was dismissed on the grounds that natural gas service expansion is necessary for LANL, Los Alamos County, and surrounding communities.

6.2. Mitigations

In all cases, best management practices would be followed according to any and all DOE and LANL best management practices for wetlands and floodplains including the "Special Environmental Analysis for the Department of Energy, National Nuclear Security Administration, Actions Taken in Response to the Cerro Grande Fire at Los Alamos National Laboratory, Los Alamos, NM" (CSFS 1998, DOE 2000). All disturbed

areas will be evaluated and improvements installed as needed. There may be some additional useful mitigation that is discussed below.

All work conducted for the proposed gas line project that involves the disturbance of soils through road building, the continuous use of roads, off-road vehicle use, dragging of debris, or trenching potentially contributes to an increase in sediment movement during a 100-year storm event. This in turn can possibly increase the amount of contaminants being relocated to downstream areas. Mitigation actions associated with activities in floodplains will in part depend upon best management practices already in place for potential release sites, erosion control, and post-gas line project mitigation.

In general, no debris would be left in the floodplains. This includes all downed vegetation. Care would be taken to keep all vegetation or soil from going into the watercourse. Leaving debris of any kind in a drainage, stream channel, or watercourse, even if it only runs seasonally, may invoke a penalty under Sections 401 and/or 404 of the Clean Water Act. Enough trees should remain along channel edges to stabilize the banks. Best management practices' suggestions from the Colorado Forest Stewardship Guidelines (CSFS 1998) include maintaining streamside management zones that are 15-m (50-ft) buffers on all sides of a perennial streambed, spring, seep, wetland, or any riparian-like area where no disturbance would occur. This enhances stability of any potential watercourse. If the gas line passes under the streambed, depending on the degree of disturbance, stabilization and revegetation of the streambed may be necessary.

Best management practices would be employed when working in canyon bottoms as a planned part of the project since these areas are considered potentially contaminated until proven otherwise through extensive further contaminant testing. Minimizing soil disturbance and contaminant movement is desired. Following the already prescribed method (CSFS 1998, Marsh 2001, DOE 2000) of using established roads only in canyon bottoms will help with this issue.

7.0 Conclusion

No potential loss of life or property have been identified with respect to the floodplains and wetlands for the proposed gas line project. Concerns about siltation, erosion, and excessive storm water runoff will be addressed with specific mitigation

implemented as part of careful project planning. Although there may be some effect to floodplains and wetlands, the potential impacts from the LAGL project are expected to be minor.

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