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Title

Information Document in Support of the Five-Year Review and Supplement Analysis for the Los Alamos National Laboratory Site-Wide Environmental Impact Statement (DOE/EIS-0238)

Prepared by

Ecology Group
Risk Reduction and Environmental Stewardship

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Los Alamos
NATIONAL LABORATORY

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Preface

This Information Document was prepared by the Risk Reduction and Environmental Stewardship-Ecology Group (RRES-ECO) to assist the Department of Energy (DOE) in its preparation of the five-year review Supplement Analysis to the Site-Wide Environmental Impact Statement (SWEIS) for Continued Operation of the Los Alamos National Laboratory (LANL) (DOE 1999a). This document presents information for use by the Department of Energy/National Nuclear Safety Administration (NNSA) to determine whether: (1) the SWEIS issued in1999 should be supplemented; (2) a new environmental impact statement (EIS) should be prepared; or (3) no further National Environmental Policy Act (NEPA) documentation is required.

DOE regulations require that site-wide environmental impact statements such as LANL SWEIS be evaluated every five years "to determine whether the existing EIS remains adequate or whether to prepare a new site-wide EIS or supplement the existing EIS" (10CFR 1021.330 [d]). This formal analysis compares the adequacy of the environmental envelope identified in the SWEIS ROD to current levels of operations at LANL.

This information document presents the following data: (1) facility and process modifications and additions; (2) current and projected capabilities and levels of operation from 1998 through 2009 as compared to the SWEIS Record of Decision (ROD) (DOE 1999b); (3) operations data for the Key and Non-Key Facilities, including waste volumes and air emissions from 1998 through 2003 as compared to the SWEIS ROD; (4) current, proposed or modified projects with potential environmental consequences; (5) evaluation of the present LANL affected environment due to certain events, new regulatory or institutional requirements and guidelines, and expanded knowledge; (6) revised accident analysis based on current conditions and site boundary changes; and (7) a wildfire accident analysis.

Acronyms

AB	Authorization Basis
ac	acre
AFCI	Advanced Fuel Cycle Initiative
ALARA	as low as reasonably achievable
AOC	area of concern
ASME	American Society of Mechanical Engineers
BA	biological assessment
BAER	Burned Area Emergency Rehabilitation
BAT	best available technology
BIA	Bureau of Indian Affairs
BIO	Basis for Interim Operations
BNM	Bandelier National Monument
BOD	biochemical/biological oxygen demand
BSL	Biosafety Level
BSRL	baseline statistical reference levels
BTF	Beryllium Technology Facility
CAA	Clean Air Act
CASA	Critical Assembly and Storage Area
CBD	Chronic Beryllium Disease
CBDPP	Chronic Beryllium Disease Prevention Program
CD	critical decision
CDC	Centers for Disease Control
CDIS	Change During Interim Status
CEQ	Council on Environmental Quality
cfs	cubic feet per second
CFR	Code of Federal Regulations
CGBAER	Cerro Grande Burned Area Emergency Rehabilitation
CGF	Cerro Grande Fire
CGRP	Cerro Grande Rehabilitation Project
Ci	curie
COD	chemical oxygen demand
COPECs	contaminants of potential ecological concern
CRMP	Cultural Resources Management Plan
CTG	combustion turbine generator
CTEDE	cumulative total effective dose equivalent
CY	calendar year
CMR	Chemical and Metallurgy Research
CX	categorical exclusion
CX-TBD	the planned activity is anticipated to be within categorical exclusion
DARHT	Dual-Axis Radiographic Hydrodynamic Test (facility)
D&D	decommissioning and demolition
dB	decibel
DCG	DOE-derived concentration guide
DEM	digital elevation model
DOE	US Department of Energy
DSA	Documented Safety Analysis
DTE	down-to-the-east
DTW	down-to-the-west
DU	depleted uranium
DVRS	Decontamination and Volume Reduction System

DX	Dynamic Experimentation (Division)
EA	environmental assessment
EA-CX	an environmental assessment found the proposed activity to be within categorical exclusion
EA-FONSI	an environmental assessment was conducted with a finding of no significant impact
EA-TBD	an environmental assessment has not been conducted but is anticipated
EDAC	Earth Data Analysis Center
EDE	effective dose equivalent
EDR	electro-dialysis reversal
EIS	environmental impact statement
EIS Draft	an EIS was drafted and issued for public comment
EIS-Prep	an EIS has been determined to be needed and is currently being prepared
EIS-ROD	an EIS was drafted and record of decision issued
EIS-TBD	a determination of need for EIS is not yet complete, but an EIS is anticipated
EISU	Electrical Infrastructure/Safety Upgrades (Project)
EM&R	Emergency Management & Response
EOC	Emergency Operations Center
EPA	US Environmental Protection Agency
ER	Environmental Restoration (Project)
ERAGS	ecological risk assessment guidance for Superfund
ERPG	Emergency Response Planning Guideline
ERT	Emergency Rehabilitation Team
ESA	Engineering Sciences and Application (Division)
FIMAD	Facility for Information Management, Analysis, and Display
FITS	Facility Improvement Technical Support (building)
FSAR	Facility Safety Analysis Report
FTE	full-time equivalent (employee)
FWS	Fish and Wildlife Service
FY	fiscal year
GIS	geographic information system
GMF	Guaje Mountain Fault
GV	guideline value
ha	hectare
HAP	hazardous air pollutant (emissions)
HC	hazard category
HDR	(Fenton Hill) Hot Dry Rock (project)
HE	high explosive
HEPA	high-efficiency particulate air (filter)
HEU	highly enriched uranium
HEWTF	High Explosives Waste Treatment Facility
HI	hazard index
HMP	Habitat Management Plan
HpCDD	1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin
HQ	hazard quotient
HREPCT	Heritage Resources and Environmental Policy Compliance Team

HRL	Health Research Laboratory
HSR	Health, Safety, and Radiation Protection
HSWA	Hazardous and Solid Waste Amendment
HVAC	heating, ventilation, and air conditioning
IAEA	International Atomic Energy Agency
ICE	Irradiation of Chips and Electronics
IRMP	Integrated Resources Management Plan
ISM	Integrated Safety Management
IWD	Integrated Work Document
IX	ion exchange
JCNNM	Johnson Controls Northern New Mexico
km	kilometer
KSL	KBR-SHAW-LATA
kV	kilovolt
L	liters
LA	Laboratory of Anthropology
LAC	Los Alamos County
LACEF	Los Alamos Critical Experiments Facility
LANL	Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LASO	Los Alamos Site Office
LEDA	Low-Energy Demonstration Accelerator
LIDAR	light-detecting and ranging
linac	linear accelerator
LIR	Laboratory Implementing Requirement
LLW	low-level radioactive waste
LPSS	Long-Pulse Spallation Source
LPT	Lymphocyte Proliferation Test
LWC	lost workday cases (rate)
m	meter
MACCS	MELCOR Accident Consequences Code System
MAR	material at risk
MDA	Material Disposal Area
MEOI	maximally exposed offsite individual
MeV	million electron volts
MG	Milagro Project
MGD	million of gallons per day
MGY	million gallons per year
MLLW	mixed low-level radioactive waste
MOU	Memorandum of Understanding
MRE	most recent faulting event
mrem	millirem
MSL	Materials Science Laboratory
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFA	no further action
NISC	Nonproliferation and International Security Center
NMDE	New Mexico Department of Education
NMED	New Mexico Environment Department
NMDGF	New Mexico Department of Game and Fish
NMEID	New Mexico Environmental Improvement Board
NMSF	Nuclear Materials Storage Facility

NM SHPD	New Mexico State Historic Preservation Department
NMWQCC	New Mexico Water Quality Control Commission
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRC	US Nuclear Regulatory Commission
NRHP	National Register of Historic Places
OCD	(NM) Oil Conservation Division
OCDD	1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin
ORPS	Occurrence Reporting and Processing System
OSR	Offsite Source Recovery (Program)
PC	personal communication
PCB	polychlorinated biphenyl
pCi	pico-Curie
PE	plutonium equivalent
PEST	organochlorine pesticides
PF	Pajarito Fault
PHERMEX	Pulsed High-Energy Radiographic Machine Emitting X-rays (facility)
PL	Public Law
PM	particulate matter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in aerodynamic diameter
PM_{10}	particulate matter less than or equal to 10 microns in aerodynamic diameter
PNM	Public Service Company of New Mexico
ppb	parts per billion
ppt	parts per trillion
PRS	potential release site
psi	pounds per square inch
PTLA	Protection Technology Los Alamos
RAMROD	Radioactive Materials Research Operations and Demonstration (facility)
RANT	Radioactive Assay and Nondestructive Test (facility)
RBES	risk-based end state
RCF	Rendija Canyon Fault
RCRA	Resource Conservation and Recovery Act
rem	roentgen equivalent man
RLW	radioactive liquid waste
RLWTF	Radioactive Liquid Waste Treatment Facility
RLWTP	TA-53 Radioactive Liquid Waste Treatment Plant
RO	reverse osmosis
ROD	record of decision
RRES-ECO	Risk Reduction and Environmental Stewardship Division-Ecology Group
RRES-OEIM	Risk Reduction and Environmental Stewardship Division-Office of Environmental Information Management
RS	Remediation Services
RSRL	regional statistical reference levels
SAL	screening action level
SCADA/ESS	Supervisory Control and Data Acquisition/Equipment Surveillance System
SCC	Strategic Computing Complex

SDWA	(EPA) Safe Drinking Water Act
SERF	Sanitary Effluent Reclamation Facility
SHEBA	Solution High-Energy Burst Assembly
SLEV	screening level emission value
SNM	special nuclear material
SVOC	semi- volatile organic compound
SWEIS	Site-Wide Environmental Impact Statement
SWMU	solid waste management unit
SWPPs	Storm-water Pollution Prevention Plans
SWSC	sanitary wastewater systems consolidation
T&E	Threatened and Endangered Species
TA	Technical Area
TAP	toxic air pollutant (emissions)
TCP	Traditional Cultural Property
TDS	total dissolved solids
TEDE	total effective dose equivalent
TEQ	toxicity equivalents
TFF	Target Fabrication Facility
TIMS	Thermal Ionization Mass Spectroscopy
TL	thermoluminescence
TNT	Tri-nitro Toluene
TRI	total recordable incident (rate)
TRU	transuranic
TSCA	Toxic Substances Control Act
TSFF	Tritium Science and Fabrication Facility
TSP	total suspended solids
TSTA	Tritium System Test Assembly (facility)
TWISP	Transuranic Waste Inspectable Storage Project
TYCSP	Ten-Year Comprehensive Site Plan
U_3O_8	triuranium octocide
UC	University of California
UF/RO	ultrafiltration/reverse osmosis
UNH	uranium nitrate hexahydrate
USC	United States Code
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WWG	Wetlands Working Group
VCA	voluntary corrective action
VOC	volatile organic compound
WCRR	Waste Characterization, Reduction, and Repackaging (facility)
WETF	Weapons Engineering Tritium Facility
WIPP	Waste Isolation Pilot Plant
WNR	Weapons Neutron Research (facility)
WTA	Western Technical Area

1.0 Introduction

1.1 Background

The Site-Wide Environmental Impact Statement (SWEIS) for Continued Operation of Los Alamos National Laboratory (LANL) (DOE 1999a) is a comprehensive review of operations, focusing on 15 Key Facilities, under four different alternative futures. The alternatives were developed to represent a best estimate of activities, but were not intended to be a predictor of all future activities. Scenarios of operations were used to develop the data that were subsequently used to project environmental consequences.

In the SWEIS Record of Decision (ROD) (DOE 1999b), the Department of Energy (DOE) made the determination to proceed with the Preferred Alternative. The Preferred Alternative is the Expanded Operations Alternative from the SWEIS with the exception of the level of pit manufacture. The Expanded Operations Alternative analyzed pit manufacture at the level of 50-80 pits per year, but the DOE decided to implement at nominally 20 pits per year. However, the DOE retained the option of manufacture at 80 pits per year under the auspices of the SWEIS.

Thus DOE has provided National Environmental Policy Act (NEPA) coverage, through its analysis in the SWEIS, for ongoing and proposed operations and capabilities for future operations at LANL. It is important to note that the environmental analyses were performed on the basis of capabilities and operations, rather than on the basis of programs. This provides the assurance that even if sponsors and funding sources change, DOE can still demonstrate that specific proposals are covered by the SWEIS analyses and that LANL remains within the established environmental parameters.

1.2 The Key Facility Concept

In order to present a logical and comprehensive evaluation of LANL's potential environmental impacts, the SWEIS developed the Key Facility concept. Fifteen facilities shown in Table 1.2-1 were identified that were both critical to meeting mission assignments and

- housed operations that have potential to cause significant environmental impacts, or
- were of most interest or concern to the public (based on comments in the SWEIS public hearings), or
- would be more subject to change because of DOE programmatic decisions.

Taken together, the 15 Key Facilities represent the great majority of environmental risks associated with LANL operations. Specifically, the Key Facilities contribute

- more than 99 percent of all radiation doses to the public,
- more than 90 percent of all radioactive liquid waste generated at LANL,
- more than 90 percent of all radioactive solid waste generated at LANL,
- more than 99 percent of all radiation doses to the LANL workforce, and
- approximately 30 percent of all chemical waste generated by LANL.

Table 1.2-1. Identification of Key Facilities for Analysis of LANL Operations

Key Facility Identification	Technical Areas
Plutonium Facility Complex	55
Tritium Facilities	16 and 21
CMR Building	3
Pajarito Site (including the Los Alamos Critical Experiments Facility [LACEF])	18
Sigma Complex	3
MSL	3
Target Fabrication Facility	35
Machine Shops	3
High Explosives Processing Facilities	8, 9, 11, 16, 22, 28, and 37
High Explosive Testing Facilities	14, 15, 36, 39, and 40
LANSCE	53
Health Research Laboratory (HSL)	43
Radioactive Laboratory	48
Waste Management Operations: Radioactive Liquid Waste Treatment Facility	50 and 21
Waste Management Operations: Solid Radioactive and Chemical Waste Facilities	50 and 54

In addition, the Key Facilities (as presented in the SWEIS) comprised 42 of the 48 Category 2 and Category 3 Nuclear Structures at LANL[1]. Subsequently, DOE and LANL have published five lists identifying nuclear facilities at LANL [one in 1998 (DOE 1998a), another in 2000 (DOE 2000a), two in 2001 (LANL 2001a and 2001b), and one in 2002 (LANL 2002a)] that significantly changed the classification of some buildings. Of these 31 structures, all but one reside within a Key Facility. The former tritium research facility (TA-33-86) was still listed as a Category 2 nuclear facility in 2001, but underwent decontamination and decommissioning in 2002, was demolished, and was removed from the nuclear facility list.

[1] DOE Order 5480.23 (DOE 1992a) categorizes nuclear hazards as Category 1, Category 2, or Category 3. Because LANL has no Category 1 nuclear facilities (usually applied to nuclear reactors), definitions are presented for only Categories 2 and 3:

- Category 2 Nuclear Hazard – has the potential for significant onsite consequences. DOE-STD-1027-92 (DOE 1992b) provides the resulting threshold quantities for radioactive materials that define Category 2 facilities.
- Category 3 Nuclear Hazard – has the potential for only significant localized consequences. Category 3 is designed to capture those facilities such as laboratory operations, low-level radioactive waste (LLW) handling operations, and research operations that possess less than Category 2 quantities of material. DOE-STD-1027-92 (DOE 1992b) provides the Category 3 thresholds for radionuclides.

The identification of nuclear facilities is based upon the official list maintained by DOE Los Alamos Site Office (LASO) as of December 2002 (LANL 2002a).

The definition of each Key Facility hinges upon operations[2], capabilities, and location and is not necessarily confined to a single structure, building, or technical area (TA). In fact, the number of structures comprising a Key Facility ranges from one, the Material Sciences Laboratory (MSL), to more than 400 for the Los Alamos Neutron Science Center (LANSCE). Key Facilities can also exist in more than a single TA, as is the case with the High Explosives Testing and High Explosives Processing Key Facilities, which exist in all or parts of five and seven TAs, respectively.

As defined in the SWEIS, a capability refers to the combination of buildings, equipment, infrastructure, and expertise necessary to undertake types or groups of activities and to implement mission assignments. The SWEIS defined specific capabilities for each of the 15 Key Facilities. The capabilities were based on projections of work (production, research, and development) anticipated at each Key Facility. In order to evaluate environmental impacts, the SWEIS estimated levels of operation for each capability. The total of these operations levels would be expected to result in a certain level of radioactive emissions, waste amounts, etc. These projected parameters set the limits for the operations levels. However, the SWEIS was not intended to set stringent limits on the level of activity for a particular capability. In most facilities, the operations levels for every capability would not be reached at one time because of the ebb-and-flow-like nature of the work at LANL. Thus, it is possible to exceed the operations level for one capability and still be within the operations limits for the facility.

The Non-Key Facilities include all buildings and structures not part of a Key Facility, or the balance of LANL. The remainder of LANL was called "Non-Key," not to imply that these facilities were any less important to accomplishment of critical research and development, but because they did not fit the above criteria (DOE 1999a). Although operations at Non-Key Facilities do not contribute significantly to radiation doses or generation of radioactive wastes, the Non-Key Facilities represent a significant fraction of LANL. The Non-Key Facilities comprise all or the majority of 30 of LANL's 48 TAs, and approximately 14,224 of LANL's 26,480 acres. The Non-Key Facilities also currently employ about two-thirds the LANL workforce. The Non-Key Facilities include such important buildings and operations as the Central Computing Facility, the TA-46 sewage treatment facility, and the Main Administration Building. Table 1.2-2 identifies and compares the acreage of the 15 Key Facilities and the Non-Key Facilities. Figure 2-1 shows the location of LANL within northern New Mexico, while Figure 2-2 illustrates the technical areas. Figure 2-3 shows the locations of the Key Facilities.

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[2] As used in the SWEIS and this Yearbook, facility operations include three categories of activities—research, production, and services to other LANL organizations. Research is both theoretical and applied. Examples include modeling (e.g., atmospheric weather patterns) to subatomic investigations (e.g., using the Los Alamos Neutron Science Center [LANSCE] linear accelerator [linac]) to collaborative efforts with industry (e.g., fuel cells for automobiles). Production involves delivery of a product to a customer, such as radioisotopes to hospitals and the medical industry. Examples of services provided to other LANL facilities include utilities and infrastructure support, analysis of samples, environmental surveys, and waste management.

Table 1.2-2. Key and Non-Key Facilities

Facility	Technical Areas	~Size (Acres)
Plutonium Complex	TA-55	93
Tritium Facilities	TA-16 & TA-21	312
CMR Building	TA-03	14
Pajarito Site	TA-18	131
Sigma Complex	TA-03	11
MSL	TA-03	2
TFF	TA-35	3
Machine Shops	TA-03	8
High Explosives Processing	TAs 08, 09, 11, 16, 22, 28, 37	1,115
High Explosives Testing	TAs 14, 15, 36, 39, 40	8,691
LANSCE	TA-53	751
Biosciences Facilities (Formerly Health Research Laboratory)	TA-43, 03, 16, 35, 46	4
Radiochemistry Facility	TA-48	116
RLWTF	TA-50	62
Solid Radioactive and Chemical Waste Facilities	TA-50 & TA-54	943
Subtotal, Key Facilities		12,256
Non-Key Facilities	30 of 49 TAs	14,244
LANL		26,480

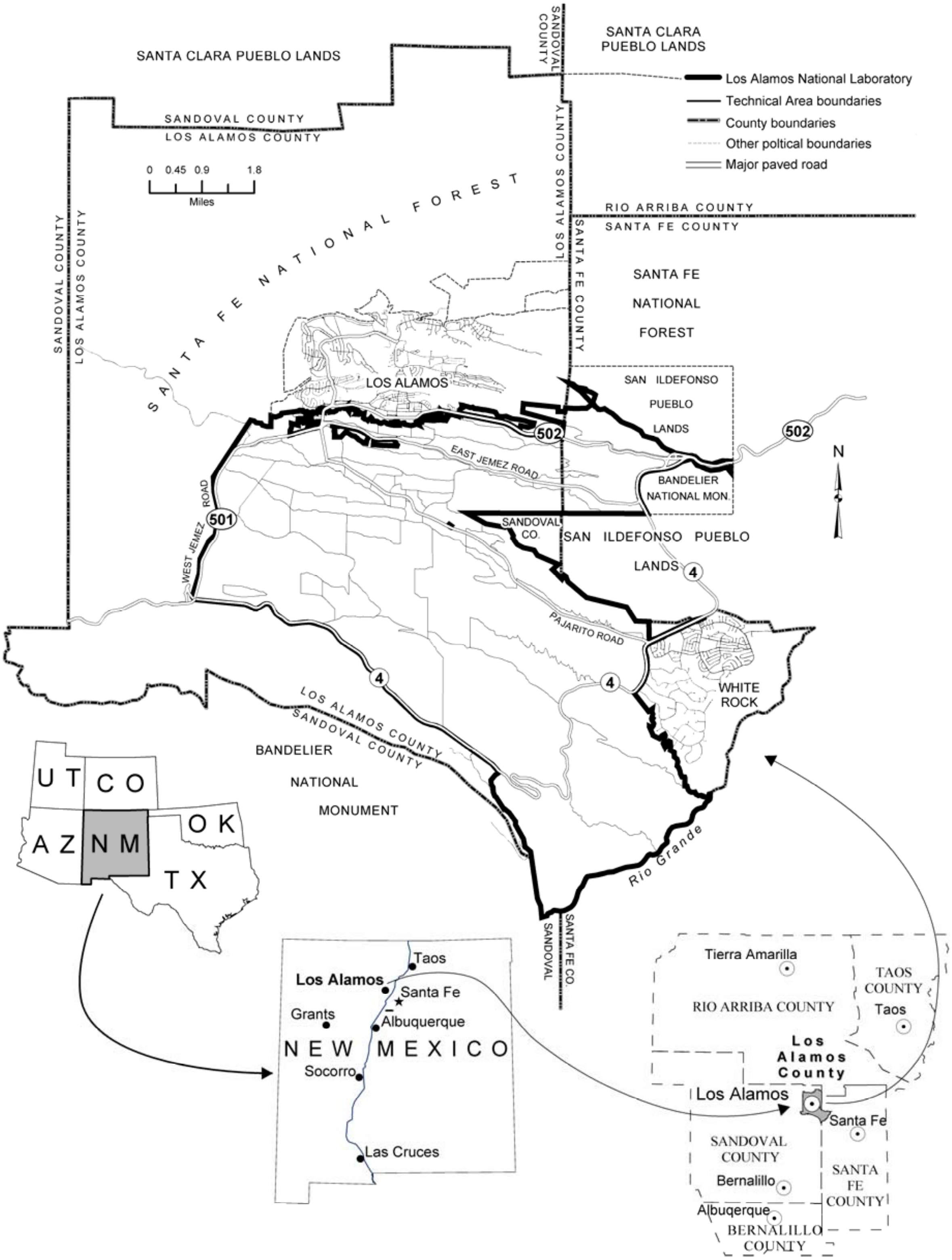

Figure 1-1. Location of LANL

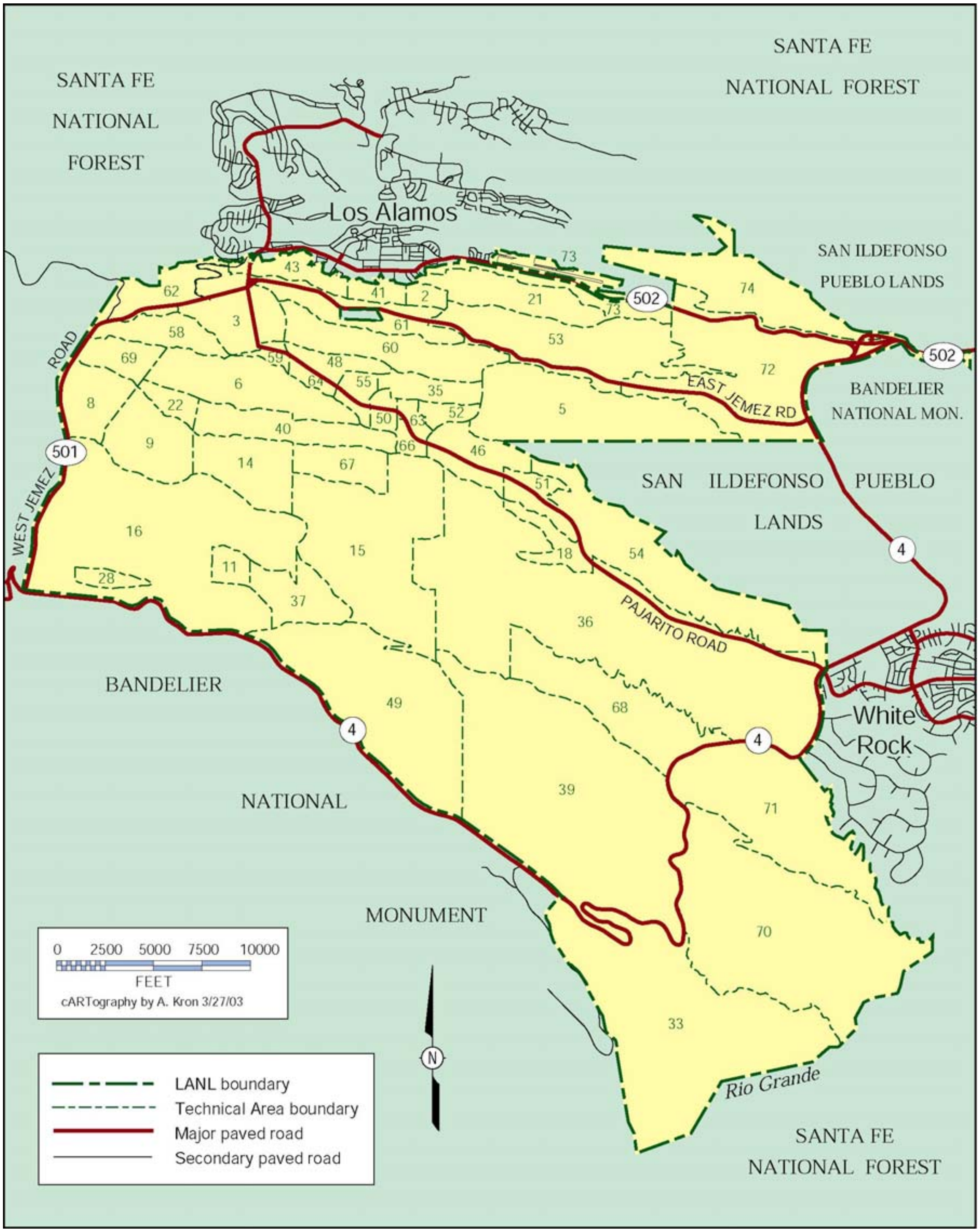

Figure 1-2. Location of technical areas

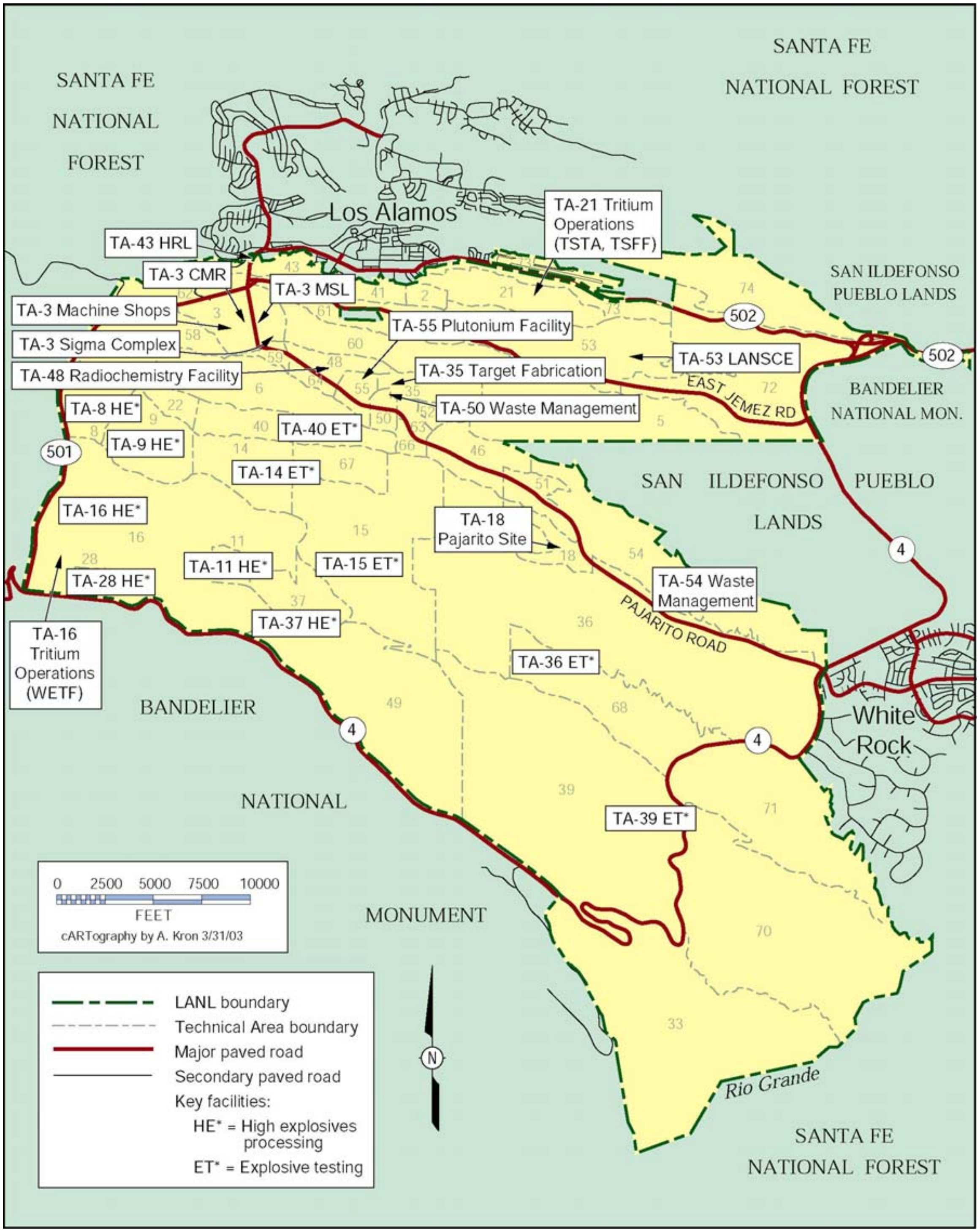

Figure 1-3. Location of Key Facilities

References

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Department of Energy, 1999b. "Record of Decision: SWEIS in the State of New Mexico," 64 FR 50797, Washington, D.C.

Los Alamos National Laboratory, 2002a. "DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities," Performance Surety Division, Office of Authorization Basis, FWO-OAB 401, Rev. 3, Los Alamos, NM.

2.0 Facilities and Operations

Chapter 2 discusses each of the 15 Key Facilities from four aspects—Section 2.1 shows significant facility construction and modifications, types and levels of operations, and operations data that have occurred during the previous six years (1998-2003) for the Key Facilities as well as for the Non-Key Facilities; Section 2.2 identifies the Key Facilities' forecast for the next five years of operation (through CY 2009). Each of these four aspects is given perspective by comparing them to projections made by the SWEIS ROD. This comparison provides an evaluation of whether or not data resulting from LANL operations continue, or are expected, to fall within the environmental envelope established by the SWEIS ROD. It should be noted that construction activities projected by the SWEIS ROD were for the ten-year period 1996–2005. All construction activities will not be complete and projected operations may not reach maximum levels until the end of the ten-year period. In addition to operations data, the Nuclear Hazard Classification (NHC) for each facility is given. **Note:** The Nuclear Hazard Classification tables reflect the data in the published DOE listings of LANL nuclear facilities and LANL radiological facilities that is applicable for the calendar year under review. Changes in the listings that have occurred during the calendar year, but are not published, will not be reflected in this table.

The Remediation Services (RS) Project, formerly called the Environmental Restoration (ER) Project, may generate a significant amount of waste during cleanup activities; therefore, the project is included as Section 2.3 of this chapter. The SWEIS ROD forecast that the RS Project would contribute 60 percent of the chemical wastes, 35 percent of the LLW, and 75 percent of the MLLW generated at LANL over the 10 years from 1996–2005. The RS Project will also affect land resources in and around LANL.

2.1 Nuclear Hazard Classification, Construction, Modifications, and Operations, 1998-2003.

The following tables have been compiled from the SWEIS Yearbooks, 1998 through 2003. They represent the past six years of Nuclear Hazard Classification, facility construction and modifications, capabilities and levels of operations, and operations data.

Table 2.1-1. Plutonium Complex Buildings with Nuclear Hazard Classification (NHC)

Building	Description	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]	LANL 2002 [e]
TA-55-0004	PU-238 Processing	2	2	2	2	2	2	2
TA-55-0041	Nuclear Material Storage	2						

[a] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
[b] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
[c] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
[d] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
[e] DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

Table 2.1.1-1. Plutonium Complex Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Renovation of the NMSF		Design efforts for renovation of NMSF were halted.				
Construction of a new administrative office building	Design commenced on a new office building.	A new office building, the Facilities Improvement Technical Support (FITS) building was constructed (LANL 1998a).[a]			FITS Parking Lot (not physically started in 2002; LANL 2002b).	FITS Parking Lot (not physically started in 2002; LANL 2002b).
				NMT FY 2001 Office Building Manufacturing technical Support Facility (MTSF) (LANL 2001c, DOE 1996a).	Construction began in 2002.	could not locate
Upgrades within Building 55-4 to support continued manufacturing at the existing capacity of 14 pits per year	Upgrades to maintain existing capacity were continued – 1996 installation of a new TA-55 Facility Control System.	Upgrades to maintain existing capacity were continued.	Upgrades to maintain existing capacity were continued.	Upgrades to maintain existing capacity were continued.		
				Nuclear Materials Technology (NMT) Protect Combustible Materials (LANL 2001d, DOE 1996b).	Continuing in 2002.	Continuing in 2003.
			Design of main fire protection water line and pump houses replacement.	TA-55 Fire Protect Yard Main Replacement (LANL 2001e, DOE 1996c).	Completed in 2002 except for repaving scheduled for summer 2003.	complete
				FRIT Transfer System (LANL 2001f, DOE 1996d).	On-going.	On-going in 2003.

				NMT Fire Safe Storage Building (LANL 2001g, DOE 1996e).	Construction not started.	Construction began.
					TA-55 Radiography/ Interim (LANL 2001h).	Ongoing
					TA-55 Radiography (complements interim; LANL 2001i).	Ongoing
					TA-55 New Parking Lot (not physically started in 2002; LANL 2002c).	TA-55 New Parking Lot (not physically started in 2002; LANL 2002c).
					Temporary Parking (False PIDAS; not completed in 2002; LANL 2002d).	Complete
Further upgrades for long-term viability of the facility and to boost production to a nominal capacity of 20 pits per year				CMR Replacement Project Preconceptual Design (LANL 2001j).	On-going in 2002. Draft EIS review in 2003.	On-going in 2003. Draft EIS review in 2003.
				TA-18 Relocation Project Office Building (LANL 2001k, DOE 2002b).	Temporary building between TA-55 and TA-48 on north side of Pajarito Road.	
				TA-18 Relocation Project CAT III/IV at TA-55 (LANL 2001l, DOE 2002b).	Under consideration at end of 2002.	Under consideration at end of 2003.
				TA-18 Relocation Project CAT-I Piece (LANL 2001m, DOE 2002b).	No longer planned for TA-55 at end of 2002.	
					CMRR Geotechnical Investigation (LANL 2002e).	CMRR Geotechnical Investigation (LANL 2002e).

Table 2.1.2-1. Plutonium Complex/Comparison of Operations

Capability	SWEIS ROD [a]	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Plutonium Stabilization	Recover, process, and store the existing plutonium inventory in eight years.	On schedule with focus on highest priority inventory items.	Highest priority items have been stabilized. The implementation plan is being modified between DOE and the Defense Nuclear Facilities Safety Board with a longer completion schedule.	Highest priority items have been stabilized. The implementation plan is being modified between DOE and the Defense Nuclear Facilities Safety Board with a longer completion schedule.	Highest priority items have been stabilized. The implementation plan is being modified between DOE and the Defense Nuclear Facilities Safety Board to be complete by 2010.	Highest priority items have been stabilized. The implementation plan has been modified between DOE and the Defense Nuclear Facilities Safety Board to be complete by 2010.	Highest priority items have been stabilized. The implementation plan has been modified between DOE and the Defense Nuclear Facilities Safety Board to be complete by 2010.
Manufacturing Plutonium Components	Produce nominally 20 war reserve pits/yr. (Requires minor facility modifications.)	There were no war reserve pits produced or accepted by DOE for transfer to the nuclear stockpile.	There were no war reserve pits produced or accepted by DOE for transfer to the nuclear stockpile. Four development pits were fabricated in preparation for eventual war reserve fabrication.	There were no war reserve pits produced or accepted by DOE for transfer to the nuclear stockpile. Two development pits were fabricated in preparation for eventual war reserve fabrication.	There were no war reserve pits produced or accepted by DOE for transfer to the nuclear stockpile.	There were no war reserve pits produced or accepted by DOE for transfer to the nuclear stockpile.	Fewer than 20 qualified pits were produced in CY 2003.
Surveillance and Disassembly of Weapons Components	Pit disassembly: Up to 65 pits/yr disassembled. Pit surveillance: Up to 40 pits/yr destructively examined and 20 pits/yr nondestructively examined.	Consistent with the No Action Alternative, no more than 20 pits were disassembled and no more than 20 pits were examined during 1998.	Less than 65 pits were disassembled during 1999. Less than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in 1999.	Less than 65 pits were disassembled during 2000. Less than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in 2000.	Less than 65 pits were disassembled during 2001. Less than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in 2001.	Less than 65 pits were disassembled during 2002. Less than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in 2002.	Fewer than 65 pits were disassembled during CY 2003. Fewer than 40 pits were destructively examined as part of the stockpile evaluation program (pit surveillance) in CY 2003.

Actinide Materials and Science Processing, Research, and Development	Develop production disassembly capacity. Process up to 200 pits/yr, including a total of 250 pits (over four years) as part of disposition demonstration activities.	Fewer than 200 pits were disassembled/ converted in 1998.	Fewer than 200 pits were disassembled/ converted in 1999.	Fewer than 200 pits were disassembled/ converted in 2000.	Fewer than 200 pits were disassembled/ converted in 2001.	Fewer than 200 pits were disassembled/ converted in 2002.	Fewer than 200 pits were disassembled/ converted in CY 2003.
	Process neutron sources up to 5,000 curies/yr. Process neutron sources other than sealed sources.	Processed sources containing approximately 120 Ci in 1998.	Neutron sources are not currently being disassembled and chemically processed.	Neutron sources are not currently being disassembled and chemically processed.	Neutron sources are not currently being disassembled and chemically processed.	Neutron sources are not currently being disassembled and chemically processed. Off-site sources are being recovered from government, industrial, and academic activities, repackaged, and sent to TA-54 for final disposition. No new sources are being processed.	Neutron sources are not currently being disassembled and chemically processed. Off-site sources are being recovered from government, industrial, and academic activities, repackaged, and sent to TA-54 for final disposition. No new sources are being processed.
	Process up to 400 kilograms/yr of actinides.[b] Provide support for dynamic experiments.	Processed approximately 140 kilograms of actinide material in 1998. Supported dynamic experiments. Processed 10 pits through tritium separation at TA-55.	Less than 400 kilograms/yr of actinides were processed. Support was provided for dynamic experiments.	Less than 400 kilograms/yr of actinides were processed. Support was provided for dynamic experiments. Less than 12 pits/yr were processed through tritium separation in 2000.	Less than 400 kilograms/yr of actinides were processed. Support was provided for dynamic experiments.	Less than 400 kilograms/yr of actinides were processed. Support was provided for dynamic experiments.	Fewer than 400 kilograms/yr of actinides were processed in CY 2003. Support was provided for dynamic experiments.

Perform decontamination of 28 to 48 uranium components per month.	Decontaminated/ converted 24 uranium components in 1998.	In 1999, less than 48 uranium components were decontaminated.	In 2000, less than 48 uranium components were decontaminated.	In 2001, less than 48 uranium components were decontaminated.	In 2002, less than 48 uranium components were decontaminated per month.	In 2003, less than 48 uranium components were decontaminated per month.
Research in support of DOE actinide cleanup activities. Stabilize minor quantities of specialty items. Research and development on actinide processing and waste activities at DOE sites, including processing up to 140 kilograms of plutonium as chloride salts from the Rocky Flats Environmental Technology Site.	Research supporting DOE actinide cleanup activities continued at low level. Small quantities of plutonium residues from Rocky Flats were processed.	Research supporting DOE actinide cleanup activities continued at low levels. No plutonium residues from Rocky Flats were processed.	Research supporting DOE actinide cleanup activities continued at low levels. No plutonium residues from Rocky Flats were processed.	Research supporting DOE actinide cleanup activities continued at low levels. No plutonium residues from Rocky Flats were processed.	Research supporting DOE actinide cleanup activities continued at low levels. No plutonium residues from Rocky Flats were processed.	Research supporting DOE actinide cleanup activities continued at low levels. No plutonium residues from Rocky Flats were processed during CY 2003.
Conduct plutonium research and development and support. Prepare, measure, and characterize samples for fundamental research and development in areas such as aging, welding and bonding, coatings, and fire resistance.	Sample preparation and characterization continued.	Sample preparation and characterization continued.	Sample preparation and characterization continued.	Sample preparation and characterization continued.	Sample preparation and characterization continued.	Sample preparation and characterization continued during CY 2003.

	Fabricate and study nuclear fuels used in terrestrial and space reactors. Fabricate and study prototype fuel for lead test assemblies.	Minimal terrestrial and space reactor fuel development occurred in 1998.	Minimal terrestrial and space reactor fuel development occurred in 1999.	Minimal terrestrial and space reactor fuel development occurred in 2000.	Minimal terrestrial and space reactor fuel development occurred in 2001.	The DOE/NE Advanced Fuel Cycle Initiative (AFCI) is fabricating actinide nitride fuels for irradiation in a reactor environment. Lead test assemblies are being considered for the future.	The DOE/NE Advanced Fuel Cycle Initiative (AFCI) is fabricating actinide nitride fuels for irradiation in a reactor environment. Lead test assemblies are being considered for the future. NMT Division is developing fuels for the Generation 4 (Gen 4) reactors. NMT is working with Naval Reactor staff for development of fuel(s) for the Jupiter Icy Moons Orbiter Project (JIMO).
	Develop safeguards instrumentation for plutonium assay.	Continued support of safeguards instrumentation development.	Continued support of safeguards instrumentation development.	Continued support of safeguards instrumentation development.	Continued support of safeguards instrumentation development.	Continued support of safeguards instrumentation development.	Continued support of safeguards instrumentation development during CY 2003.
	Analyze samples in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.	Analysis of actinide samples at TA-55 continued in support of actinide reprocessing and research and development activities.

Fabrication of Ceramic-Based Reactor Fuels	Build mixed oxide test reactor fuel assemblies and continue research and development on fuels.	Manufactured approximately 11 kg of mixed oxide fuel in 1998.	Manufactured approximately 10 kg of mixed oxide fuel in 1999.	No mixed oxide fuel was manufactured in 2000.	No mixed oxide fuel was manufactured in 2001.	AFCI mixed oxide fuels are being fabricated for irradiation testing.	AFCI mixed oxide fuels are being fabricated for irradiation testing.
Plutonium-238 Research, Development, and Applications	Process, evaluate, and test up to 25 kilograms/yr plutonium-238. Recycle residues and blend up to 18 kilograms/yr plutonium-238.	Recovered approximately 0.5 kg and processed approximately 1.5 kg of plutonium-238 in 1998.	Recovered approximately 0.5 kg of plutonium-238 and processed approximately 1.0 kg of plutonium-238 for heat source fuel in 1999.	Recovered approximately 0.65 kilograms of plutonium-238 and processed approximately 0.75 kilograms of plutonium-238 for heat source fuel in 2000.	Recovered approximately 1.1 kilograms of plutonium-238 and processed approximately 0.70 kilograms of plutonium-238 for heat source fuel in 2001.	Recovered approximately 1.5 kilograms of plutonium-238 and processed approximately 2.2 kilograms of plutonium-238 for heat source fuel.	Recovered approximately 2.2 kilograms of plutonium-238 and processed approximately 2.0 kilograms of plutonium-238 for heat source fuel during CY 2003.
Nuclear Materials Storage, Shipping, and Receiving	Store up to 6,600 kilograms SNM in the Nuclear Material Storage Facility; continue to store working inventory in the vault in Building 55-4; ship and receive SNM as needed to support LANL activities.	NMSF not operational as a storage vault. Building 55-4 vault levels remained approximately constant with 1996 levels.	NMSF is not operational as a storage vault and there are no current plans to complete the modifications required to use the facility as a storage vault. Building 55-4 vault levels remained approximately constant with 1996 levels.	Because of changes in plans, the Nuclear Material Storage Facility will not be used for this activity, and SNM storage, shipping, and receiving will continue to be performed at the Plutonium Facility (Building 55-4). Building 55-4 vault levels remained constant at levels identified during preparation of the SWEIS.	Because of changes in plans, the Nuclear Material Storage Facility will not be used for this activity, and SNM storage, shipping, and receiving will continue to be performed at the Plutonium Facility (Building 55-4). Building 55-4 vault levels remained approximately constant at levels identified during preparation of the SWEIS.	Because of changes in plans, the Nuclear Material Storage Facility will not be used for this activity, and SNM storage, shipping, and receiving will continue to be performed at the Plutonium Facility (Building 55-4). Building 55-4 vault levels remained approximately constant at levels identified during preparation of the SWEIS.	Because of changes in plans, the Nuclear Material Storage Facility will not be used for this activity, and SNM storage, shipping, and receiving will continue to be performed at the Plutonium Facility (Building 55-4). Building 55-4 vault levels remained approximately constant at levels identified during preparation of the SWEIS.

	Conduct nondestructive assay on SNM at the Nuclear Material Storage Facility to identify and verify the content of stored containers.	NMSF not operational as a storage vault and was not used for nondestructive assay.	NMSF not operational as a storage vault and was not used for nondestructive assay.	The Nuclear Material Storage Facility is not operational as a storage vault and was not used for nondestructive assay.	The Nuclear Material Storage Facility is not operational as a storage vault and was not used for nondestructive assay.	The Nuclear Material Storage Facility is not operational as a storage vault and was not used for nondestructive assay.	The Nuclear Material Storage Facility is not operational as a storage vault and was not used for nondestructive assay during CY 2003.

a Includes renovation of the Nuclear Material Storage Facility (which is no longer planned for use), construction of new technical support office building, and upgrades to enable the production of nominally 20 war reserve pits per year.

b The actinide activities at the CMR Building and at TA-55 are expected to total 400 kilograms/yr. The future split between these two facilities was not known, so the facility-specific impacts at each facility were conservatively analyzed at this maximum amount. Waste projections that are not specific to the facility (but are related directly to the activities themselves) are only projected for the total of 400 kilograms/yr.

Table 2.1.3-1. Plutonium Complex/Operations Data

Parameter	Units [a]	SWEIS ROD	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Radioactive Air Emissions:								
Plutonium-239 [b]	Ci/yr	2.70E-05	6.20E-08	1.2E-07	2.4E-06	3.2E-08	8.1E-08	1.49E-06
Plutonium-238	Ci/yr	Not projected [c]	Not detected	Not detected	1.1E-07	1.0E-08	1.4E-08	6.14E-08
Americium-241	Ci/yr	Not projected [c]	Not detected	5.4E-08	3.3E-07	6.2E-09	1.6E-08	5.85E-07
Other actinides [d]	Ci/yr	Not projected [c]	Not detected	Not detected	Not detected	3.2E-07	1.2E-07	3.90E-08
Strontium-90/Yttrium-90	Ci/yr	Not projected [c]						5.62E-08
Tritium in Water Vapor	Ci/yr	7.50E+2	4.80E-01	3.1E-01	3.1E-01	7.4E-01	1.6E+0	9.83E+00
Tritium as a Gas	Ci/yr	2.50E+2	1.40E+0	1.45E+0	6.1E+0	2.5E+0	5.9E+01	5.04E+01
Uranium-234 [*]	Ci/yr	Not projected [c]	Not detected	2.0E-08	Not detected	Not detected	6.8E-08	
Uranium-238 [*]	Ci/yr	Not projected [c]	Not detected	5.1E-08	Not detected	Not detected	1.6E-07	
NPDES Discharge [e]								
Number of outfalls	---	1	1	1	1	1	1	
Total Discharge	MGY	14	8.5	8.54	6.4	0.4	2.8	
03A–181 [f]	MGY	14	8.5	8.54	6.4	0.4	2.8	3.02
Wastes:								
Chemical	kg/yr	8,400	10,900	2,539	2,340	11,708	14,243	19,354 [i]
LLW [g]	m^3/yr	754 [h]	242	340	199	326	296.3	392
MLLW [g]	m^3/yr	13 [h]	1.3	4	2	13	3.34	4.1
TRU [g]	m^3/yr	237 [j]	73	94	54	36	40.6	216
Mixed TRU	m^3/yr	102 [j]	17	66	17	30	54.9	78
Number of Workers	FTEs	1,111 [k] 589 [k]	526 [k]	589 [k]	572 [k]	635 [k]	689 [k]	715 [k]

* Uranium 234, 238 not reported in 2003 yearbook.

a Ci/yr = curies per year; MGY = million gallons per year; FTEs = full-time equivalent workers.

b Projections for the SWEIS were reported as plutonium or plutonium-239, the primary material at TA-55.

c The radionuclide was not projected in the SWEIS ROD because it was either dosimetrically insignificant or not isotopically identified.

d These radionuclides include isotopes of thorium and uranium.

e NPDES is National Pollutant Discharge Elimination System.

f This outfall flowed all four quarters during CY 1999, 2000, and 2001.

g LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; TRU = transuranic.

h Includes estimates of waste generated by the facility upgrades associated with pit fabrication.

i SWEIS ROD production was exceeded due to disposition of 9,979 kg of soil contaminated with diesel fuel, 856 kg of waste solutions from experiments, and an additional 371 kg of dirt and rocks contaminated with diesel fuel.

j The SWEIS provided data for TRU and mixed TRU wastes in Chapter 3 and Chapter 5. However, projections made had to be modified to reflect the decision to produce nominally 20 pits per year.

k The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include Protection Technology Los Alamos (PTLA), KBR-SHAW-LATA (KSL), and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.2-1. Tritium Buildings with Nuclear Hazard Classification

Building	Description	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]	LANL 2002 [e]
TA-16-0205 [f]	WETF	2	2	2	2	2	2	2
TA-16-0205A [f]	WETF	2						2
TA-16-0450 [f]	WETF	2						
TA-21-0155	TSTA	2	2	2	2	2	2	2
TA-21-0209	TSFF	2	2	2	2	2	2	2

a DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
b DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
c DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
d DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
e DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)
f In 2002, TA-16-205 and TA-16-205A are nuclear facilities while 450 is not operational with tritium. When the WETF Safety Analysis Report is approved and an operational readiness review is completed, TA-16-205, -205A, and -450 will be considered one facility.

Table 2.2.1-1. Tritium Facilities Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
WETF at TA-16						
Extend the WETF tritium operations into TA-16-450	Significant remodeling of TA-16-450 begun (DOE 1995a).	Remodeling of TA-16-450 continued.	Remodeling of TA-16-450 completed.			
			Upgrade of WETF roof began (DOE 1998b).	WETF roof upgrade completed.		
				Several existing systems upgraded.		
				WETF office building completed (DOE 1998c).		
TSTA and TSFF at TA-21						
		New cooling tower for TSTA (DOE 2000b).				
	Outfalls. 05S, 03A-036, and 04A-091 eliminated from NPDES permit.					
		DOE determined that TSTA mission completed.		TSTA completed limited experimental program.		
					Cross-country transfer line to TA-50 removed.	

Table 2.2.2-1. Tritium Facilities/Comparison of Operations

Capability	SWEIS ROD [a]	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
High-Pressure Gas Fills and Processing: WETF	Handling and processing of tritium gas in quantities of up to 100 grams with no limit on number of operations per year. Capability used approximately 65 times/yr.	Approximately 30 high-pressure gas fills/processing operations.	Approximately 19 high-pressure gas fills/processing operations.	Approximately 25 high-pressure gas fills/processing operations.	Approximately 25 high-pressure gas fills/processing operations.	Approximately 25 high-pressure gas fills/processing operations were conducted in 2002.	Approximately 25 high-pressure fills/processing operations.
Gas Boost System Testing and Development: WETF	System testing and gas processing operations involving quantities of up to 100 grams. Capability used approximately 35 times/yr.	Approximately 25 gas boost tests and operations.	Approximately 14 gas boost tests and operations.	Approximately 10 gas boost tests and operations.	Approximately 30 gas boost tests and operations.	Approximately 20 gas boost tests and operations.	Approximately 20 gas boost tests and operations.
		One cryogenic separation operation.	One cryogenic separation operation.	One cryogenic separation operation.	This capability was disabled at TSTA and will no longer be used. A system to separate hydrogen isotopes using a chromatographic process was tested. The testing did not use tritium.	This capability was disabled at TSTA and will no longer be used.	
Diffusion and Membrane Purification: TSTA, TSFF, WETF	Research on tritium movement and penetration through materials. Expect six to eight experiments/month. Capability also used continuously for hydrogen purification.	Approximately five to eight experiments per month. Capability not used for continuous effluent treatment.	Approximately zero. Capability not used for continuous effluent treatment.	Capability not used in 2000.	Capability not used in 2001.	Capability not used in 2002.	Capability used in 2003.

Metallurgical and Material Research: TSFF, WETF	Capability involves materials research including metal getter research and application studies. Small quantities of tritium support tritium effects and properties research and development. Contributes <2% of LANL's tritium emissions to the environment.	Activities resulted in <1% tritium emissions from each facility.	Activities resulted in <1% tritium emissions from each facility.	Activities resulted in <1% tritium emissions from each facility.	Activities resulted in <1% tritium emissions from each facility.	Activities resulted in <1% tritium emissions from each facility.	Activities resulted in <1% tritium emissions from each facility.
Thin Film Loading: TSFF (WETF by 2001)	Chemical bonding of tritium to thin metal films. Current application is for tritium loading of neutron tube targets; perform loading operations up to 3,000 units/yr. Tritium inventory <1 gram.	Approximately 600 units were loaded. Operations occurred at both TSFF and WETF.	Approximately 600 units were loaded. Operations occurred at TSFF and WETF.	Approximately 600 units were loaded. Operations occurred at TSFF.	Approximately 900 units were loaded. Operations occurred at TSFF.	Approximately 1100 units were loaded. Operations occurred at TSFF.	Approximately 1,500 units were loaded. Operations occurred at TSFF.
Gas Analysis: TSFF, WETF	Analytical support to current capabilities. Operations estimated to contribute <5% of LANL's tritium emissions to the environment.	Gas analysis operations were continued at all three facilities. No changes in facility emissions occurred from this activity.	Gas analysis operations were continued at all three facilities. No changes in facility emissions occurred from this activity.	Gas analysis operations were continued at all three facilities. No changes in facility emissions occurred from this activity.	Gas analysis operations were continued at all three facilities. No changes in facility emissions occurred from this activity.	Gas analysis operations were continued at all three facilities. No changes in facility emissions occurred from this activity.	Gas analysis operations continued at TSFF and WETF during 2003. No changes in facility emissions from this activity.
Calorimetry: TSTA, WETF	This capability provides a measurement method for tritium material accountability. Contained tritium is placed in the calorimeter for quantity measurements. This capability is used frequently, but contributes <2% of LANL's tritium emissions to the environment.	Calorimetry activities were continued at WETF and TSFF. No changes occurred in facility emissions from this activity.	Continues at WETF and TSFF. No changes occurred in facility emissions from this activity.	Continues at WETF and TSFF. No changes occurred in facility emissions from this activity.	Calorimetry activities were conducted at WETF and TSFF. No changes occurred in facility emissions from this activity.	Calorimetry activities were conducted at WETF and TSFF. No changes occurred in facility emissions from this activity.	Calorimetry activities were conducted at WETF only. No changes occurred in facility emissions from this activity.

Tritium Storage and Handling: TSFF and WETF	Storage of tritium occurs in process systems, process samples, inventory for use, and as waste. Onsite storage could increase by a factor of 10 over levels identified during preparation of the SWEIS, with most of the increase occurring at WETF.	The storage at TSTA and TSFF remained constant. The storage at WETF has increased by approximately 10 % over levels identified during preparation of the SWEIS.	The storage at TSTA and TSFF remained constant. The storage at WETF has increased by approximately 10 % over levels identified during preparation of the SWEIS.	The storage at TSTA and TSFF remained constant. The storage at WETF has increased by approximately 10 % over levels identified during preparation of the SWEIS.	The storage at TSTA and TSFF decreased. The storage at WETF has increased by approximately 5% over levels identified during preparation of the SWEIS.	The storage at TSTA and TSFF decreased. The storage at WETF has increased by approximately 5% over levels identified during preparation of the SWEIS.	The storage of tritium at TSFF decreased below 30 grams due to tritium stabilization activities starting in FY04. The storage at WETF has increased by approximately 5% over levels identified during preparation of the SWEIS. Current Authorization Basis approves 1,000 g inventory limit.@ WETF.
Surface Analysis: WETF	Daily use of systems to analyze tritiated materials. This involves small quantities of tritium (<<1 gram).						Starting in FY04
Tritiated Salt Component Fabrication	6 to 12 items per year.						Potential future activity
Hydrogen Isotope Separation: WETF	6 runs per year.						Potential future activity

a Includes the remodel of Building 16-450 to connect it to WETF in support of neutron tube target loading.

Table 2.2.3-1. Tritium Facilities (TA-16 and TA-21)/Operations Data

Parameter	Units	SWEIS ROD	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Radioactive Air Emissions:								
TA-16/WETF, Elemental tritium	Ci/yr	3.0E+2	2.3E+1	2.4E+1	3.9E+1	7.7E+3	3.0E+2	7.58E+01
TA-16/WETF, Tritium in water vapor	Ci/yr	5.0E+2	2.2E+2	1.4E+2	2.2E+2	2.0E+2	1.0E+2	6.02E+01
TA-21/TSTA, Elemental tritium	Ci/yr	1.0E+2	1.3E+1	1.7E+1	2.5E+1	7.1E+0	4.1E+1	1.91E+01
TA-21/TSTA, Tritium in water vapor	Ci/yr	1.0E+2	6.9E+1	4.9E+1	1.5E+2	5.8E+1	4.8E+2	4.42E+02
TA-21/TSFF, Elemental tritium	Ci/yr	6.4E+2	7.3E+1	9.2E+1	2.5E+2	3.1E+1	2.6E+1	3.49E+01
TA-21/TSFF, Tritium in water vapor	Ci/yr	8.6E+2	3.1E+2	3.3E+2	5.1E+2	3.9E+2	5.8E+2	6.84E+02
NPDES Discharge: [a]								
Total Discharges	MGY	0.3	13.7	8.97	8.6	0.3932 [b]	13.4000	19.0250
05S (Sewage Treatment Plant, TA-21)	MGY	0	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
02A-129 (TA-21)	MGY	0.1	13	8.83	7.9	0.3902 [b]	10.8400	18.66
03A-036 (TA-21)	MGY	0	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	
03A-158 (TA-21)	MGY	0.2	0.7	0.14 [c]	0.7	0.00300	2.5600	0.365
04A-091 (TA-16)	MGY	0	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	
Wastes:								
Chemical	kg/yr	1,700	195	30	10	2,65 [d]	5,164 [e]	41
LLW	m^3/yr	480	46	47	49	0	90	109
MLLW	m^3/yr	3	0.1	0	0	0.01	0.8	1.5
TRU	m^3/yr	0	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0	0
Number of Workers	FTEs	123 [f] 28 [f]	31 [f]	28 [f]	24 [f]	25 [f]	20 [f]	19 [f]

a Outfalls eliminated before 1999: 05S (TA-21), 03A-036 (TA-21), 04A-091 (TA-16). Consolidation and removal of outfalls has resulted in projected NPDES volumes underestimating actual discharges from the exiting outfalls.

b Discharge quantity is not considered significantly different from the SWEIS ROD.

c This outfall only discharged two quarters during calendar year 1999.

d During CY 2001, 2,350 kg of the chemical waste is from refrigerant replacement at TA-16-450.

e Over 4,000 kg of the chemical waste in 2002 is from refrigerant replacement at TA-16-450.

f The first number shown in the “SWEIS ROD” column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the “SWEIS ROD” column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the 10-year window represented by the SWEIS ROD.

Table 2.3-1 CMR Buildings with Nuclear Hazard Classification

Building	Description	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]	LANL 2002 [e]
TA-03-0029	CMR	2			2	2	2	2
TA-03-0029	Radiochemistry Hot Cell		2	2	2			
	Actinide chemistry and metallurgy research and analysis					2		
TA-03-0029	SNM Vault		2	2	2			
TA-03-0029	Nondestructive analysis/nondestructive examination Waste Assay		2	2	2			
TA-03-0029	IAEA Classroom [f]			2	2			
TA-03-0029	Wing 9 (Enriched Uranium)		2	2	2			

a DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
b DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
c DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
d DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
e DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)
f The IAEA (International Atomic Energy Agency) Classroom was used to conduct Nonproliferation Training. In CY2001, this capability was moved to Pajarito Site (TA-18) and renamed the “Nuclear Measurement School.” However, the capability was returned to and operated in CMR in CY2002.

Table 2.3.1-1. CMR Building Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification								
	Description of Upgrades/ Modifications	1998 Yearbook	1999 Yearbook [a]	2000 Yearbook [b]	2001 Yearbook	2002 Yearbook	2002 Completion Status of Upgrades	2003 Yearbook	2003 Completion Status of Upgrades
Phase I Upgrades to maintain safe operating conditions for 5-10 years	Phase I Upgrades:	Five of the 11 Phase I Upgrades completed by end of 1998.	Six of the 11 Phase I Upgrades completed by end of 1999.				Phase I Upgrades were re-baselined in 1999.		
	Continuous Air Monitors	95% complete 1. Continuous air monitors in building wings.	95% complete.				Installed, but never became operational.		
	HVAC blowers and motors (Wing 7 only, balance moved to Phase II)	100% complete 2. Heating, ventilation, and air conditioning blowers.					Cancelled; became out of scope.		
	Electrical	80% complete 3. Wing electrical systems.	80% complete, work continuing.				Modified and completed.		
		70% complete 4. Power distribution system.	70% complete, work stopped.				Cancelled.		
	Stack monitors	90% complete 5. Stack monitoring system.	90% complete, work stopped.				Completed; modified.		
	Uninterruptible power supply	100% complete 6. Uninterruptible					Incomplete; out of scope with re-baselining.		

		power supply for stack monitors in wings.					Never turned over.		
	Duct Work Modification	90% complete 7. Interim improvements to the duct washdown system.	90% complete, continuing.				Out of scope with re-baselining.		
	Acid Vents and Drains (Immediate repairs, remaining scope moved to Phase II)	40% complete 8. Improvements to acid vents and drains.	40% complete, work stopped.				Out of scope with re-baselining.		
	Sanitary Sewer	100% complete 9. Modify the sanitary sewer system.					Completed.– plugged drains.		
	Fire Protection (Title 1/Fire Hazard Analysis, remaining scope moved to Phase 2)	100% complete 10. Fire hazard analysis.					Fire Hazard Analysis completed.		
	Engineering Assessment/CDR & EA	100% complete. 11. Engineering assessment and conceptual design.					Completed.		
	Safety Analysis Report	Basis for Interim Operation completed August 1998.					Basis for Interim Operation completed August 1998.		

Phase II Upgrades (except seismic) to enable operations for an additional 20-30 years	Phase II Upgrades:		Progress was made on 3 of the original 13 Phase II Upgrades during 1999.						
	Seismic/Tertiary Confinement						Out of scope with re-baselining.		
	Security Related to Tertiary Confinement						Out of scope with re-baselining.		
	Ventilation/Confinement Zone Separation						Out of scope with re-baselining.		
	Operation Center		25% complete.	0% complete, in design.	80% complete, construction.	100% completed.	Modified; completed.		
	Standby Power/Communications						Modified; completed.		
	Wing 1 HVAC Upgrades (includes Decontamination)						Out of scope with re-baselining.		
	Wing 2 and 4 Safe Standby						Out of scope with re-baselining.		
	Chilled Water Upgrades						Incomplete; out of scope with re-baselining.		
	Main Vault Upgrades						Out of scope with re-baselining.		
	Acid Vent and Drains (beyond Phase I)						Out of scope with re-baselining		
	Fire Protection Upgrades		25% complete.	40% complete, in	100% complete.	100% completed.	Modified; completed.		

				design.					
	Exhaust Wash Down Recycle						Out of scope with re-baselining.		
	Standby Power for Operation Center		100% complete.				Completed.		
	Modifications under Rebaselining								
	Motor Control Centers	Completed.							
	Fire Alarm Control Panels		Completed.						
	Transient Combustible Loading		Completed						
	Air Compressors Replacement			80% complete, in construction.	100% completed.				
	HVAC Delta P Indicators			100% completed.					
	Duct Wash Down System Assessment	Completed.							
	Duct Wash Down System Design and Construction			75% complete, in construction.	100% completed.				
	Stack Monitors FE 14, 19, 20, 23, 24, 28, and 32 (Phase A)			100% completed.					
	Emergency Personnel Accountability System			60% complete, in construction.	95% complete, turnover.	100% completed.			
	Wing 9 Ventilation Assessment		Completed.						
	Ventilation System Filter Replacement Assessment			Completed.					
	Hood Wash Down			65% complete, in construction.	100% completed.				
	Stack Monitors FE 15, 29, and 33 (Phase B)			90% completed.	100% completed.				

	Emergency Lighting			55% complete, in construction.	100% completed.				
	1952 Sprinkler Head replacement			100% completed.					
	Ventilation System Filter Replacement Design and Construction (Wing 9)			45% complete, in design.	100% completed.				
	West Bank Hot Cell Controls/Radiation Monitors			40% complete, in design.	95% complete, turnover.	100% completed.			
	West Bank Hot Cell Delta P Indicators			55% complete, in design.	95% complete, turnover.	100% completed.			
	Fire Protection System			40% complete, in design.	100% complete.	100% completed.			
	Emergency Notification			35% complete, in design.	90% complete, turnover.	100% completed.			
	Operations Center			0% complete, in design.	80% complete, construction.	100% completed.			
	Internal Power Distribution			40% complete, in design.	90% complete, turnover.	100% completed.			
Modifications for production of targets for the molybdenum-99 medical isotope							Incomplete – inactive project.		
Modifications for the recovery of sealed neutron sources							Incomplete – inactive project.		

Modifications for safety testing of pits in the Wing 9 hot cells							Incomplete – inactive project		
	Other/additional modifications:								
	East Bank Hot Cell Controls/Radiation Monitors						Completed.		
	East Bank Hot Cell Delta P Indicators						Completed.		
	Wing 9 Modifications for Bolas Grande						Started.		Started
	Wing 3 Modifications for Bolas Grande						Started.		
	Material recovery in Wing 9						Started.		
	Clean-out of Waste Storage Tanks						Started.		

a During 1999, Phase I and II Upgrades were re-baselined to include only those needed to ensure compliance with the Basis of Interim Operations (BIO).
b Construction disrupted by Cerro Grande Fire.

Table 2.3.2-1. CMR Building (TA-03)/Comparison of Operations

Capability	SWEIS ROD [a]	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Analytical Chemistry	Sample analysis in support of a wide range of actinide research and processing activities. Approximately 7,000 samples/yr.	Approximately 4000 samples were analyzed.	Approximately 2926 samples were analyzed.	Approximately 2,150 samples were analyzed.	Approximately 2,500 samples were analyzed.	Approximately 2,800 samples were analyzed.	Approximately 1,200 samples were analyzed in CY 2003.
Uranium Processing	Activities to recover, process, and store LANL highly enriched uranium inventory by 2005. Includes possible recovery of materials resulting from manufacturing operations.	No activity.	Activities to recover and process highly enriched uranium were performed. Three shipments to Y-12 involved packaging and repackaging.	Activities to recover and process highly enriched uranium were performed. Four to five shipments were made to Y-12.	Highly enriched uranium was repackaged. Five shipments were made to Y-12 at Oak Ridge National Laboratory. Other material was moved to TA-18.	Highly enriched uranium was repackaged. Two batches of solid UNH were converted to U_3O_8. Also 3 batches of UNH liquids were converted to U_3O_8. All items are from TA-18.	During CY 2003, highly enriched uranium (HEU) was processed. One and one-half batches of uranium nitrate hexahydrate (UNH) liquids from TA-18 were converted to uranium oxide (U_3O_8) in CY 2003.
Destructive and Nondestructive Analysis	Evaluate 6 to 10 secondaries/yr through destructive/ nondestructive analyses and disassembly.	Performed nondestructive analysis on two secondaries.	Performed nondestructive analysis on less than 10 secondaries.	No activity. Project is no longer active, and capability was not used in 2000.	No activity. Project is no longer active, and capability was not used in 2001.	No activity. Project is no longer active and capability has not been used since 1999.	No activity. Project is no longer active. Capability has not been used since 1999.
Nonproliferation Training	Nonproliferation training involving SNM. No additional quantities of SNM, but may work with more types of SNM than present during preparation of the SWEIS.	No activity. Project inactive.	Five weeks of SNM nonproliferatio n training conducted. Two weeks involved Category 2 quantities of SNM.	Training was conducted in August 2000. This capability was moved back to TA-18, and no more training is planned at CMR Building because of a change in status.	This capability was moved back to TA-18, and no more training is planned at CMR Building because of a change in status.	This capability returned to CMR and operated at CMR during 2002.	This activity returned to CMR from TA-18 during 2002 and was active in CY 2002 and CY 2003. During CY 2003, four nuclear measurement schools were conducted.

Actinide Research and Processing [b]	Process up to 5,000 Curies/yr plutonium-238/beryllium and americium-241/beryllium neutron sources. Process neutron sources other than sealed sources. Stage up to 1,000 Curies/yr plutonium-238/beryllium and americium-241/beryllium sources in Wing 9 floor holes.	Received a few small-quantity sources. Level well below that projected by the SWEIS ROD.	No source processing activity.	No activity.	No activity.	No activity.	No activity. Mechanical or chemical processing of sources is not allowed in the CMR per the facility Authorization Basis. During CY 2003, sealed sources were brought into Wing 9 for verification of unique identification numbers and were repackaged for eventual shipment to WIPP.
	Introduce research and development effort on spent nuclear fuel related to long-term storage and analyze components in spent and partially spent fuels.	No activity.	No activity.	No activity.	Analyzed approximately 50 samples in 2001.	No Activity.	This project was completed in February 1997 when the final shipment of spent fuel from Omega West Reactor that was in dry storage in Wing 9 was packaged and shipped to Savannah River Site for reprocessing.
	Metallurgical microstructural/ chemical analysis and compatibility testing of actinides and other metals. Primary mission to study long-term aging and other material effects. Characterize about	Metallurgical microstructural/ chemical analysis and compatibility testing of actinides and other metals. Primary mission	Performed microstructural characterizatio n tests on approximately 50 samples. No research and development	Performed microstructural characterization tests on approximately 50 samples containing less than 20 grams of	Performed microstructural characterizatio n tests on approximately 200 samples containing less than 20 grams	Performed microstructural characterization tests on approximately 200 samples containing less than 20 grams of	No activity.

	100 samples/yr. Conduct research and development in hot cells on pits exposed to high temperatures.	to study long-term aging and other material effects. Characterize about 100 samples/yr. Conduct research and development in hot cells on pits exposed to high temperatures.	on pits exposed to high temperatures.	plutonium per sample. No research and development on pits exposed to high temperatures.	of plutonium per sample.	plutonium per sample.	
	Analysis of TRU waste disposal related to validation of the Waste Isolation Pilot Plant (WIPP) performance assessment models. TRU waste characterization. Analysis of gas generation such as could occur in TRU waste during transportation to WIPP. Performance Demonstration Program to test nondestructive analysis/nondestructive examination equipment. Demonstrate actinide decontamination technology for soils and materials. Develop actinide precipitation method to reduce mixed wastes in LANL effluents.	No decontamination technology activity. Studies on TRU waste and WIPP performance assessment models ongoing.	Final analysis conducted on experiments.	Decontamination performed on 15 drum scales, and decontamination was started on 34 liter drum scales. This operation is expected to terminate in 2001.	This is no longer an ongoing program.	No Activity. Project terminated.	Project was completed in CY 2001.

Fabrication and Metallography	Produce 1,080 targets/yr, each containing approximately 20 grams uranium-235, for the production of molybdenum-99, plus an additional 20 targets/wk for 12 weeks. Separate fission products from irradiated targets to provide molybdenum-99. Ability to produce 3,000 six-day curies of molybdenum-99/wk.[c]	Coated approximately 300 targets for molybdenum-99.	No work performed.	No activity. Project was terminated.	No activity. Project was terminated.	No activity. Project was terminated.	Project was terminated in CY 1999.
	Support complete highly enriched uranium processing, research and development, pilot operations, and casting. Fabricate metal shapes, including up to 50 sets of highly enriched uranium components, using 1 to 10 kilograms highly enriched uranium per operation. Material recovered and retained in inventory. Up to 1,000 kilograms annual throughput.	No activity.	No activity.	No activity.	No activity.	No activity.	Process activity was never initiated on this project; during CY 2003, highly enriched uranium (HEU) project equipment was removed from Wing 9 in preparation for the Bolas Grande Project.

a Includes completion of Phase I and Phase II Upgrades, except for seismic upgrades, modifications for the fabrication of molybdenum-99 (Mo-99) targets, modifications for the Radioactive Source Recovery Program, and modification for safety testing of pits.

b The actinide activities at the CMR Building and at TA-55 are expected to total 400 kilograms/yr. The future split between these two facilities is not known, so the facility-specific impacts at each facility are conservatively analyzed at this maximum amount. Waste projections, which are not specific to the facility (but are related directly to the activities themselves), are only projected for the total of 400 kilograms/yr.

c Mo-99 is a radioactive isotope that decays to form metastable technicium-99, a radioactive isotope that has broad applications in medical diagnostic procedures. Both isotopes are short-lived, with half-lives (the time in which the quantity of the isotope is reduced by 50 percent) of 66 hours and 6 hours, respectively. These short half-lives make these isotopes both attractive for medical use (minimizes the radiation dose received by the patient) and highly perishable. Production of these isotopes is therefore measured in "six-day curies," the amount of radioactivity remaining after six days of decay, which is the time required to produce and deliver the isotope to hospitals and other medical institutions.

Table 2.3.3-1. CMR Building (TA-03)/Operations Data

Parameter	Units	SWEIS ROD	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Radioactive Air Emissions:								
Total Actinides[a]	Ci/yr	7.60E-4	2.62E-5	3.0E-5	1.0E-5	5.9E-8	2.7E-5	1.12E-05
Selenium-75 [*]	Ci/yr	Not projected	6.66E-6	Not detected	Not detected	Not detected	Not detected	
Strontium-90/ Yttrium-90	Ci-yr	Not projected [b]						2.10E-07
Krypton-85	Ci/yr	1.00E+2	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]
Xenon-131m	Ci/yr	4.50E+1	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]
Xenon-133	Ci/yr	1.50E+3	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]
Tritium Water	Ci/yr	Negligible	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]
Tritium Gas	Ci/yr	Negligible	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]
Technetium-99	Ci/yr	Not projected [c]	Not measured [b]	9.2E-4	Not measured [b]	Not measured [b]	Not measured [b]	
NPDES Discharge:								
Number of outfalls	---	1	1	1	1	1	1	
Total Discharge	MGY	0.53	3.2	4.45	2.28	0.02090	0.76	
03A–021 [d]	MGY	0.53	3.2	4.45	2.28	0.02090	0.76	2.1626
Wastes:								
Chemical	kg/yr	10,800	3,313	4,824	1,837	676	707	1.651
LLW [e]	m^3/yr	1,820	124	184	264	448	389	423
MLLW	m^3/yr	19	3.2	0.4	0.3	0.4	0.9	4.7
TRU	m^3/yr	28 [f]	12.2	8.9	24.8	46.5	10.2	7.9
Mixed TRU	m^3/yr	13 [f]	15.8	1.9	1	080	16.7	11.5
Number of Workers	FTEs	367 [g] 204 [g]	218 [g]	204 [g]	190 [g]	192 [g]	201 [g]	198 [g]

* Selenium-75 not in 2003 yearbook.

a Includes uranium, plutonium, americium, and thorium.

b Potential emissions during the period were sufficiently small that measurement of these radionuclides was not necessary to meet facility or regulatory requirements.

c The radionuclide was not projected in the SWEIS ROD because it was either dosimetrically insignificant or not isotopically identified.

d This outfall discharged all four quarters during calendar year 1999.

e Wastes (e.g., 4000 m^3 LLW) from the Phase II CMR Upgrades are included.

f The SWEIS provided the data for TRU and mixed TRU wastes in Chapter 3 and Chapter 5. However, the projections made had to be modified to reflect the decision to produce nominally 20 pits per year.

g The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.4-1. Pajarito Site Buildings with Nuclear Hazard Classification

Building	Description	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]	LANL 2002 [e]
TA-18	Site Itself		2	2	2	2	2	2
TA-18-0023	SNM Vault (CASA 1)	2	2	2	2	2		
TA-18-0026	Hillside Vault	2	2	2	2	2		
TA-18-0032	SNM Vault (CASA 2)	2	2	2	2	2		
TA-18-0116	Assembly Building (CASA 3)	2	2	2	2	2		
TA-18-0127	Accelerator used for weapons x-ray		2	2	2	2		
TA-18-0129	Calibration Laboratory		2	2	2	2		
TA-18-0247	Sealed Sources		3	3				
TA-18-0258	IAEA Classroom (Trailer) [f]		2					

a DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
b DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
c DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
d DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
e DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)
f The IAEA (International Atomic Energy Agency) Classroom was used to conduct Nonproliferation Training. In CY2001, this capability was moved to Pajarito Site (TA-18) and renamed the “Nuclear Measurement School.” However, the capability was returned to and operated in CMR in CY2002.

Table 2.4.1-1. Pajarito Site Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Replacement of the portable linear accelerator (linac)	Not done.	Not done	Not done.	Not done.	Not done.	Has not been performed.
				Installation of two office trailers (Buildings 300 and 301).		
				Security enhancements.		
					Cable tray relocation (DOE 2001a).	

Table 2.4.2-1. Pajarito Site (TA-18)/Comparison of Operations

Capabilities	SWEIS ROD [a]	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Dosimeter Assessment and Calibration	Perform up to 1,050 criticality experiments per year.	Performed 54 experiments.	Performed 188 experiments.	Performed 140 experiments.	Performed 140 experiments.	Performed 160 experiments.	Performed 164 criticality experiments.
Detector Development	Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%, and replace portable linac.	Same activities as in 1995. Increased nuclear materials inventory by 5%. Did not replace the portable linac.	Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999. Did not replace the portable linac.	Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999, and a 15% increase in 2000. Did not replace the portable linac.	The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory. Did not replace the portable linac.	The nuclear materials inventory for 2002 was approximately the same as the 2001 inventory. Did not replace the portable linac.	The nuclear materials inventory for 2003 was approximately the same as the 2002 inventory. The portable linac was not replaced.
Materials Testing	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing.	Performed 54 experiments.	Performed 188 experiments.	Performed 140 experiments.	Performed 140 experiments.	Performed 160 experiments.	Performed 164 criticality experiments.
Subcritical Measurements	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%.	Performed 54 experiments. Increased nuclear materials inventory by 5%.	Performed 188 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999.	Performed 140 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999, and a 15% increase in 2000. The SKUA critical assembly	Performed 140 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory. The SKUA critical assembly was de-fueled at DOE's request	Performed 160 experiments. The nuclear materials inventory for 2002 was approximately the same as the 2001 inventory. The SKUA critical assembly was	Performed 164 experiments. The nuclear materials inventory for 2003 was approximately the same as the 2002 inventory. The SKUA critical assembly was defueled at DOE's request

				was de-fueled at DOE's request and is no longer available for criticality experiments.	and is no longer available for criticality experiments.	de-fueled at DOE's request and is no longer available for criticality experiments. All expected SKUA material shipments will be completed by May 2003.	and is no longer available for criticality experiments. All expected SKUA material shipments were completed by May 2003.
Fast-Neutron Spectrum	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%, and increase nuclear weapons components and materials.	Performed 54 experiments. Increased nuclear materials inventory by 5%. Slight increase in nuclear weapons components and materials.	Performed 188 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999. Slight increase in nuclear weapons components and materials in 1998, no additional increase in 1999.	Performed 140 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999, and a 15% increase in 2000. Slight increase in nuclear weapons components and materials in 1998, no additional increase in 1999.	Performed 140 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory. Slight increase in nuclear weapons components and materials in 1998, no additional increase in 1999 through 2001.	Performed 160 experiments. The nuclear materials inventory for 2002 was approximately the same as the 2001 inventory. Significant decrease in nuclear weapons components and materials in 1999 and 2002, no additional increase in 1999 through 2002.	Performed 164 experiments. The nuclear materials inventory for 2003 was approximately the same as the 2002 inventory.
Dynamic Measurements	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing.	Performed 54 experiments. Increased nuclear materials inventory by 5%.	Performed 188 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999.	Performed 140 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999, and a 15% increase in 2000.	Performed 140 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory.	Performed 160 experiments. The nuclear materials inventory for 2002 was decreased by 10%.	Performed 154 experiments. The nuclear materials inventory for 2002 was decreased by 10%.

	Increase nuclear materials inventory by 20%.						
Skyshine Measurements	Perform up to 1,050 criticality experiments per year.	Performed 54 experiments.	Performed 188 experiments.	Performed 140 experiments.	Performed 140 experiments.	Performed 160 experiments.	Performed 164 experiments.
Vaporization	Perform up to 1,050 criticality experiments per year.	Performed 54 experiments.	Performed 188 experiments.	Performed 140 experiments.	Performed 140 experiments.	Performed 160 experiments.	Performed 164 experiments.
Irradiation	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, interrogation techniques, and field systems. Increase nuclear materials inventory by 20%.	Performed 54 experiments. Increased nuclear materials inventory by 5%.	Performed 188 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999.	Performed 140 experiments. Increased nuclear materials inventory by 5% in 1998, no additional increase in 1999, and a 15% increase in 2000.	Performed 140 experiments. The nuclear materials inventory for 2001 was approximately the same as the 2000 inventory.	Performed 160 experiments. The nuclear materials inventory for 2002 was approximately the same as the 2001 inventory.	Performed 164 experiments. The nuclear materials inventory for 2003 was approximately the same as the 2002 inventory.
Nuclear Measurement School (relocated from CMR and renamed. At CMR it was called “Nonproliferation Training”).	Not in SWEIS ROD (was located in CMR). IAEA schools are at CMR				This capability was located at TA-18 in years past, but had been moved to CMR. In the effort to reduce the CMR Building to a Category 3 nuclear facility, these operations were moved back to TA-18, necessitating the transfer of additional nuclear material to the facility for use in the classes.	This capability returned to CMR and operated at CMR during 2002.	The IAEA schools were returned to CMR in 2002. All other schools remain at TA-18.

a Includes replacement of the portable linac.

Table 2.4.3-1. Pajarito Site (TA-18)/Operations Data

Parameter	Units	SWEIS ROD	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Radioactive Air Emissions Argon-41 [a]	Ci/yr	1.02E+2	1.8E-1	4.9E-1	8.0E-1	2.9E-1	1.6E-1	1.0
External Penetrating Radiation	mrem/yr [b]	28.5 [c]	3	2.6	2.5	4.2	1.0	2.6
NPDES Discharge	MGY	No Outfalls	No Outfalls	No Outfalls	No Outfalls	No Outfalls	No Outfalls	No Outfalls
Wastes:								
Chemical	kg/yr	4,000	3,127	1,707	127	91	82	28
LLW	m^3/yr	145	4	31.3	14	13	0	10
MLLW	m^3/yr	1.5	0.3	7.9 [d]	0	0	0	0
TRU	m^3/yr	0	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0	0
Number of Workers	FTEs	95 [e] 70 [e]	65 [e]	70 [e]	73 [e]	73 [e]	78 [e]	41 [e]

a These values are not stack emissions. The SWEIS ROD projections are from Monte Carlo modeling. Values are from the first 394-foot (120-meter) radius. Other isotopes (nitrogen-13 and oxygen-15) are not shown because of very short half-lives.

b mrem/yr = millirem per year.

c Page 5-116, Section 5.3.6.1, "Public Health," of the SWEIS.

d The 7.9 cubic meters of MLLW in CY 2000 were generated as a result of maintenance activities.

e The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.5-1. Sigma Buildings with Nuclear Hazard Classification

Building	Description	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]	LANL 2002 [e]
TA-03-0066	44 metric tons of depleted uranium storage	3	3	3				
TA-03-0159	thorium storage	3	3					

a DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
b DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
c DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
d DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
e DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

Table 2.5.1-1. Sigma Complex Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Sigma Building Upgrades						
• Replacement of graphite collection systems	Completed in 1998.					
• Modification of the industrial drain system	Completed in 1998.					
• Replacement of electrical components	Worked on.	Worked on.	Completed.	Additional work being done.	Additional work being done.	Additional work will continue.
• Roof replacement	Worked on; largely completed.				Additional work needed.	Additional work needed.
• Seismic upgrades	Not started.	Not started.	Not started.	Not started.	Not started.	Not started.
Beryllium Technology Facility	D&D and reconfiguration from Rolling Mill Building (DOE 1993a).	Reconfiguration completed.	Beryllium equipment moved in stages from Building 03-39.	DOE authorization to begin operations.		HVAC and locker room upgrades complete.

Table 2.5.2-1. Sigma Complex (TA-03)/Comparison of Operations

Capability	SWEIS ROD [a]	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Research and Development on Materials Fabrication, Coating, Joining, and Processing	Maintain and enhance capability to fabricate items from metals, ceramics, salts, beryllium, enriched uranium, depleted uranium, and other uranium isotope mixtures including casting, forming, machining, polishing, coating, and joining.	Capability maintained and enhanced, as projected.	Capability maintained and enhanced, as projected.	Capability maintained and enhanced, as projected.	Capability maintained and enhanced, as projected.	Capability maintained and enhanced, as projected.	Capability maintained and enhanced, as projected.
Characterization of Materials	Maintain and enhance research and development activities on properties of ceramics, oxides, silicides, composites, and high-temperature materials. Characterize components for accelerator production of tritium.	Modest increase in research and development. Totals of 255 assignments and 1,200 specimens were characterized.	Modest increase in research and development. Totals of 248 assignments and 1,300 specimens were characterized.	Totals of 227 assignments and 1,070 specimens were characterized.	Totals of 184 assignments and 961 specimens were characterized.	Totals of 153 assignments and 759 specimens were characterized.	Totals of 153 assignments and 759 specimens were characterized.
	Analyze up to 36 tritium reservoirs/yr.	Total of 36 tritium reservoirs analyzed.	Less than 36 tritium reservoirs analyzed.	Total of 3 tritium reservoirs analyzed.	Activity transferred to TFF (See Table 2.7.2-1.) [b]	Activity transferred to TFF (See Table 2.7.2-1.) [b]	Activity transferred to TFF (See Table 2.7.2-1.) [b]
	Develop library of aged non-SNM materials from stockpiled weapons and develop techniques to test and predict changes. Store and characterize up to 2,500 non-SNM component samples, including uranium.	Less than 2,500 non-SNM component samples, including uranium, stored in library.	Approximately 500 non-SNM materials samples and 500 non-SNM component samples stored in library.	Approximately 1,000 non-SNM materials samples and 1,000 non-SNM component samples stored in library.	Approximately 500 non-SNM materials samples and 500 non-SNM component samples stored in library.	Approximately 500 non-SNM materials samples and 500 non-SNM component samples stored in library.	Approximately 1,250 non-SNM materials samples and 1,250 non-SNM component samples stored in library.
Fabrication of Metallic and Ceramic Items	Fabricate stainless steel and beryllium components for about 80 pits/yr.	Fabricated two development pits from existing components.	No development pits fabricated.	No development pits fabricated.	No development pits fabricated.	No development pits fabricated.	Fabricated approximately 66 stainless steel and beryllium pit components.
	Fabricate up to 200 tritium reservoirs per year.	Total of 36 reservoirs fabricated.	Less than 200 reservoirs fabricated.	Less than 25 reservoirs fabricated.	Less than 25 reservoirs fabricated.	Less than 25 reservoirs fabricated.	Less than 25 reservoirs fabricated.

	Fabricate components for up to 50 secondaries per year.	Evaluated less than 50 components. Fabricated 10 secondaries.	Fabricated components for less than 50 secondaries.	Fabricated components for less than 50 secondaries.	Fabricated components for less than 50 secondaries.	Fabricated components for less than 50 secondaries.	Fabricated components for less than 50 secondaries.
	Fabricate nonnuclear components for research and development: about 100 major hydrotests and 50 joint test assemblies/yr.	Fabricated components for less than 100 major hydrotests and for less than 50 joint test assemblies.	Fabricated components for less than 100 major hydrotests and for less than 50 joint test assemblies.	Fabricated components for less than 100 major hydrotests and for less than 50 joint test assemblies.	Fabricated components for less than 100 major hydrotests and for less than 50 joint test assemblies.	Fabricated components for less than 100 major hydrotests and for less than 50 joint test assemblies.	Fabricated components for less than 100 major hydrotests and for less than 50 joint test assemblies.
	Fabricate beryllium targets.	None produced.	None produced.	None produced.	Provided material for the production of Inertial Confinement Fusion targets but did not fabricate any targets.	Provided material for the production of Inertial Confinement Fusion targets but did not fabricate any targets.	Provided material for the production of Inertial Confinement Fusion targets but did not fabricate any targets.
	Fabricate targets and other components for accelerator production of tritium research.	One radio-frequency cavity produced.	Three radio-frequency cavities were produced.	Seven radio-frequency cavities were polished. None were produced.	Two radio-frequency cavities were polished. None were produced.	Six radio-frequency cavities were polished. None were produced.	
	Fabricate test storage containers for nuclear materials stabilization.	None produced.	None produced.	None produced.	Produced 50 containers.	Produced 50 containers.	Produced approximately 50 containers
	Fabricate nonnuclear (stainless steel and beryllium) components for up to 20 pit rebuilds/yr.	None produced.	Fabricated nonnuclear (stainless steel and beryllium) components for up to 20 pit rebuilds/yr.	Less than 10 stainless steel, and no beryllium, components produced.	Less than 10 stainless steel, and no beryllium, components produced.	Less than 10 stainless steel, and no beryllium, components produced.	Fabricated 3- stainless steel and beryllium components.

a Includes Sigma Building renovation and modifications for Beryllium Technology Facility.
b The SWEIS indicated that this activity would also be accomplished at TFF.

Table 2.5.3-1. Sigma Complex (TA-03)/Operations Data

Parameter	Units	SWEIS ROD	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Operations	2003 Operations
Radioactive Air Emissions: [a]								
Americium-241 [*]	Ci/yr	Not projected [b]	9.30E-09	Not detected [a]	Not Measured [c]	Not Measured [c]	Not Measured [c]	
Uranium-234	Ci/yr	6.60E-5	1.30E-09	1.2E-06	Not Measured [c]	Not Measured [c]	Not Measured [c]	Not Measured [c]
Uranium-235 [*]	Ci/yr	Not projected [b]	Not detected	4.5E-08	Not Measured [c]	Not Measured [c]	Not Measured [c]	
Uranium-238	Ci/yr	1.80E-3	6.20E-09	1.3E-08	Not Measured [c]	Not Measured [c]	Not Measured [c]	Not Measured [c]
Thorium-230 [*]	Ci/yr	Not projected [b]	Not detected	6.4E-09	Not Measured [c]	Not Measured [c]	Not Measured [c]	
NPDES Discharge:								
Total Discharges	MGY	7.3	12.7	5.77	3.9	0.05	2.0040	7.619
03A–022	MGY	4.4	12.7	5.77	3.9 [d]	0.05	2.0040	7.619
03A–024	MGY	2.9	No discharge	No discharge	0	0	0	0
Wastes:								
Chemical	kg/yr	10,000	22,489	3,208	3,672	1,265	32,397 [e]	878
LLW	m^3/yr	960	3	61	52	0.5	202	124
MLLW	m^3/yr	4	0	0.3	0	1.3	0	0
TRU	m^3/yr	0	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0	0
Number of Workers	FTEs	284 [f] 101 [f]	110 [f]	101 [f]	99 [f]	94 [f]	105 [f]	106 [f]

* Not listed in 2003 yearbook.

a During 1999, only emissions from TA-3-35 were measured using stack sampling. Potential emissions from other Sigma facilities were sufficiently small that measurement systems were not necessary to meet regulatory or facility requirements.

b The radionuclide was not projected in the SWEIS ROD because it was either dosimetrically insignificant or not isotopically identified.

c Stack monitoring at Sigma was discontinued early in 2000. This decision was made because the potential emissions from the monitored stack were sufficiently low that stack monitoring was no longer warranted for compliance with Environmental Protection Agency (EPA) or DOE regulations. Therefore, no emissions from monitoring data are available.

d This outfall flowed all four quarters during calendar year 2000.

e A significant difference in the amount of chemical waste generated from that projected in the SWEIS is due to structure rehabilitation and disposal of equipment and other material debris resulting from bringing the Press Building back on-line.

f The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

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Table 2.6.1-1. Materials Science Laboratory Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook [a]	2001 Yearbook	2002 Yearbook	2003 Yearbook
Completion of top floor of MSL	Unscheduled and not funded.	Unscheduled and not funded.	Unscheduled and not funded.	Unscheduled and not funded.	Unscheduled and not funded.	Completion of top floor of MSL remains unscheduled and unfunded. Construction of MST Office Building was initiated.

Table 2.6.2-1. Materials Science Laboratory (TA-03)/Comparison of Operations

Capability	SWEIS ROD [a]	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Materials Processing	Maintain seven research capabilities at levels identified during preparation of the SWEIS: • Wet chemistry • Thermomechanical processing • Microwave processing • Heavy equipment materials • Single crystal growth • Amorphous alloys • Powder processing Expand materials synthesis/processing to develop cold mock-up of weapons assembly and processing. Expand materials synthesis/processing to develop environmental and waste technologies.	Unlike projections, microwave processing was not performed, and materials synthesis/processing was not expanded. The other five capabilities were maintained as projected by the SWEIS ROD.	These capabilities were maintained as projected by the SWEIS ROD.	These capabilities were maintained as projected by the SWEIS ROD.	These capabilities were maintained as projected by the SWEIS ROD.	These capabilities were maintained as projected by the SWEIS ROD.	These capabilities were maintained as projected by the SWEIS ROD. Single crystal growth, amorphous alloy research and powder processing were expanded in CY 2003. Materials characterization capacity was expanded upon. Cold mock up of weapons assembly and processing as well as other technologies continued to be expanded in CY 2003.
Mechanical Behavior in Extreme Environment	Maintain two research capabilities at levels identified during preparation of the SWEIS: • Mechanical testing • Fabrication and assembly Expand dynamic testing to include research and development for the aging of weapons materials. Develop a new research capability (machining technology).	Mechanical testing was maintained as projected, and dynamic testing was expanded as projected. Fabrication and assembly was not performed, however. A new research capability was developed for research into materials failure and fracture.	Mechanical testing was maintained as projected. Research into materials failure and fracture continued.	Mechanical testing was maintained as projected. Research into materials failure and fracture continued.	Items were maintained and processes improved. New capabilities development and process improvement is an ongoing effort.	Items were maintained and processes improved. New capabilities development and process improvement is an ongoing effort.	These two capabilities were maintained as projected by the SWEIS ROD and additional capabilities continued to be expanded as projected by the SWEIS ROD. Fabrication assembly and prototype experiments were expanded in CY 2003. Improvements were accomplished in the conduct of dynamic

							load and crack testing and measurement.
Advanced Materials Development	Maintain four research capabilities at levels identified during preparation of the SWEIS: • New materials • Synthesis and characterization • Ceramics • Superconductors	Three capabilities were maintained as projected by the SWEIS ROD. Synthesis and characterization was not performed, however.	This capability was maintained as projected by the SWEIS ROD.	This capability was maintained as projected by the SWEIS ROD.	This capability was maintained as projected by the SWEIS ROD.	This capability was maintained as projected by the SWEIS ROD.	Capability was maintained as projected and improved. Capability for ion beam modification of materials was increased. Superconductivity capability has been expanded to include: 1) Electron Beam Deposition and 2) Performance measurement capabilities including atomic force microscopy.
Materials Characterization	Maintain four research capabilities at levels identified during preparation of the SWEIS: • Surface science chemistry • X-ray • Optical metallography • Spectroscopy Expand corrosion characterization to develop surface modification technology. Expand electron microscopy to develop plasma source ion implantation.	As projected in the SWEIS ROD, four capabilities were maintained at 1995 levels, and corrosion characterization was expanded to develop surface modification technology. Electron microscopy was also expanded, but plasma source ion implantation was not developed.	Materials characterization continued to be maintained.	Materials characterization continued to be maintained.	These processes are expanded and improved upon on a continual basis.	These processes are expanded and improved upon on a continual basis.	Improvements occur on a continual basis including: Electron microscopy expanding to include atomic scale microscopy. X-ray capabilities were improved upon.

a Includes completion of the second floor of MSL.

Table 2.6.3-1. Materials Science Laboratory (TA-03)/Operations Data

Parameter	Units	SWEIS ROD	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Radioactive Air Emissions	Ci/yr	Negligible	Not Measured [a]	Not Measured [a]	Not Measured [a]	Not Measured [a]	Not Measured [a]	Not Measured [a]
NPDES Discharge Volume	MGY	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls
Wastes:								
Chemical	kg/yr	600	244	154	881	255	149	196
LLW	m^3/yr	0	0	0	0	0	0	0
MLLW	m^3/yr	0	0	0	0	0	0	0
TRU	m^3/yr	0	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0	0
Number of Workers	FTEs	82 [b] 57 [b]	57 [b]	57 [b]	59 [b]	60 [b]	61 [b]	52 [b]

a Potential emissions during the period were sufficiently small that measurements of these radionuclides was not necessary to meet facility or regulatory requirements.

b The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.7.1-1. Target Fabrication Facility Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook [a]	2001 Yearbook	2002 Yearbook	2003 Yearbook
No changes through 2005	Outfall 04A-127 eliminated with sewage rerouting to TA-46 (DOE 1996f).					No significant facility additions or modifications. The SWEIS ROD did not project any facility changes through 2005.

Table 2.7.2-1. Target Fabrication Facility (TA-35)/Comparison of Operations

Capability	SWEIS ROD	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Precision Machining and Target Fabrication	Provide targets and specialized components for ~ 6,100 laser and physics tests/yr, including a 20% increase over levels identified during preparation of the SWEIS for high-explosive pulsed-power target operations, and including ~ 100 high-energy-density physics tests.	Provided targets and specialized components for ~ 1,200 tests. Supported high-explosive pulsed-power tests at 1995 levels. Supported ~ 25 high-energy-density physics tests.	Provided targets and specialized components for ~ 1,200 tests. Supported high-explosive pulsed-power tests at 1995 levels. Supported ~ 25 high-energy-density physics tests.	Provided targets and specialized components for ~ 1,300 tests. Supported high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; supported ~ 7 high-energy-density physics tests.	Provided targets and specialized components for ~ 1,600 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical high energy density hydrodynamics. Supported ~ 7 high-energy-density physics tests.	Provided targets and specialized components for ~ 1,600 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical high energy density hydrodynamics. Supported ~ 18 high-energy-density physics tests.	Provided targets and specialized components for about 800 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS. In addition, did not do any high-energy density physics tests.
Polymer Synthesis	Produce polymers for targets and specialized components for ~ 6,100 laser and physics tests/yr, including a 20% increase over levels identified during preparation of the SWEIS for high-explosive pulsed-power target operations, and including ~100 high-energy-density physics tests.	Produced polymers for targets and specialized components for ~600 tests. Supported high-explosive pulsed-power tests at 1995 levels. Supported ~15 high-energy-density physics tests.	Produced polymers for targets and specialized components for ~600 tests. Supported high-explosive pulsed-power tests at 1995 levels. Supported ~20 high-energy-density physics tests.	Produced polymers for targets and specialized components for ~600 tests. Support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; supported ~7 high-energy-density physics tests.	Produced polymers for targets and specialized components for ~800 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical high energy density hydrodynamics. Supported ~7 high-energy-density physics tests.	Produced polymers for targets and specialized components for ~800 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical high energy density hydrodynamics. Supported ~18 high-energy-density physics tests.	Produced polymers for targets and specialized components for about 400 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS. Supported no high-energy density physics tests.
Chemical and Physical Vapor Deposition	Coat targets and specialized	Coated targets and specialized	Coated targets and specialized	Coated targets and specialized	Coated targets and specialized components	Coated targets and specialized components	Coated targets and specialized

	components for ~ 6,100 laser and physics tests/yr, including a 20% increase over levels identified during preparation of the SWEIS for high-explosive pulsed-power target operations, including ~ 100 high-energy-density physics tests, and including support for pit rebuild operations at twice the levels identified during preparation of the SWEIS.	components for ~600 tests. Supported high-explosive pulsed-power tests at 1995 levels. Supported ~25 high-energy-density physics tests. Provided no support for pit rebuild operations.	components for ~600 tests. Supported high-explosive pulsed-power tests at 1995 levels. Supported ~25 high-energy-density physics tests. Provided coatings for pit rebuild operations.	components for ~600 tests. Supported high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; supported ~7 high-energy-density physics tests. Provided coatings for pit rebuild operations.	for ~800 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical high energy density hydrodynamics. Supported ~7 high-energy-density physics tests. Provided coatings for pit rebuild operations.	for ~800 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS; however, did support electrical high energy density hydrodynamics. Supported ~18 high-energy-density physics tests. Provided coatings for pit rebuild operations.	components for about 400 tests. Did not support high-explosive pulsed-power tests at levels identified during preparation of the SWEIS. Supported no high-energy density physics tests.
Characterization of Materials [a]	Analyze up to 36 tritium reservoirs/yr. [a]				Less than 36 tritium reservoirs analyzed	Less than 36 tritium reservoirs analyzed	No tritium reservoirs analyzed.

a The SWEIS indicated that this activity would be accomplished at TFF as well as the Sigma Complex. See Table 2.5.2-1.

Table 2.7.3-1. Target Fabrication Facility (TA-35)/Operations Data

Parameter	Units	SWEIS ROD	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Operations
Radiological Air Emissions	Ci/yr	Negligible	Not Measured	Not Measured [a]	Not Measured [b]	Not Measured [b]	Not Measured [b]	Not Measured [b]
NPDES Discharge:								
4A-127	MGY	0	Eliminated [c]	Eliminated [c]	Eliminated [c]	Eliminated [c]	Eliminated [c]	Eliminated [c]
Wastes:								
Chemical	kg/yr	3,800	2,830	595	1,062	668	904	1,311
LLW	m^3/yr	10	0	0	0	0.2	0.4	0
MLLW	m^3/yr	0.4	0	0	0	0	0	0
TRU	m^3/yr	0	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0	0
Number of Workers	FTEs	98 [d] 54 [d]	57 [d]	54 [d]	52 [d]	54 [d]	53 [d]	49 [d]

a Potential emissions during 1999 were sufficiently small that measurement systems were not necessary to meet regulatory or facility requirements.

b The emissions continue to be sufficiently low that monitoring is not required.

c Outfall eliminated before 1999: 04A-127 (TA-35).

d The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.8.1-1. Machine Shops Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
No new construction or modifications projected	Building 03-39, Room 26 became central weapons information center (DOE 1996f).					Depleted uranium was added to materials compatibility study. Controlled storage areas in support of weapons program added to TA-03-39.
	Upgraded and replaced ventilation system in Building 03-102 (LANL 1996a)					
	Waste machine coolant volume reduction at Building 03-39 (LANL 1998b)					
		Re-roofed Building 03-39 (LANL 1998c).				
		Electrical upgrades at Building 03-102 (LANL 1998d).				
			Beryllium equipment moved to Beryllium Technology Facility from Building 03-39.	Beryllium equipment moved to Beryllium Technology Facility from Building 03-39.		
				Security container fire and lighting upgrades at Buildings 03-39 and 03-102 (LANL 2001n).		
					Duplicate TA-03-66 heat treating capability at Building 03-102 (LANL 2002f).	

Table 2.8.2-1. Machine Shops (TA-03)/Comparison of Operations

Capability	SWEIS ROD	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Fabrication of Specialty Components	Provide fabrication support for the dynamic experiments program and explosives research studies. Support up to 100 hydrodynamic tests/yr. Manufacture up to 50 joint test assembly sets/yr. Provide general laboratory fabrication support as requested.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.	Specialty components were fabricated at levels below those projected by the SWEIS ROD.
Fabrication Utilizing Unique Materials	Continue fabrication utilizing unique and unusual materials.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.	Fabrication with unique materials was conducted at levels below those projected by the SWEIS ROD.
Dimensional Inspection of Fabricated Components	Provide appropriate dimensional inspection of above fabrication activities. Undertake additional types of measurements and inspections.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.	Dimensional inspection was provided for the above fabrication activities. Additional types of measurements and inspections were not undertaken.

Table 2.8.3-1. Machine Shops (TA-03)/Operations Data

Parameter	Units	SWEIS ROD	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Radioactive Air Emissions:								
Americium-241	Ci-yr	Not projected [a]						1.03E-10
Plutonium-238	Ci-yr	Not projected [a]	2.3E-10 [a]	Not detected	Not detected	Not detected	Not detected	Not detected
Plutonium-239	Ci/yr	Not projected [a]	not detected	Not detected	Not detected	Not detected	3.9E-10 [a]	Not detected
Thorium-228	Ci/yr	Not projected [a]	2.3E-9 [a]	2.5E-9 [a]	Not detected	Not detected	8.0E-10 [a]	Not detected
Thorium-230	Ci/yr	Not projected [a]	6.8E-9 [a]	7.8E-10 [a]	1.2E-9 [a]	Not detected	Not detected	5.75E-09 [a]
Thorium-232	Ci/yr	Not projected [a]	1.4E-9 [a]	5.4E-10 [a]	Not detected	Not detected	Not detected	1.44E-09 [a]
Uranium-234	Ci/yr	Not projected [a]	1.7E-5 [a]	3.0E-7 [a]	5.3E-8 [a]	2.1E-8 [a]	8.7E-8 [a]	2.16E-08 [a]
Uranium-235	Ci/yr	Not projected [a]	5.8E-9 [a]	1.2E-8 [a]	1.9E-9 [a]	9.9E-10 [a]	3.8E-9 [a]	5.13E-10 [a]
Uranium-238	Ci/yr	1.50E-4	3.6E-8	1.3E-8	1.3E-9	4.5E-10	5.0E-9	3.42E-09
NPDES Discharge	MGY	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls
Wastes:								
Chemical	kg/yr	474,000	4,399	3,955	887	26,474	2,023	156
LLW	m^3/yr	606	27	40.4	409	22	44	15
MLLW	m^3/yr	0	0.3	0.03	0.12	0.05	0	0
TRU	m^3/yr	0	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0	0
Number of Workers	FTEs	289 [b] 81 [b]	83 [b]	81 [b]	80 [b]	91 [b]	92 [b]	90 [b]

a This radionuclide was not projected by the SWEIS ROD because it was either dosimetrically insignificant or not isotopically identified.

b The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.9-1. High Explosives Processing Buildings with Nuclear Hazard Classification

Building	Description	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]	LANL 2002 [e]
TA-08-0022	Radiography facility	2	2	2				
TA-08-0023	Radiography facility	2	2	2	2	2	2	2
TA-08-0024	Isotope Building	2						
TA-08-0070	Experimental Science	2						
TA-16-0411	Intermediate Device Assembly		2	2				

a DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
b DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
c DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
d DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
e DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

Table 2.9-2. High Explosives Processing Buildings Identified as Radiological Facilities

Building	Description	LANL 2001 [a]	LANL 2002 [b]	LANL 2002 [b]
TA-08-0022	Radiography	RAD	RAD	RAD
TA-08-0070	NDT&E	RAD	RAD	RAD
TA-08-0120	Radiography		RAD	RAD
TA-11-0030	Vibration Testing	RAD	RAD	RAD
TA-16-0088	Component Storage	RAD	RAD	RAD
TA-16-0202	Laboratory		RAD	RAD
TA-16-0207	Component Testing		RAD	RAD
TA-16-0300	Component Storage	RAD	RAD	RAD
TA-16-0301	Component Storage	RAD	RAD	RAD
TA-16-0302	Component Storage/Training	RAD	RAD	RAD
TA-16-0332	Component Storage	RAD	RAD	RAD
TA-16-0410	Assembly Building	RAD	RAD	RAD
TA-16-0411	Assembly Building	RAD	RAD	RAD
TA-16-0413	Component Storage	RAD	---	---
TA-16-0415	Component Storage	RAD	---	---
TA-37-0010	Storage Magazine	RAD	RAD	RAD
TA-37-0014	Storage Magazine	RAD	RAD	RAD
TA-37-0016	Storage Magazine	---	RAD	RAD
TA-37-0022	Magazine	RAD	---	---
TA-37-0024	Storage Magazine	RAD	RAD	RAD
TA-37-0025	Storage Magazine	RAD	RAD	RAD

a LANL Radiological Facility List (LANL 2001o)
b LANL Radiological Facility List (LANL 2002g)

Table 2.9.1-1. High Explosives Processing Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook [a]	2001 Yearbook	2002 Yearbook	2003 Yearbook
Construction of the High Explosives Wastewater Treatment Facility (HEWTF)	HEWTF, TA-16-1508, for treating process waters via sand filtration became fully operational in 1997.	Completed before 1999.				
Modification of 17 outfalls and their elimination from the NPDES permit	19 outfalls were eliminated from the NPDES permit during 1997 and 1998 [b].	Completed before 1999.				
Relocation of the Weapons Components Testing Facility	Completed before 1999.	Completed before 1999.				
TA-16 steam plant conversion	Energy-efficient satellite steam boilers placed into service for each major TA-16 building or cluster of buildings in 1997 Gas-fired, central steam plant for TA-16 shut down.	Completed before 1999.				
	Real time, small component radiography capability installed in TA-16-260 in 1998 (DOE 1997a).	TA-16-260 not fully operational in 1999 (DOE 1997a).	TA-16-260 not fully operational in 2000 (DOE 1997a).	TA-16-260 completed and made fully operational in 2001 Buildings 16-220, -222, -223, -224, -225, and –226 vacated.	Decontamination and decommissioning of Buildings 16-220, -222, -223, -224, -225, and -226.	Buildings 16-220, -222, -223, -224, -225, and –226 were vacated and demolished.
	High explosives casting and inert (mock high explosives) processing operations moved from Buildings TA-16-300 and -302 to Building TA-16-260. TA-16-300 and -302					

	became Joint Weapons Training Facility (DOE 1996g).					
	Old casting and storage buildings TA-16-164 and -27 and six nearby WWII-vintage machining and inspection buildings plus associated support structures removed under decontamination and decommissioning (DOE 1997b).					
	Planning and modification work at TA-09 to consolidate high explosives formulation operations previously conducted at TA-16-340 with other TA-9 high explosives operations (DOE 1999a)	Planning and modification work at TA-9 to consolidate high explosives formulation operations continued (DOE 1999a).	Planning and modification work at TA-9 to consolidate high explosives formulation operations continued (DOE 1999a). Building TA-16-340 closed during second quarter of FY2000.	Planning and modification work at TA-9 to consolidate high explosives formulation operations continued (DOE 1999a).		
	Explosive material storage magazines at TA-28 used for PTLA support rather than high explosives processing operations.	Explosives stored at TA-28 were moved to TA-37 for storage. TA-28 remains part of High Explosives Processing Key Facility.				
	Burn operations at high explosives-contaminated combustible trash incinerator, TA-16-1409 ceased Draft closure plan submitted to NM state.		Incinerator underwent Resource Conservation and Recovery Act (RCRA) clean-closure and was dismantled and scrapped.			

		Above-ground waste water storage tank system placed into service at TA-9 (LANL 1998e).				
			RCRA closure activities continued for TA-16-387 flash pad [c] (LANL 1996b).			
			RCRA closure activities continued for TA-16-394 burn tray [d] (LANL 2000a).			
			ESA upgraded a burn unit improving capacity and efficiency and minimizing environmental impacts.			
			Cerro Grande Fire Impacts: all V Site buildings except one destroyed, fire and smoke damage, underground fire in Material Disposal Area (MDA) R.			
					Consolidation of all high explosives burning operations at TA-16-388 and -399.	Burning operations performed only TA-16-388. TA-16-399 still available for burning of bulk high explosives.

a Additional information on the impacts from the Cerro Grande Fire can be found in Section 2.9.4.
b Refer to Table 2.9.3-1 for information on the outfalls that were eliminated.
c Approximately 545 m^3 of hazardous wastes were removed during closure of the flash pad.
d Approximately 114 m^3 of hazardous wastes were removed during closure of the burn tray.

Table 2.9.2-1. High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, and TA-37)/Comparison of Operations

Capability	SWEIS ROD [a, b]	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
High Explosives Synthesis and Production	Continue synthesis research and development, produce new materials, and formulate explosives as needed. Increase production of materials for evaluation and process development. Produce material and components for directed stockpile production.	The high explosives synthesis and production operations were less than those projected by the SWEIS ROD.	The high explosives synthesis and production operations were less than those projected by the SWEIS ROD.	The high explosives synthesis and production operations were less than those projected by the SWEIS ROD.	The high explosives synthesis and production operations were less than those projected by the SWEIS ROD.	The high explosives synthesis and production operations were less than those projected by the SWEIS ROD.	The high explosives synthesis and production operations were less than those projected by the SWEIS ROD.
High Explosives and Plastics Development and Characterization	Evaluate stockpile returns. Increase (40%) efforts in development and characterization of new plastics and high explosives for stockpile improvement. Improve predictive capabilities. Research high explosives waste treatment methods.	High explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected by the SWEIS ROD.	High explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected by the SWEIS ROD.	High explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected by the SWEIS ROD.	High explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected by the SWEIS ROD.	High explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected by the SWEIS ROD.	High explosives formulation, synthesis, production, and characterization operations were performed at levels that were less than those projected by the SWEIS ROD.
High Explosives and Plastics Fabrication	Continue traditional stockpile surveillance and process development. Supply parts to Pantex for surveillance, stockpile rebuilds, and joint test assemblies. Increase fabrication for hydrodynamic and environmental testing.	Fabricated ~ 950 high explosives parts in support of the weapons program, including high explosives characterization studies, subcritical experiments, hydro tests,	DX Division fabricated ~ 3,000 high explosive parts, and ESA Division fabricated ~ 870 high explosives parts in 1999. Therefore, ~ 3870 parts were	DX Division fabricated ~ 2,000 high explosive parts, and ESA Division fabricated ~ 578 high explosives parts in 2000. Therefore, ~ 2,578 parts were	DX Division fabricated ~ 2,000 high explosive parts, and ESA Division fabricated ~ 578 high explosives parts in 2001. Therefore, ~ 2,578 parts were	DX Division fabricated ~ 7,400 high explosive parts, and ESA Division fabricated ~ 778 high explosives parts in 2002. Therefore, ~ 8,178 parts were	Approximately 7,136 high explosive parts were fabricated in CY 2003 in support of the weapons program (6,075 by DX Division and 1,061 by ESA Division), including high explosives

		surveillance activities, environmental weapons tests, and safety tests.	fabricated in support of the weapons program, including high explosives characterization studies, subcritical experiments, hydrotests, surveillance activities, environmental weapons tests, and safety tests.	fabricated in support of the weapons program, including high explosives characterization studies, subcritical experiments, hydrotests, surveillance activities, environmental weapons tests, and safety tests.	fabricated in support of the weapons program, including high explosives characterization studies, subcritical experiments, hydrotests, surveillance activities, environmental weapons tests, and safety tests.	fabricated in support of the weapons program, including high explosives characterization studies, subcritical experiments, hydrotests, surveillance activities, environmental weapons tests, and safety tests.	characterization studies, subcritical experiments, hydrotests, surveillance activities, environmental weapons tests, and safety tests.
Test Device Assembly	Increase test device assembly to support stockpile related hydrodynamic tests, joint test assemblies, environmental and safety tests, and increased research and development. Approximately 100 major assemblies per year.	Eleven major assemblies were provided for hydrodynamic, Nevada Test Site sub-critical, and joint environmental test programs.	ESA Division provided 10 major assemblies for hydrodynamic, Nevada Test Site subcritical, and joint environmental test programs.	ESA Division provided 10 major assemblies for hydrodynamic, Nevada Test Site subcritical, and joint environmental test programs.	ESA Division provided less than 100 major assemblies for Nevada Test Site subcritical and joint environmental test programs.	ESA Division provided less than 100 major assemblies for Nevada Test Site subcritical and joint environmental test programs.	ESA Division provided fewer than 100 major assemblies for Nevada Test Site subcritical and joint environmental test programs.
Safety and Mechanical Testing	Increase (50%) safety and environmental tests related to stockpile assurance. Improve predictive models. Approximately 15 safety and mechanical tests per year.	Fifteen stockpile related safety and mechanical tests during 1998.	DX Division performed 13 stockpile related safety and mechanical tests during 1999. ESA Division provided three revalidation and two certification assemblies during 1999.	DX Division performed 13 stockpile related safety and mechanical tests during 2000. ESA Division provided three revalidation and two certification assemblies during 2000.	DX Division performed less than 15 stockpile related safety and mechanical tests during 2001.	DX Division performed less than 15 stockpile related safety and mechanical tests during 2002.	DX Division performed less than 15 stockpile related safety and mechanical tests during 2003.

Research, Development, and Fabrication of High-Power Detonators	Increase operations to support assigned stockpile stewardship management activities; manufacture up to 40 major product lines per year. Support DOE complex for packaging and transportation of electro-explosive devices.	High-power detonator activities resulted in the manufacture of less than 10 product lines in 1998.	High-power detonator activities by DX Division resulted in the manufacture of less than 20 product lines in 1999. In addition, ESA Division provided fourteen flux generator assemblies in 1999.	High-power detonator activities by DX Division resulted in the manufacture of less than 20 product lines in 2000. In addition, ESA Division provided 14 flux generator assemblies in 2000.	High-power detonator activities by DX Division resulted in the manufacture of less than 40 product lines in 2001.	High-power detonator activities by DX Division resulted in the manufacture of less than 40 product lines in 2002.	High-power detonator activities by DX Division resulted in the manufacture of less than 40 product lines in 2003.

a The total amount of explosives and mock explosives used across all activities is an indicator of overall activity levels for this Key Facility. Amounts projected by the SWEIS ROD are 82,700 pounds of explosives and 2,910 pounds of mock explosives.

b Includes construction of the High Explosives Wastewater Treatment Facility, the steam plant conversion, relocation of the Weapons Testing Facility, and outfall modifications.

Table 2.9.3-1. High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, and TA-37)/Operations Data

Parameter	Units	SWEIS ROD	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Radioactive Air Emissions:								
Uranium-238	Ci/yr	9.96E-7	[a]	[a]	[a]	[a]	[a]	Not measured [a]
Uranium-235	Ci/yr	1.89E-8	[a]	[a]	[a]	[a]	[a]	Not measured [a]
Uranium-234	Ci/yr	3.71E-7	[a]	[a]	[a]	[a]	[a]	Not Measured [a]
NPDES Discharge: [b]								
Number of outfalls	---	22	4	3	3	3	3	3
Total Discharges	MGY	12.4	17.1	0.118	0.086	0.036	0.03	0.0192
02A-007 (TA-16)	MGY	7.4	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
03A-130 (TA-11) [c]	MGY	0.04	0.1	0.022	0.001	0.002	0.0020	0.0064
04A-070 (TA-16)	MGY	0.0	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	
04A-083 (TA-16)	MGY	0.0	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	
04A-092 (TA-16)	MGY	0.0	Eliminated –1998	Eliminated – 1998	Eliminated – 1998	Eliminated – 1998	Eliminated – 1998	
04A-115 (TA-08)	MGY	0.0	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	
04A-157 (TA-16)	MGY	0.0	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	
05A-053 (TA-16)	MGY	0.0	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
05A-054 (TA-16) [d]	MGY	3.6	6.3	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
05A-055 (TA-16)	MGY	0.13	8.9	0.096	0.085	0.034	0.0275	0.0128
05A-056 (TA-16)	MGY	0.0	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
05A-066 (TA-09)	MGY	0.74	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
05A-067 (TA-09)	MGY	0.33	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
05A-068 (TA-09)	MGY	0.06	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
05A-069 (TA-11)	MGY	0.01	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
05A-071 (TA-16)	MGY	0.04	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
05A-072 (TA-16)	MGY	0.0	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	
05A-096 (TA-11)	MGY	0.01	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
05A-097 (TA-11)	MGY	0.01	1.8	No discharge	No discharge	No discharge	0.00	0.00
06A-073 (TA-16)	MGY	0.0	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
06A-074 (TA-08)	MGY	0.0	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated-1997	
06A-075 (TA-08)	MGY	0.0	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	
Wastes:								
Chemical [e]	kg/yr	13,000	12,237	13,329	1,032,985 [f]	375,283 [g]	15,109 [h]	24,230 [j]
LLW	m^3/yr	16	6	8.3	3	1	8.69	28
MLLW	m^3/yr	0.2	0	0	0	0	0	0
TRU	m^3/yr	0	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0	0

Number of Workers	FTEs	335[j] 96[j]	201[j]	96[j]	92[j]	107[j]	114[j]	112[j]

a No stacks require monitoring; all non-point sources are measured using ambient monitoring.

b Outfalls eliminated before 1999: 02A-007 (TA-16), 04A-070 (TA-16), 04A-083 (TA-16), 04A-092 (TA-16), 04A-115 (TA-8), 04A-157 (TA-16), 05A-053 (TA-16), 05A-056 (TA-16), 05A-066 (TA-9), 05A-067 (TA-9), 05A-068 (TA-9), 05A-069 (TA-11), 05A-071 (TA-16), 05A-072 (TA-16), 05A-096 (TA-11), 06A-073 (TA-16), 06A-074 (TA-8), and 06A-075 (TA-8).

c This outfall discharged only one quarter during calendar year 1999.

d Outfall 05A-054 had discharges only part of the year. Process flows were routed to the HEWTF, and this outfall was then eliminated from the NPDES permit.

e Explanations for the chemical waste numbers that exceed the ROD projections were not given in the 1998 and 1999 Yearbooks. Research indicates that the CY 1998 volume consists of 12,236 kilograms of non-ER chemical waste and 36,364 kilograms of ER waste. The CY 2002 volume includes 2,721.55 kilograms of roll-off scrap metal for recycle that was caught up in the DOE radiological area release moratorium.

f During CY 2000, cleanup of MDA R generated 1,023,284 kilograms of chemical waste.

g During CY 2001, cleanup of MDA R generated 370,124 kilograms of chemical waste.

h The CY 2002 chemical waste volume is due to chemical cleanup activities.

i SWEIS ROD projection was exceeded in CY 2003 due to the demolition and waste disposition of Buildings TA-16-220, -222, -223, -224, -225, and –226.

j The first number shown in the “SWEIS ROD” column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the “SWEIS ROD” column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.10.1-1. HE Testing Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook [a]	2001 Yearbook	2002 Yearbook	2003 Yearbook
DARHT facility construction and modification	Construction of the DARHT building (TA-15-312) continued.	Construction of the DARHT building (TA-15-312) continued (DOE 1995b).	Construction of the DARHT building (TA-15-312) completed in 1999 (DOE 1995b).	Construction of the DARHT building (TA-15-312) completed in 1999 (DOE 1995b).		
	DARHT cooling tower became operational in 1998.					
		DARHT Axis I operational.				
		Installation and component testing of the accelerator and its associated control and diagnostics systems began in 1999.	Installation and component testing of the accelerator and its associated control and diagnostics systems began in 1999 and continued in 2000.	Installation and component testing of the accelerator and its associated control and diagnostics systems began in late 1999 and continued in 2001.		
					Vessel Preparation Facility constructed at TA-15 (DOE 1995b).	Construction complete.
	Hydrodynamic Test Operations Control Building (TA-15-484) constructed and became operational in spring 1999 (LANL 1996c).					
	Access Control Building (TA-15-446) became operational in 1998 (DOE 1993b).					

	Ector Multi-diagnostic Hydrotest Accelerator taken out of service. (Firing site remains active.)					
		Applied Research Optics Electronics Laboratory (TA-15-494, new office and laboratory building) and adjacent parking under construction in 1999 (LANL 1998f).	Construction of Applied Research Optics Electronics Laboratory (TA-15-494, new office building) completed in 2000 (LANL 1998f).			
	Twelve of 14 outfalls eliminated [b].	Outfall 06A106 at TA-36 eliminated from NPDES permit in 1999.				
			Cerro Grande Fire destroyed DARHT equipment, materials, and storage structures.	Cerro Grande Fire: ~14 facilities destroyed and ~28 damaged; destroyed facilities transferred to decontamination and decommissioning in 2001; tree thinning (LANL 2001p).		
				Categorical exclusion for high explosive storage and preparation facilities at TA-36 (DOE 2001b).		Construction of HE Preparation Facility (TA-36-78) complete.
					Camera Room built at TA-36-12 (DOE 2001c).	
					Carpenter shop constructed at TA-15 (DOE 2001d).	Construction completed.

					X-Ray calibration facility constructed at TA-15 (DOE 2001d).	Construction completed.
					Warehouse constructed at TA-15 (DOE 2001d).	Construction completed.

a Additional information on the impacts from the Cerro Grande Fire can be found in Section 2.9.4.
b Refer to Table 2.10.3-1 for information on the outfalls that were eliminated.

Table 2.10.2-1. High Explosives Testing (TA-14, TA-15, TA-36, TA-39, and TA-40)/Comparison of Operations

Capability	SWEIS ROD [a]	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Hydrodynamic Tests	Conduct up to 100 hydrodynamic tests/yr. Develop containment technology. Conduct baseline and code development tests of weapons configuration. Depleted uranium use of 6,900 lb/yr (over all activities).	Hydrodynamic tests were conducted in 1998 at a level far below those projected in the SWEIS.	Hydrodynamic tests were conducted in 1999 at a level below those projected in the SWEIS.	Hydrodynamic tests were conducted in 2000 at a level below those projected by the SWEIS ROD.	Hydrodynamic tests were conducted in 2001 at a level below those projected by the SWEIS ROD.	Hydrodynamic tests were conducted in 2002 at a level below those projected by the SWEIS ROD.	Hydrodynamic tests were conducted in 2003 at a level below those projected by the SWEIS ROD.
Dynamic Experiments	Conduct dynamic experiments to study properties and enhance understanding of the basic physics of state and motion for materials used in nuclear weapons including some experiments with SNM.	Dynamic experiments were conducted at a level far below those projected in the SWEIS (See Table 2.10.3-1).	Dynamic experiments were conducted at a level far below those projected in the SWEIS.	Dynamic experiments were conducted at a level below those projected by the SWEIS ROD.	Dynamic experiments were conducted at a level below those projected by the SWEIS ROD.	Dynamic experiments were conducted at a level below those projected by the SWEIS ROD.	Dynamic experiments were conducted at a level below those projected by the SWEIS ROD.
Explosives Research and Testing	Conduct high explosives tests to characterize explosive materials.	Explosives research and testing were conducted at a level far below those projected in the SWEIS (See Table 2.10.3-1).	Explosives research and testing were conducted at a level far below those projected in the SWEIS.	Explosives research and testing were conducted at a level below those projected by the SWEIS ROD.	Explosives research and testing were conducted at a level below those projected by the SWEIS ROD.	Explosives research and testing were conducted at a level below those projected by the SWEIS ROD.	Explosives research and testing were conducted at a level below those projected by the SWEIS ROD.
Munitions Experiments	Continued support of Department of Defense in conventional munitions. Conduct experiments with projectiles and study other effects on munitions.	Munitions experiments were conducted at a level far below those projected in the SWEIS (See Table 2.10.3-1).	Munitions experiments were conducted at a level far below those projected in the SWEIS.	Munitions experiments were conducted at a level below those projected by the SWEIS ROD.	Munitions experiments were conducted at a level below those projected by the SWEIS ROD.	Munitions experiments were conducted at a level below those projected by the SWEIS ROD.	Munitions experiments were conducted at a level below those projected by the SWEIS ROD.

High-Explosives Pulsed-Power Experiments	Conduct experiments and development tests.	Experiments were conducted at a level far below those projected in the SWEIS (See Table 2.10.3-1).	Experiments were conducted at a level far below those projected.	Experiments were conducted at a level below those projected by the SWEIS ROD.	Experiments were conducted at a level below those projected by the SWEIS ROD.	Experiments were conducted at a level below those projected by the SWEIS ROD.	Experiments were conducted at a level below those projected by the SWEIS ROD.
Calibration, Development, and Maintenance Testing	Conduct tests to provide calibration data, instrumentation development, and maintenance of image processing capability.	Calibration, development, and maintenance testing were conducted at a level far below those projected in the SWEIS (See Table 2.10.3-1).	Calibration, development, and maintenance testing were conducted at a level far below those projected in the SWEIS.	Calibration, development, and maintenance testing were conducted at a level below those projected by the SWEIS ROD.	Calibration, development, and maintenance testing were conducted at a level below those projected by the SWEIS ROD.	Calibration, development, and maintenance testing were conducted at a level below those projected by the SWEIS ROD.	Calibration, development, and maintenance testing were conducted at a level below those projected by the SWEIS ROD.
Other Explosives Testing	Develop advanced high explosives or weapons evaluation techniques.	Other explosives testing was conducted at a level far below explosives testing projected in the SWEIS (See Table 2.10.3-1).	Other explosives testing was conducted at a level far below explosives testing projected in the SWEIS.	Other explosives testing was conducted at a level below explosives testing projected by the SWEIS ROD.	Other explosives testing was conducted at a level below explosives testing projected by the SWEIS ROD.	Other explosives testing was conducted at a level below explosives testing projected by the SWEIS ROD.	Other explosives testing was conducted at a level below explosives testing projected by the SWEIS ROD.

a Includes completion of construction for the DARHT facility and its operation.

Table 2.10.3-1. High Explosives Testing (TA-14, TA-15, TA-36, TA-39, and TA-40)/Operations Data

Parameter	Units	SWEIS ROD	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Radioactive Air Emissions:								
Depleted Uranium	Ci/yr	1.5E-1 [a]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]
Chemical Usage: [c]								
Aluminum [d]	kg/yr	45,450	624	688	394	78	860	376.415
Beryllium	kg/yr	90	1	0.5	2	52	0	36.72
Copper [d]	kg/yr	45,630	14	41	88	24	33	28.234
Depleted Uranium	kg/yr	3,930	121	67	419	536	216	175.737
Lead	kg/yr	240	2	0.5	5	0	0	0
Tantalum	kg/yr	300	5	0.2	1	12	2	0.418
Tungsten	kg/yr	300	0	0	19	0	0	0
NPDES Discharge:								
Number of outfalls [e]	---	14	4	2	2	2	2	2
Total discharges	MGY	3.6	1.9	14.23	16	9	1.38	1.7493
03A-028 (TA-15) [f]	MGY	2.2	0.5	2.81 [g]	5	4	0.5027	0.4563
03A-185 (TA-15) [f]	MGY	0.73	1.2	11.42 [h]	11	5	0.8773	1.293
04A-101 (TA-40)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	
04A-139 (TA-15)	MGY	None	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	
04A-141 (TA-39)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	
04A-143 (TA-15)	MGY	0.018	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	
04A-156 (TA-39)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	
06A-079 (TA-40) [i]	MGY	0.54	0.1	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	
06A-080 (TA-40)	MGY	0.03	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	
06A-081 (TA-40)	MGY	0.03	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	
06A-082	MGY	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	
06A-099 (TA-40)	MGY	0.0	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	
06A-100 (TA-40) [g]	MGY	0.04	0.1	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	
06A-106 (TA-36) [j]	MGY		Eliminated 1999	Eliminated 1999	Eliminated 1999	Eliminated 1999	Eliminated 1999	
06A-123 (TA-15)	MGY	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998
Wastes:								
Chemical	kg/yr	35,300	444	1,015	60,437 [k]	1,337	1,285	1.057
LLW	m^3/yr	940	0	0.01	0.6	0	0	0
MLLW	m^3/yr	0.9	0	0	0	0	0	0
TRU/Mixed TRU [l]	m^3/yr	0.2	0	0	0	0	0	0
Number of Workers	FTEs	619 [m] 227 [m]	93 [m]	227 [m]	212 [m]	245 [m]	264 [m]	251 [m]

a The isotopic composition of depleted uranium is approximately 99.7% uranium-238, approximately 0.3% uranium-235, and approximately 0.002% uranium-234. Because there are no historic measurements of emissions from these sites, projections are based on estimated release fractions of the materials used in tests.

b No stacks require monitoring; all non-point sources are measured using ambient monitoring. During 1999, a total of 67 kg of depleted uranium was expended during these activities.

c Usage listed for the SWEIS ROD includes projections for expanded operations at DARHT as well as the other TA-15 firing sites (the highest foreseeable level of such activities that could be supported by the LANL infrastructure). No proposals are currently before DOE to exceed the material expenditures at DARHT that are evaluated in the DARHT Environmental Impact Statement (DOE 1995b).

d The quantities of copper and aluminum involved in these tests are used primarily in the construction of support structures. These structures are not expended in the explosive tests, and thus, do not contribute to air emissions.

e Outfalls eliminated before 1999: 04A-101 (TA-40), 04A-139 (TA-15), 04A-141 (TA-39), 04A-143 (TA-15), 04A-156 (TA-39), 06A-080 (TA-40), 06A-081 (TA-40), 06A-082 (TA-40), 06A-099 (TA-40), and 06A-123 (TA-15). Consolidation and removal of outfalls has resulted in projected NPDES volumes underestimating actual discharges from the existing outfalls.

f The annual quantity of discharge was calculated by using the average daily flow and multiplying by 365 days in the year; this results in an overestimate of volume. A totalizing water meter has been installed on 03A-185 (TA-15), which will allow for much more accurate water usage calculations for 2002 reporting. 03A-28 (TA-15) does not yet have a totalizing water meter and the water use will continue to be averaged.

g This outfall discharged during three quarters of calendar year 1999.

h This outfall discharged during all four quarters of calendar year 1999.

i Outfalls 06A-079 and 06A-100 had discharges only part of 1998. Process flows were routed to the HEWTF, and these outfalls were eliminated from the NPDES permit.

j This outfall was originally identified with the non-key facilities.

k The 2000 chemical waste, as indicated in the 2000 SWEIS Yearbook exceeded the ROD due to cleanup following the Cerro Grande Fire. Construction and demolition debris (previously cited as ‘industrial waste’ in the yearbooks) accounted for 9,362 kg of the chemical waste, was nonhazardous, and was disposed of in regular landfills. The remainder of the chemical waste was shipped offsite to approved hazardous waste facilities.

l TRU waste (steel) will be generated as a result of DARHT’s Phased Containment Option (see DARHT Environmental Impact Statement [DOE 1995b]).

m The first number shown in the “SWEIS ROD” column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the “SWEIS ROD” column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.11-1. LANSCE Buildings with Nuclear Hazard Classification

Building	Description	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]	LANL 2002 [e]
TA-53-1L	1L Target		3	3	3	3	3	3
TA-53-3M	Experimental Science	3						
TA-53-A-6	Area A East		3	3	3	3	3	3
TA-53-ER1	Actinide scattering experiments			3	3			
TA-53-ER1/ER-2	Actinide scattering experiments		3			3	3	3
TA-53-P3E	Pion Scattering Experiment		3	3				
TA-53 Target 4	WNR Neutron Production target					3		

a DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
b DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
c DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
d DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
e DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

Table 2.11.1-1. LANSCE Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook [a]	2001 Yearbook	2002 Yearbook	2003 Yearbook
Eliminate NPDES outfall 03A-145 from the Orange Box Building	Eliminated in 1998 [b].					
Closure of two former sanitary lagoons	Sampling conducted in 1998 [c].	Remediation started in 1999.	Characterization continued; south lagoon sludge and liner removed.	Data analysis and sampling continued.	Cleanup of north lagoon as Interim Action.	Completed [d].
LEDA to become operational in late 1998	Started high-power conditioning.	Maximum power achieved.		Shutdown in December until funded.	Inactive until funding is resolved [e].	LEDA D&D funded [e]
Short-Pulse Spallation Source enhancements	Upgrades started.	Upgrades started; installation of new instruments began.	First phase of the Proton Storage Ring Upgrade completed.	Proton Storage Ring completed; instruments commissioned.	Upgrades to ion source and 1L line in progress [f].	Upgrades to ion source and 1L line in progress [f].
One-megawatt target/blanket	Not completed.	Not completed.	Not completed.	Not completed.	Not completed and not funded.	Not completed.
New 100-MeV Isotope Production Facility		Construction preparations began.	Construction began.	Facility completed; upgrades to beam line in progress.	Readiness Review planned for July 2003 and commissioning for October 2003.	First beam was thrown on December 23, 2003 [g]
Long-Pulse Spallation Source (LPSS), including decontamination and renovation of Area A	Not completed.	Not completed.	Not completed.	Not completed.	Not completed and not funded.	Not completed.
Dynamic Experiment Lab	Not started.	Not started.	Concept revised [h].	Concept revised [h].	Concept revised [h].	Concept revised [h].
Los Alamos International Facility for Transmutation	Not completed.	Not completed.	Not completed.	Not completed.	Not completed and not funded.	Not completed.
Exotic Isotope Production Facility	Not completed.	Not completed.	Not completed.	Not completed.	Not completed and not funded.	No
Decontamination and renovation of Area A-East	Not completed.	Not completed.	Not completed.	Not completed.	Not completed [i].	No

	Outfalls 03A-146 and 03A-125 eliminated from NPDES permit[j].					
	New warehouse erected at east end of mesa (DOE 1998d).					
		TA-53 radioactive liquid waste treatment facility constructed (DOE 1998e).				
			Cooling tower 53-963 completed and replaces tower 53-62 (DOE 1999b).			
				Cooling tower 53-952 replaces cooling towers 53-60 and 53-64.		
				ICE House constructed[k].		
					Started construction of two new instruments on Flight Paths 12 and 13 at the Lujan Center.	Construction continues.

a Additional information on the impacts of the Cerro Grande fire can be found in Section 2.11.4.

b Outfall 03A-145 was associated with a small swamp cooler for the Orange Box Conference and Office Building (53-06). There was no flow from the outfall. Although there had been no flow, discharge piping from the outfall was tied to the sewage plant at TA-46.

c The lagoons were removed from the resource Conservation and Recovery Act closure. Cleanup will be performed as a corrective action. The ER Project started the cleanup with some sampling in 1998.

d Characterization started in CY 1999 and continued into CY 2000. Cleanup at the south lagoon began in CY 2000 with the removal of the sludge and liner. Data analysis and sampling continued through CY 2001 for both lagoons and an Interim Action Plan was written for remediation of the north lagoon. Cleanup of the north lagoon was done in CY 2002. The lagoons (SWMU 53-002[a]-99) have been remediated with the complete removal of all contaminated sludge and liners; the nature and extent of residual contamination have been defined, and it has been shown that the residual contamination does not pose a potential unacceptable risk to humans or the environment. Currently, the site is located within an industrial area under LANL (institutional) control. The site is expected to remain so for the reasonably foreseeable future. For these reasons, neither additional corrective action nor further characterization is warranted at the site. The report is in review by NMED and comments have not been received to date.

e LEDA started high-power conditioning of the radio-frequency quadrupole power supply in November 1998. The first trickle of proton beam was produced in March 1999, and maximum power was achieved in September 1999. It has been designed for a maximum energy of 12 million electron volts, not the 40 million electron volts projected by the

SWEIS ROD. LEDA was shut down in December 2001 and will remain inactive until funding is resolved. (True for 2002; note that the 2003 omnibus bill passed by Congress included funding for LEDA D&D. The plan is to remove all support equipment and leave the building and the accelerator itself in place.)

f Part of the Short-Pulse Spallation Source upgrades have been performed. Upon completion, the project will upgrade the Proton Storage Ring and IL line to operate at 200 microamperes at 30 hertz (vs 70 microamperes at 20 hertz present during preparation of the SWEIS); will install a brighter ion source; and will add three neutron-scattering instruments to the Lujan Center. Through the end of CY 2002, the upgrades to the Proton Storage Ring had been completed, and the three instruments have been installed and commissioned in the Lujan Center. Upgrades to the ion source and IL line are still in progress. [Note: the latter upgrades have been delayed to CY 2004].

g Preparations began in the spring of CY 1999 for construction of the new 100-million-electron-volt Isotope Production Facility. Construction started in CY 2000 and the facility was completed in CY 2002. The Isotope Production Facility threw its first beam on December 23, 2003. Full production has not yet begun.

h The Stockpile Stewardship Program is currently using Experimental Area C, Building 53-3P, for proton radiography, and the Blue Room in Building 53-07 for neutron resonance spectroscopy. The concept of combining these experiments in a new Dynamic Experiment Laboratory has been replaced by the concept to construct a $1.6 billion Advanced Hydrotest Facility, which is currently in the conceptual phase. Conceptual planning for the Advanced Hydrotest Facility is being done consistent with the Stockpile Stewardship and Management Programmatic Environmental Impact Statement (DOE 1996b) and ROD. Before DOE decides to build and operate the Advanced Hydrotest Facility at LANL or some other site, an environmental impact statement and ROD would be prepared.

i Area A East is used to store the old 1L target. Both the target and residually activated materials such as the 800 MeV beam stop are why Area A East is designated as a Category 3 nuclear facility.

j Outfalls 03A-146 and 03A-125 were eliminated from the NPDES permit in 1997 and 1998, respectively. Although no flows are expected because the cooling units have been or are scheduled to be removed, discharge piping for both outfalls was tied in to the sanitary sewer instead and rerouted to the sewage treatment plant at TA-46.

k The “ICE House” is a new building completed in 2002. The building houses an experimental station on an existing WNR flight path and provides a new capability at WNR for single-event upset measurements.

Table 2.11.2-1. Los Alamos Neutron Science Center (TA-53)/Comparison of Operations

Capability	SWEIS ROD [a]	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Accelerator Beam Delivery, Maintenance, and Development	Deliver LANSCE linac beam to Areas A, B, C, WNR facility, Manuel Lujan Center, Dynamic Experiment Facility, and new isotope production facility for 10 months/yr (6,400 hrs). Positive ion current 1,250 microampere and negative ion current of 200 microampere.	In 1998, positive ion beam was produced for 1335 hours at an average current of 740 microamps. Negative ion beam was delivered, at varying currents, to Areas A, B, C, WNR facility, and Lujan Center for up to 1127 hours.	In 1999, H+ beam was not produced. H- beam was delivered, at maximum current of 93 microamps, to lines B and C (505 hours), WNR facility (1993 hours), and Lujan Center (239 hours). Area A did not receive beam.	In 2000, H+ beam was not produced. H- beam was delivered as follows: (a) to the Lujan Center for 1,749 hours at an average current of 100 microamperes. (b) to WNR Target 2 for 307 hours in a "pulse on demand" mode of operation, with an average current below 1 femtoampere, (c) to WNR Target 4 for 2,024 hours at an average current of 5 microamperes, (d) through Line X to Lines B and C for 806 hours in a "pulse on demand" mode of operation, with an average current below 1 femtoampere.	In 2001, H+ beam was not produced. H- beam was delivered as follows: (a) to the Lujan Center for 2,741 hours at an average current of 55 microamperes, (b) to WNR Target 2 for 350 hours in a "pulse on demand" mode of operation, with an average current below 1 femtoampere, (c) to WNR Target 4 for 1,989hours at an average current of 5microamperes, (d) through Line X to Lines B and C for 465 hours in a "pulse on demand" mode of operation, with an average current below 1 femtoampere.	In 2002, H+ beam was not produced. H- beam was delivered as follows: (a) to the Lujan Center for 2,303 hours at an average current of 105 microamperes with 87 percent total availability (b) to WNR Target 2 for 252 hours in a "pulse on demand" mode of operation, with an average current below 1 femtoampere with 90 percent total availability (c) to WNR Target 4 for 2,507 hours at an average current of 3.5microamperes with 88 percent total availability (d) through Line X to Lines B and C for 384 hours in a "pulse on demand" mode of operation, with an average current below 1	In 2003, H+ beam was not produced. H- beam was delivered as follows: (a) to the Lujan Center for 2,307 hours at an average current of 92.4 microamperes with 76.2% total reliability. (b) to WNR Target 2 for 321 hours in a "pulse on demand" mode of operation, with an average current below 1 femtoampere with 70.4% total reliability. (c) to WNR Target 4 for 2,436 hours at an average current of 2.7 microamperes with 79% total reliability. (d) through line X to lines B and C for 461 hours in a "pulse on demand" mode of operation, with an average current below 1 femtoampere with 75.8% total reliability.

						femtoampere with 85 percent total availability.	
	Reconfigure beam delivery and support equipment to support new facilities, upgrades, and experiments.[b]	In the fall of 1998, the upgrade to H(-) injectors to the Proton Storage Ring was completed.	No major upgrades to the beam delivery complex.	No major upgrades to the beam delivery complex.	No major upgrades to the beam delivery complex.	No major upgrades to the beam delivery complex. Material was received for installation of a new switchyard kicker magnet during 2003; this will allow simultaneous operations of Line D (Lujan and WNR) and Line X (Area B and C).	No major upgrades to the beam delivery complex. Material was received for installation of a new switchyard kicker magnet during 2003; this will allow simultaneous operations of Line D (Lujan and WNR) and Line X (Area B and C).
	Commission/operate/ maintain LEDA for 10 to 15 yrs; operate up to approximately 6,600 hrs/yr.	In November 1998, started conditioning the radiofrequency quadrupole power supply. No beam was generated in 1998.	Full power (100 milliamps and 6.7 MeV) achieved in September 1999.	Continued to operate at full power (100 milliamps and 6.7 million electron volts).	LEDA was shutdown in December 2001.	LEDA was shutdown in December 2001.	LEDA was shut down in December 2001 and is now being decommissioned and dismantled.
Experimental Area Support	Full-time remote handling and radioactive waste disposal capability required during Area A interior modifications and Area A-East renovation.	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.)	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.)	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.)	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.)	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.)	Full-time capability maintained. (Note: Modifications and renovations were not undertaken, however.)
	Support of experiments, facility upgrades, and modifications.	Support activities were conducted per the projections of the SWEIS ROD.	Support activities were conducted per the projections of the SWEIS ROD.	Support activities were conducted per the projections of the SWEIS ROD.	Support activities were conducted per the projections of the SWEIS ROD.	Support activities were conducted per the projections of the SWEIS ROD.	Support activities were conducted per the projections of the SWEIS ROD.

	Increased power demand for LANSCE linac and LEDA radio-frequency operation.	Started conditioning the radiofrequency quadrupole power supply for LEDA in November 1998.	A 700-MHz klystron was developed for use with LEDA.	No developments in 2000.	No developments in 2001.	Average beam current to the Lujan Center was increased to over 100 microamps.	Average beam current to the Lujan Center was increased to over 100 microamps.
Neutron Research and Technology [b]	Conduct 1,000 to 2,000 experiments/yr using Manuel Lujan Center, WNR facility, and LPSS. Establish LPSS in Area A (requires modification).	Far fewer number of experiments since the linac operated only 1135 hours. LPSS was not constructed.	Far fewer number of experiments, since the Lujan Center was idle from February into July. LPSS was not constructed.	Fewer than 200 experiments were conducted at the Lujan Center. LPSS was not constructed.	113 experiments were conducted at the Lujan Center and 36 experiments at WNR. LPSS was not constructed.	165 experiments were conducted at the Lujan Center and 59 experiments at WNR. LPSS was not constructed.	128 experiments were conducted at the Lujan Center and 45 experiments at WNR. LPSS was not constructed.
	Conduct accelerator production of tritium target neutronics experiment for six months.	Accelerator production of tritium target neutronics experiments were begun in Experimental Area C in 1997 and were completed in 1998.					
	Construct Dynamic Experiment Laboratory adjacent to WNR Facility. Support contained weapons-related experiments: - With small quantities of actinides, high explosives, and sources (up to approximately 80/yr) - With nonhazardous materials and small quantities of	The Dynamic Experiment Laboratory was not constructed, but weapons-related experiments were conducted: - None with actinides - Some with nonhazardous materials and high explosives - Some with high explosives, but none with depleted	The Dynamic Experiment Laboratory was not constructed, but weapons-related experiments were conducted: - None with actinides - Some with nonhazardous materials and high explosives - Some with high explosives, but none with depleted uranium - No shock wave experiments.	The Dynamic Experiment Laboratory was not constructed, but weapons-related experiments were conducted: - None with actinides - Some with nonhazardous materials and high explosives - Some with high explosives, but none with depleted	The Dynamic Experiment Laboratory was not constructed, but weapons-related experiments were conducted: - None with actinides - Some with nonhazardous materials and high explosives - Some with high explosives, but none with depleted uranium - Some shock wave	The Dynamic Experiment Laboratory was not constructed, but weapons-related experiments were conducted: - None with actinides - Some with nonhazardous materials and high explosives - Some with high explosives,	The Dynamic Experiment Laboratory was not constructed, but weapons-related experiments were conducted: - None with actinides - Some with nonhazardous materials and high explosives - Some with high explosives, but none with depleted

	high explosives (up to approximately 200/yr) - With up to 4.5 kilograms high explosives and/or depleted uranium (up to approximately 60/yr) - Shock wave experiments involving small amounts, up to (nominally) 50 grams plutonium.	uranium - No shock wave experiments.		uranium - Some shock wave experiments.	experiments.	but none with depleted uranium - Some shock wave experiments.	uranium - Some shock wave experiments.
	Provide support for static stockpile surveillance technology research and development.	Support was not provided for surveillance research and development.	Support was not provided for surveillance research and development.	Support was provided for surveillance research and development.	Support was provided for surveillance research and development.	Support was provided for surveillance research and development.	Support was provided for surveillance research and development.
Accelerator Transmutation of Wastes [c]	Conduct lead target tests for two years at Area A beam stop.	No tests.	No tests.	No tests.	No tests.	No tests.	No tests in CY 2003. No lead tests are expected for at least five years unless funding becomes available from DOE-NE.
	Implement the Los Alamos International Facility for Transmutation (Establish one-megawatt, then five-megawatt Accelerator Transmutation of Wastes target/blanket experiment areas adjacent to Area A.)	Neither the target/blanket experiment nor the Los Alamos International Facility for Transmutation was constructed.	Neither the target/blanket experiment nor the Los Alamos International Facility for Transmutation was constructed.	Neither the target/blanket experiment nor the Los Alamos International Facility for Transmutation was constructed.	Neither the target/blanket experiment nor the Los Alamos International Facility for Transmutation was constructed.	Neither the target/blanket experiment nor the Los Alamos International Facility for Transmutation was constructed.	No Accelerator Transmutation waste tests are planned for the future.

	Conduct five-megawatt experiments for 10 months/yr for four years using about three kilograms of actinides.	No experiments.	No experiments.	No experiments.	No experiments.	No experiments.	No experiments.
Subatomic Physics Research	Conduct 5 to 10 physics experiments/yr at Manuel Lujan Center, WNR facility, and LPSS.	Between 5 and 10 physics were conducted in 1998.	Ultra-cold neutron experiments ran on 5 occasions in the Blue Room.	Ultra-cold neutron experiments ran on 13 days in the "B" line beam tunnel room.	Ultra-cold neutron experiments ran 10 days in the "Blue Room" (target 2).	No ultra-cold neutron experiments were run during 2002 LANSCE beam operations.	No ultra-cold neutron experiments were run during 2003 LANSCE beam operations.
	Continue neutrino experiment through FY97.	The neutrino experiment, extended one year, concluded in September 1998.					
	Conduct proton radiography experiments, including contained experiments with high explosives.	Experiments involving contained high explosives were conducted in 1998.	Experiments involving contained high explosives were conducted on 10 days in 1999.	Experiments involving contained high explosives were conducted on 28 days in 2000.	Fewer than 40 experiments involving contained high explosives were conducted in 2001.	42 experiments involving contained high explosives were conducted in 2002.	30 experiments involving contained high explosives were conducted in CY 2003.
Medical Isotope Production	Irradiate up to approximately 50 targets/yr for medical isotope production.	Production began in November 1998. Twelve targets were irradiated.	No production in 1999.	No production in 2000.	No production in 2001.	No production in 2002.	No production in 2003.
	Added production of exotic, neutron-rich, and neutron-deficient isotopes (requires modification of an existing target area).	No production in 1998.	No production in 1999.	No production in 2000.	No production in 2001.	No production in 2002.	No production in 2003.

High-Power Microwaves and Advanced Accelerators	Conduct research and development in these areas, including microwave chemistry research for industrial and environmental applications.	Research and development was conducted.	Research and development was conducted.	Research and development was conducted.	Research and development was conducted.	Research and development was conducted.	Research and development was conducted.

a Includes the completion of proton and neutron radiography facilities, the LEDA, the isotope production facility relocation, the Short-Pulsed Spallation Source, and the LPSS.

b Numbers of neutron experiments represent plausible levels of activity. Bounding conditions for the consequences of operations are primarily determined by 1) length and power of beam operation and 2) maintenance and construction activities.

c Formerly Accelerator-Driven Transmutation Technology.

Table 2.11.3-1. Los Alamos Neutron Science Center (TA-53)/Operations Data

Parameter	Units	SWEIS ROD	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Radioactive Air Emissions:								
Argon-41	Ci/yr	7.44E+1	1.52E+02	1.4E+01	2.9E+01	1.6E+1	2.5E+1	1.29E+01
Arsenic-73	Ci/yr	Not projected [a]	1.26E-04	Not detected	2.2E-05	7.6E-4 [a]	Not detected	
Beryllium-7	Ci/yr	Not projected [a]	1.16E-04	Not detected	Not detected	Not detected	Not detected	
Bromine-76	Ci/yr	Not projected [a]	3.65E-02	2.3E-04 [a]	2.6E-04 [a]	1.4E-3 [a]	Not detected	
Bromine-77	Ci/yr	Not projected [a]	3.55E-02	Not detected	Not detected	Not detected	Not detected	
Bromine-82	Ci/yr	Not projected [a]	7.71E-03	6.3E-04 [a]	4.2E-03 [a]	3.4E-3 [a]	6.0E-3 [a]	
Carbon-10	Ci/yr	2.65E+0	1.87E+02	4.2E-02	1.4E-01	2.5E+0	7.3E-1	2.38E-01
Carbon-11	Ci/yr	2.96E+3	3.38E+03	2.8E+02	6.9E+02	3.4E+3	2.8E+3	5.08E+02
Chlorine-39	Ci/yr	Not projected [a]	3.25E+0	Not detected	Not detected	Not detected	Not detected	
Cobalt-60	Ci/yr	Not projected [a]	Not detected	4.0E-06 [a]	Not detected	Not detected	Not detected	
Mercury-193	Ci/yr	Not projected [a]	Not detected	Not detected	8.0E-01 [a]	6.9E-1 [a]	4.4E-1 [a]	
Mercury-193m	Ci/yr	Not projected [a]	Not detected	Not detected	Not detected	Not detected	4.7E-4 [a]	
Mercury-195m	Ci/yr	Not projected [a]	Not detected	Not detected	2.0E-02 [a]	2.4E-2 [a]	8.0E-3 [a]	
Mercury-197	Ci/yr	Not projected [a]	6.12E-03	1.6E-03 [a]	1.0E-01 [a]	3.7E-1 [a]	1.6E-1 [a]	
Mercury-203	Ci/yr	Not projected [a]	Not detected	Not detected	Not detected	8.6E-3 [a]	6.2E-4 [a]	
Nitrogen-13	Ci/yr	5.35E+2	1.28E+03	1.6E	2.8E+01	1.3E+2	1.2E+2	2.78E+01
Nitrogen-16	Ci/yr	2.85E-2	1.50E+02	1.5E-02	1.7E-02	2.8E-2	4.7E-1	1.91E-01
Oxygen-14	Ci/yr	6.61E+0	5.87E+01	1.0E-01	4.1E-01	3.4E+1	1.5E+1	1.60E-01
Oxygen-15	Ci/yr	6.06E+2	2.66E+03	1.9E+01	9.1E+01	2.4E+3	1.5E+3	6.93E+01
Potassium-40	Ci/yr	Not projected [a]	7.62E-05	Not detected	Not detected	Not detected	Not detected	
Scandium-44M	Ci/yr	Not projected [a]	5.81E-07	Not detected	Not detected	Not detected	Not detected	
Sodium-24	Ci/yr	Not projected [a]	1.82E-04	Not detected	Not detected	Not detected	Not detected	
Tritium as Water	Ci/yr	Not projected [a]	3.79	2.3 [a]	2.9 [a]	6.4E+0 [a]	Not measured	4.42E+00
Vanadium-48	Ci/yr	Not projected [a]	5.29E-06	Not detected	Not detected	Not detected	Not detected	
LEDA Projections (8-yr average):								
Oxygen-19	Ci/yr	2.16E-3	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]

Sulfur-37	Ci/yr	1.81E-3	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]
Chlorine-39	Ci/yr	4.70E-4	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]
Chlorine-40	Ci/yr	2.19E-3	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]
Krypton-83m	Ci/yr	2.21E-3	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]
Others	Ci/yr	1.11E-3	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]	Not measured [b]
NPDES Discharge: [c]								
Total Discharges	MGY	81.8	53.4	37.2	30.5	20.45	24.04	16.4613
03A-047	MGY	7.1	13.5	3.4	3.5	0	0	0
03A-048	MGY	23.4	19.1	19.7	15.6	13.05	23.25	15.494
03A-049	MGY	11.3	20.1	10.8	9.6	5.9	0.14	0
03A-113	MGY	39.8	0.7	3.3	1.8	1.5	0.65	0.9673
03A-125	MGY	0.18	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	
03A-145	MGY	0.0	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	
03A-146	MGY	Not projected [d]	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	
Wastes:								
Chemical	kg/yr	16,600	55,258 [d]	11,060	1,205 [f]	4,057	1,999	6,914
LLW	m^3/yr	1,085 [d]	16	7 0	28	0.1	0	70
MLLW	m^3/yr	1	0.4	0.5	4.9	0.2	0.9	0.6
TRU	m^3/yr	0	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0	0
Number of	FTEs	846 [h]						
Workers		560 [h]	547 [h]	560 [h]	550 [h]	505 [h]	496 [h]	455 [h]

a The radionuclide was not projected by the SWEIS ROD because it was either dosimetrically insignificant or not isotopically identified.

b Potential emissions from LEDA were sufficiently small that measurement systems were not necessary to meet regulatory or facility requirements.

c Outfalls eliminated before 1999: 03A-125 (TA-53), 03A-145 (TA-53), and 03A-146 (TA-53).

d This outfall was not listed in the SWEIS.

e Chemical waste in CY 1998 was generated as a result of the legacy material action project.

f About one-half of this waste (590 kilograms) was construction and demolition debris (previously identified as industrial solid waste in the yearbook; nonhazardous) and may be disposed of in regular landfills.

g LLW volumes include decommissioning and renovation of Experimental Area A (Building 53-03M) due to the LPSS project.

h The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.12.1-1. Bioscience Facilities Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Outfall 03A-040 exists	Discharge redirected to Los Alamos County sewage treatment plant in 1998.	Outfall eliminated from NPDES permit in 1999.				
	Two-story, 4,500-square foot wing added to Building 43-01 in 1997.					
	Animal colony downsized in 1996 and 1997.	Animal colony eliminated and research activities with radioactive materials moved into space.				
		Radioactive material work decreased.	Radioactive material work decreased.	Radioactive material work decreased.	Radioactive material work decreased.	
			Interior remodeling within TA-43 buildings.	Interior remodeling within TA-43 buildings.	Interior remodeling within TA-43 buildings.	
			Genomics work moved from TA-43-1 to TA-35-85 and expanded.		Southwest corner of TA-35-85 remodeled.	
		Remodeling of TA-43-45 to accommodate Computational Biology.				
					BSL-3 facility construction began (LANL 2000b; DOE 2002a).	Construction of BSL-3 almost complete. Authorization basis and readiness assessments continue.

Table 2.12.2-1. Bioscience Facilities/Comparison of Operations

Capabilities	SWEIS ROD [a]	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Biologically Inspired Materials and Chemistry	Not in SWEIS ROD.	Not in SWEIS ROD. This operation was developed in 1999.	Not in SWEIS ROD. This operation was developed in 1999.	Not in SWEIS ROD. This operation was developed in 1999.	Not in SWEIS ROD. This operation was developed in 1999.	In 2002, 17 FTEs were associated with Biologically Inspired Materials and Chemistry.	In 2003, 20 FTEs were associated with Biologically Inspired Materials and Chemistry.
Computational Biology	Not in SWEIS ROD.	Not in SWEIS ROD. This operation was developed in 1999.	Not in SWEIS ROD. This operation was developed in 1999.	In 2000, there were 25 FTEs, expected to grow to 35 FTEs by 2002.	In 2001, 16 FTEs were associated with Computational Biology.	In 2002, 16 FTEs were associated with Computational Biology.	In CY 2003, 18 FTEs were associated with Computational Biology.
Environmental Biology (formerly named Environmental Effects)	Research to characterize the extent of diversity in environmental microbes and to understand their functions and occurrences in the environment. (25 FTEs)	In 1998, activities increased about 50% above 1995 levels to 30 FTEs, and exceeded SWEIS ROD projections.	In 1999, 25 FTEs were associated with Environmental Biology. This equals the SWEIS ROD projection and is an increase of 25% over 1995 levels.	In 2000, 20 FTEs were associated with Environmental Biology.	In 2001, 27 FTEs were associated with Environmental Biology.	In 2002, 24 FTEs were associated with Environmental Biology.	In 2003, 24 FTEs were associated with Environmental Biology.
Genomics (formerly named Genomic Studies)	Conduct research at current levels utilizing molecular and biochemical techniques to determine and analyze the sequences of genomes (human, microbes and animal). Develop strategies to analyze the nucleotide sequence of individual genes,	In 1998, activities increased about 10% above 1995 levels to 43 FTEs, but were still below SWEIS ROD projections.	In 1999, 61 FTEs were associated with Genomics. This exceeded the SWEIS ROD projection of 50 FTEs and is an increase of 56% over 1995 levels.	In 2000, 50 FTEs were associated with Genomics.	In 2001, 47 FTEs were associated with Genomics.	In 2002, 47 FTEs were associated with Genomics.	In 2003, 47 FTEs were associated with Genomics.

	especially those associated with genetic disorders, infectious disease organisms.						
Measurement Science and Diagnostics (formerly named Cytometry)	Conduct research utilizing imaging and spectroscopy systems to analyze the structures and functions of subcellular systems and components. (40 FTEs)	In 1998, activities increased 10% above 1995 levels to 33 FTEs, but were below projections made by the SWEIS ROD.	In 1999, 25 FTEs were associated with Measurement Science and Diagnostics, a specialized application of cytometry, microscopy, spectroscopy, and other techniques for molecular detection and diagnosis. In 1999, 10 FTEs were associated with Medical Applications utilizing lasere based molecular analysis techniques to develop tools for clinical diagnosis of disease. The 35 total FTEs in Cytometry is below the 40 FTEs projected in the ROD.	In 2000, 30 FTEs were associated with Measurement Science and Diagnostics.	In 2001, 37 FTEs were associated with Measurement Science and Diagnostics.	In 2002, 37 FTEs were associated with Measurement Science and Diagnostics.	In 2003, 37 FTEs were associated with Measurement Science and Diagnostics.
Molecular and Cell Biology (formerly Cell Biology and DNA Damage and Repair)	Conduct research at current levels utilizing whole cells and cellular systems, both in-vivo and in-vitro, to investigate the effects of natural and catastrophic cellular events like	In 1998, Cell Biology activities increased ~15% above 1995 levels to 29 FTEs, but were still below projections of 35 FTEs made by the SWEIS ROD.	In 1999, 30 FTEs were associated with Molecular Cell Biology. This is less than half of the 70 FTEs projected in the ROD. In 1995, a total of 50 FTEs were associated with Cell Biology and DNA	In 2000, 30 FTEs were associated with Molecular Cell Biology.	In 2001, 42 FTEs were associated with Molecular Cell Biology.	In 2002, 42 FTEs were associated with Molecular Cell Biology.	In 2003, 42 FTEs were associated with Molecular Cell Biology.

	response to aging, harmful chemical and physical agents, and cancer. The work includes using isolated cells to investigate DNA repair mechanisms. (35 FTEs)	DNA Damage and Repair activities increased ~30% above 1995 levels to 32 FTEs, but were still below projections of 35 FTEs made by the SWEIS ROD.	Damage and Repair.				
Molecular Synthesis	Generate biometric organic materials and construct synthetic biomolecules.	This operation was developed in 1999.	This operation was developed in 1999.	In 2000, 10 FTEs were associated with this capability.	In 2001, 16 FTEs were associated with Molecular Synthesis.	In 2002, 16 FTEs were associated with Molecular Synthesis.	In 2003, 16 FTEs were associated with Molecular Synthesis.
Structural Biology (formerly named Structural Cell Biology)	Conduct research utilizing chemical and crystallographic techniques to isolate and characterize the properties and three-dimensional shapes of DNA and protein molecules. (15 FTEs)	In 1998, activities increased 130% above 1995 levels to 23 FTEs and exceeded SWEIS ROD projections.	In 1999, 60 FTEs were associated with Structural Biology. This exceeded the SWEIS ROD projection of 15 FTEs and is an increase of 500% over 1995 levels.	In 2000, 35 FTEs were associated with Structural Biology.	In 2001, 18 FTEs were associated with Structural Biology.	In 2002, 18 FTEs were associated with Structural Biology.	In 2003, 20 FTEs were associated with Structural Biology.

In-Vivo Monitoring. This is not a Bioscience Division capability; however, it is located at TA-43-HRL-1. Therefore, it is a capability within this Key Facility and is included here.	Perform 3,000 whole-body scans per year as a service to the LANL personnel monitoring program, which supports operations with radioactive materials conducted elsewhere at LANL. (5 FTEs)	Conducted 1,068 whole-body scans and 1,737other counts (detector studies, quality assurance measurements, etc.). In 1998, 5 FTEs were associated with this capability.	Conducted 1,250 whole-body scans and 1,733 other counts (detector studies, quality assurance measurements, etc.). In 1999, 3 FTEs were associated with this capability.	Conducted 1,261 whole-body scans and 718other counts (detector studies, quality assurance measurements, etc.). In 2000, 3 FTEs were associated with this capability.	Conducted 1,083 whole-body scans and 766 other counts (detector studies, quality assurance measurements, etc.). In 2001, 2.5 FTEs were associated with this capability.	Conducted 1,639 whole-body scans and 641other counts (detector studies, quality assurance measurements, etc.). In 2002, 3 FTEs were associated with this capability.	Conducted 1,140 lung and whole-body scans and 767other counts (detector studies, quality assurance measurements, etc.). In 2003, 3 FTEs were associated with this capability.

a FTEs: full-time-equivalent scientists, researchers, and other staff supporting a particular research capability.

Table 2.12.3-1. Bioscience Facilities/Operations Data

Parameter	Units	SWEIS ROD	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Radioactive Air Emissions	Ci/yr	Not estimated	Not measured	Not measured	Not measured	Not measured	Not measured	Not measured
NPDES Discharge: [a] 03A-040	MGY	2.5 [b]	No discharge [c]	Eliminated in 1999	Eliminated in 1999	Eliminated in 1999	Eliminated in 1999	Eliminated in 1999
Wastes:								
Chemical	kg/yr	13,000	2,368	1,691	2,370 [d]	1,359 [d]	4,504 [d]	2,870
Biomedical Waste	kg/yr	280 [e]	<60	0	0	0	0	0
LLW	m^3/yr	34	7	14	0	0	0	0
MLLW	m^3/yr	3.4	0	0.01	0	0	0	0
TRU	m^3/yr	0	0	0	0	0	0	0
Mixed TRU	m^3/yr	0	0	0	0	0	0	0
Number of Workers	FTEs	250 [f] 98 [f]	82 [f]	98 [f]	110 [f]	116 [f]	108 [f]	112 [f]

a Outfall 03A-040 consisted of one process outfall and nine storm drains.

b Storm water only.

c Process flows were routed in 1998 to Bayo Canyon sewage plant operated by the County.

d Represents only the Bioscience contribution. Wastes from the other buildings were insignificant and were captured in the Non-Key Facilities totals.

e Animal colony and the associated waste. The animal colony waste in calendar year 1997 was 75 kg. The animal colony was downsized substantially in the 1996 to 1997 period and was eliminated in 1999.

f The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.13.1-1. Radiochemistry Facility Construction and Modification

WEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Projected no facility changes through 2005		Minor maintenance: office modifications, chiller replaced, and some basement ventilation removed.	Minor maintenance activities.	Minor maintenance activities.	Minor maintenance activities.	Minor maintenance activities.
	Building 48-01, Room 346 Converted 3500 square feet of storage space to chemistry laboratory space (DOE 1997c).			Building 48-01 Upgraded some of the basement ductwork.	Building 48-01 Replaced refrigerants in two chillers with pollution prevention funds. Improved some HVAC. Repaired roof. Upgraded lightning protection. Improved life safety.	
	Building 48-01, Room 430 upgraded the ventilation systems and remodeled chemistry Lab (DOE 1998f).				Building 48-0 Removed machine shop from basement.	
					Building 48-0 Installed machine shop from Building 48-1.	
					Building 48-31 removed.	
				Building 48-45 refurbished due to Cerro Grande Fire (LANL 2001p, DOE 1996f).	Building 48-45 Installed acid neutralization system.	
					Building 48-210 Transportable office building installed to replace TA-48-31.	
	Four outfalls eliminated during 1997 and 1998: 04A-016, 04A-152, 04A-131, and 04A-153 (DOE 1996e).	Remaining outfall eliminated: 03A045 (DOE 1996e).				

Table 2.13.2-1. Radiochemistry Facility (TA-48)/Comparison of Operations

Capability	SWEIS ROD	1998 Operations [a]	1999 Operations [b]	2000 Operations [b]	2001 Operations [b]	2002 Operations [b]	2003 Operations
Radionuclide Transport Studies	Actinide transport, sorption, and bacterial interaction studies. Development of models for evolution of groundwater. Assessment of performance or risk of release for radionuclide sources at proposed waste disposal sites. (28 to 34 FTEs [a])	Increased level of operations, approximately twice 1995 levels. (32 FTEs)	Increased level of operations, approximately twice 1995 levels. (35 FTEs)	Increased level of operations, approximately twice levels identified during preparation of the SWEIS (36 FTEs)	During 2001, operations continued at approximately twice the levels identified during preparation of the SWEIS. (36 FTEs)	During 2002, operations continued at approximately twice the levels identified during preparation of the SWEIS. (36 FTEs)	During 2003, operations continued at approximately twice the levels identified during preparation of the SWEIS. (36 FTEs [a])
Environmental Remediation Support	Background contamination characterization pilot studies. Performance assessments, soil remediation research and development, and field support. (34 FTEs [a])	Decreased level of operations, approximately half 1995 levels. (9 FTEs)	Decreased level of operations, approximately half 1995 levels. (10 FTEs)	Decreased level of operations, approximately half levels identified during preparation of the SWEIS (10 FTEs)	During 2001, operations continued at approximately half the levels identified during preparation of the SWEIS. (10 FTEs)	During 2002, operations continued at approximately half the levels identified during preparation of the SWEIS. (10 FTEs)	During 2003, operations continued at approximately half the levels identified during preparation of the SWEIS. (10 FTEs [a])
Ultra-Low-Level Measurements	Isotope separation and mass spectrometry. (30 FTEs [a])	Slightly increased level of operations, approximately the same as in 1995. (15 FTEs)	Level of operations, approximately the same as in 1995. (14 FTEs)	Level of operations, approximately the same as levels identified during preparation of the SWEIS (14 FTEs)	Level of operations was approximately the same as levels identified during preparation of the SWEIS. (14 FTEs)	Level of operations was approximately the same as levels identified during preparation of the SWEIS. (14 FTEs)	Level of operations was approximately the same as levels identified during preparation of the SWEIS. (14 FTEs [a])
Nuclear/ Radiochemistry	Radiochemical operations involving quantities of alpha-, beta-, and gamma-emitting radionuclides for non-weapons and weapons work. (44 FTEs [a])	Slightly increased level of operations, approximately the same as 1995 levels. (40 FTEs)	Slightly decreased level of operations, but approximately the same as 1995 levels. (35 FTEs)	Slightly decreased level of operations, but approximately the same as levels identified during preparation of the SWEIS (35 FTEs)	Slightly decreased level of operations, but approximately the same as levels identified during preparation of the SWEIS. (35 FTEs)	Slightly decreased level of operations, but approximately the same as levels identified during preparation of the SWEIS. (35 FTEs)	Significant decrease in quantities of alpha-emitting radionuclides used in operations (35 FTEs [a])
Isotope Production	Target preparation. High-level beta/gamma chemistry and target processing to recover	Slightly increased level of operations, approximately the	Slightly increased level of operations, approximately the	Slightly increased level of operations, but approximately the same as levels	Slightly increased level of operations, but approximately the same as levels	Slightly increased level of operations, but approximately the same as levels	Slightly increased level of operations, but approximately the same as levels identified

	isotopes for medical and industrial application. (15 FTEs [a])	same as in 1995. (12 FTEs)	same as in 1995. (11 FTEs)	identified during preparation of the SWEIS (11 FTEs)	identified during preparation of the SWEIS. (11 FTEs)	identified during preparation of the SWEIS. (11 FTEs)	during preparation of the SWEIS. (11 FTEs [a])
Actinide/TRU Chemistry	Radiochemical operations involving significant quantities of alpha-emitting radionuclides. (12 FTEs [a])	Increased operations, approximately twice 1995 levels. (14 FTEs)	Increased operations, approximately twice 1995 levels. (13 FTEs)	Increased operations, approximately twice levels identified during preparation of the SWEIS (14 FTEs)	Increased operations, approximately twice levels identified during preparation of the SWEIS. (14 FTEs)	Significant decrease in quantities of alpha-emitting radionuclides used in operations. (14 FTEs)	Significant decrease in quantities of alpha-emitting radionuclides used in operations. (14 FTEs [a])
Data Analysis	Re-examination of archive data and measurement of nuclear process parameters of interest to weapons radiochemists. (10 FTEs [a])	Slight increase from 1995 to six FTEs, but less than projected by the SWEIS ROD.	Slight increase from 1995 to six FTEs, but less than projected by the SWEIS ROD.	Slight increase from levels identified during preparation of the SWEIS to six FTEs, but less than projected by the SWEIS ROD.	Slight increase from levels identified during preparation of the SWEIS to six FTEs, but less than projected by the SWEIS ROD.	Slight increase from levels identified during preparation of the SWEIS to six FTEs, but less than projected by the SWEIS ROD.	Slight increase from levels identified during preparation of the SWEIS to six FTEs [a], but less than projected by the SWEIS ROD.
Inorganic Chemistry	Synthesis, catalysis, actinide chemistry: • Chemical synthesis of new organo-metallic complexes • Structural and reactivity analysis, organic product analysis, and reactivity and mechanistic studies • Synthesis of new ligands for radiopharmaceuticals Environmental technology development: • Ligand design and synthesis for selective extraction of metals • Soil washing • Membrane separator development • Ultrafiltration (49 FTEs [a] —total for both activities)	Slight decrease from levels in 1995 to 32 FTEs, below projections of the SWEIS ROD.	Same level of activity as in 1995 (35 FTEs), but below projections of the SWEIS ROD.	Same level of activity (35 FTEs) as levels identified during preparation of the SWEIS, but below projections of the SWEIS ROD.	Same level of activity (35 FTEs) as levels identified during preparation of the SWEIS, but below projections of the SWEIS ROD.	Same level of activity (35 FTEs) as levels identified during preparation of the SWEIS, but below projections of the SWEIS ROD.	Same level of activity (35 FTEs [a]) as levels identified during preparation of the SWEIS, but below projections of the SWEIS ROD.

Structural Analysis	Synthesis and structural analysis of actinide complexes at current levels. X-ray diffraction analysis of powders and single crystals at current levels. (22 FTEs [a])	Decreased level of operations from 1995, and about 1/3 of those projected by the SWEIS ROD. (6 FTEs)	Decreased level of operations from 1995, and about 1/3 of those projected by the SWEIS ROD. (8 FTEs)	Decreased level of operations from levels identified during preparation of the SWEIS, and about one-third of those projected by the SWEIS ROD. (7 FTEs)	Decreased level of operations from levels identified during preparation of the SWEIS, and about one-third of those projected by the SWEIS ROD. (7 FTEs)	Decreased level of operations from levels identified during preparation of the SWEIS, and about one-third of those projected by the SWEIS ROD. (7 FTEs)	Decreased level of operations from levels identified during preparation of the SWEIS, and about one-third of those projected by the SWEIS ROD. (7 FTEs [a])
Sample Counting	Measurement of the quantity of radioactivity in samples using alpha-, beta-, and gamma-ray counting systems. (5 FTEs [a])	Approximately the same as SWEIS ROD. (6 FTEs)	Approximately the same as SWEIS ROD. (6 FTEs)	Approximately the same as projected by the SWEIS ROD. (6 FTEs)	During 2001, slight increase in the number of samples projected by the SWEIS ROD. (6 FTEs)	During 2002, slight increase in the number of samples projected by the SWEIS ROD. (6 FTEs)	During 2003, slight increase in the number of samples projected by the SWEIS ROD. (6 FTEs [a])

a FTEs: full-time-equivalent scientists, researchers, and other staff supporting a particular research capability. FTEs: full-time-equivalent. It is imperative that these FTE numbers are not confused with the FTEs identified in Table 2.13.3-1. Two different populations of individuals are represented. The FTEs in this table include students, visitors, and temporary staff. The FTEs in Table 2.13.3-1 for 1998-2002 operations only include full-time and part-time regular LANL staff.

b Projections in the ROD were made as increments to the current level of operations as expressed by the "No Action" alternative for the current (1995) year. Thus, 1999 operations must use increments from 1995 operational levels for comparison.

Table 2.13.3-1. Radiochemistry Facility (TA-48)/Operations Data

Parameter	Units	SWEIS ROD	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Radioactive Air Emissions:								
Mixed Fission Products	Ci/yr	1.4E-4	Not detected	Not reported [a]	Not reported [a]	Not reported [a]	Not reported [a]	Not reported [a]
Plutonium-238	Ci/yr	Not Projected [c]	Not detected	Not detected [b]	Not detected [b]	Not detected [b]	2.3E-10	Not detected [b]
Plutonium-239	Ci/yr	1.1E-5	Not detected	Not detected [b]	Not detected [b]	Not detected [b]	1.5E-9	Not detected [b]
Uranium-234	Ci/yr	Not Projected [c]	1.35E-7	Not detected [b]	Not detected [b]	Not detected [b]	Not detected [b]	Not detected [b]
Uranium-235	Ci/yr	4.4E-7	5.00E-9	Not detected [b]	Not detected [b]	Not detected [b]	Not detected [b]	Not detected [b]
Mixed Activation Products	Ci/yr	3.1E-6	Not detected	Not reported [a]	Not reported [a]	Not reported [a]	Not reported [a]	
Uranium-238	Ci/yr	Not Projected [d]	Not detected	6.0E-10	Not detected [b]	Not detected [b]	Not detected [b]	Not detected [b]
Arsenic-72	Ci/yr	1.1E-4	Not detected	Not detected [b]	Not detected [b]	Not detected [b]	Not detected [b]	Not detected [b]
Arsenic-73	Ci/yr	1.9E-4	Not detected	1.8E-5	4.4E-5	4.2E-5	2.3E-3	Not detected [b]
Arsenic-74	Ci/yr	4.0E-5	9.46E-7	4.5E-5	2.8E-5	1.1E-5	1.2E-3	Not detected [b]
Beryllium-7	Ci/yr	1.5E-5	Not detected	Not detected [b]	Not detected [b]	Not detected [b]	Not detected [b]	Not detected [b]
Bromine-77	Ci/yr	8.5E-4	8.68E-5	1.2E-5	2.8E-5	Not detected [b]	Not detected [b]	Not detected [b]
Germanium-68	Ci/yr	1.7E-5	Not detected	1.7E-3	8.1E-3	1.1E-3	3.4E-3	3.33E-04
Gallium-68	Ci/yr	1.7E-5	Not detected	1.7E-3	8.1E-3	1.1E-3	3.4E-3	3.33E-04
Rubidium-86	Ci/yr	2.8E-7	Not detected	Not detected [b]	Not detected [b]	Not detected [b]	Not detected [b]	Not detected [b]
Selenium-75	Ci/yr	3.4E-4	2.41E-5	3.5E-4	1.4E-4	Not detected [b]	3.8E-7	Not detected [b]
Silicon-32	Ci/yr	Not Projected [e]	Not measured	5.1E-6	Not measured	Not measured	Not measured	Not measured
NPDES Discharge: [f]								
Total Discharges	MGY	4.1	No Discharge	No discharge	No discharge	No discharge	No discharge	
03A-045	MGY	0.87	No Discharge	Eliminated-1999 [g]	Eliminated-1999	Eliminated–1999	Eliminated-1999	Eliminated-1999
04A-016	MGY	None	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated–1997	Eliminated-1997	Eliminated-1997
04A-131	MGY	None	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated–1998	Eliminated-1998	Eliminated-1998
04A-152	MGY	None	Eliminated-1997	Eliminated-1997	Eliminated-1997	Eliminated–1997	Eliminated-1997	Eliminated-1997
04A-153	MGY	3.2	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998	Eliminated-1998
Wastes:								
Chemical	kg/yr	3,300	1,990	1,513	12,461 [h]	17,731 [i]	186,135 [j]	4,860 [k]
LLW	m^3/yr	270	89	40	57	60	34	78
MLLW	m^3/yr	3.8	1.0	0.6	1.6	2.2	2.2	5.7
TRU [l]	m^3/yr	0	0.2	0	0	0	0	1.25
Mixed TRU [l]	m^3/yr	0	0	0	0	0	0	0
Number of Workers	FTEs	248 [m] 128 [m]	129 [m]	128 [m]	124 [m]	122 [m]	110 [m]	113 [m]

a Emission categories of 'mixed fission products' and 'mixed activation products' are no longer used. Instead, where fission or activation products are measured, they are reported as specific radionuclides, e.g., Cs-137 or Co-60.

b Although stack sampling systems were in place to measure these emissions, any emissions were sufficiently small to be below the detection capabilities of the sampling systems.

c The SWEIS ROD did not contain projections for this radioisotope.

d The radionuclide was not projected in the ROD because it was either dosimetrically insignificant or not isotopically identified.

e The Si-32 emissions were not expected. There was a slight process problem that resulted in these emissions. The dose from these emissions was not significant.

f Outfalls eliminated before 1999: 04A-016 (TA-48), 04A-131 (TA-48), 04A-152 (TA-48), and 04A-153 (TA-48).

g This outfall was eliminated from the NPDES permit on December 6, 1999.

h Approximately 10,959 kilograms of this chemical waste represents construction and demolition debris (previously identified in the yearbook as industrial solid waste) resulting from cleanup following the Cerro Grande fire. The construction and demolition debris is nonhazardous and is disposed in regular county landfills.

i Approximately 8,861 kilograms of this waste was generated during chemical cleanouts of TA-48-01 during 2001.

j The CY 2002 chemical waste volume includes 182,891.52 kilograms of contaminated soil from a construction project outside TA-48-1. The contamination was from a leaky pipe uncovered during excavation of trenches for new utilities.

k In 2003, TA-48 had several chemical clean outs to dispose of unwanted chemicals. In addition, two mercury containing shields weighing a total of 8,000 lbs were sent to a mercury recycler for mercury recovery. The clean outs and the disposal of the mercury were all done in support of RC-1 efforts to downgrade the facility from a nuclear facility to a radiological one.

l TRU waste was projected to be returned to the generating facility.

m The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.14-1. Radioactive Liquid Waste Treatment Facility Buildings with Nuclear Hazard Classification

Building	Description	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]	LANL 2002 [e]
TA-50-0001	Main Treatment Plant	2	3	3	3	3	3	3
TA-50-0002	LLW Tank Farm		3	3	3	3	3	3
TA-50-0066	Acid and Caustic Tank Farm		3	3	3	3	3	3
TA-50-0090	Holding Tank		3	3	3	3	3	3

a DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
b DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
c DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
d DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
e DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

Table 2.14.1-1. Radioactive Liquid Waste Treatment Facility Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook [a]	2001 Yearbook	2002 Yearbook	2003 Yearbook
Replace influent underground storage tanks	Tank farm upgraded by replacing two of three underground storage tanks with four aboveground steel tanks in 1997.					
Install a UF/RO process	Process installed in 1998.	Process became operational in 1999.				
		Installed an electrodialysis reversal unit and began construction of an evaporator to support UF/RO process (DOE 1999c, DOE 1999d).			Installation of ion exchange process to remove perchlorate from the RLWTF effluent.	
Install nitrate reduction equipment	Equipment installed in 1998.	Equipment became operational in 1999.		Nitrate reduction equipment was removed from service.		
			Decontamination operations relocated from Building TA-50-01 to TA-54.			
			Lead decontamination trailer sent to Area G for decommissioning.			
				Cross-country transfer line between TA-21 and TA-50 RLWTF taken out of service.		
						Begin use of metal tank with secondary containment for holding process sludge.

a Additional information on the impacts of the Cerro Grande fire can be found in Section 2.14.4.

Table 2.14.2-1. Radioactive Liquid Waste Treatment Facility (TA-50)/Comparison of Operations

Capability	SWEIS ROD [a]	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Waste Characterization	Support, certify, and audit generator characterization programs.	As projected.	As projected.	As projected.	As projected.	As projected.	As projected.
Packaging, Labeling	Maintain waste acceptance criteria for radioactive liquid waste treatment facilities.	As projected.	As projected.	As projected.	As projected.	As projected.	As projected.
Waste Transport, Receipt, and Acceptance	Collect radioactive liquid waste from generators and transport to TA-50.	As projected.	As projected.	As projected.	As projected.	As projected.	As projected.
Radioactive Liquid Waste Pretreatment	Pretreat 900,000 liters/yr of radioactive liquid waste at TA-21.	Pretreated 370,000 liters at TA-21.	Pretreated 45,000 liters at TA-21.	Pretreated 45,000 liters at TA-21.	Pretreated 457,000 liters at TA-21.	Pretreated 36,700 liters at TA-21.	Pretreated 24,640 liters of radioactive liquid waste at TA-21.
	Pretreat 80,000 liters/yr of radioactive liquid waste from TA-55 in Room 60.	Pretreated 39,000 liters in Room 60.	Pretreated less than 80,000 liters in Room 60.	Pretreated 9,000 liters in Room 60.	Pretreated 22,000 liters in Room 60.	Pretreated 35,400 liters in Room 60.	Pretreated 51,674 liters of radioactive liquid waste in Room 60.
	Solidify, characterize, and package 3 m^3 per year of TRU waste sludge in Room 60.	No TRU waste sludge was treated; solidification was conducted in Room 60 (5 m^3 in 1997; 5 m^3 in 1999).	Solidified 5 m^3 of TRU waste in Room 60.	Solidified 5 m^3 of TRU waste sludge in Room 60.	No TRU waste sludge was solidified in Room 60.	No TRU waste sludge was solidified in Room 60.	2.9 cubic meters of TRU waste sludge was solidified in Room 60.
Radioactive Liquid Waste Treatment	Install ultrafiltration/reverse osmosis (UF/RO) equipment in 1997. Install equipment for nitrate reduction in 1999.	UF/RO equipment installed in 1998. Nitrate reduction equipment installed in 1998.	UF/RO equipment operational in March 1999. Nitrate reduction equipment operational in March 1999.	UF/RO equipment operational in March 1999. Nitrate reduction equipment operational in March 1999.	UF/RO equipment installed in 1998 and subsequently removed in 2001. Nitrate reduction equipment installed in 1998 and subsequently removed in 2001.	UF/RO equipment installed in 1998 and subsequently removed in 2001. Nitrate reduction equipment installed in 1998 and subsequently removed in 2001.	UF/RO equipment installed in 1998. Nitrate reduction equipment installed in 1998 and subsequently removed in 2001.

	Treat 35 million liters/yr of radioactive liquid waste.	Treated 23 million liters of radioactive liquid waste.	Treated 20 million liters of radioactive liquid waste.	Treated 19 million liters of radioactive liquid waste.	Treated 14 million liters of radioactive liquid waste.	Treated 11.5 million liters of radioactive liquid waste.	Treated 13.5 million liters of radioactive liquid waste.
	De-water, characterize, and package 10 m^3 per year of LLW sludge.	De-watered 28 m^3 of LLW sludge.	De-watered 37 m^3 of LLW sludge.	De-watered 48 m^3 of LLW sludge.	De-watered 60 m^3 of LLW sludge.	Produced 52 m^3 of dewatered LLW sludge.	Dewatered 28.7 cubic meters of LLW sludge.
	Solidify, characterize, and package 32 m^3 per year of TRU waste sludge.	No TRU waste sludge was solidified.	No TRU waste sludge was solidified.	No TRU waste sludge was solidified.	Solidified 5 m^3 of TRU waste sludge.	No TRU waste sludge was solidified.	No TRU waste sludge was solidified as a result of main plant operations.
						Installation of ion exchange resin columns to remove perchlorates from all the RLWTF effluent.	Installation of ion exchange resin columns to remove perchlorates from all the RLWTF effluent.
Decontamination Operations	Decontaminate LANL personnel respirators for reuse (~ 700 per month).	Decontaminated 500 personnel respirators per month	Decontaminated 425 personnel respirators per month	Decontaminated 450 personnel respirators per month	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.
	Decontaminate air-proportional probes for reuse (~ 300 per month).	Decontaminated 250 faces and 200 bodies per month.	Decontaminated 93 faces and 94 bodies per month.	Decontaminated about 125 air-proportional probes per month.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.
	Decontaminate vehicles and portable instruments for reuse (as required).	Decontaminated two vehicles in 1998 and eight portable instruments per month.	Decontaminated 26 drill bits, 12 augers, four collars, and six portable instruments per month.	Decontaminated six portable instruments per month. No large-item decontamination was performed.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.

	Decontaminate precious metals for resale (acid bath).	Decontamination of precious metals started in 1998 via decon of platinum from TRU waste to LLW.	Decontaminated platinum from TRU waste to LLW.	No activity.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.
	Decontaminate scrap metals for resale (sandblast).	Decontaminated 11 m^3 of scrap metals.	Decontaminated no scrap metals	Decontaminated 386 ft^3 of metal and 58 ft^3 of circuit boards for recycle.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.
	Decontaminate 200 m^3 of lead for reuse (grit blast).	Decontaminated 1 m^3 of lead.	Decontaminated 2.3 m^3 of lead.	Decontaminated 0.15 m^3 of lead.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.	No activity. [b] Decontamination operations were relocated during 2000 from Building 50-01 to TA-54.

a Includes installation of ultrafiltration and reverse osmosis (UF/RO) and nitrate reduction processes in Building 50-01 and installation of aboveground tanks for the collection of influent radioactive liquid waste.

b Decontamination operations are reported as part of the Solid Radioactive and Chemical Waste Key Facility.

Table 2.14.3-1. Radioactive Liquid Waste Treatment Facility (TA-50)/Operations Data

Parameter	Units	SWEIS ROD	1998 Operations	1999 Operations	2000 Operations	2001 Operations	2002 Operations	2003 Operations
Radioactive Air Emissions:								
Americium-241	Ci/yr	Negligible	6.5E-09	1.3E-07	Not detected	Not detected	1.3E-08	6.89E-09
Plutonium-238	Ci/yr	Negligible	1.4E-08	3.4E-08	9.8E-09	3.8E-08	1.6E-08	7.37E-09
Plutonium-239	Ci/yr	Negligible	Not detected	1.8E-08	Not detected	4.5E-09	3.1E-08	Not detected
Thorium-228	Ci-yr	Negligible						2.21E-08
Thorium-230	Ci/yr	Negligible	7.7E-08	3.7E-08	5.3E-08	Not detected	Not detected	1.16E-08
Thorium-232	Ci/yr	Negligible						2.22E-08
Uranium-234	Ci/yr	Negligible	1.8E-07	Not detected [a]	Not detected	Not detected	Not detected	Not detected
Uranium-238	Ci/yr	Not projected	Not detected	Not detected	Not detected	Not detected	2.5E-08	Not detected
NPDES Discharge:								
051	MGY	9.3	6.1	5.3	4.9	3.6	2.9	2.9
Wastes: [b]								
Chemical	kg/yr	2,200	384	201	384 [c]	68,792 [d]	1,143	69
LLW	m^3/yr	160	132	176	132	527 [e]	193	390
MLLW [f]	m^3/yr	0	1.3	3.2	2.5	2.6	3.7	0
TRU	m^3/yr	30	1	0	16.1	0.4	1.9	0
Mixed TRU	m^3/yr	0	1.4	4.6	0	4.4	0.2	2.7
Number of Workers	FTEs	110 [g] 62 [g]	55 [g]	62 [g]	58 [g]	47 [g]	54 [g]	52 [g]

a Although stack sampling systems were in place to measure these emissions, any emissions were sufficiently small to be below the detection capabilities of the sampling system.

b Secondary wastes are generated during the treatment of radioactive liquid waste and as a result of decontamination operations performed at this Key Facility until calendar year 2000. Examples include decontamination acid bath solutions and rinse waters, high-efficiency particulate air filters, personnel protective clothing and equipment, and sludges from the pretreatment and main radioactive liquid waste treatment processes.

c Approximately 127 kilograms of the chemical wastes are construction and demolition debris (previously identified in the yearbook as industrial solid wastes) resulting from cleanup following the Cerro Grande fire. Construction and demolition debris is nonhazardous, may be disposed of in county landfills, and does not represent a threat to local environs.

d Approximately 68,584 kilograms of the chemical waste were generated as a result of replacement of storage tanks and some associated plumbing at TA-50. The waste consisted of soil piles and asphalt associated with the pad the old tanks were sitting on.

e In an effort to be in compliance with the Water Quality standard of 20 picocuries, wastewater from tritium experiments is occasionally sent to the Evaporation Basins at TA-53. During CY 2001, approximately 380 cubic meters of water were transferred to TA-53.

f Resource Conservation and Recovery Act-listed hazardous chemicals were not projected to be used in RLWTF, and secondary mixed wastes were therefore not projected to be generated.

g The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2002 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include Protection Technology Los Alamos (PTLA), KSL, and other subcontractor personnel. The number of employees for 1998 through 2002 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.15-1. Solid Waste Buildings with Nuclear Hazard Classification

Building	Description	SWEIS ROD	DOE 1998 [a]	DOE 2000 [b]	LANL 2001 [c]	LANL 2001 [d]	LANL 2002 [e]	LANL 2002 [e]
TA-50-0037	RAMROD [f]		2	2	2	2	3	3
TA-50-0069	WCRRF Building	2	3	3	3	3	3	3
TA-50-0069 Outside	Nondestructive Analysis Mobile Activities			2	2	2	2	2
TA-50-0069 Outside [g]	Drum Storage			2	2	2		
TA-54-Area G	LLW Storage/Disposal	2	2	2	2	2	2	2
TA-54	TWISP		2	2	2	2	2	2
TA-54-0002 [h]	TRU Storage Building		3	3	3		2	2
TA-54-0033	TRU Drum Preparation	2			2	2	2	2
TA-54-0038	Radioassay and Nondestructive Testing Facility	2	3	3	3	3	3	3
TA-54-0048	TRU Storage Dome	2	3	3	3		2	2
TA-54-0049	TRU Storage Dome	2	3	3	3		2	2
TA-54-0144	Shed	2					2	2
TA-54-0145	Shed	2					2	2
TA-54-0146	Shed	2					2	2
TA-54-0153	TRU Storage Dome	2	3	3	3		2	2
TA-54-0177	Shed	2					2	2
TA-54-0224	Mixed Waste Storage Dome						2	2
TA-54-0226	TRU Storage Dome	2					2	2
TA-54-0229	Tension Support Dome	2					2	2
TA-54-0230	Tension Support Dome	2					2	2
TA-54-0231	Tension Support Dome	2					2	2
TA-54-0232	Tension Support Dome	2		2			2	2
TA-54-0283	Tension Support Dome	2		2			2	2
TA-54-0375	TRU Storage Dome	2					2	2
TA-54-Pad2	Storage Pad	2		2		2	2	2
TA-54-Pad3	Storage Pad	2		2			2	2
TA-54-Pad4	TRU Storage	2		2			2	2
TA-54 Pit 2	TRU Waste Storage Dome				2			

a DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
b DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
c DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
d DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
e DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

f RAMROD – Radioactive Materials Research Operations and Demonstration Facility.

g In the most recent nuclear facility lists (LANL 2001b) and (LANL 2002a), "Drum Storage" includes drum staging/storage pad and waste container temperature equilibration activities outside TA-50-69.

h This includes Low level Waste (including mixed waste) storage and disposal in domes, pits, shafts, and trenches. TRU waste storage in domes and shafts (does not include TWISP). TRU legacy waste in pits and shafts. Low-level disposal of asbestos in pits and shafts. Operations building: TRU waste storage.

Table 2.15.1-1. Solid Radioactive and Chemical Waste Facilities Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Four additional fabric domes for storage of retrieved TRU waste	Domes 54-231, 54-232, and 54-375 constructed Dome 54-226 usage changed from retrieval to storage for TWISP.	Dome 54-375 completed.				
Area G expansion for waste storage	Not yet needed.	Not yet needed.	Not yet needed.	Not yet needed.	Not yet needed.	Not yet needed.
	Automated and enclosed drum washers installed in Drum Preparation Facility, Building 54-33.					
	Modular containment for size reduction removed from Building 54-33.					
	Small compactor removed from Compactor Facility, Building 54-281.					
	Maintenance Shop, Building 54-02, converted into a counting laboratory for "Green is Clean".					
		Construction of Decontamination and Volume Reduction System began (DOE 1999e).				
			Decontamination operations relocated from TA-50-01 to TA-54.			
			Lead decontamination trailer from TA-50 removed from service and awaiting decommissioning at Area G.			

			Check dams installed at Area G for storm water runoff control (DOE 1999f).			
					Storage of sources recovered from Off-Site Source Recovery Project.	
					Plan submitted to close three RCRA regulated storage units at TA-50.	Plan submitted to close three RCRA regulated storage units at TA-50.

a Additional information on the impacts of the Cerro Grande Fire can be found in Section 2.15.4.

Table 2.15.2-1. Solid Radioactive and Chemical Waste Facilities (TA-50 and TA-54)/Comparison of Operations

Capability	SWEIS ROD [a]	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Waste Characterization, Packaging, and Labeling	Support, certify, and audit generator characterization programs.	As projected.	As projected.	As projected.	As projected.	As projected.	As projected.
	Maintain waste acceptance criteria for LANL waste management facilities.	As projected.	As projected.	As projected.	As projected.	As projected.	As projected.
	Characterize 760 m^3 of legacy MLLW.	Characterized 136 m^3 of legacy MLLW in 1998.	Characterized 83 m^3 of legacy MLLW.	Characterized 11 m^3 of legacy MLLW.	Characterized 59 m^3 of legacy MLLW.	Characterized 42 m^3 of legacy MLLW.	Characterized 25 m^3 of legacy MLLW.
	Characterize 9,010 m^3 of legacy TRU waste.	Characterized 21 m^3 of TRU waste during 1996-1998.	Characterized 6.25 m^3 of legacy TRU waste in 1999.	No TRU waste was fully characterized in 2000.	Characterized 83 m^3 of TRU waste in 2001.	Characterized 14.4 m^3 of TRU waste in 2001.	Characterized 280 m^3 of TRU waste in 2003.
	Verify characterization data at the Radioactive Assay and Nondestructive Test Facility for unopened containers of LLW and TRU waste.	Verified characterization data at Radioactive Assay and Nondestructive Test Facility for TRU wastes, but not for LLW.	Verified characterization data at Radioactive Assay and Nondestructive Test Facility for TRU wastes, but not for LLW.	Verified characterization data at Radioactive Assay and Nondestructive Test Facility for TRU wastes, but not for LLW.	Verified characterization data at Radioactive Assay and Nondestructive Test Facility for TRU wastes, but not for LLW.	Verified characterization data at Radioactive Assay and Nondestructive Test Facility for TRU wastes, but not for LLW.	Verified characterization data at Radioactive Assay and Nondestructive Test Facility for TRU wastes, but not for LLW.
	Maintain waste acceptance criteria for offsite treatment, storage, and disposal facilities.	As projected.	As projected.	As projected.	As projected.	As projected.	As projected.
	Over-pack and bulk waste as required.	As projected.	As projected.	As projected.	As projected.	As projected.	As projected.
	Perform coring and visual inspection of a percentage of TRU waste packages.	Two drums were cored and inspected.	Six drums were cored and inspected in 1999.	Coring operations were suspended until homogenous analytical capabilities are added to the RAMROD Facility.	Coring operations were suspended until homogenous analytical capabilities are added to the RAMROD Facility.	Performed visual inspection of 13 m^3 of TRU waste packages. No coring was performed in 2002.	Performed visual examinations on 16 TRU waste packages; 12 drums were cored in 2003.

	Vent 16,700 drums of TRU waste retrieved during TWISP.	Vented 4,816 drums during 1996-1998.	Vented 8,426 drums as of December 1999.	Vented 622 drums during 2000 reaching a total of 9,048 as of December 2000.	Vented 7,085 drums during 2001 reaching a total of 16,133 as of December 2001.	Vented 766 drums during 2002.	Vented 500 drums during 2003.
	Maintain current version of WIPP waste acceptance criteria and liaison with WIPP operations.	As projected.	As projected.	As projected.	As projected.	As projected.	As projected.
Compaction	Compact up to 25,400 m^3 of LLW.	94 m^3 of LLW were compacted into 35 m^3.	280 m^3 of LLW were compacted into 77 m^3.	353 m^3 of LLW were compacted into 84 m^3.	483 m^3 of LLW were compacted into 108 m^3.	Approximately 271 m^3 of LLW were compacted into 63 m^3.	Approximately 350 m^3 of LLW were compacted into 77m^3.
Size Reduction	Size reduce 2,900 m^3 of TRU waste at WCRRF and the Drum Preparation Facility.	Size reduction was not performed in 1998.	Size reduction was not performed in 1999.	As proof-of-principle testing for the Decontamination and Volume Reduction System Facility, 100 m^3 of TRU waste were processed and reduced to 60 m^3.	As proof-of-principle testing for the Decontamination and Volume Reduction System Facility, 40 m^3 of waste were recharacterized and disposed of as LLW at TA-54, Area G.	Approximately 32 m^3 of TRU waste were processed through the DVRS. Over 85% was characterized as LLW and disposed of at TA-54, Area G.	Approximately 42 m^3 of TRU waste were processed through the DVRS.
Waste Transport, Receipt, and Acceptance	Collect chemical and mixed wastes from LANL generators and transport to TA-54.	Collected and transported chemical and mixed wastes.	Collected and transported chemical and mixed wastes.	Collected and transported chemical and mixed wastes.	Collected and transported chemical and mixed wastes.	Collected and transported chemical and mixed wastes.	Collected and transported chemical and mixed wastes.
	Begin shipments to WIPP in 1999.	No shipments to WIPP.	Shipments to WIPP began 3/26/1999.	Shipments to WIPP began 3/26/1999.	Shipments to WIPP began 3/26/1999.	Shipments to WIPP began 3/26/1999.	Shipments to WIPP began 3/26/1999.
	Over the next 10 years, ship 32,000 metric tons of chemical wastes and 3,640 m^3 of MLLW for offsite land disposal restrictions, treatment, and disposal.	1,767 metric tons of chemical waste and 136 m^3 of MLLW were shipped for offsite treatment and disposal.	882 metric tons of chemical waste and 96 m^3 of MLLW were shipped for offsite treatment and disposal.	450 metric tons of chemical waste and 11 m^3 of MLLW were shipped for offsite treatment and disposal.	504 metric tons of chemical waste and 46 m^3 of MLLW were shipped for offsite treatment and disposal.	Approximately 194 metric tons of chemical waste and ~ 42 m^3 of MLLW were shipped for offsite treatment	Approximately 184 metric tons of chemical waste and approximately 36 m^3 of MLLW were

						and disposal.	shipped for offsite treatment and disposal from the Solid Radioactive and Chemical Waste Facility.
	Over the next 10 years, ship no LLW for offsite disposal.	No LLW was shipped for offsite disposal.	No LLW was shipped for offsite disposal.	No LLW was shipped for offsite disposal.	No LLW was shipped for offsite disposal.	No LLW was shipped for offsite disposal.	No LLW was shipped for offsite disposal.
	Over the next 10 years, ship 9,010 m^3 of legacy TRU waste to WIPP.	No legacy TRU waste was shipped to WIPP.	6.25 m^3 of legacy TRU waste were shipped in 1999.	No legacy TRU waste was shipped in 2000.	8 shipments of legacy TRU waste were shipped in 2001.	2 shipments of legacy TRU waste were shipped in 2002.	41 shipments of legacy TRU waste were shipped in 2003.
	Over the next 10 years, ship 5,460 m^3 of operational and environmental restoration TRU waste to WIPP.	No operational or environmental restoration TRU wastes were shipped to WIPP.	No operational or environmental restoration TRU wastes were shipped to WIPP.	No operational or environmental restoration TRU wastes were shipped to WIPP.	No operational or environmental restoration TRU wastes were shipped to WIPP.	No operational or environmental restoration TRU wastes were shipped to WIPP.	No operational or environmental restoration TRU wastes were shipped to WIPP.
	Over the next 10 years, ship no environmental restoration soils for offsite solidification and disposal.	No environmental restoration soils were shipped for offsite solidification and disposal.	No environmental restoration soils were shipped for offsite solidification and disposal in 1999.	No environmental restoration soils were shipped for offsite solidification and disposal in 2000. [b]	No environmental restoration soils were shipped for offsite solidification and disposal in 2001. [b]	No environmental restoration soils were shipped for offsite solidification and disposal in 2002. [b]	No environmental restoration soils were shipped for offsite solidification and disposal in 2003. [b]
	Annually receive, on average, 5 m^3 of LLW and TRU waste from offsite locations in 5 to 10 shipments.	There were no LLW or TRU waste receipts from offsite locations.	There were no LLW or TRU waste receipts from offsite locations.	There were no LLW or TRU waste receipts from offsite locations.	There were no LLW or TRU waste receipts from offsite locations.	There were no LLW or TRU waste receipts from offsite locations.	There were 0.5 m^3 of LLW receipts from offsite locations.
Waste Storage	Stage chemical and mixed wastes before shipment for offsite treatment, storage, and disposal.	Chemical and mixed wastes were staged before shipment.	Chemical and mixed wastes were staged before shipment.	Chemical and mixed wastes were staged before shipment.	Chemical and mixed wastes were staged before shipment.	Chemical and mixed wastes were staged before shipment.	Chemical and mixed wastes were staged before shipment.

	Store legacy TRU waste and MLLW.	Legacy TRU waste and MLLW stored.	Legacy TRU waste and MLLW stored.	Legacy TRU waste and MLLW stored.	Legacy TRU waste and MLLW stored.	Legacy TRU waste and MLLW stored.	Legacy TRU waste and MLLW stored.
	Store LLW uranium chips until sufficient quantities have accumulated for stabilization.	LLW uranium chips are no longer generated.	LANL still generates this waste; however, TA-54 no longer accepts it for storage. The generator is required to process this waste to make it acceptable for disposal at TA-54.	Two drums of uranium chips in storage at Area G.	There are no drums of uranium chips in storage awaiting stabilization.	There are no drums of uranium chips in storage awaiting stabilization.	There were 7 m^3 of uranium chips in storage awaiting stabilization.
Waste Retrieval	Begin retrieval operations in 1997.	Retrieval begun in 1997.	Retrieval begun in 1997.	Retrieval begun in 1997.	Retrieval begun in 1997.	Retrieval begun in 1997.	Retrieval begun in 1997.
	Retrieve 4,700 m^3 of TRU waste from Pads 1, 2, 4 by 2004.	Retrieved 1,951 m^3 through 1998 (Pad 1).	Retrieved 2,195 m^3 in 1999. Retrieved 4,146 m^3 total through Dec. 1999.	Retrieved 169 m^3 in 2000. Retrieved 4,315 m^3 total through Dec. 2000.	Retrieved 1,463 m^3 in 2001. Retrieved 4,700 m^3 total through Dec. 2001.	Retrieval activities were completed in 2001. No retrieval occurred in 2002.	Retrieval activities were completed in 2001. No retrieval occurred in 2003.
Other Waste Processing	Demonstrate treatment (e.g., electrochemical) of MLLW liquids.	No activity.	No activity.	No activity.	No activity.	No activity.	No activity.
	Land farm oil-contaminated soils at Area J.	No oil-contaminated soils were land-farmed.	No oil-contaminated soils were land-farmed.	No oil-contaminated soils were land-farmed.	Area J is undergoing closure.	Closure of Area J is now complete.	Closure of Area J is now complete.
	Stabilize 870 m^3 of uranium chips.	No uranium chips were stabilized. Waste stream was treated by generator prior to transfer to Area G.	No uranium chips were stabilized in 1999.	No uranium chips were stabilized.	8.3 m^3 of uranium chips and turnings were stabilized at TA-3, Building 39.	7.2 m^3 of uranium chips and turnings were staged for processing.	Stabilized 7 m^3 of uranium chips.
	Provide special-case treatment for 1,030 m^3 of TRU waste.	None.	None.	None.	None.	None.	None.
	Solidify 2,850 m^3 of MLLW (environmental restoration soils) for disposal at Area G.	No environmental restoration soils were solidified	No environmental restoration soils were solidified	No environmental restoration soils were solidified.	No environmental restoration soils were solidified.	No environmental restoration soils were solidified.	No environmental restoration soils were solidified.

Disposal	Over next 10 years, dispose of 420 m^3 of LLW in shafts at Area G.	5 m^3 of LLW were disposed of in shafts at Area G.	23 m^3 of LLW were disposed of in shafts at Area G.	13 m^3 of LLW were disposed of in shafts at Area G.	9 m^3 of LLW were disposed of in shafts at Area G.	Approximately 8.5 m^3 of LLW were disposed of in shafts at Area G.	Approximately 66 m^3 of LLW were disposed of in shafts at Area G.
	Over next 10 years, dispose of 115,000 m^3 of LLW in disposal cells at Area G. (Requires expansion of onsite LLW disposal operations beyond existing Area G footprint.)	1,807 m^3 of LLW were disposed of in cells. Area G was not expanded.	1,320 m^3 of LLW were disposed of in cells. Area G was not expanded.	4,441 m^3 of LLW were disposed of in cells. Area G was not expanded.	1,808 m^3 of LLW were disposed of in cells. Area G was not expanded.	Approximately 7,000 m^3 of LLW were disposed of in cells. Area G was not expanded.	Approximately 4,500 m^3 of LLW were disposed of in cells. Area G was not expanded.
	Over next 10 years, dispose 100 m^3 per year administratively controlled industrial solid wastes in pits at Area J.	55 m^3 solid wastes disposed of in pits at Area J.	4,003 m^3 solid wastes disposed of in pits at Area J [d].	5,839 m^3 solid wastes disposed of in pits at Area J.	Area J is undergoing closure.	Closure of Area J is now complete.	Closure of Area J is now complete.
	Over next 10 years, dispose non-radioactive classified wastes in shafts at Area J.	One m^3 of classified solid wastes disposed of in shafts at Area J.	0.28 m^3 of classified solid wastes disposed of in shafts at Area J.	0.79 m^3 of classified solid wastes disposed of in shafts at Area J.	Area J is undergoing closure.	Closure of Area J is now complete.	Closure of Area J is now complete.
Decontamination Operations [e]	Decontaminate LANL personnel respirators for reuse (approximately 700/month).	See Table 2.14.2-1.	See Table 2.14.2-1.	See Table 2.14.2-1.	Decontaminated 450 personnel respirators per month at TA-54-1009.	Decontaminated 500 personnel respirators per month at TA-54-1009.	In 2003, decontaminated 500 personnel respirators per month at TA-54-1009.
	Decontaminate air-proportional probes for reuse (~ 300/month).	See Table 2.14.2-1.	See Table 2.14.2-1.	See Table 2.14.2-1.	Decontaminated 125 faces and 120 bodies per month at TA-54-1009.	Decontaminated 70 faces and 70 bodies per month at TA-54-1009.	In 2003, decontaminated 70 faces and 70 bodies per month at TA-54-1009.
	Decontaminate vehicles and portable instruments for reuse (as required).	See Table 2.14.2-1.	See Table 2.14.2-1.	See Table 2.14.2-1.	Decontaminated five portable instruments per month at TA-54-1009. No large-	Decontaminated six portable instruments per month at TA-54-1009. No large-	No activity in 2003.

					item decontamination was performed.	item decontamination was performed	
	Decontaminate precious metals for resale (acid bath).	See Table 2.14.2-1.	See Table 2.14.2-1.	See Table 2.14.2-1.	No activity. [f]	No activity. [f]	No activity. [g]
	Decontaminate scrap metals for resale (sandblast).	See Table 2.14.2-1.	See Table 2.14.2-1.	See Table 2.14.2-1.	No activity. [f]	No activity. [f]	No activity. [g]
	Decontaminate 200 m^3 of lead for reuse (grit blast).	See Table 2.14.2-1.	See Table 2.14.2-1.	See Table 2.14.2-1.	No activity. [f]	No activity. [f]	No activity. [g]

a Includes the construction of four new storage domes for the TWISP.

b The ER Project usually ships soils removed in remediation of a potential release site (PRS) directly to an offsite disposal facility. These wastes do not typically require processing at TA-54 and do not go through the TA-54 operations for shipment.

c In the SWEIS, the term “industrial solid waste” was used for construction debris, chemical waste and sensitive paper records.

d This volume exceeds projections because of excavation of MDA-P by the ER Project.

e The Decontamination Operations capability was identified with the Radioactive Liquid Waste Treatment Key Facility in the SWEIS. Activities prior to 2000 are reported in Section 2.14.2 of the Yearbook. In 2000, this capability was relocated to TA-54 and the Solid Radioactive and Chemical Waste Facility.

f Although there has been no activity in 2001 and 2002, this decontamination operation is now part of the Solid Radioactive and Chemical Waste Facility capabilities.

g Although there has been no activity in 2001, 2002, and 2003, this decontamination operation is now part of the Solid Radioactive and Chemical Waste Facility capabilities.

Table 2.15.3-1. Solid Radioactive and Chemical Waste Facilities (TA-54 and TA-50)/Operations Data

Parameter	Units	SWEIS ROD	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Radioactive Air Emissions: [a]								
Tritium	Ci/yr	6.09E+1	[a]	[a]	[a]	[a]	[a]	[a]
Americium-241	Ci/yr	6.60E-7	[a]	[a]	[a]	5.8E-11	7.5E-10	7.58E-11
Plutonium-238	Ci/yr	4.80E-6	1.3E-09	9.9E-11	[a]	3.6E-11	5.0E-10	2.20E-09
Plutonium-239	Ci/yr	6.80E-7	[a]	[a]	[a]	2.7E-10	1.3E-09	5.21E-10
Uranium-234	Ci/yr	8.00E-6	1.14E-08	1.7E-08	[a]	[a]	2.4E-10	Not detected
Uranium-235	Ci/yr	4.10E-7	[a]	[a]	[a]	[a]	Not detected	Not detected
Uranium-238	Ci/yr	4.00E-6	[a]	2.3E-09	[a]	[a]	8.9E-11	8.19E-10
Strontium-90/ Yttrium-90	Ci/yr	Not projected [b]						3.41E-09
Thorium isotopes	Ci/yr	Not projected	3.10E-10	Not detected	Not detected	Not detected	Not detected	3.50E-09
NPDES Discharge	MGY	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls	No outfalls
Wastes: [b]								
Chemical	kg/yr	920	327	30	806	449	863	816
LLW	m^3/yr	174	368	21	13	17	35	204
MLLW	m^3/yr	4	0	0	0	0	0	0
TRU	m^3/yr	27	21	40	27	0	29	88 [c]
Mixed TRU	m^3/yr	0	0	0	71	0	15	59 [c]
Number of Workers	FTEs	225 [d] 65 [d]	60 [d]	65 [d]	64 [d]	60 [d]	63 [d]	56 [d]

a Data indicate no measured emissions at WCRRF and the ARTIC facility at TA-50. No stacks require monitoring at TA-54. All non-point sources at TA-50 and TA-54 are measured using ambient monitoring.

b Secondary wastes are generated during the treatment, storage, and disposal of chemical and radioactive wastes. Examples include repackaging wastes from the visual inspection of TRU waste, high-efficiency particulate air filters, personnel protective clothing and equipment, and process wastes from size reduction and compaction.

c SWEIS ROD projection for TRU and mixed TRU waste generated by the Key Facilities was exceeded at the Solid Chemical and Radioactive Waste Facility due to Decontamination and Volume Reduction System repackaging of legacy TRU waste for shipment to the Waste Isolation Pilot Plant.

d The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

Table 2.16-1. Non-Key Facilities with Nuclear Hazard Classification

Building	Description	SWEIS ROD	DOE 1998[a]	DOE 2000[b]	LANL 2001[c]	LANL 2001[d]	LANL 2002[e]	LANL 2002[e]
TA-03-0040	Physics Building	3						
TA-03-0065	Source Storage	2						
TA-03-0130	Calibration Building	3						
TA-33-0086	Former Tritium Research	3	2	2	2	2		
TA-35-0002	Non-American National Standards Institute Uranium Sources	3	3					
TA-35-0027	Safeguard Assay and Research	3	3					

a DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 1998a)
b DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (DOE 2000a)
c DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001a)
d DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2001b)
e DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2002a)

Table 2.16-2. Non-Key Facilities with Radiological Hazard Classification

Building	Description	LANL 2001 [a]	LANL 2002 [b]	LANL 2002 [b]
TA-2-1	Omega Reactor	RAD	RAD	RAD
TA-3-16	Ion Exchange	---	RAD	RAD
TA-3-34	Cryogenics Bldg. B	RAD	RAD	RAD
TA-3-40	Physics Bldg. (HP)	RAD	RAD	RAD
TA-3-169	Warehouse	---	RAD	RAD
TA-3-1819	Experiment Mat'l Lab	---	RAD	RAD
TA-21-5	Lab Bldg	RAD	RAD	RAD
TA-21-150	Molecular Chemical	RAD	---	---
TA-33-86	High Pressure Tritium	---	RAD	RAD
TA-35-2	Nuclear Safeguards Research	RAD	RAD	RAD
TA-35-27	Nuclear Safeguards Lab	RAD	RAD	RAD
TA-36-1	Laboratory and offices	---	RAD	RAD
TA-36-214	Central HP Calibration Facility	---	RAD	RAD
TA-41-1	Underground Vault	RAD	RAD	RAD
TA-41-4	Laboratory	RAD	---	---

a LANL Radiological Facility List (LANL 2001o)
b LANL Radiological Facility List (LANL 2002g)

Table 2.16.2-1. Operations at the Non-Key Facilities

Capability	Examples
1. Theory, modeling, and high-performance computing.	Modeling of atmospheric and oceanic currents. Theoretical research in areas such as plasma and beam physics, fluid dynamics, and superconducting materials.
2. Experimental science and engineering.	Experiments in nuclear and particle physics, astrophysics, chemistry, and accelerator technology. Also includes laser and pulsed-power experiments (e.g., Atlas).
3. Advanced and nuclear materials research and development and applications	Research and development into physical and chemical behavior in a variety of environments; development of measurement and evaluation technologies.
4. Waste management	Management of municipal solid wastes. Sewage treatment. Recycle programs.
5. Infrastructure and central services	Human resources activities. Management of utilities (natural gas, water, electricity). Public interface.
6. Maintenance and refurbishment	Painting and repair of buildings. Maintenance of roads and parking lots. Erecting and demolishing support structures.
7. Management of environmental, ecological, and cultural resources	Research into, assessment of, and management of plants, animals, cultural artifacts, and environmental media (groundwater, air, surface waters).

Table 2.16.1-1. Non-Key Facilities Construction and Modifications

SWEIS ROD Projection	Actual Construction and Modification					
	1998 Yearbook	1999 Yearbook	2000 Yearbook [a]	2001 Yearbook	2002 Yearbook	2003 Yearbook
Land Transfer – DP Road Tract	Under study EA prepared (DOE 1997d).	Under study.	Under study.	Under study.	Under study- see Chapter 5.	
Research Park	EA prepared (DOE 1997e).	Construction started in 1999.	Began construction of first building at Los Alamos Research Park.	Construction of first building completed in March 2001; occupancy began in June 2001.	Most of first building leased.	
Renovate TA-3 infrastructure						
Nonproliferation and International Security Center	EA prepared (DOE 1999g).	Building design began in 1999.	Design continued.	Construction began at TA-3 in March 2001.	Construction continued.	Occupancy completed.
Electrical power supply and reliability						
Strategic Computing Complex (SCC)	EA prepared for SCC at TA-3 (DOE 1998g).	Began construction of SCC in 1999.	Construction continued.	Construction completed; occupancy began in December 2001.	Occupancy completed.	
	Atlas Facility designed and began constructed in 1996-1998 at TA-35 (DOE 1996h).	Construction continued in 1999.	Construction completed and major capacitor banks tested.	Readiness for operations in July 2001 and first experiments in September 2001; EA for relocating to NTS (DOE 2001e).	Atlas physically moved to NTS by end of December 2002.	Reassembly of ATLAS at NTS continued through 2003.
	Ten of 28 outfalls eliminated from NPDES permit during 1997-1998.	13 outfalls eliminated from NPDES permit; 9 of 13 transferred to Los Alamos County (Sandoval 2000).	Outfall 03A-199 added to permit for future Laboratory Data Communications Center.			
		Funding approved for Central Health Physics Calibration Laboratory at TA-36.				

			High Pressure Tritium Facility (TA-33-86) in safe shutdown mode.	High Pressure Tritium Facility (TA-33-86) in safe shutdown mode.	High Pressure Tritium Facility (TA-33-86) underwent D&D (DOE 1998h).	
			Cerro Grande Fire impacted 86 structures or buildings, damaged 31 structures or buildings, and destroyed 10 structures or buildings.			
				EA and design prepared for Emergency Operations Center (DOE 2001f).	Construction started.	Construction completed. Occupancy completed.
				EA prepared for multichannel communications (MCC) Project (DOE 2001f).	Design and acquisition in process.	Equipment installation in progress.
					EA for Omega West Reactor Facility; demolition activities began in July 2002(DOE 2002c).	Demolition completed.
				Security Systems Group (S-3) Security Systems Support Facility at TA-3: NEPA categorical exclusion issued (DOE 2001g).	Design and construction began.	Construction completed. Occupancy completed.
					Decision Applications Division Office Building at TA-03: NEPA categorical exclusion issued and construction began (DOE 2002d).	Construction completed. Occupancy completed.

				LANL Medical Facility at TA-03: NEPA categorical exclusion issued (DOE 2001h).	Design and construction began.	Readiness assessment was completed December 2003.
				Chemistry Division Office Building at TA-46: NEPA categorical exclusion issued (DOE 2001i)	Construction began and was completed; occupancy granted in November 2002.	
				MST Office Building at TA-03: NEPA categorical exclusion issued (DOE 2001j).	Construction began.	Construction continued during 2003.
				TA-72 Live Fire Shoot House: NEPA categorical exclusion issued (DOE 2000c).	Construction began.	Construction completed. Facility became operational in March 2003.
					Security Truck Inspection Station: NEPA categorical exclusion issued, constructed, and operational (DOE 2002e).	
					Omega West Facility Building TA-41-30 and front of TA-41-4 demolished.	Demolition of Omega West Facility completed in September 2003.

a Additional information on the impacts of the Cerro Grande Fire can be found in Section 2.16.4.

Table 2.16.3-1. Non-Key Facilities/Operations Data

Parameter	Units	SWEIS ROD	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Radioactive Air Emissions: [a]								
Tritium	Ci/y	9.1E+2	5.66E+2	9.5E+2	1.15E+3	1.0E+3	2.9E+2	None measured [b]
Plutonium	Ci/y	3.3E-6	None measured [b]	None measured [b]	None measured [b]	None measured [b]	None measured [b]	None measured [b]
Uranium	Ci/y	1.8E-4	None measured [b]	None measured [b]	None measured [b]	None measured [b]	None measured [b]	None measured [b]
NPDES Discharge:								
Total Discharges	MGY	142	95	232	192	99.01	130.827	156.794
001 (TA-03)	MGY	114			170	98.75	101.3200	131.427
013S (TA-03)	MGY	[c]	[c]	[c]	[c]	[c]	[c]	[c]
03A-027 (TA-03)	MGY	5.8			8.7	0.13	6.6070	8.02
03A-160 (TA-35)	MGY	5.1			14	0.13	22.9000	17.347
03A-199 (TA-03)	MGY	---	0 [d]	0 [d]	0 [d]	0 [d]	0 [d]	0 [d]
03A-042 (TA-46)	MGY	5.30	No Discharge	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	
04A-118 (TA-54)	MGY	1.10	No Discharge	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999	
04A-166 (TA-05)	MGY	0.01	No Discharge	No observation	Eliminated 1999	Eliminated 1999	Eliminated 1999	
03A-038 (TA-33)	MGY	5.80	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	
04A-171 (National Forest)	MGY	0.00	No Discharge	No discharge	Eliminated 1999	Eliminated 1999	Eliminated 1999	
04A-172 (National Forest)	MGY	0.00	No Discharge	No discharge	Eliminated 1999	Eliminated 1999	Eliminated 1999	
04A-173 (National Forest)	MGY	0.00	No Discharge	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999	
04A-174 (National Forest)	MGY	0.00	No Discharge	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	
04A-175 (National Forest)	MGY	0.00	No Discharge	No observation	Eliminated 1999	Eliminated 1999	Eliminated 1999	
04A-176 (National Forest)	MGY	0.66	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999	
04A-177 (National Forest)	MGY	0.06	No Discharge	No observation	Eliminated 1999	Eliminated 1999	Eliminated 1999	
03A-034 (TA-21)	MGY	0.26	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	
03A-035 (TA-21)	MGY	0.04	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	
04A-182 (TA-21)	MGY	0.00	Active	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	
04A-186 (TA-21)	MGY	0.18	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999	
06A-132 (TA-35)	MGY	5.80	No Discharge	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	
03A-025 (TA-03)	MGY	0.18	Active	Eliminated 1998	Eliminated 1998	Eliminated 1998	Eliminated 1998	
04A-164 (TA-18)	MGY	0.01	No Discharge	No observation	Eliminated 1999	Eliminated 1999	Eliminated 1999	
06A-106 (TA-36) [e]	MGY	0.58	No Discharge	Eliminated 1999	Eliminated 1999	Eliminated 1999	Eliminated 1999	
04A-161 (TA-72)	MGY	1.00	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999	
03A-148 (TA-03)	MGY	6.30	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	
04A-094 (TA-03)	MGY	5.30	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	Eliminated 1997	
04A-163 (TA-72)	MGY	6.20	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999	
04A-165 (TA-72)	MGY	2.00	Active	Active	Eliminated 1999	Eliminated 1999	Eliminated 1999	

Parameter	Units	SWEIS ROD	1998 Yearbook	1999 Yearbook	2000 Yearbook	2001 Yearbook	2002 Yearbook	2003 Yearbook
Wastes:								
Chemical [f]	kg/yr	651,000	1,506,392	765,395	367,768	1,254,680 [f]	334,348	624,826
LLW	m^3/yr	520	386	350	2,781 [g]	569	534	3,783 [h]
MLLW	m^3/yr	30	55.4 [i]	3	10	9.4	8.7	20
TRU	m^3/yr	0	0	0	2.7	24.8	36.8	90 [j]
Mixed TRU	m^3/yr	0	0	15	63	0	0.21	5.9 [k]
Number of Workers		6,579 [l]						
	FTEs	4,601 [l]	4,547 [l]	4,601 [l]	4,501 [l]	4,816 [l]	5,243 [l]	5,576 [l]

a Stack emissions from previously active facilities (TA-33 and TA-41); these were not projected as continuing emissions in the future. Does not include non-point sources.

b Most of the stacks in the Non-Key Facilities are not sampled for radioactive airborne emissions because the potential emissions from these stacks are sufficiently small that measurement systems are not necessary to meet regulatory or facility requirements.

c Outfall 013 is from the TA-46 sewage plant. Instead of discharging to Mortandad Canyon, however, treated waters are pumped to TA-3 for re-use and ultimate discharge through Outfall 001 into Sandia Canyon. This transfer of water has resulted in projected NPDES volumes underestimating actual discharges from the exiting outfall.

d New Outfall 03A-199 was permitted by the EPA on 2/1/2001 for the future Laboratory Data Communications Center. It had no discharge during 2000, 2001, or 2002.

e Outfall 06A-106 was incorrectly associated with the Non-Key Facilities in the SWEIS. Starting with the 2002 Yearbook, Outfall 06A-106 is accounted for with High Explosives Testing.

f Approximately 73,449 kilograms of the chemical wastes are construction and demolition debris (previously indicated in the yearbooks as industrial solid wastes) resulting from cleanup following the Cerro Grande Fire. The construction and demolition debris is nonhazardous, may be disposed in county landfills, and does not represent a threat to local environs.

g The CY 2000 LLW was generated from D&D activities and from soil and sediment removal from Mortandad and Los Alamos Canyons.

h LLW generation at the Non-Key Facilities exceeded the SWEIS ROD projection due to heightened activities and new construction.

i The CY 1998 MLLW was generated as a result of soil and asphalt removal from MDA-L construction activities.

j TRU waste generated at the Non-Key Facilities during CY 2002 and CY 2003 was the result of the OSR Project. Because this waste comes from shipping and receiving, it is attributed to that location as the point of generation.

k Generation of 5.91 m^3 of mixed TRU waste at the Non-Key Facilities was the result of the OSR Project. Because this waste comes from shipping and receiving, it is attributed to that location as the point of generation.

l The first number shown in the "SWEIS ROD" column is the actual employee count representing CY 1999 (the year the SWEIS ROD was published). The second number shown in the "SWEIS ROD" column is the index number representing CY1999 (the year the SWEIS ROD was published). The number of employees for 1998 through 2003 operations cannot be directly compared to numbers projected by the SWEIS ROD. The employee numbers projected by the SWEIS ROD represent total workforce size and include PTLA, KSL, and other subcontractor personnel. The number of employees for 1998 through 2003 operations is routinely collected information and represents only University of California (UC) employees (regular full-time and part-time). Because the two sets of numbers (SWEIS ROD versus the new index) do not represent the same entity, a direct comparison to numbers projected by the SWEIS ROD (see Section 3.6, Socioeconomics) is not appropriate. However, because this index is going to be used in each subsequent Yearbook, selecting CY 1999 as the base year establishes an index that can be compared over the ten-year window represented by the SWEIS ROD.

2.2 Key Facilities Forecast for the Next Five Years of Operation, 2004-2009.

Managers at each of the 15 Key Facilities were asked to review the capabilities table from the SWEIS Yearbook and answer the following two questions:

1. Do you expect that any activities will occur in this Key Facility in the next five years that are not covered by the listed capabilities?

2. Do you expect that the level of operations will increase above the level identified in the SWEIS Record of Decision?

   Note: Changes projected by the managers are shown in the Five-Year Projection column and in red in the Capability column. If there is no projected change in either capabilities or levels of operation, the table is included here, but indicates no change. Also included under each Key Facility is relevant text submitted by each reviewer.

2.2.1 Plutonium Complex (TA-55)

The Plutonium Complex Key Facility consists of six primary buildings and a number of lesser buildings and structures. As presented in the SWEIS, this Key Facility contained one operational Category 2 nuclear hazard facility (TA-55-4), two Low Hazard chemical facilities (TA-55-3 and TA-55-5), and one Low Hazard energy source facility (TA-55-7). Additionally, NMT Division acquired and took ownership of the TA-50-37 building, designated as the Actinide Research Training and Instruction Center in CY 2003.

The SWEIS also identified one potential Category 2 nuclear hazard facility (TA-55-41, the Nuclear Material Storage Facility), which was slated for potential modification to bring it into operational status. This was not done, and the DOE removed this facility from its list of nuclear facilities in its April 2000 listing (DOE 2000a). There are currently no plans to use this building for storage of nuclear materials.

Five-year Projection for Plutonium Complex (TA-55)
(Contact: Steve Schreiber, NMT-DO, 665-2003, sschreiber@lanl.gov)

1. No new activities anticipated or currently performed that are not covered in the existing capabilities.

2. The SWEIS ROD values are still bounding.

Table 2.2.1-1. Plutonium Complex/Capabilities and Levels of Operation

Capability	SWEIS ROD[a]	Five-year Projection
Plutonium Stabilization	Recover, process, and store the existing plutonium inventory in eight years.	Recover, process or repackage, and store the existing plutonium inventory in eight years.
Manufacturing Plutonium Components	Produce nominally 20 war reserve pits/yr. (Requires minor facility modifications.)	Produce nominally 20 war reserve pits/yr. (Requires minor facility modifications.)
Surveillance and Disassembly of Weapons Components	Pit disassembly: Up to 65 pits/yr disassembled. Pit surveillance: Up to 40 pits/yr destructively examined and 20 pits/yr nondestructively examined.	Pit disassembly: Up to 65 pits/yr disassembled. Pit surveillance: Up to 40 pits/yr destructively examined and 20 pits/yr nondestructively examined.
Actinide Materials and Science Processing, Research, and Development	Develop production disassembly capacity. Process up to 200 pits/yr, including a total of 250 pits (over four years) as part of disposition demonstration activities.	Develop production disassembly capacity. Process up to 200 pits/yr, including a total of 250 pits (over four years) as part of disposition demonstration activities.
	Process neutron sources up to 5,000 curies/yr. Process neutron sources other than sealed sources.	Process neutron sources up to 5,000 curies/yr. Process neutron sources other than sealed sources.
	Process up to 400 kilograms/yr of actinides.[b] Provide support for dynamic experiments.	Process up to 400 kilograms/yr of actinides.[b] Provide support for dynamic experiments.
	Perform decontamination of 28 to 48 uranium components per month.	Perform decontamination of 28 to 48 uranium components per month.
	Research in support of DOE actinide cleanup activities. Stabilize minor quantities of specialty items. Research and development on actinide processing and waste activities at DOE sites, including processing up to 140 kilograms of plutonium as chloride salts from the Rocky Flats Environmental Technology Site.	Research in support of DOE actinide cleanup activities. Stabilize minor quantities of specialty items. Research and development on actinide processing and waste activities at other DOE sites, ~~including processing up to 140 kilograms of plutonium as chloride salts from the Rocky Flats Environmental Technology Site.~~
	Conduct plutonium research and development and support. Prepare, measure, and characterize samples for fundamental research and development in areas such as aging, welding and bonding, coatings, and fire resistance.	Conduct plutonium research and development and support. Prepare, measure, and characterize samples for fundamental research and development in areas such as aging, welding and bonding, coatings, and fire resistance.
Actinide Materials and Science Processing, Research, and Development (cont.)	Fabricate and study nuclear fuels used in terrestrial and space reactors. Fabricate and study prototype fuel for lead test assemblies.	Fabricate and study nuclear fuels used in terrestrial and space reactors. Fabricate and study prototype fuel for lead test assemblies.
	Develop safeguards instrumentation for plutonium assay.	Develop safeguards instrumentation for plutonium assay.
	Analyze samples in support of actinide reprocessing and research and development activities.	Analyze samples in support of actinide reprocessing and research and development activities.

Table 2.2.1-1. cont.

Capability	SWEIS ROD[a]	Five-year Projection
Fabrication of Ceramic-Based Reactor Fuels	Build mixed oxide test reactor fuel assemblies and continue research and development on fuels.	Build mixed oxide test reactor fuel assemblies and continue research and development on fuels.
Plutonium-238 Research, Development, and Applications	Process, evaluate, and test up to 25 kilograms/yr plutonium-238. Recycle residues and blend up to 18 kilograms/yr plutonium-238.	Process, evaluate, and test up to 25 kilograms/yr plutonium-238. Recycle residues and blend up to 18 kilograms/yr plutonium-238.
Nuclear Materials Storage, Shipping, and Receiving	Store up to 6,600 kilograms SNM in the Nuclear Material Storage Facility; continue to store working inventory in the vault in Building 55-4; ship and receive SNM as needed to support LANL activities.	Store up to 6,600 kilograms SNM in the Nuclear Material Storage Facility; continue to store working inventory in the vault in Building 55-4; ship and receive SNM as needed to support LANL activities.
	Conduct nondestructive assay on SNM at the Nuclear Material Storage Facility to identify and verify the content of stored containers.	Conduct nondestructive assay on SNM at the Nuclear Material Storage Facility to identify and verify the content of stored containers.

a Includes renovation of the Nuclear Material Storage Facility (which is no longer planned for use), construction of new technical support office building, and upgrades to enable the production of nominally 20 war reserve pits per year.

b The actinide activities at the CMR Building and at TA-55 are expected to total 400 kilograms/yr. The future split between these two facilities was not known, so the facility-specific impacts at each facility were conservatively analyzed at this maximum amount. Waste projections that are not specific to the facility (but are related directly to the activities themselves) are only projected for the total of 400 kilograms/yr. (Please contact Tim Nelson for details on the CMR Replacement Project and estimated/design values for throughput rates.)

2.2.2 Tritium Facilities (TA-16 and TA-21)

This Key Facility consists of tritium operations at TA-16 and TA-21. Tritium operations in 2003 were conducted in three buildings: The Weapons Engineering Tritium Facility (WETF, Building TA-16-205), the Tritium Systems Test Assembly (TSTA, Building TA-21-155N), and the Tritium Science and Fabrication Facility (TSFF, Building TA-21-209). Limited operations involving the removal of tritium from actinide material are conducted at LANL's TA-55 Plutonium Facility; however, these operations are small in scale and this operation was not included as part of the Tritium Facilities in the SWEIS. The tritium emissions from TA-55, however, are included in the TA-55 Plutonium Complex Key Facility.

Two facilities, WETF and TSFF, had tritium inventories greater than 30 grams during the entire 2003 year and, thus, were Category 2 nuclear facilities. During 2003, the tritium inventory at TSTA was reduced to less than 1 gram. This facility was reclassified to a radiological facility in June 2003. In August 2003, TSTA was formally transferred from ESA line management to FWO line management for surveillance and maintenance and limited equipment removal.

Programmatic activities at the TSFF are also being reduced and will be moved to the WETF facility in 2004. The transition of TSFF to a radiological facility is estimated to occur in 2006. When funding becomes available, the TSFF will be deactivated.

As shown in Table 2.2-1, the NHC of these three facilities has remained constant. However, WETF was separated into its three component buildings in the SWEIS, but is now considered a single building.

Five-year Projection for the Tritium Facilities (TA-16 and TA-21)
(Contact: Stephen Black, ESA-TSE, 667-1620, sblack@lanl.gov)

1. Two potential future operations, in response to your question #1, as well as removing all reference to TSTA since it is no longer a TSE nuclear facility (owned by FWO now and < 1.6 grams total inventory).

2. In response to question #2, we do not see levels increasing beyond the level listed in the SWEIS ROD. We only made changes to clarify the existing information.

Table 2.2.2-1. Tritium Facilities/ Capabilities and Levels of Operation

Capability	SWEIS ROD[a]	Five-year Projection
High-Pressure Gas Fills and Processing: WETF	Handling and processing of tritium gas in quantities of up to 100 grams with no limit on number of operations per year. Capability used approximately 65 times/yr.	Handling and processing of tritium gas in quantities of up to 100 grams with no limit on number of operations per year. Capability used approximately 65 times/yr.
Gas Boost System Testing and Development: WETF	System testing and gas processing operations involving quantities of up to 100 grams. Capability used approximately 35 times/yr.	System testing and gas processing operations involving quantities of up to 100 grams. Capability used approximately 35 times/yr.
~~Cryogenic Separation: TSTA~~ 5-yr. projection	Tritium gas purification and processing in quantities up to 200 grams. Capability used five to six times/yr.	~~Tritium gas purification and processing in quantities up to 200 grams. Capability used 5-6 times per year.~~
Diffusion and Membrane Purification: TSFF, WETF	Research on tritium movement and penetration through materials. Expect six to eight experiments/month. Capability also used continuously for effluent treatment.	Research on tritium movement and penetration through materials. Expect six to eight experiments/month. Capability also used continuously for hydrogen purification.
Metallurgical and Material Research: TSFF, WETF	Capability involves materials research including metal getter research and application studies. Small quantities of tritium support tritium effects and properties research and development. Contributes <2% of LANL's tritium emissions to the environment.	Capability involves materials research including metal getter research and application studies. Small quantities of tritium support tritium effects and properties research and development. Contributes <2% of LANL's tritium emissions to the environment.
Thin Film Loading: TSFF (WETF by 2004)	Chemical bonding of tritium to metal surfaces. Current application is for tritium loading of neutron tube targets; perform loading operations up to 3,000 units/yr.	Chemical bonding of tritium to thin metal ~~surfaces~~ films. Current application is for tritium loading of neutron tube targets; perform loading operations up to 3,000 units/yr. Tritium inventory < 1 gram.

Table 2.2.2-1. cont.

Capability	SWEIS ROD[a]	Five-year Projection
Gas Analysis: TSFF, WETF	Analytical support to current capabilities. Operations estimated to contribute <5% of LANL's tritium emissions to the environment.	Analytical support to current capabilities. Operations estimated to contribute <5% of LANL's tritium emissions to the environment.
Calorimetry: WETF	This capability provides a measurement method for tritium material accountability. Contained tritium is placed in the calorimeter for quantity measurements. This capability is used frequently, but contributes <2% of LANL's tritium emissions to the environment.	This capability provides a measurement method for tritium material accountability. Contained tritium is placed in the calorimeter for quantity measurements. This capability is used frequently, but contributes <2% of LANL's tritium emissions to the environment.
~~Solid Material and Container~~ Tritium Storage & Handling: ~~TSTA~~, TSFF, WETF 5-yr. projection	Storage of tritium occurs in process systems, process samples, inventory for use, and as waste. Onsite storage could increase by a factor of 10 over levels identified during preparation of the SWEIS, with most of the increase occurring at WETF.	Storage of tritium occurs in process systems, process samples, inventory for use, and as waste. Onsite storage could increase by a factor of 10 over levels identified during preparation of the SWEIS, with most of the increase occurring at WETF.
Surface analysis: WETF 5-yr. projection		Daily use of systems to analyze tritiated materials. This involves small quantities of tritium (<< 1 gram)
Tritiated salt component Fabrication: WETF 5-yr. projection		6-12 items per year
Hydrogen isotope separation: WETF 5-yr. projection		6 runs per year

a Includes the remodel of Building 16-450 to connect it to WETF in support of Neutron Tube Target Loading.

2.2.3 Chemistry and Metallurgy Research Building (TA-03)

The CMR Building was designed and constructed in 1952 to house analytical chemistry, plutonium metallurgy, uranium chemistry, engineering design, and drafting. However, at the time the SWEIS ROD was issued in 1999, the CMR Building was described as a "production, research, and support center for actinide chemistry and metallurgy research and analysis, uranium processing, and fabrication of weapon components." It consists of a main building (TA-3-29) and a radioactive liquid waste pump house, TA-3-154. The CMR Building consists of three floors: a basement, first floor, and attic. It has seven independent wings connected by a common corridor. The CMR Building remains a Hazard Category 2 per DOE Standard 1027-92 (DOE 1997f).

Five-year Projection for the Chemistry and Metallurgy Research Building (TA-03)
(Contact: Bob Romero, NMT-DO, 667-8440, rjromero@lanl.gov)
Changes are shown in red. All the rest still applies.

Table 2.2.3-1. CMR Building (TA-03)/ Capabilities and Levels of Operation

Capability	SWEIS ROD[a]	Five-year Projection
Analytical Chemistry	Sample analysis in support of a wide range of actinide research and processing activities. Approximately 7,000 samples/yr.	Sample analysis in support of a wide range of actinide research and processing activities. Approximately 7,000 samples/yr.
Uranium Processing	Activities to recover, process, and store LANL highly enriched uranium inventory by 2005. Includes possible recovery of materials resulting from manufacturing operations.	Activities to recover, process, and store LANL highly enriched uranium inventory by 2005. Includes possible recovery of materials resulting from manufacturing operations.
Destructive and Nondestructive Analysis (Design Evaluation Project)	Evaluate 6 to 10 secondaries/yr through destructive/nondestructive analyses and disassembly.	Evaluate 6 to 10 secondaries/yr through destructive/nondestructive analyses and disassembly.
Nonproliferation Training (moved to Pajarito Site [TA-18] and renamed the Nuclear Measurement School).	Nonproliferation training involving SNM. No additional quantities of SNM, but may work with more types of SNM than present during preparation of the SWEIS.	Nonproliferation training involving SNM. No additional quantities of SNM, but may work with more types of SNM than present during preparation of the SWEIS. This activity returned to CMR from TA-18 during 2002 and was active in CYs 2002 and 2003.
Actinide Research and Processing [b]	Process up to 5,000 Curies/yr plutonium-238/beryllium and americium-241/beryllium neutron sources. Process neutron sources other than sealed sources. Stage up to 1,000 Curies/yr plutonium-238/beryllium and americium-241/beryllium sources in Wing 9 floor holes.	Process up to 5,000 Curies/yr plutonium-238/beryllium and americium-241/beryllium neutron sources. Process neutron sources other than sealed sources. Stage up to 1,000 Curies/yr plutonium-238/beryllium and americium-241/beryllium sources in Wing 9 floor holes. No activity in CY-2003. Mechanical or chemical processing of sources is not allowed in the CMR per the facility Authorization Basis. Prior to CY 2003, sealed sources were brought into Wing 9 for verification of unique identification numbers and were repackaged for eventual shipment to WIPP.
	Introduce research and development effort on spent nuclear fuel related to long-term storage and analyze components in spent and partially spent fuels.	Introduce research and development effort on spent nuclear fuel related to long-term storage and analyze components in spent and partially spent fuels. This project was completed in February 1997 when the final shipment of spent fuel from the Omega West Reactor that was in dry storage in Wing 9 was packaged and shipped to Savannah River Site for reprocessing.

Table 2.2.3-1. cont.

Capability	SWEIS ROD[a]	Five-year Projection
	Metallurgical microstructural/chemical analysis and compatibility testing of actinides and other metals. Primary mission to study long-term aging and other material effects. Characterize about 100 samples/yr. Conduct research and development in hot cells on pits exposed to high temperatures.	Metallurgical microstructural/chemical analysis and compatibility testing of actinides and other metals. Primary mission to study long-term aging and other material effects. Characterize about 100 samples/yr. Conduct research and development in hot cells on pits exposed to high temperatures.
	Analysis of TRU waste disposal related to validation of the Waste Isolation Pilot Plant (WIPP) performance assessment models. TRU waste characterization. Analysis of gas generation such as could occur in TRU waste during transportation to WIPP. Performance Demonstration Program to test nondestructive analysis/nondestructive examination equipment. Demonstrate actinide decontamination technology for soils and materials. Develop actinide precipitation method to reduce mixed wastes in LANL effluents.	Analysis of TRU waste disposal related to validation of the Waste Isolation Pilot Plant (WIPP) performance assessment models. TRU waste characterization. Analysis of gas generation such as could occur in TRU waste during transportation to WIPP. Performance Demonstration Program to test nondestructive analysis/nondestructive examination equipment. Demonstrate actinide decontamination technology for soils and materials. Develop actinide precipitation method to reduce mixed wastes in LANL effluents. Project was completed in CY 2001.
Fabrication and Metallography	Produce 1,080 targets/yr, each containing approximately 20 grams uranium-235, for the production of molybdenum-99, plus an additional 20 targets/wk for 12 weeks. Separate fission products from irradiated targets to provide molybdenum-99. Ability to produce 3,000 six-day curies of molybdenum-99/wk.[c]	Produce 1,080 targets/yr, each containing approximately 20 grams uranium-235, for the production of molybdenum-99, plus an additional 20 targets/wk for 12 weeks. Separate fission products from irradiated targets to provide molybdenum-99. Ability to produce 3,000 six-day curies of molybdenum-99/wk.[c] Project was terminated in CY 1999.
	Support complete highly enriched uranium processing, research and development, pilot operations, and casting. Fabricate metal shapes, including up to 50 sets of highly enriched uranium components, using 1 to 10 kilograms highly enriched uranium per operation. Material recovered and retained in inventory. Up to 1,000 kilograms annual throughput.	Support complete highly enriched uranium processing, research and development, pilot operations, and casting. Fabricate metal shapes, including up to 50 sets of highly enriched uranium components, using 1 to 10 kilograms highly enriched uranium per operation. Material recovered and retained in inventory. Up to 1,000 kilograms annual throughput. Process activity was never initiated on this project; during CY 2003, highly enriched uranium (HEU) project equipment was removed from Wing 9 in preparation for the Bolas Grande Project

a Includes completion of Phase I and Phase II Upgrades, except for seismic upgrades, modifications for the fabrication of molybdenum-99 (Mo-99) targets, modifications for the Radioactive Source Recovery Program, and modification for safety testing of pits.

b The actinide activities at the CMR Building and at TA-55 are expected to total 400 kilograms/yr. The future split between these two facilities is not known, so the facility-specific impacts at each facility are conservatively analyzed at this maximum amount. Waste projections, which are not specific to the facility (but are related directly to the activities themselves), are only projected for the total of 400 kilograms/yr.

c Mo-99 is a radioactive isotope that decays to form metastable technicium-99, a radioactive isotope that has broad applications in medical diagnostic procedures. Both isotopes are short-lived, with half-lives (the time in which the quantity of the isotope is reduced by 50 percent) of 66 hours and 6 hours, respectively. These short half-lives make these isotopes both attractive for medical use (minimizes the radiation dose received by the patient) and highly perishable. Production of these isotopes is therefore measured in "six-day curies," the amount of radioactivity remaining after six days of decay, which is the time required to produce and deliver the isotope to hospitals and other medical institutions.

2.2.4 Pajarito Site (TA-18)

The Pajarito Site Key Facility is located entirely at TA-18. Principal activities are design and performance of nuclear criticality experiments and detector development in support of emergency response, nonproliferation, and arms control.

The SWEIS defined the facility as having a main building (18-30), three outlying, remote-controlled critical assembly buildings then known as "kivas" (18-23, -32, -116), and a number of additional support buildings, including the hillside vault (18-26). During 2000, in response to concerns expressed by two Native American Indian Pueblos (Santa Ana and Picuris), the term "kiva" (which has religious significance to these Native Americans, was replaced with the acronym CASA (Critical Assembly and Storage Area).

Five-year Projection for the Pajarito Site (TA-18)
(Contact: Debbie Baca, N-2, 667-7598, bacad@lanl.gov)

1. No new Key Facility activities are expected for the next five years. The site LACEF (Pajarito Site) capabilities are being move to the DAF in Nevada. Other current key facility activities that are currently listed are expected to remain at TA-18 until 2010.

2. Levels of operations are not expected to increase above the level listed in the SWEIS ROD.

Table 2.2.4-1. Pajarito Site (TA-18)/ Capabilities and Levels of Operation

Capabilities	SWEIS ROD[a]
Dosimeter Assessment and Calibration	Perform up to 1,050 criticality experiments per year.
Detector Development	Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%, and replace portable linac.
Materials Testing	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing.

Table 2.2.4-1. cont.

Capabilities	SWEIS ROD[a]
Subcritical Measurements	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%.
Fast-Neutron Spectrum	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%, and increase nuclear weapons components and materials.
Dynamic Measurements	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, light detection and ranging experiments, and materials processing. Increase nuclear materials inventory by 20%.
Skyshine Measurements	Perform up to 1,050 criticality experiments per year.
Vaporization	Perform up to 1,050 criticality experiments per year.
Irradiation	Perform up to 1,050 criticality experiments per year. Develop safeguards instrumentation and perform research and development for nuclear materials, interrogation techniques, and field systems. Increase nuclear materials inventory by 20%.
Nuclear Measurement School (relocated from CMR and renamed. At CMR it was called "Nonproliferation Training") [b].	Not in SWEIS ROD (was located in CMR). IAEA schools are at CMR

a Includes replacement of the portable linac.

b This capability was located at TA-18 in years past, but had been moved to CMR. In the effort to reduce the CMR Building to a Category 3 nuclear facility, these operations were moved back to TA-18, necessitating the transfer of additional nuclear material to the facility for use in the classes.

2.2.5 Sigma Complex (TA-03)

The Sigma Complex Key Facility consists of four principal buildings: the Sigma Building (03-66), the Beryllium Technology Facility (03-141), the Press Building (03-35), and the Thorium Storage Building (03-159). Primary activities are the fabrication of metallic and ceramic items, characterization of materials, and process research and development. As shown in Table 2.5-1, this Key Facility had two Category 3 nuclear facilities, 03-66 and 03-159 identified in the SWEIS; however, in April 2000, Building 03-159 was downgraded from a hazard category 3 nuclear facility to a radiological facility and removed from the nuclear facilities list. In March 2001, Building 03-66 was downgraded from a hazard category 3 nuclear facility and removed from the nuclear facilities list (LANL 2002a). In September 2001, Buildings 03-35, 03-66, and 03-159 were placed on the radiological facility list (LANL 2002g) Building 03-141 is a Non-nuclear Moderate Hazard Facility.

Five-year Projection for the Sigma Complex (TA-03)
(Contact: Jen Rezmer, MST-OPS, 667-0096, jrezmer@lanl.gov)

This change is for the 5-year look ahead. MST is currently working with DOE to change our facility categorization for the Beryllium Technology Facility (03-141) to a Non-nuclear High Hazard Facility (currently Building 03-141 is listed as a Non-nuclear Moderate Hazard Facility.) This should be completed in the 5-year time frame.

Table 2.2.5-1. Sigma Complex (TA-03)/ Capabilities and Levels of Operations

Capability	SWEIS ROD[a]	Five-year Projection
Research and Development on Materials Fabrication, Coating, Joining, and Processing	Maintain and enhance capability to fabricate items from metals, ceramics, salts, beryllium, enriched uranium, depleted uranium, and other uranium isotope mixtures including casting, forming, machining, polishing, coating, and joining.	Maintain and enhance capability to fabricate items from metals, ceramics, salts, beryllium, beryllium oxide, enriched uranium, depleted uranium, and other uranium isotope mixtures including casting, forming, machining, polishing, coating, and joining.
Characterization of Materials	Maintain and enhance research and development activities on properties of ceramics, oxides, silicides, composites, and high-temperature materials. Characterize components for accelerator production of tritium.	Maintain and enhance research and development activities on properties of ceramics, oxides, silicides, composites, and high-temperature materials. Characterize components for accelerator production of tritium.
	Analyze up to 36 tritium reservoirs/yr.	Analyze up to 36 tritium reservoirs/yr.
	Develop library of aged non-SNM materials from stockpiled weapons and develop techniques to test and predict changes. Store and characterize up to 2,500 non-SNM component samples, including uranium.	Develop library of aged non-SNM materials from stockpiled weapons and develop techniques to test and predict changes. Store and characterize up to 2,500 non-SNM component samples, including uranium.
Fabrication of Metallic and Ceramic Items	Fabricate stainless steel and beryllium components for about 80 pits/yr.	Fabricate stainless steel and beryllium components for about 80 pits/yr.
	Fabricate up to 200 tritium reservoirs per year.	Fabricate up to 200 tritium reservoirs per year.
	Fabricate components for up to 50 secondaries per year.	Fabricate components for up to 50 secondaries per year.
	Fabricate nonnuclear components for research and development: about 100 major hydrotests and 50 joint test assemblies/yr.	Fabricate nonnuclear components for research and development: about 100 major hydrotests and 50 joint test assemblies/yr.
	Fabricate beryllium targets.	Fabricate beryllium targets.
	Fabricate targets and other components for accelerator production of tritium research.	Fabricate targets and other components for accelerator production of tritium research.
	Fabricate test storage containers for nuclear materials stabilization.	Fabricate test storage containers for nuclear materials stabilization.
	Fabricate nonnuclear (stainless steel and beryllium) components for up to 20 pit rebuilds/yr.	Fabricate nonnuclear (stainless steel and beryllium) components for up to 20 pit rebuilds/yr.

a Includes Sigma Building renovation and modifications for Beryllium Technology Facility.
b The SWEIS indicated that this activity would also be accomplished at TFF.

2.2.6 Materials Science Laboratory (TA-03)

The MSL Key Facility is a single laboratory building (3-1698) containing 27 labs, 60 offices, 21 materials research areas, and support rooms. The building, a two-story structure with approximately 55,000 square feet of floor space, was first opened in November 1993. Activities are all related to research and development of materials science. In 1998, 1999, and 2000, this Key Facility was categorized as a Low Hazard nonnuclear facility. In September 2001, MSL was placed on the Radiological Facility List (LANL 2002b) and remained on the list in CY 2003.

Five-year Projection for the Materials Science Laboratory (TA-03)
(Contact: Jen Rezmer, MST-OPS, 667-0096, jrezmer@lanl.gov)

Please note, that there will be a new building built within the Material Science Complex starting this year. The Center for Integrated Nanotechnology (CINT) will be an additional research facility that will need to be added to the capabilities of the Material Science Complex SWEIS. I do not have all the information at this time, therefore, I will have to send you additional information or meet with you in the near future.

Table 2.2.6-1. Materials Science ~~Laboratory~~ Complex (TA-03)/Capabilities and Levels of Operations

Capability	SWEIS ROD[a]
Materials Processing	Maintain seven research capabilities at levels identified during preparation of the SWEIS: • Wet chemistry • Thermomechanical processing • Microwave processing • Heavy equipment materials • Single crystal growth • Amorphous alloys • Powder processing Expand materials synthesis/processing to develop cold mock up of weapons assembly and processing. Expand materials synthesis/processing to develop environmental and waste technologies.
Mechanical Behavior in Extreme Environment	Maintain two research capabilities at levels identified during preparation of the SWEIS: • Mechanical testing • Fabrication and assembly Expand dynamic testing to include research and development for the aging of weapons materials. Develop a new research capability (machining technology).
Advanced Materials Development	Maintain four research capabilities at levels identified during preparation of the SWEIS: • New materials • Synthesis and characterization • Ceramics • Superconductors

Table 2.2.6-1. cont.

Capability	SWEIS ROD[a]
Materials Characterization	Maintain four research capabilities at levels identified during preparation of the SWEIS: • Surface science chemistry • X-ray • Optical metallography • Spectroscopy Expand corrosion characterization to develop surface modification technology. Expand electron microscopy to develop plasma source ion implantation.

a Includes completion of the second floor of MSL.

2.2.7 Target Fabrication Facility (TA-35)

The Target Fabrication Facility (TFF) is a two-story building (35-213) housing activities related to weapons production and laser fusion research. This Key Facility is categorized as a Low Hazard non-nuclear facility. Exhaust air from process equipment is filtered prior to exhaust to the atmosphere. Sanitary wastes are piped to the LANL sewage facility at TA-46, and radioactive liquid wastes are piped to the Radioactive Liquid Waste Treatment Facility at TA-50.

Five-year Projection for the Target Fabrication Facility (TA-03)
(Contact: Jen Rezmer, MST-OPS, 667-0096, jrezmer@lanl.gov)

Table 2.2.7-1. Target Fabrication Facility (TA-35)/ Capabilities and Levels of Operations

Capability no additions now known	SWEIS ROD
Precision Machining and Target Fabrication	Provide targets and specialized components for about 6,100 laser and physics tests/yr, including a 20% increase over levels identified during preparation of the SWEIS for high-explosive pulsed-power target operations, and including about 100 high-energy-density physics tests. 5 year: No increase – if any change will be a decrease
Polymer Synthesis	Produce polymers for targets and specialized components for about 6,100 laser and physics tests/yr, including a 20% increase over levels identified during preparation of the SWEIS for high-explosive pulsed-power target operations, and including about 100 high-energy-density physics tests. 5 year: No increase – if any change will be a decrease
Chemical and Physical Vapor Deposition	Coat targets and specialized components for about 6,100 laser and physics tests/yr, including a 20% increase over levels identified during preparation of the SWEIS for high-explosive pulsed-power target operations, including about 100 high-energy-density physics tests, and including support for pit rebuild operations at twice the levels identified during preparation of the SWEIS. 5 year: No increase – if any change will be a decrease

Table 2.2.7-1. cont.

Capability no additions now known	SWEIS ROD
Characterization of Materials [a]	Analyze up to 36 tritium reservoirs/yr. [a] No tritium reservoirs analyzed in 2003. 5 year: Not expected to begin again.

a The SWEIS indicated that this activity would be accomplished at TFF as well as the Sigma Complex. See Table 2.5.2-1.

2.2.8 Machine Shops (TA-03)

The Machine Shops Key Facility consists of two buildings, the Nonhazardous Materials Machine Shop (Building 03-39) and the Radiological Hazardous Materials Machine Shop (Building 03-102). Both buildings are located within the same exclusion area. Activities consist of machining, welding, and assembly of various materials in support of major LANL programs and projects, principally those related to weapons manufacturing. In September 2001, Building 03-102 was placed on the Radiological Facility List (LANL 2002g).

Five-year Projection for the Machine Shops (TA-03)
(Contact: Doug Hemphill, ESA-WMM, 667-8335, dhemphill@lanl.gov)

Machine Shops will not exceed capabilities and levels of operation listed in the SWEIS ROD.

Table 2.2.8-1. Machine Shops (TA-03)/ Capabilities and Levels of Operations

Capability	SWEIS ROD	Five-year Projection
Fabrication of Specialty Components	Provide fabrication support for the dynamic experiments program and explosives research studies. Support up to 100 hydrodynamic tests/yr. Manufacture up to 50 joint test assembly sets/yr. Provide general laboratory fabrication support as requested.	Provide fabrication support for the pit manufacturing, dynamic experiments program and explosives research studies. Support up to 100 hydrodynamic tests/yr. Manufacture up to 50 joint test assembly sets/yr. Provide general laboratory fabrication support as requested.
Fabrication Utilizing Unique Materials	Continue fabrication utilizing unique and unusual materials.	Continue fabrication utilizing unique and unusual materials.
Dimensional Inspection of Fabricated Components	Provide appropriate dimensional inspection of above fabrication activities. Undertake additional types of measurements/inspections.	Provide appropriate dimensional inspection of above fabrication activities. Undertake additional types of measurements/inspections.

2.2.9 High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, TA-37)

The High Explosives Processing Key Facility is located in all or parts of seven technical areas. Building types consist of production and assembly facilities, analytical laboratories, explosives storage magazines, and a facility for treatment of explosive contaminated wastewaters. Activities consist primarily of manufacture and assembly of high explosives components for nuclear weapons and for Science-Based Stockpile Stewardship Program tests and experiments. Environmental and safety tests are performed at TA-11 and TA-09 while TA-08 houses radiography activities.

As identified in the SWEIS, this Key Facility has one Category 2 nuclear building in TA-08 (TA-08-0023) (see Table 2.9-1). In November 2002, the updated LANL Radiological Facility List (LANL 2002b) was published and identified Buildings TA-08-0022, TA-08-0070, TA-08-0120, TA-11-0030, TA-16-0088, TA-16-0202, TA-16-0207, TA-16-0300, TA-16-0301, TA-16-3020, TA-16-0332, TA-16-0410, TA-16-0411, TA-16-0413, TA-16-0415, TA-37-0010, TA-37-0014, TA-37-0016, TA-37-0022, TA-37-0024, and TA-37-0025 as radiological facilities.

Operations at this Key Facility are performed by two separate Divisions: the Dynamic Experimentation (DX) Division and the Engineering Sciences and Applications (ESA) Division. ESA performs the majority of the high explosives manufacturing and assembly work while DX assesses the parts produced by ESA.

The ESA Weapon Materials and Manufacturing group brings 99 percent of the explosives into LANL and stores it as raw material. ESA presses the raw explosives into solid shapes and machines these shapes to specifications. The completed shapes are shipped to DX for testing (detonation). The DX High Explosives Science and Technology group also produces a small quantity of high explosives during the year from basic chemistry. The DX Detonation Science and Technology group uses a small amount of the raw explosives for making detonators.

There are two major pathways for expending the explosives brought into LANL: wastes from the pressing and machining operations, which are burned; and completed shapes that are detonated as part of the testing program. Information from both Divisions must be combined to completely capture operational parameters for production of high explosives.

Five-year Projection for High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, and TA-37)
(Contact: Doug Hemphill, ESA-WMM, 667-8335, dhemphill@lanl.gov)

Table 2.2.9-1. High Explosives Processing (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, and TA-37)/ Capabilities and Levels of Operations

Capability	SWEIS ROD[a, b]	Five-year Projection
High Explosives Synthesis and Production	Continue synthesis research and development, produce new materials, and formulate explosives as needed. Increase production of materials for evaluation and process development. Produce material and components for directed stockpile production.	Continue synthesis research and development, produce new materials, and formulate explosives as needed. Increase production of materials for evaluation and process development. Produce material and components for directed stockpile production.
High Explosives and Plastics Development and Characterization	Evaluate stockpile returns. Increase (40%) efforts in development and characterization of new plastics and high explosives for stockpile improvement. Improve predictive capabilities. Research high explosives waste treatment methods.	Evaluate stockpile returns. Increase (40%) efforts in development and characterization of new plastics and high explosives for stockpile improvement. Improve predictive capabilities. Research high explosives waste treatment methods.
High Explosives and Plastics Fabrication	Continue traditional stockpile surveillance and process development. Supply parts to Pantex for surveillance, stockpile rebuilds, and joint test assemblies. Increase fabrication for hydrodynamic and environmental testing.	Continue traditional stockpile surveillance and process development. Supply parts to Los Alamos and Pantex for surveillance, stockpile rebuilds, and joint test assemblies. Increase fabrication for hydrodynamic and environmental testing.
Test Device Assembly	Increase test device assembly to support stockpile related hydrodynamic tests, joint test assemblies, environmental and safety tests, and increased research and development. Approximately 100 major assemblies per year.	Increase test device assembly to support stockpile related hydrodynamic tests, joint test assemblies, environmental and safety tests, and increased research and development. Approximately 100 major assemblies per year.
Safety and Mechanical Testing	Increase (50%) safety and environmental tests related to stockpile assurance. Improve predictive models. Approximately 15 safety and mechanical tests per year.	Increase (50%) safety and environmental tests related to stockpile assurance. Improve predictive models. Approximately 15 safety and mechanical tests per year.
Research, Development, and Fabrication of High-Power Detonators	Increase operations to support assigned stockpile stewardship management activities; manufacture up to 40 major product lines per year. Support DOE complex for packaging and transportation of electro-explosive devices.	Increase operations to support assigned stockpile stewardship management activities; manufacture up to 40 major product lines per year. Support DOE complex for packaging and transportation of electro-explosive devices.

a The total amount of explosives and mock explosives used across all activities is an indicator of overall activity levels for this Key Facility. Amounts projected by the SWEIS ROD are 82,700 pounds of explosives and 2,910 (5-yr. Projection: increase to 5,000) pounds of mock explosives. Actual amounts used in CY 2003 were 7,819 pounds of high explosives and 2,841 pounds of mock high explosives.

b Includes construction of the High Explosives Wastewater Treatment Facility, the steam plant conversion, relocation of the Weapons Testing Facility, and outfall modifications.

2.2.10 High Explosives Testing (TA-14, tA-15, TA-36, TA-39, TA-40)

The High Explosives Testing Key Facility is located in all or parts of five technical areas, comprises more than one-half (22 of 40 square miles) of the land area occupied by LANL, and has 16 associated firing sites. All firing sites are in remote locations and/or within canyons. Major buildings are located at TA-15, and include the Dual Axis Radiographic Hydrodynamic Test (DARHT) facility (Building TA-15-312), the Pulsed High Energy Radiation Machine Emitting X-Rays (PHERMEX) (TA-15-184), and the TA-15-306 firing site. Building types consist of preparation and assembly facilities, bunkers, analytical laboratories, high explosives storage magazines, and offices. Activities consist primarily of testing high explosives components for nuclear weapons and for Science-Based Stockpile Stewardship Program tests and experiments. In September 2001, Building TA-15-R183 was placed on the LANL Radiological Facility List (LANL 2002g).

Five-year Projection for High Explosives Testing (TA-14, TA-15, TA-36, TA-39, and TA-40)
(Contact: Randy Johnson, DX-4, 667-0509, randyj@lanl.gov)

1. DX-4 has reviewed Table 2.10.2-1 for High Explosives Testing (TA-14, TA-15, TA-39, and TA-40) and determined that:
2. **No new** activities will occur in this Key Facility in the next five years that are not covered by the listed capabilities.
3. DX Division **does not** expect that the level of operations will increase above the level listed by the SWEIS Record of Decision.

Table 2.2.10-1. High Explosives Testing (TA-14, TA-15, TA-36, TA-39, and TA-40)/ Capabilities and Levels of Operations

Capability	SWEIS ROD[a]
Hydrodynamic Tests	Conduct up to 100 hydrodynamic tests/yr. Develop containment technology. Conduct baseline and code development tests of weapons configuration. Depleted uranium use of 6,900 lb/yr (over all activities).
Dynamic Experiments	Conduct dynamic experiments to study properties and enhance understanding of the basic physics of state and motion for materials used in nuclear weapons including some experiments with SNM.
Explosives Research and Testing	Conduct high explosives tests to characterize explosive materials.
Munitions Experiments	Continued support of Department of Defense in conventional munitions. Conduct experiments with projectiles and study other effects on munitions.
High-Explosives Pulsed-Power Experiments	Conduct experiments and development tests.
Calibration, Development, and Maintenance Testing	Conduct tests to provide calibration data, instrumentation development, and maintenance of image processing capability.
Other Explosives Testing	Develop advanced high explosives or weapons evaluation techniques.

a Includes completion of construction for the DARHT facility and its operation.

2.2.11 The Los Alamos Neutron Science Center (TA-53)

The LANSCE Key Facility lies entirely within TA-53. The facility has more than 400 buildings, including one of the largest at LANL. Building 53-3, which houses the linac, has 315,000 square feet under roof. Activities consist of neutron science and nuclear physics research, proton radiography, the development of accelerators and diagnostic instruments, and production of medical radioisotopes. Isotope production has not occurred since 1998, however, the new isotope production facility threw its first beam on December 23, 2003, as part of the facility commissioning activities which will continue into CY 004. Full production has not begun. The majority of the LANSCE Key Facility (the User Facility) is composed of the 800-million-electron-volt linac, a Proton Storage Ring, and three major experimental areas: the Manuel Lujan Neutron Scattering Center, the Weapons Neutron Research (WNR) facility, and Experimental Area C.

Experimental Area C is the location of proton radiography experiments for the Stockpile Stewardship Program. A new experimental facility for the production of ultracold neutrons is under construction in Area B. Experimental Area A, formerly used for materials irradiation experiments and isotope production, is currently inactive; construction of a new isotope production facility was completed in CY 2002 and commissioning occurred in December 2003. A second accelerator facility located at TA-53, the Low-Energy Demonstration Accelerator (LEDA), is also inactive and is being decommissioned and dismantled.

This Key Facility has three Category 3 nuclear activities (Table 2.11-1): experiments using neutron scattering by actinides in Experimental Area ER-1/ER-2, the 1L neutron production target in Building 53-7, and Area A East in Building 53-3M (LANL 2001b) which is used for passive storage of activated materials. There are no Category 2 nuclear facilities at TA-53. In September 2001, TA-53-945 and 53-954 were placed on the LANL Radiological Facility List (LANL 2002g). Experimental Area ER-1/ER-2 is categorized as a Moderate Hazard facility. The remainder of the LANSCE User Facility is categorized as Low Hazard. DOE approved an Interim Safety Assessment Document for the LANSCE accelerator and experimental areas in May 2002. LANSCE began work on a two-year project to update and consolidate existing authorization basis documents for the User Facility.

Five-year Projection for the Los Alamos Neutron Science Center (TA-53)
(Contact: Joyce Roberts, LANSCE-DO, 667-3629, joycer@lanl.gov)

LANSCE has revised the SWEIS ROD column to reflect our projected uses of the facilities at LANSCE over the next five years.

Table 2.2.11-1. Los Alamos Neutron Science Center (TA-53)/ Capabilities and Levels of Operations

Capability	SWEIS ROD[a]	Five-year Projection
Accelerator Beam Delivery, Maintenance, and Development	Deliver LANSCE linac beam to Areas A, B, C, WNR facility, Manuel Lujan Center, Dynamic Experiment Facility, and new isotope production facility for 10 months/yr (6,400 hrs). Positive ion current 1,250 microampere and negative ion current of 200 microampere.	Deliver LANSCE linac beam to Areas A, B/C (proton radiography, UCN), WNR facility, Manuel Lujan Center, ~~Dynamic Experiment Facility~~ and ~~new~~ Isotope Production Facility for 10 months/yr (6,400 hrs). Positive ion current 1,250 microampere and negative ion current of 200 microampere.
	Reconfigure beam delivery and support equipment to support new facilities, upgrades, and experiments.[a]	Reconfigure beam delivery and support equipment to support new facilities, upgrades, and experiments.[a]
	Commission/operate/maintain LEDA for 10 to 15 yrs; operate up to approximately 6,600 hrs/yr.	Develop a new fusion materials irradiation capability in MPF-365 and commission/operate/maintain ~~LEDA~~ this capability for 10 to 15 yrs; operate up to approximately 6,600 hrs/yr.
Experimental Area Support	Full-time remote handling and radioactive waste disposal capability required during Area A interior modifications and Area A-East renovation.	Full-time remote handling and radioactive waste disposal capability required during Area A interior modifications and Area A-East renovation to support LPSS or MTS.
	Support of experiments, facility upgrades, and modifications.	Support of experiments, facility upgrades, and modifications.
	Increased power demand for LANSCE linac and LEDA radio-frequency operation.	Increased power demand for LANSCE linac and ~~LEDA~~ new capability radio-frequency operation.
Neutron Research and Technology [b]	Conduct 1,000 to 2,000 experiments/yr using Manuel Lujan Center, WNR facility, and LPSS. Establish LPSS in Area A (requires modification).	Conduct 1,000 to 2,000 experiments/yr using Manuel Lujan Center, WNR facility, and LPSS. Establish LPSS in Area A (requires modification).
	Construct Dynamic Experiment Laboratory adjacent to WNR Facility. Support contained weapons-related experiments: - With small quantities of actinides, high explosives, and sources (up to approximately 80/yr) - With nonhazardous materials and small quantities of high explosives (up to approximately 200/yr) - With up to 4.5 kilograms high explosives and/or depleted uranium (up to approximately 60/yr) - Shock wave experiments involving small amounts, up to (nominally) 50 grams plutonium.	~~Construct Dynamic Experiment Laboratory adjacent to WNR Facility.~~ Support contained weapons-related experiments: - With small quantities of actinides, high explosives, and sources (up to approximately 80/yr) - With nonhazardous materials and small quantities of high explosives (up to approximately 200/yr) - With up to 4.5 kilograms high explosives and/or depleted uranium (up to approximately 60/yr) - Shock wave experiments involving small amounts, up to (nominally) 50 grams plutonium
	Provide support for static stockpile surveillance technology research and development.	Provide support for static stockpile surveillance technology research and development.

Table 2.2.11-1. cont.

Capability	SWEIS ROD[a]	Five-year Projection
~~Accelerator Transmutation of Wastes~~ [c] Advanced Fuel Cycle Initiative 5-yr. projection	Conduct lead target tests for two years at Area A beam stop.	Conduct lead target tests for two years at Area A beam stop. Establish a new Materials Test Station (MTS) capability in Area (requires modification)
	Implement the Los Alamos International Facility for Transmutation (Establish one-megawatt, then five-megawatt Accelerator Transmutation of Wastes target/blanket experiment areas adjacent to Area A.)	Implement the Los Alamos International Facility for Transmutation (Establish one-megawatt, then five-megawatt Accelerator Transmutation of Wastes target/blanket experiment areas adjacent to Area A.)
	Conduct five-megawatt experiments for 10 months/yr for four years using about three kilograms of actinides.	Conduct five-megawatt experiments for 10 months/yr for four years using about three kilograms of actinides.
Subatomic Physics Research	Conduct 5 to 10 physics experiments/yr at Manuel Lujan Center, WNR facility, and LPSS.	Conduct 5 to 10 physics experiments/yr at Manuel Lujan Center, WNR facility, UCN (Area B), and LPSS.
	Conduct proton radiography experiments, including contained experiments with high explosives.	Conduct proton radiography experiments, including contained experiments with high explosives.
Medical Isotope Production	Irradiate up to approximately 50 targets/yr for medical isotope production.	Irradiate up to approximately ~~50~~ 120 targets/yr for medical isotope production.
	Added production of exotic, neutron-rich, and neutron-deficient isotopes (requires modification of an existing target area).	Added production of exotic, neutron-rich, and neutron-deficient isotopes (requires modification of an existing target area).
High-Power Microwaves and Advanced Accelerators	Conduct research and development in these areas, including microwave chemistry research for industrial and environmental applications.	Conduct research and development in these areas, including microwave chemistry research for industrial and environmental applications.

a Includes the completion of ~~proton and neutron radiography facilities, the LEDA, the isotope production facility relocation, the Short Pulsed Spallation Source and~~ the LPSS and MTS.

b Numbers of neutron experiments represent plausible levels of activity. Bounding conditions for the consequences of operations are primarily determined by 1) length and power of beam operation and 2) maintenance and construction activities.

c Formerly Accelerator Transmutation of Waste and Accelerator-Driven Transmutation Technology.

2.2.12 Bioscience Facilities (TA-43, TA-03, TA-16, TA-35, TA-46) (Previously Health Research Laboratory [TA-43])

The Bioscience Key Facility definition includes the main Health Research Laboratory (HRL) facility (Buildings 43-1, -37, -45, and -20) plus additional offices and labs located at TA-35-85 and -2, TA-03-562 and -1698, and TA-46-158/161, -217, -218, -80, -24, and -31. Additionally, Bioscience has small operations located at TA-16. Operations at TA-43, TA-35-85 and -02, and TA-46-158/161 have chemical, laser, and limited radiological activities that maintain hazardous materials inventory and generate hazardous chemical wastes and very small amounts of LLW. Activities at TA-03-562, -03-1698, and TA-16 have relatively minor impacts because of low numbers of personnel and limited quantities of materials. Bioscience activities at TA-03-1698, the Materials Science Laboratory

(MSL), are accounted for with potential impacts of that Key Facility and are not double-counted here. Bioscience research capabilities focus on the study of intact cells (conducted at Biosafety Levels 1 and 2 [BSL-1 and -2]), cellular components (RNA, DNA, and proteins), instrument analysis (laser and mass spectroscopy), and cellular systems (repair, growth, and response to stressors). All Bioscience activities are classed as Low Hazard non-nuclear in all buildings within this Key Facility; there are no Moderate Hazard non-nuclear facilities or nuclear facilities (LANL 2002a). TA-43-1 is now on the Radiological Facilities list (LANL 2002g).

Five-year Projection for the Bioscience Facilities (TA-43, TA-03, TA-16, TA-35, and TA-46) (Previously Health Research Laboratory [TA-43])
(Contact: Andrea Pistone, B-DO, 667-8718, apistone@lanl.gov)

Bioscience is expecting to have a new facility in 2006. Thus, the Division expects to vacate all of TA-43 (HRL-1, 20, 37 and 45) in 2006. In the meantime, we do not expect any new activities to occur in HRL.

Table 2.2.12-1. Bioscience Facilities/ Capabilities and Levels of Operations

Capabilities	SWEIS ROD[a]
Biologically Inspired Materials and Chemistry	Not in SWEIS ROD
Computational Biology	Not in SWEIS ROD
Environmental Biology	Research to characterize the extent of diversity in environmental microbes and to understand their functions and occurrences in the environment. (25 FTEs)
Genomic Science	Conduct research at current levels utilizing molecular and biochemical techniques to determine and analyze the sequences of genomes (human, microbes and animal). Develop strategies to analyze the nucleotide sequence of individual genes, especially those associated with genetic disorders, infectious disease organisms
Measurement Science and Diagnostics	Conduct research utilizing imaging and spectroscopy systems to analyze the structures and functions of subcellular systems and components. (40 FTEs)
Molecular and Cell Biology	Conduct research at current levels utilizing whole cells and cellular systems, both in-vivo and in-vitro, to investigate the effects of natural and catastrophic cellular events like response to aging, harmful chemical and physical agents, and cancer.
	The work includes using isolated cells to investigate DNA repair mechanisms. (35 FTEs)
Molecular Synthesis	Generate biometric organic materials and construct synthetic biomolecules.
Structural Biology	Conduct research utilizing chemical and crystallographic techniques to isolate and characterize the properties and three-dimensional shapes of DNA and protein molecules. (15 FTEs)

Table 2.2.12-1. cont.

Capabilities	SWEIS ROD[a]
In-Vivo Monitoring. This is not a Bioscience Division capability; however, it is located at TA-43-HRL-1. Therefore, it is a capability within this Key Facility and is included here.	Perform 3,000 whole-body scans per year as a service to the LANL personnel monitoring program, which supports operations with radioactive materials conducted elsewhere at LANL. (5 FTEs)

a FTEs: full-time-equivalent scientists, researchers, and other staff supporting a particular research capability.

2.2.13 Radiochemistry Facility (TA-48)

The Radiochemistry Key Facility includes all of TA-48 (116 acres). It is a research facility that fills three roles - research, production of medical radioisotopes, and support services to other LANL organizations, primarily through radiological and chemical analyses of samples. TA-48 contains four major research buildings: the Radiochemistry Laboratory (Building 48-1), the Diagnostic Instrumentation and Development Building (48-28), the Advanced Radiochemical Diagnostics Building (48-45), and the Analytical Facility (48-107), and the Machine and Fabrication Shop (48-8). The DOE listing of LANL nuclear facilities for CY 2003 (LANL 2002a) retained Building TA-48-0001 as a Category 3 nuclear facility as shown in Table 2.1-1. However, during CY 2003, the Radiochemistry Facility was downgraded to a radiological Category B facility and during the next year, CY 2004, the building is expected to be further downgraded to a radiological Category C (low hazard) facility.

Five-year Projection for the Radiochemistry Facility (TA-48)
(Contact: Sandra Wagner, C-DO, 665-7031, swagner@lanl.gov)

This is from one of the two groups at TA-48. I am still working with the C-SIC folks to get their information. Attached are the C-INC changes to the operations comparison table per the team leaders.

Table 2.2.13-1. Radiochemistry Facility (TA-48)/ Capabilities and Levels of Operations

Capability	SWEIS ROD	Five-year Projection
Radionuclide Transport Studies	Actinide transport, sorption, and bacterial interaction studies. Development of models for evolution of groundwater. Assessment of performance or risk of release for radionuclide sources at proposed waste disposal sites. (28 to 34 FTEs [a])	Actinide transport, sorption, and bacterial interaction studies. Development of models for radionuclide transport in groundwater. Assessment of performance or risk of release for radionuclide sources at proposed waste disposal sites and trace activities at NTs. (28 to 34 FTEs [a]) increase to 36 FTEs
Environmental Remediation and risk mitigation. 5-yr. projection	Background contamination characterization pilot studies. Performance assessments, soil remediation research and development, and field support. (34 FTEs [a])	Background contamination characterization pilot studies. Performance assessments, soil remediation research and development, and field support. (34 FTEs [a]) increase to 12-15 FTEs Add Beryllium dispersion and mitigation assessments

Table 2.2.13-1. cont.

Capability	SWEIS ROD	Five-year Projection
Atom Trapping 5-yr. projection	New Capability	Use of a high-efficiency magneto-optical trap (MOT) that is coupled to an off-line mass separator to efficiently trap radioactive atoms for both fundamental and applied research. This project makes use of advances in atomic physics that allows us to cool, trap and manipulate neutral atoms. 3 to 5 FTEs
Hydrotest Sample Analysis 5-yr. projection	New Capability	Measurement of beryllium contamination from simulated nuclear weapons hydrotesting, 5 FTEs
Ultra-Low-Level Measurements	Isotope separation and mass spectrometry. (30 FTEs [a])	Isotope separation and mass spectrometry. (30 FTEs [a]) Increase to 30-40 FTEs
Nuclear/Radiochemistry Separations	Radiochemical operations involving quantities of alpha-, beta-, and gamma-emitting radionuclides for non-weapons and weapons work. (44 FTEs [a])	Radiochemical operations involving quantities of alpha-, beta-, and gamma-emitting radionuclides for non-weapons and weapons work. (44 FTEs [a])
Isotope Production	Target preparation. High-level beta/gamma chemistry and target processing to recover isotopes for medical and industrial application. (15 FTEs [a])	Target preparation. High-level beta/gamma chemistry and target processing to recover isotopes for medical and industrial application. (15 FTEs [a])
Actinide/TRU Chemistry	Radiochemical operations involving significant quantities of alpha-emitting radionuclides. (12 FTEs [a])	Radiochemical operations involving significant quantities of alpha-emitting radionuclides. (12 FTEs [a])
Data Analysis	Re-examination of archive data and measurement of nuclear process parameters of interest to weapons radiochemists. (10 FTEs [a])	Re-examination of archive data and measurement of nuclear process parameters of interest to weapons radiochemists. (10 FTEs [a])
Inorganic Chemistry	Synthesis, catalysis, actinide chemistry: Chemical synthesis of new organo-metallic complexes Structural and reactivity analysis, organic product analysis, and reactivity and mechanistic studies Synthesis of new ligands for radiopharmaceuticals Environmental technology development: Ligand design and synthesis for selective extraction of metals Soil washing	Synthesis, catalysis, actinide chemistry: Chemical synthesis of new organo-metallic complexes Structural and reactivity analysis, organic product analysis, and reactivity and mechanistic studies Synthesis of new ligands for radiopharmaceuticals Environmental technology development: Ligand design and synthesis for selective extraction of metals Soil washing Membrane separator development
Inorganic Chemistry cont.	Membrane separator development Ultrafiltration (49 FTEs [a] —total for both activities)	Ultrafiltration (49 FTEs [a] —total for both activities)
Structural Analysis	Synthesis and structural analysis of actinide complexes at current levels. X-ray diffraction analysis of powders and single crystals at current levels. (22 FTEs [a])	Synthesis and structural analysis of actinide complexes at current levels. X-ray diffraction analysis of powders and single crystals at current levels. (22 FTEs [a])

Table 2.2.13-1. cont.

Capability	SWEIS ROD	Five-year Projection
Sample Counting	Measurement of the quantity of radioactivity in samples using alpha-, beta-, and gamma-ray counting systems. (5 FTEs [a])	Measurement of the quantity of radioactivity in samples using alpha-, beta-, and gamma-ray counting systems. (5 FTEs [a])

a FTEs: full-time-equivalent. It is imperative that these FTE numbers are not confused with the FTEs identified in Table 2.13.3-1. Two different populations of individuals are represented. The FTEs in this table include students, visitors, and temporary staff. The FTEs in Table 2.13.3-1 only include full-time and part-time regular LANL staff.

2.2.14 Radioactive Liquid Waste Treatment Facility (TA-50)

The RLWTF is located at TA-50 and consists of the treatment facility (Building 50-1), support buildings, and liquid and chemical storage tanks. The primary activity is treatment of radioactive liquid wastes generated at other LANL facilities. The facility also houses analytical laboratories to support waste treatment operations.

This Key Facility consisting of the following structures: the RLWTF itself (Building 50-01), the tank farm and pumping station (50-2), the acid and caustic solution tank farm (50-66), and a 100,000-gallon influent holding tank (50-90), were originally considered four Hazard Category 3 segments. This segmentation is no longer allowable. Presently the four segments are considered as a single Hazard Category 2 facility. The Documented Safety Analysis was submitted for review by DOE the 2[nd] quarter of FY03. There are no other nuclear facilities and no Moderate Hazard nonnuclear buildings within this Key Facility.

Five-year Projection for the Radioactive Liquid Waste Treatment Facility (TA-50)
(Contact: Pete Worland, FWO-WFM, 665-7167, vpw@lanl.gov)

Table 2.2.14-1. Radioactive Liquid Waste Treatment Facility (TA-50)/ Capabilities and Levels of Operations

Capability	SWEIS ROD[a]	Five-year Projection
Waste Characterization	Support, certify, and audit generator characterization programs.	Support, certify, and audit generator characterization programs.
Packaging, Labeling	Maintain waste acceptance criteria for radioactive liquid waste treatment facilities.	Maintain waste acceptance criteria for radioactive liquid waste treatment facilities.
Waste Transport, Receipt, and Acceptance	Collect radioactive liquid waste from generators and transport to TA-50.	Collect radioactive liquid waste from generators and transport to TA-50.
Radioactive Liquid Waste Pretreatment	Pretreat 900,000 liters/yr of radioactive liquid waste at TA-21.	Pretreat 900,000 liters/yr of radioactive liquid waste at TA-21. This facility at TA-21 is being decommissioned. It will be totally closed within the next 5 years.
	Pretreat 80,000 liters/yr of radioactive liquid waste from TA-55 in Room 60.	Pretreat 80,000 liters/yr of radioactive liquid waste from TA-55 in Room 60. The level of activity in Room 60 for the next 5 years should likely be below this ROD.

Table 2.2.14-1. cont.

Capability	SWEIS ROD[a]	Five-year Projection
	Solidify, characterize, and package 3 cubic meters/yr of TRU waste sludge in Room 60.	Solidify, characterize, and package 3 cubic meters/yr of TRU waste sludge in Room 60. The level of activity in Room 60 for the next 5 years should likely be below this ROD.
Radioactive Liquid Waste Treatment Main Plant	Install UF/RO equipment in 1997. Install equipment for nitrate reduction in 1999.	Install UF/RO equipment in 1997. Install equipment for nitrate reduction in 1999.
	Treat 35 million liters/yr of radioactive liquid waste.	Treat 35 million liters/yr of radioactive liquid waste. The level of activity for the next 5 years should likely be below this ROD.
	De-water, characterize, and package 10 cubic meters/yr of LLW sludge.	De-water, characterize, and package 10 cubic meters/yr of LLW sludge. (This ROD is low. If you review past years, the RLWTF generates more than 10 cubic meters/yr of LLW sludge. This is due to the projection back in 1999 that the new water treatment processes, being started up in 1999, would generate less sludge than the old process. Presently, the clarifier is still used in the treatment process. The sludge comes from the clarifier. Therefore, the RLWTF generates more sludge than 10 cubic meters/year.)
	Solidify, characterize, and package 32 cubic meters/yr of TRU waste sludge.	Solidify, characterize, and package 32 cubic meters/yr of TRU waste sludge. (It is not clear to me where this ROD value came from. Typically, the RLWTF Main Plant does not generate any TRU waste sludge. We wonder if this ROD value belongs below in the Decontamination Operations section. Additionally, the Decon Operation mentioned below has been moved to TA-54.)
Installation of ion exchange resin columns to remove perchlorates from all the RLWTF effluent. (This cell should be included in the Radioactive Liquid Waste Treatment Main Plant capability.)		
A new capability titled, "Radioactive Liquid Waste Treatment – Secondary Waste Treatment" should probably be added. In this capability we evaporate secondary waste waters to dryness and for disposal at TA-54.	Decontaminate LANL personnel respirators for reuse (approximately 700/month).	Some ROD should be determined that would be in cubic meters/year of LLW.

Table 2.2.14-1. cont.

Capability	SWEIS ROD[a]	Five-year Projection
Construction of a new 300,000 gallon influent tank farm will start and be completed within the next 5 years.	Decontaminate air-proportional probes for reuse (approximately 300/month).	
Decontamination Operations (Perhaps this section, Decontamination Operations, should be removed from the RLWTF portion of the ROD since that operation is now at TA-54)	Decontaminate vehicles and portable instruments for reuse (as required).	Decontaminate LANL personnel respirators for reuse (approximately 700/month).
	Decontaminate precious metals for resale (acid bath).	Decontaminate air-proportional probes for reuse (approximately 300/month).
	Decontaminate scrap metals for resale (sandblast).	Decontaminate vehicles and portable instruments for reuse (as required).
	Decontaminate 200 cubic meters of lead for reuse (grit blast).	Decontaminate precious metals for resale (acid bath).
		Decontaminate scrap metals for resale (sandblast).
		Decontaminate 200 cubic meters of lead for reuse (grit blast).

a Includes installation of UF/RO and nitrate reduction processes in Building 50-01 and installation of aboveground tanks for the collection of influent radioactive liquid waste.
b Decontamination operations are reported as part of the Solid Radioactive and Chemical Waste Key Facility.

2.2.15 Solid Radioactive and Chemical Waste Facilities (TA-50 and TA-54)

The Solid Radioactive and Chemical Waste Key Facility is located at TA 50 and 54. Activities are all related to the management (packaging, characterization, receipt, transport, storage, and disposal) of radioactive and chemical wastes generated at LANL facilities.

It is important to note that LANL's waste management operation captures and tracks data for waste streams (whether or not they go through the Solid Radioactive and Chemical Waste Facilities), regardless of their points of generation or disposal. This includes information on the waste generating process; quantity; chemical and physical characteristics of the waste; regulatory status of the waste; applicable treatment and disposal standards; and the final disposition of the waste. The data are ultimately used to assess operational efficiency, help ensure environmental protection, and demonstrate regulatory compliance.

There are three Category 3 nuclear buildings within this Key Facility: the Radioactive Materials Research Operations and Demonstration (RAMROD) Facility (Building 50-37); the Waste Characterization, Reduction, and Repackaging Facility (WCRR; Building 50-69), and the Radioactive Assay and Nondestructive Test Facility (RANT; Building 54-38). In addition, there are also several Category 2 nuclear facilities/operations; the LLW disposal cells, shafts, and trenches and fabric domes and buildings within Area G; the Transuranic Waste Inspection Project (TWISP) for the retrieval of TRU wastes, including storage domes 226 and 229–232; and outdoor operations at the WCRR facility.

In addition to the nuclear facilities, has a radiological facility. DVRS, TA-54-412, was added to the radiological facility list in CY 2002 (LANL 2002g).

As shown in Table 2.15-1, the SWEIS recognized 19 structures as having Category 2 nuclear classification (Area G was recognized as a whole and then individual buildings and structures were also recognized). The WCRR was identified as a Category 2 in the SWEIS, but because of inventories and the newer guidelines, it was downgraded to a Category 3. Area G has remained a Category 2 facility when taken as a whole.

Five-year Projection for the Solid Radioactive and Chemical Waste Facility (TA-50 and TA-54)
(Contact: Julie Minton-Hughes, FWO-SWO, 667-5873, jemh@lanl.gov)

Table 2.2.15-1. Solid Radioactive and Chemical Waste Facility (TA-50 and TA-54)/ Capabilities and Levels of Operations

Capability	SWEIS ROD[a]	Five-year Projection
Waste Characterization, Packaging, and Labeling	Support, certify, and audit generator characterization programs.	Support, certify, and audit generator characterization programs.
	Maintain waste acceptance criteria for LANL waste management facilities.	Maintain waste acceptance criteria for LANL waste management facilities.
	Characterize 760 cubic meters of legacy MLLW.	Characterize the remaining 4 cubic meters of legacy MLLW.
	Characterize 9,010 cubic meters of legacy TRU waste.	Characterize 9,010 cubic meters of legacy TRU waste.
	Verify characterization data at the Radioactive Assay and Nondestructive Test Facility for unopened containers of LLW and TRU waste.	Verify characterization data at the Radioactive Assay and Nondestructive Test Facility and Area G for unopened containers of ~~LLW and~~ TRU waste.
	Maintain waste acceptance criteria for offsite treatment, storage, and disposal facilities.	Maintain waste acceptance criteria for offsite treatment, storage, and disposal facilities.
	Over-pack and bulk waste as required.	Over-pack and bulk waste as required.
	Perform coring and visual inspection of a percentage of TRU waste packages.	Perform coring and visual inspection of a percentage of TRU waste packages.
	Ventilate 16,700 drums of TRU waste retrieved during TWISP.	Vent~~ilate~~ 16,700 drums of TRU waste retrieved during TWISP.
	Maintain current version of WIPP waste acceptance criteria and liaison with WIPP operations.	Maintain current version of WIPP waste acceptance criteria and liaison with WIPP operations.
Compaction	Compact up to 25,400 cubic meters of LLW.	Compact up to 25,400 cubic meters of LLW.
Size Reduction	Size reduce 2,900 cubic meters of TRU waste at WCRRF and the Drum Preparation Facility.	Size reduce 2,900 cubic meters of TRU waste at WCRRF, DVRS, and the Drum Preparation Facility.
Waste Transport, Receipt, and Acceptance	Collect chemical and mixed wastes from LANL generators and transport to TA-54.	Collect chemical and mixed wastes from LANL generators and transport to TA-54.
	Begin shipments to WIPP in 1999.	Begin shipments to WIPP in 1999.

Table 2.2.15-1. cont.

Capability	SWEIS ROD[a]	Five-year Projection
	Over the next 10 years, ship 32,000 metric tons of chemical wastes and 3,640 cubic meters of MLLW for offsite land disposal restrictions, treatment, and disposal.	Over the next 5 years, ship 10 metric tons of chemical wastes per year and 25 cubic meters per year of MLLW for offsite land disposal restrictions, treatment, and disposal.
	Over the next 10 years, ship no LLW for offsite disposal.	Over the next 5 years, ship 35,000 m^3 of LLW for offsite disposal. (This is worst case, the max that ER has sent to Area G in a year was approx. 7,000 m3)
	Over the next 10 years, ship 9,010 cubic meters of legacy TRU waste to WIPP.	Over the next 10 years, ship 9,010 cubic meters of legacy TRU waste to WIPP.
	Over the next 10 years, ship 5,460 m^3 of operational and environmental restoration TRU waste to WIPP.	Over the next 10 years, ship 5,460 m^3 of operational and environmental restoration TRU waste to WIPP.
	Over the next 10 years, ship no environmental restoration soils for offsite solidification and disposal.	Over the next 5 years, ship 35,000 m^3 of environmental restoration soils for offsite solidification and disposal.
	Annually receive, on average, 5 cubic meters of LLW and TRU waste from offsite locations in 5 to 10 shipments.	Annually receive, on average, 5 cubic meters of LLW and TRU waste from offsite locations in 5 to 10 shipments.
		Receive approximately 40 m^3 of uranium chip waste from LLNL for treatment and disposal. (This will most likely occur in early FY05)
	Stage chemical and mixed wastes before shipment for offsite treatment, storage, and disposal.	Stage chemical and mixed wastes before shipment for offsite treatment, storage, and disposal.
Waste Storage	Store legacy TRU waste and MLLW.	Store legacy TRU waste and MLLW.
	Store LLW uranium chips until sufficient quantities have accumulated for stabilization.	Store LLW uranium chips until sufficient quantities have accumulated for stabilization.
	Begin retrieval operations in 1997.	Begin retrieval operations in 1997.
Waste Retrieval	Retrieve 4,700 cubic meters of TRU waste from Pads 1, 2, 4 by 2004.	Retrieve 4,700 cubic meters of TRU waste from Pads 1, 2, 4 by 2004.
	Demonstrate treatment (e.g., electrochemical) of MLLW liquids.	Demonstrate treatment (e.g., electrochemical) of MLLW liquids.
Other Waste Processing	Land farm oil-contaminated soils at Area J.	Closure of Area J is now complete.
	Stabilize 870 cubic meters of uranium chips.	Stabilize 500 cubic meters of uranium chips.
	Provide special-case treatment for 1,030 cubic meters of TRU waste.	Provide special-case treatment for 1,030 cubic meters of TRU waste.
	Solidify 2,850 cubic meters of MLLW (environmental restoration soils) for disposal at Area G.	Solidify 2,850 cubic meters of MLLW (environmental restoration soils) for disposal at Area G.
	Over next 10 years, dispose of 420 cubic meters of LLW in shafts at Area G.	Over next 5 years, dispose of 210 cubic meters of LLW in shafts at Area G.
Disposal	Over next 10 years, dispose of 115,000 cubic meters of LLW in disposal cells at Area G. (Requires expansion of onsite LLW disposal operations beyond existing Area G footprint.)	Over next 5 years, dispose of 20,000 cubic meters of LLW in disposal cells at Area G. (Requires expansion of onsite LLW disposal operations beyond existing Area G footprint.)

Table 2.2.15-1. cont.

Capability	SWEIS ROD[a]	Five-year Projection
	Over next 10 years, dispose of 100 cubic meters per year administratively controlled industrial solid wastes [c] in pits at Area J.	Closure of Area J is now complete.
	Over next 10 years, dispose of non-radioactive classified wastes in shafts at Area J.	Closure of Area J is now complete.
Decontamination Operations [d]	Decontaminate LANL personnel respirators for reuse (approximately 700/month).	Decontaminate LANL personnel respirators for reuse (approximately 700/month).
	Decontaminate air-proportional probes for reuse (approximately 300/month).	Decontaminate air-proportional probes for reuse (approximately 300/month).
	Decontaminate vehicles and portable instruments for reuse (as required).	Decontaminate vehicles and portable instruments for reuse (as required).
	Decontaminate precious metals for resale (acid bath).	Decontaminate precious metals for resale (acid bath).
	Decontaminate scrap metals for resale (sandblast).	Decontaminate scrap metals for resale (sandblast).
	Decontaminate 200 cubic meters of lead for reuse (grit blast).	Decontaminate 200 cubic meters of lead for reuse (grit blast).

a Includes the construction of four new storage domes for the TWISP.
b The ER Project usually ships soils removed in remediation of a potential release site (PRS) directly to an offsite disposal facility. These wastes do not typically require processing at TA-54 and do not go through the TA-54 operations for shipment.
c In the SWEIS, the term “industrial solid waste” was used for construction debris, chemical waste, and sensitive paper records.
d The Decontamination Operations capability was identified with the Radioactive Liquid Waste Treatment Key Facility in the SWEIS. Activities prior to 2000 are reported in Section 2.14.2 of the Yearbook. In 2000, this capability was relocated to TA-54 and the Solid Radioactive and Chemical Waste Facility.
e Although there has been no activity in CYs 2001, 2002, and 2003, this decontamination operation is now part of the Solid Radioactive and Chemical Waste Facility capabilities.

2.3 Remediation Services Project (Formerly Environmental Restoration Project)

LANL’s RS Project (formerly the ER Project) was established in 1989 as part of a Department of Energy nation-wide program to characterize and remediate over 2,100 potential release sites (PRSs) known, or suspected, to be contaminated from 60 years of LANL operations. Many of the sites remain under DOE control; however, some have been transferred to Los Alamos County or to private ownership (at various locations within the Los Alamos town site). Remediation and cleanup efforts are regulated by and coordinated with the New Mexico Environment Department (NMED) and DOE. The cleanup schedule includes investigation and remediation milestones for the lifecycle (2015) of the project.

The project originally identified 2,124 PRSs, consisting of 1,099 PRSs administered by NMED and 1,025 PRSs administered by DOE. By the end of 2003, only 833 discrete PRSs remain. Approximately 707 (694 in 2002 plus 5 DOE and 8 NMED no further actions [NFAs] in 2003) units have been approved for NFA, and 139 units have been removed from LANL's Hazardous Waste Facility Permit. NFA means that the site is considered "clean" for its intended purpose. For example, an industrial site would not be cleaned up to the same level as a residential site. Of the 139 total PRSs removed from the permit, no sites were removed in 2003.

Sites removed from LANL's Hazardous Waste Facility Permit satisfy one or more regulatory criteria: the site(s) did not exist; was a duplicate of another site; could not be located; or was located within another site, and has been or will be, investigated as part of that site; the site was never used for the management (that is, generation, treatment, storage, or disposal) of Resource Conservation and Recovery Act (RCRA) solid or hazardous wastes and/or constituents; and, the site was not known or suspected of releasing RCRA solid or hazardous wastes and/or constituents to the environment.

In 2000, the project organized its site investigation and remediation efforts according to the watersheds in which PRSs were found. A watershed is composed of one or more mesas, all of the drainages from those mesas, and the major canyon into which the drainages converge. A watershed is evaluated from a mesa top, through a canyon, to the Rio Grande to understand how contamination moves in sediments, soils, surface water, and groundwater. Taking the entire watershed system into consideration helps staff make remediation decisions regarding the amount of contaminants, the type of contamination, and public accessibility to the watershed, and human health and ecological risks. The Project also uses the evaluation results to prioritize its remediation efforts so the most contaminated and most publicly accessible sites are addressed first. Each watershed presents unique challenges because of its location and topography and because of the cleanup solutions required by the types of hazardous chemical and/or radioactive wastes found in the watershed.

The Project is faced with the challenge of compiling a documented safety analysis (DSA) in accordance with the new regulation for nuclear safety management for 11 sites that meet the threshold requirements for category 2 and 3 nuclear facilities (See Table 2.3-1). An additional 254 sites, categorized as radiological sites, do not require this document, but do require other documentation. The project will apply a graded approach to the new requirements that include training, procedure review and revision, change control, and review of management authorities.

During CY 2003, the LANL Nuclear Facility List[a] added 11 environmental sites that are categorized as Hazard Category 2 and Hazard Category 3 Nuclear Facilities.

The New Mexico Environment Department, UC/LANL, and DOE reached agreement on a draft Consent Order on March 2004. The Consent Order replaces the environmental restoration portion of the LANL RCRA Permit and contains detailed investigation requirements for groundwater, canyons, and material disposal areas. In concept and practice, the Consent Order is going to establish the future programmatic path forward and operational envelope for the RS Project. This should address the next five years of operations for the SWEIS SA.

Note: At the present time, RRES-ECO does not have legal access to the Consent Order. A public draft of the Consent Order is not expected to be available until sometime in August 2004.

Table 2.3-1. Environmental Sites with Nuclear Hazard Classification (NHC)

Zone	PRS	Description	HAZ CAT
TA-10	10-0029(a)-99	PRS 10-002(a)-99 is associated with the former liquid disposal complex serving the radiochemistry laboratory at TA-10. The complex discharged to leach fields and pits. The entire complex underwent D&D in 1963. The remaining materials were placed in a pit that remains in place.	3
TA-21	21-014	MDA A is a 1.25 acre site that was used intermittently from 1945 to 1949 and 1969 to 1977 to dispose of radioactively contam,inated solid wastes, debris from D&D activities, and radioactive liquids generated at TA-21. The area contains two buried 50,000 gal. Storage tanks (the “General’s Tanks”) on the west side of MDA A, two rectangular disposal pits (each 18 ft long x 12.5 ft wide x 12.5 ft deep) on the east side of MDA A, and a large central pit (172 ft long x 134 ft wide x 22 ft deep).	2
TA-21	21-015	MDA B is an inactive 6.03-acre disposal site. It was the first common disposal area for radioactive waste generated at LANL and operated from 1945 to 1952. The site runs along the fence line on DP Road and is located about 1600 ft east of the intersection of DB (*sic*) Road and Trinity Drive. The site comprises four major pits (each 300 ft x 15 ft x 12 ft deep), a small trench (40 ft x 2 ft x 3 ft deep), and miscellaneous small disposal sites.	3
TA-21	21-016(a)-99	MDA T, an area of about 2.2 acres, consists of four inactive absorption beds, a distribution box, a subsurface retrievable waste storage area disposal shafts (*sic*), a former waste treatment plant, and cement paste spills on the surface and within the retrievable waste storage area.	2
TA-35	35-001	MDA W consists of two vertical shafts or “tanks” that were used for the disposal of sodium coolant used in LAMPRE-1 sodium cooled research reactor. The two tanks are 125 ft long stainless steel tubes that were half filled and inserted into carbon steel casings separated by approximately 3 ft. Until 1980, a metal control shed was located above the tanks, but this feature was removed and replaced with a concrete cover. The predominant radionuclide of concern in the Sodium is Pu-239 that may have been introduced from a breach of one or two fuel elements during the operational life of LAMPRE-1.	3
TA-35	35-003(a)-99	The Wastewater Treatment Plant (WWTP) was located at the east end of Ten Site Mesa and operated from 1951 until 1963. It consisted of an array of underground waste lines, storage tanks, and chemical treatment precipitation tanks. The plant treated liquid waste that originated from the radiochemistry laboratories and operation of the radioactive lanthanum-140 hot cells in Bldg 35-2. The liquid wastes from the laboratories were acidic, and the radioactivity in the waste came from barium-140, lanthanum-140, strontium-89, strontium-90, and yttrium-90.	3

Table 2.3-1. cont.

Zone	PRS	Description	HAZ CAT
TA-35	35-003(d)-00	The former structures associated with the Pratt Canyon component of the WWTP. All buildings, foundations, and structures were removed during D&D activities in 1981 and 1985, then backfilled with 20 ft of clean fill material.	3
TA-49	49-001(a)-00	This underground, former explosive test site comprises four distinct areas, each with a series of deep shafts used for subcritical testing. Radioactively contaminated surface soil exists at one of the test areas [SWMU 49-001(g)].	2
TA-50	50-009	MDA C was established in 1948 to replace MDA B. MDA C covers 11.8 acres and consists of 7 pits (four are 610 ft x 40 ft x 25 ft, one is 110 ft x 705 ft x 18 ft, one is 100 ft x 505 ft x 25 ft, and one 25 ft x 180 ft x 12 ft), 107 shafts (each typically 2 ft dia. x 10-025 deep), and one unnumbered shaft used for a single strontium-90 source disposal. Pits and shafts were used for burial of hazardous chemicals, uncontaminated classified materials, and radioactive materials. TRU waste also was buried in unknown quantities in the pits. The landfill was used until 1974. COCPCs included inorganic chemicals, VOCs, SVOCs, and radionuclides.	2
TA-53	21-014	Three inactive underground tanks associated with the former radioactive liquid waste system at TA-53. One tank (Structure 53-59) is 28 in dia x 65 ft long and contains spent ion exchange resin. Two empty tanks are 6 ft dia x 12 ft long and are not included here.	2
TA-54	Area G	Low level waste (LLW) (including mixed waste) storage and disposal in domes, pits, shafts, and trenches. TRU waste storage in domes and shafts (does not include TWISP). TRU legacy waste in pits and shafts. Low-level disposal of asbestos in pits and shafts. Operations building; TRU waste storage.	2

a DOE/LANL list of Los Alamos National Laboratory Nuclear Facilities (LANL 2004)

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Los Alamos National Laboratory, 2001h. “TA-55 Radiography/Interim,” ESH-ID 01-0258, Los Alamos, NM.

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Los Alamos National Laboratory, 2001k. “TA-18 Relocation Project Office Building,” ESH-ID 01-0058, Los Alamos, NM.

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3.0 Potential Environmental Consequences of New and Proposed Projects

This chapter is a compilation of projects undertaken or proposed at LANL since the issuance of the 1999 SWEIS. Section 3.1 reviews certain projects that have received DOE-approved NEPA categorical exclusions (cx) under the LANL umbrella cx for *Support Structures at LANL*, LAN 96-022.

Section 3.2 reviews projects that have been proposed for the next five years. Section 3.3 presents tables listing potential environmental affects analyzed in LANL environmental assessments (EA) prepared since 1999.

3.1 LAN-96-022 Projects Undertaken or Proposed at LANL Since the Issuance of the 1999 SWEIS

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LAN-96-022, *Support Structures at LANL*, is included in this document as Attachment A. A complete list of proposed LANL projects reviewed under LAN-96-022 from 1999 to the present can be found in Attachment B. The selected projects that are listed in Table 3.1-1 are those that were considered to have potential environmental consequences. The criteria used to screen for these projects were potential runoff issues, an increased footprint of excavation, project activity located near a wetland or in a floodplain or arroyo, potential loss of habitat and other T&E issues, an increase in utilities' consumption, potential cultural resources issues, and relocation of programs or project activities.

Table 3.1-1. Projects Undertaken or Proposed at LANL under LAN 96-022 and Considered to Have Potential Environmental Consequences.

RRES-ECO Access. Number	RRES-ECO Access. Date	Project Title	Description	Notes	TA	Bldg. Num.	Green Space?	Contact name	Phone number
7663	8/23/1999	Fabrication of Lattice Injector for 75K Engine	Laser welding cylindrical tubes to carry liquid oxygen and RPI fuel. Trumaz Engineering contractors to build rocket engine at LANL.		3	1698	N	Yvette Husky	760-680-0986
7695	9/17/1999	Silver plating cyclotron parts	replated at Los Alamos closest facility to handle radioactive waste	radioactive waste issues?	3	66	N	Emanuel Blosseur, Medcyc Corp.	313-745-2465
8034	6/19/2000	Expand Parking Lot	Create additional parking for TA-3 area, Expand lot NE of SM-16	inc. footprint?, runoff issues?	3	0	N	Sandra Cata	667-2218
8035	6/20/2000	Construct South CMR Parking	Create additional parking for TA-3 area	inc. footprint?, runoff issues?	3	0	N	Sandra Cata	667-2218
8036	6/20/2000	Eniwetok Drive Parking	Create additional parking for TA-3 area	inc. footprint?, runoff issues?	3	0	N	Sandra Cata	667-2218
8398	4/19/2001	ESH-2 Medical Clinic	Replacement of current medical clinic		3	0		Margaret Gosling	667-7251
8501	7/10/2001	TA-03-0040 plating shop	Room N161D has levels of chemical and heavy metal contamination. Remove concreate floor, dispose of equipment, disconnect pipes and dismantle, remove and dispose of ventilation system	contaminated waste issues?	3	40		Tom Montoya	665-4868
8612	11/15/2001	S-3 Security systems support facility	Provide new facility	inc. utilities, inc. footprint?	3	0		Charles Campbell	665-1467
8618	11/27/2001	MST Office Building	2 Story Office Building	inc. utilities, inc. footprint?	3	0		Andrew Erickson	
8909	5/30/2002	Quantum Ion Trapping Lab	Remodel existing lab for new experiment TA-3-0040	New experiment	3	40		Stephanie Archuleta	
9239	10/23/2002	Parking Lots, TA-3	Two Temporary parking lots	SE of bldg. 141, runoff issues?	3	141		Dana Parrett	667-8043
9593	3/27/2003	SM-16 Access Road		green space, inc. footprint	3	16	Y?	Dana Parrett	667-8043
9714	3/28/2003	Install slab and dewar	7X12' slab	in grassy area next to building	3	0			
9804	5/29/2003	Site work for TA-3-481	removing 7 trees and compacting site for building.	wetland issue	3	481	Y	Charles Trujillo	665-6636
9903	7/8/2003	Design a 150 Car Parking Lot and Entrance from W. Jemez in the area west of the Wellness Center	construction of a 170 car parking lot in NW corner TA-3	inc footprint, runoff issues?	3	0	Y	John Bradley	667-5293
9931	7/16/2003	Design a 200 Car Parking Lot and Entrance Rd in the TA-3, SM-70 (Batch Plant) Area	200 car surface parking lot	potential storm water issues, inc footprint	3	70	Y?	John Bradley	667-5293
9994	8/13/2003	Security Division Office Building	new building	inc footprint, utilities	3	0		Elizabeth Martinez	665-6658

RRES-ECO Access. Number	RRES-ECO Access. Date	Project Title	Description	Notes	TA	Bldg. Num.	Green Space?	Contact name	Phone number
7663	8/23/1999	Fabrication of Lattice Injector for 75K Engine	Laser welding cylindrical tubes to carry liquid oxygen and RPI fuel. Trumaz		3	1698	N	Yvette Husky	760-680-0986
10580	5/10/2004	Install Hydrogen Generator Pads	moving H generator from trailer to permit building programmatic installation	relocation	3	1269		Monica Ruiz	667-1725
8438	6/27/2001	CGRP Task 41, TA-06 storage facility	Construct 1 metal buildings at TA-06	Replace building that was lost in fire	6	0		William Massengale	665-6748
7473	3/19/1999	Emergency Response Consolidation Office		inc footprint?	8	0		Bryan Koehler	667-3585
9937	7/24/2003	Dynex Weather Exclosure	Temporary 28X59' weather exclosure for Dynex		8	0		David Katonak	665-9637
10256	12/9/2003	Gunsight, Potholing, New Access Rd, and New Retaining Wall		near arroyo, drainage, or wetland, new reataining wall might affect runoff/wetlans, inc. footprint	8	1		Eloy Trujillo	667-1945
10271	12/22/2003	TA-8 connector Rd-Gun Site Stabilization		previously disturbed site, but, states that trees and native veg will be romoved.	8	0	Y?	Eloy Trujillo	665-6740
8437	6/26/2001	CGRP Task 41, TA-15 storage facility	Construct 3 metal buildings at TA-15	Replace buildings that were lost in fire	15	0		William Massengale	665-6748
9325	11/26/2002	DARHT Firing point removal and cleanup	Remove gravel from firing area	Within core area, contaminated waste issues?	15	312			
9949	7/24/2003	Paving TA-15-312	Parking area	arc sites and runoff issues, inc. footprint	15	0		Dana Parrett	667-3751
9950	7/24/2003	Paving TA-15-313	Parking area	arc sites and runoff issues, inc. footprint	15	0		Dana Parrett	667-3751
7759	11/23/1999	TA-16 SWMU Erosion Contro	Control erosion potentail from SWMU's. Rock check dams installed above and below SWMUs	runoff issues?, wetland issues?	16	0			
7902	3/1/2000	ESA -TSE Office Building	1-2 Story Office Building and Parking Lot	inc footprint?, inc. utilities, runoff issues?	16	-		Lawrie Eaton	667-4434
9417	1/15/2003	Relocate transportainer		buffer area	16	328		Steve Marin	667-3751
9925	7/16/2003	TA-16 West Jemez Rd upgrade	widening NM 501 Approx 1500' N of Intersection w/ Hwy 4.	inc. footprint, sensitive species habitat?	16	0	Y	Manuel Vigil	655-5417
10169	10/30/2003	WETF Diesel Generator Relocation Project	installation of new diesel generator	inc. air emmisions?, relocation	16	205		Richard Conner	665-3091
8270	1/31/2001	TA-18 Sewer Replacement	Replace existing clay pipes with new plastic pipe to prevent release of sewage in to the environment.	Within a cultural site and 100 year flood plain.	18	0		Jeffrey Schroeder	665-9515
8299	2/27/2001	TA-18 office building	Set-up two office trailers, installing utilites.	Within buffer area of federally protected species, inc utilities, inc. footprint?	18	0	N	Dennis Hamerdinger	667-1612

RRES-ECO Access. Number	RRES-ECO Access. Date	Project Title	Description	Notes	TA	Bldg. Num.	Green Space?	Contact name	Phone number
9530	3/5/2003	TA-18 Natural Gas System Upgrade	project will allow natural gas to 18-0023, 18-0032, 18-0116, 18-0127, 18-0168	inc. utilities?	18	0		Dennis Hamerdinger	667-1612
9987	8/12/2003	Ta-18 Electrical Power for PTLA Trailers	install electrical power to 3 PTLA trailers	inc utilities	18	30		Dennis Hamerdinger	667-1612
10071	9/17/2003	Site Prep for dumpsters	level and compact area for dumpster	in floodplain	18	303		Jim Spach	665-3098
7396	1/20/1999	Storage Facility at TA-22	One story building with parking lot	Built between building 120 &70 that no longer exist, developed area.	22	110	N	Michael Smith	667-6237
9407	1/8/2002	TA-22 Additional Parking Area	40 Additional spaces to already existing parking lot	in wetland area, inc. footprint?, runoff issues?	22	0		Mike Kuzmask	667-0288
8725	3/6/2002	Freeway	Install overhead powerline from TA-33-0025 to 33-0087	Two proposed routes, inc. utilities?	33	0		Bill Watson	667-5203
9946	7/24/2003	Parking area Development	Develop parking areas near buildings 33-280 & 33-168	arc sites and runoff issues, inc. footprint	33	0		David Madrid	799-1778
10058	9/10/2003	Contractor Trailer, TA-33, FMU-5	Water tower, parking lot, use dirt and base fill from other projects	inc footprint, runoff issues?, inc. utilities?	33	0		Horton Struve	665-5374
10324	1/29/2004	Ta-33 connect Utilities to pre-fab building	provide water, electric, sewer, gas to new building	inc. utilities	33	0		David Madrid	667-3751
8445	7/2/2001	New net station maintenance	Relocating activites from 35-0034 to 35-0002, New space propsed as light soldering laboratory	Relocation	35	2			
9248	10/23/2002	TA-36-69 Parking Lot		Constructed W side of security fence near bldg. 69, runoff issues?	36	69		Dana Parrett	667-8043
9788	5/21/2003	HE Prep Facility-Primary Power	set two power poles for power	impacts utilities, and 1 pole needs to be moved because located in arch site.	36	0			
10428	3/29/2004	TA-46 Install RAS Chlorination Line		spotted owl concerns	46	337		Richard Allison	699-0694
8288	2/14/2001	TA-49 Interagency helitac base upgrade	New concrete pad, water lines, electrical lines and communication lines.	Within sensitive habitat, inc. utilities	49	0	Y	Jeff Waltersheid	667-3643
9621	4/7/2003	Lay Base coarse to and around transportainer		in developed core habitat, need to delay activities accordingly.	50	0	N		
8820	4/15/2002	TA-51 Turning lanes	Constructin of acceleration/deceleration added to Pajarito Road	Within floodplains wetlands and 5 archaelogical sites	51	0		Crystal Rodarte	665-7690
7564	5/24/1999	Renovate Parking lot	Larger parking area	inc. footprint?, runnoff issues?, sensitive specieis habitat	52	1		George Martinez	665-5247
7665	8/26/1999	TA-53 Acceleration Lane	acceleration lane from TA-53 to W Jemez rd.	next to arc site	53	0	Y	Dana Parrett	667-8043

RRES-ECO Access. Number	RRES-ECO Access. Date	Project Title	Description	Notes	TA	Bldg. Num.	Green Space?	Contact name	Phone number
8818	4/15/2002	TA-53 Traffic upgrades	Construction of acceleration lane	Within core area of the pajarito canyon AEI on top of archaelogical site (LA 21150)	53	0		Crystal Rodarte	665-7690
7943	4/12/2000	Relocate Mobile lead decon trailer	Relocate existing operations at TA-50 to TA-54	relocation	54	0		Larman Everett	665-2629
8396	5/23/2001	Cerro Grande Rehabiltation project: task 16, TA-54 emergency vehicle access point	Relocate buildings to allow vehicle access		54	242			
8824	4/19/2002	TA-54 west office building	New 20,000 sq ft building with road widened.	Within arc site; inc. footprint?, inc utilities	54	0		Larman Everett	665-2629
9093	8/29/2002	Gravel Parking Lot		Near two arc sites, runoff issues?	54	0		Larman Everett	665-2629
9324	11/15/2002	Shop Driveway, TA-54	grub 20X100', lay base course gravel	incr. Footprint? Runoff issues?	54	473		Larman Everett	665-2629
10168	10/28/2003	CCP Office Building	install 3 portable office buildings, electric and sewer to be installed	inc. utilities, inc. footprint?	54	0		Teresa Hofhings	667-3312
7656	8/17/1999	TSME, 431/432 Configuration	disconnect fume hood from rm 432 for waste operations decontaminate, remove and dispose. Reconnect in rooms 431 and 432	relocation	55	4	N	Dwain Keith	
8156	8/30/2000	Storage Building	Covered storage for some contaminated items		55	0		Robert Quinlan	665-9345
8911	5/31/2002	FITS Parking Lot	New prking lot	runoff issues?, inc footprint?	55	0		Elizabeth Martinez	665-6658
8980	7/24/2002	Temporary Parking	Compact soil and lay base coarse material	Near sensitive habitat, runoff issues?	55	0		Manuel Trujillo	667-6105
9654	4/10/2003	Set Barriers TA-55		cult resources marked, no map	55	265		Dana Parrett	667-3751
10409	3/19/2004	TA-55 Pajarito East Parking Structure		inc footprint, potential runoff issues	55	0		Ken Towery	665-1716
7562	5/21/1999	Parking Lot, TA-58, FM-81		inc footprint?, runoff issues?	58	0		Miles Britielle	667-8236
9645	4/10/2003	SM-31 Parking Lot		inc. footprint >1acre , cult resources marked, runoff issues?	58	31			
10239	12/2/2003	Fill Material for Parking Structure		>1 acre, near arroyo, drainage, or wetland, greenspace??	58	0	Y?	Thomas Fitzgerald	667-5042
9580	3/27/2003	Sigma Mesa Building		green space, inc. utilities, footprint	60	3	Y?	Terry Norris	667-7711
10155	10/23/2003	Sigma Mesa Metal Building	install utilities to support new metal building	inc. utilities	60	0		David Madrid	699-1778
10213	11/17/2003	TA-60 Storage Yards		undev space, inc. footprint	60	29		Dana Parrett	667-3751
7571	6/2/1999	Salt Dome, New Location-99-0124	former acc. Number 7456, 3/9/1999	runoff issues?	61	0		Paul Harrison	667-8236

RRES-ECO Access. Number	RRES-ECO Access. Date	Project Title	Description	Notes	TA	Bldg. Num.	Green Space?	Contact name	Phone number
8033	6/19/2000	Construct TA-61 Parking	Create additional parking for TA-3 area	inc. footprint?, runoff issues?	61	0	N	Sandra Cata	667-2218
8214	11/2/2000	Border Station	Install meter & regulator station to supply LANL with a second source of natural gas.	inc. utilities	61	23	Y	Jerry Gonzales	655-2612
7896	3/8/2000	FWO Parking Lot	Provide Asphalt Parking Lot to FWO-DO	Asphalt over existing gravel; runoff/stormwater issues?	63	0		Steve Francis	665-5918
8339	4/17/2001	Proposes FWO Division Administration Building	Two story office building	Within developed core and buffer mortandad, inc. utilities, inc. footprint?	63	0	N	George Martinez	665-5247
9622	4/7/2003	TA-63 FWO-DO Office Building		inc. footprint 1.5 acres, inc utilities, no bio/cult issues	63	0			
10473	4/5/2004	IM-DO Office Building project development		>1 acre, near arroyo, drainage, or wetland, water supply issues, greenspace??	63	0	Y?	Elizabeth Martinez	665-6658
9458	2/3/2003	TA-64 PTLA Buildings	new buildings	inc. footprint?, runoff issues?	64	0			
7667	8/26/1999	Pave Parking Lot	grade and level parking area, install concrete, widen existing parking lot.	inc footprint, runoff issues?	66	0		Arline Gurley	667-4599 / 665-2071
8409	6/5/2001	FWO Division Administration Building - New Location	Two story office building	Within core area of the pajarito canyon AEI on top of archaelogical site (LA 21150). Inc. utilities, footprint	66	0		George Martinez	665-5247
8965	7/24/2002	Site preparation of project office transportables	Place 6 trailers side by side	inc footprint?, inc utilities?	48 & 55	0		Tom Short	667-3710
8821	4/15/2002	TA-59 to TA-18	Widen Pajarito Road from TA-59 to TA-18	Within core and buffer of AEI. Floodplains wetland assessment needed	59 &18	0		Crystal Rodarte	665-7690
8693	2/19/2002	100 PSI natural gas pipeline	8 inch natural gas pipeline between TA-06-TA-55	MSO core and buffer, inc. utilities?	6 & 55	-			

3.2 Projects Proposed During the Next Five Years of LANL Operations

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Section 3.2 reviews future LANL projects. Table 3.2-1 presents proposed LANL projects through FY 2009. The table also shows the NEPA review if previously determined or the level of NEPA review expected for the project. Additional information may be provided if necessary to evaluate potential environmental consequences.

Table 3.2-1. Projects Proposed through FY 2009.

Project Name	NEPA Status	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	NEPA Review
National Security Sciences Building	EA-FONSI	Y	Y	Y	Y	N	N	DOE/EA-1375
CMR Replacement Project	EIS-ROD	Y	Y	Y	Y	Y	Y	DOE/EIS-0350
TA-18 Mission Relocation Project	EIS-ROD	Y	Y	Y	Y	Y	Y	DOE/EIS-0319
Radioactive Liquid Waste Treatment Facility Upgrade	EA-TBD	Y	Y	Y	Y	N	N	
TA-55 Infrastructure Reinvestment	CX-TBD	Y	Y	Y	Y	Y	Y	
DX High Explosives Characterization Consolidation	EA-FONSI	Y	Y	Y	Y	N	N	DOE/EA-1447
ESA Fabrication Facility Replacement	EA-FONSI	Y	Y	Y	Y	Y	Y	DOE/EA-1407
Support Services Consolidation	EA-TBD	N	Y	Y	Y	N	N	
Power Grid Infrastructure Upgrade	EA-FONSI	Y	Y	Y	N	N	N	DOE/EA-1247
LANSCE High Voltage Distribution Replacement	CX-TBD	Y	Y	Y	Y	Y	Y	
NMSSUP Phase 1	CX	Y	Y	N	N	N	N	LAN-97-084 amended
Security Perimeter Project	EA-FONSI	Y	Y	Y	N	N	N	DOE/EA-1429
NMSSUP Phase 2	CX	Y	Y	Y	Y	Y	Y	LAN-99-026
DARHT (Phase 1 & 2)	EIS-ROD	N	N	N	N	N	N	DOE/EIS-0228
Nonproliferation and International Security Center	EA-FONSI	Y	N	N	N	N	N	DOE/EA-1238
TA-53 Isotope Production Facility	CX	N	N	N	N	N	N	LAN-95-130A
LANSCE Refurbishment/Revitalization	CX-TBD	Y	Y	Y	Y	Y	Y	
Pajarito Road Corridor Utilities	EA-TBD	N	N	Y	Y	Y	Y	
Modern Radiological Science Complex	EA-TBD	N	N	Y	Y	Y	Y	Attached
Radiography Facility, TA-55	EA-PREP	Y	Y	Y	Y	Y	N	DOE/EA-1428
Center for Stockpile Stewardship Research, TA-3	EA-TBD	Y	Y	Y	Y	Y	Y	
Advanced Hydrotest Facility	EIS-TBD	N	N	N	N	N	Y	
Los Alamos CINT Gateway	CX	Y	Y	Y	N	N	N	LAN-02-011
Fuel Cell Facility	EA-TBD	Y	N	N	N	N	N	
Fire Suppression Yard Main Replacement (TA-55)	CX	N	N	N	N	N	N	LAN-96-012
Monitoring Well Project (NA)	CX	Y	Y	Y	N	N	N	LAN-96-027
Electrical Infrastructure Safety Upgrade (TA-3-40)	CX	N	N	N	N	N	N	LAN-96-022
TA-21 HIC Move to TA-16-202	CX-TBD	N	N	N	N	N	N	
Weapons Plant Support Building	EA-FONSI	N	N	N	N	N	N	DOE/EA-1407
WETF 1.6 MVA Generator Installation	CX-TBD	N	N	N	N	N	N	
TA-16 Intersection	CX	Y	N	N	N	N	N	LAN-96-022
TSR Implementation	CX-TBD	Y	N	Y	Y	N	N	
Pajarito Road Access Control Stations	EA-FONSI	N	N	N	N	N	N	DOE/EA-1429
Lujan Center Neutron Production Target System	EIS/ROD	N	N	Y	N	N	N	DOE/EIS-0238
Renovate MPF-3 Sector R and MPF-1 Basement	CX-TBD	N	N	Y	Y	N	N	
LANSCE Lab/Office Building	CX-TBD	N	N	Y	N	N	N	
TA-8 Radiography Upgrades	CX-TBD	N	N	Y	Y	N	N	
BTF upgrades to FMS and VAV systems	CX-TBD	N	N	N	Y	N	N	
TA-16-202 Renovation/Tritium Consolidation	EA-FONSI	N	N	N	Y	Y	N	DOE/EA-1407
Calibration Laboratory	EA-FONSI	N	N	N	N	Y	N	DOE/EA-1407
Vessel Facility 1of 4	EA-FONSI	N	N	N	N	Y	N	DOE/EA-1447
Classified Detonator Storage Facility	EA-FONSI	N	N	N	N	Y	N	DOE/EA-1447
Medium/Heavy Lab At TA-22	EA-FONSI	N	N	N	N	Y	N	DOE/EA-1447
Vessel Facility 2 of 4	EA-FONSI	N	N	N	N	N	Y	DOE/EA-1447
TA-37 Classified HE Storage Facility	EA-FONSI	N	N	N	N	N	Y	
Replace Machine Shop At TA-22	EA-FONSI	N	N	N	N	N	Y	DOE/EA-1447
TA-16-200 Upgrades	CX-TBD	N	N	N	N	N	Y	
Bomb Proof At TA-22	EA-FONSI	N	N	N	N	N	Y	DOE/EA-1447
Vessel Facility 3 of 4	EA-FONSI	N	N	N	N	N	N	DOE/EA-1447
Move Existing Vessel To TA-22	EA-FONSI	N	N	N	N	N	N	DOE/EA-1447

Project Name	NEPA Status	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	NEPA Review
Gas Gun Relocation TA-40 To TA-22	EA-FONSI	N	N	N	N	N	N	DOE/EA-1447
Classified HE Storage	EA-FONSI	N	N	N	N	N	N	DOE/EA-1447
Joint DX/ESA Conference Facility	EA-FONSI	N	N	N	N	N	N	DOE/EA-1447
Vessel Facility 4 of 4	EA-FONSI	N	N	N	N	N	N	DOE/EA-1447
LANSCE Chiller Replacement	CX	N	N	N	N	N	N	LAN-96-012
Beryllium Tech Facility - Cartridge Filter House Install	CX	Y	Y	N	N	N	N	LAN-96-012
Electrical Infrastructure Safety Upgrade (TA-3-261)	CX	Y	Y	N	N	N	N	LAN-96-022
Electrical Infrastructure Safety Upgrade (TA-8-21)	CX-TBD	Y	N	N	N	N	N	LAN-96-022
Electrical Infrastructure Safety Upgrade (TA-43-1)	CX-TBD	N	Y	N	N	N	N	LAN-96-022
TA-16-260 Reconfiguration	EA-FONSI	Y	N	N	N	N	N	DOE/EA-1407
Hydrotest Design Facility	CX	N	N	N	N	N	N	LAN-02-027
Shock & Vibration Laboratory	EA-FONSI	Y	N	N	N	N	N	DOE/EA-1407
FWO Office Building	CX	N	N	N	N	N	N	LAN-96-022
CCF Electrical Upgrades	CX-TBD	Y	N	N	N	N	N	
HRL-1 HVAC	CX-TBD	Y	N	N	N	N	N	
TA-46-24 Roof Replacement	CX	N	N	N	N	N	N	LAN-96-010
WETF Systems Refurbishment	EIS/ROD	Y	Y	N	N	N	N	DOE/EIS-0238
Deferred Maintenance Small Projects	CX	Y	N	N	N	N	N	
Electrical Infrastructure Safety Upgrade (TA-46-1)	CX	Y	Y	N	N	N	N	LAN-96-022
Electrical Infrastructure Safety Upgrade (TA-53-2)	CX	Y	Y	N	N	N	N	LAN-96-022
TA-16 WE Campus Grading, Drainage & Utilities	EA-FONSI	Y	N	N	N	N	N	DOE/EA-1407
Replace High Voltage Electrical Panels TA-48-1	CX	Y	Y	N	N	N	N	LAN-96-022
TA-16-193 Reconfiguration	EA-FONSI	Y	Y	N	N	N	N	DOE/EA-1407
Vulnerable Building Replacement - DX Shock & Detonation	EA-FONSI	Y	N	N	N	N	N	DOE/EA-1447
TA-50 Caustic Tank Replacement	CX	Y	N	N	N	N	N	LAN-96-012
MCC Replacement at CMR	CX	Y	N	N	N	N	N	
Generator/Load Bank Installation at TA-55	CX	Y	N	N	N	N	N	LAN-96-012
Electrical Infrastructure Safety Upgrade (TA-3-40)	CX	Y	N	N	N	N	N	LAN-96-022
Electrical Infrastructure Safety Upgrade (TA-46-31)	CX	Y	N	N	N	N	N	LAN-96-022
Lujan Center Ventilation and Cooling Upgrade	CX	Y	Y	N	N	N	N	
Deferred Maintenance Bundle 05-01	CX-TBD	N	Y	N	N	N	N	
Electrical Infrastructure Safety Upgrade (TA-59-1)	CX-TBD	N	Y	Y	N	N	N	LAN-96-012
Electrical Infrastructure Safety Upgrade (TA-48-1)	CX-TBD	N	Y	Y	N	N	N	LAN-96-012
IM-Division Office Building Replacement	CX-TBD	N	Y	N	N	N	N	
TA-9-38,40,42,46 Stm to Hot Water Htg. Conversion	CX-TBD	N	N	Y	N	N	N	
Reconfigure TA-39-98, Close 39-2,39-103, 39-07	CX-TBD	N	N	Y	N	N	N	pmweb.lanl.gov/pqm/projects/FIRP/ta-39-98/ta-39-98_index.htm
Convert Htng System & Upgrade Ctrls at TA-48-RC1	CX-TBD	N	N	Y	N	N	N	
HVAC/Electrical Upgrade, MPF-6	CX-TBD	N	N	Y	N	N	N	
Electronics/Data Systems Building	EA-FONSI	N	N	Y	N	N	N	DOE/EA-1447
Firing Site Consolidation	CX-TBD	N	N	Y	N	N	N	
FY05 FIRP Funded D&D	CX-TBD	N	Y	N	N	N	N	
FY06 Planning	CX-TBD	N	Y	N	N	N	N	
Electrical Infrastructure Safety Upgrade (TA-15-183)	CX-TBD	N	N	Y	Y	N	N	http://pmweb.lanl.gov/pqm/projects/eisu/index.htm
Electrical Infrastructure Safety Upgrade (TA-3-32)	CX-TBD	N	N	Y	Y	N	N	http://pmweb.lanl.gov/pqm/projects/eisu/index.htm
Electrical Infrastructure Safety Upgrade (TA-35-2)	CX-TBD	N	N	Y	Y	N	N	http://pmweb.lanl.gov/pqm/projects/eisu/index.htm

Project Name	NEPA Status	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	NEPA Review
Deferred Maintenance Bundle 06-01	CX-TBD	N	N	Y	N	N	N	
Deferred Maintenance Bundle 06-02	CX-TBD	N	N	Y	N	N	N	
Deferred Maintenance Bundle 06-03	CX-TBD	N	N	Y	N	N	N	
TA-33 Sanitary Sewer System Replacement	CX-TBD	N	N	Y	N	N	N	LAN-92-043A
TA-16-450 Gas Transfer System	CX-TBD	N	N	Y	Y	N	N	
GTS SLEP Support Building	CX	N	N	Y	Y	N	N	
TA-3-32 & TA-3-34 Revitalization (MST)	CX-TBD	N	N	Y	N	N	N	
Central Auditorium, TA-16-200	EA-FONSI	N	N	Y	N	N	N	DOE/EA-1407
Communication Shop Building	CX-TBD	N	N	Y	N	N	N	
FY06 FIRP Funded D&D	CX-TBD	N	N	Y	N	N	N	
FY07 Planning	CX-TBD	N	N	Y	N	N	N	
Electrical Infrastructure Safety Upgrade (TA-35-27)	CX-TBD	N	N	N	Y	Y	N	http://pmweb.lanl.gov/pqm/projects/eisu/index.htm
Electrical Infrastructure Safety Upgrade (TA-33-114)	CX-TBD	N	N	N	Y	Y	N	http://pmweb.lanl.gov/pqm/projects/eisu/index.htm
Deferred Maintenance Bundle 07-01	CX-TBD	N	N	N	Y	N	N	
Deferred Maintenance Bundle 07-02	CX-TBD	N	N	N	Y	N	N	
Deferred Maintenance Bundle 07-03	CX-TBD	N	N	N	Y	N	N	
Deferred Maintenance Bundle 07-04	CX-TBD	N	N	N	Y	N	N	
Deferred Maintenance Bundle 07-05	CX-TBD	N	N	N	Y	N	N	
Deferred Maintenance Bundle 07-06	CX-TBD	N	N	N	Y	N	N	
Deferred Maintenance Bundle 07-07	CX-TBD	N	N	N	Y	N	N	
Deferred Maintenance Bundle 07-08	CX-TBD	N	N	N	Y	N	N	
Electrical Infrastructure Safety Upgrade (TA-3-39)	CX-TBD	N	N	N	N	Y	Y	
Electrical Infrastructure Safety Upgrade (TA-35-46)	CX-TBD	N	N	N	N	Y	Y	
Deferred Maintenance Bundle 08-01	CX-TBD	N	N	N	N	Y	N	http://pmweb.lanl.gov/pqm/projects/eisu/index.htm
Deferred Maintenance Bundle 08-02	CX-TBD	N	N	N	N	Y	N	http://pmweb.lanl.gov/pqm/projects/eisu/index.htm
Deferred Maintenance Bundle 08-03	CX-TBD	N	N	N	N	Y	N	
Deferred Maintenance Bundle 08-04	CX-TBD	N	N	N	N	Y	N	
Deferred Maintenance Bundle 08-05	CX-TBD	N	N	N	N	Y	N	
Deferred Maintenance Bundle 08-06	CX-TBD	N	N	N	N	Y	N	
Deferred Maintenance Bundle 08-07	CX-TBD	N	N	N	N	Y	N	
Deferred Maintenance Bundle 08-08	CX-TBD	N	N	N	N	Y	N	
Deferred Maintenance Bundle 08-09	CX-TBD	N	N	N	N	Y	N	
Deferred Maintenance Bundle 08-10	CX-TBD	N	N	N	N	Y	N	
Deferred Maintenance Bundle 08-11	CX-TBD	N	N	N	N	Y	N	
Deferred Maintenance Bundle 08-12	CX-TBD	N	N	N	N	Y	N	
Electrical Infrastructure Safety Upgrade (TA-3-102)	CX-TBD	N	N	N	N	Y	Y	
Electrical Infrastructure Safety Upgrade (TA-39-2)	CX-TBD	N	N	N	N	Y	Y	
Deferred Maintenance Bundle 09-01	CX-TBD	N	N	N	N	N	Y	
Deferred Maintenance Bundle 09-02	CX-TBD	N	N	N	N	N	Y	
Deferred Maintenance Bundle 09-03	CX-TBD	N	N	N	N	N	Y	http://pmweb.lanl.gov/pqm/projects/eisu/index.htm
Deferred Maintenance Bundle 09-04	CX-TBD	N	N	N	N	N	Y	http://pmweb.lanl.gov/pqm/projects/eisu/index.htm
Deferred Maintenance Bundle 09-05	CX-TBD	N	N	N	N	N	Y	
Deferred Maintenance Bundle 09-06	CX-TBD	N	N	N	N	N	Y	
Deferred Maintenance Bundle 09-07	CX-TBD	N	N	N	N	N	Y	

Project Name	NEPA Status	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	NEPA Review
Deferred Maintenance Bundle 09-08	CX-TBD	N	N	N	N	N	Y	
Deferred Maintenance Bundle 09-09	CX-TBD	N	N	N	N	N	Y	
Deferred Maintenance Bundle 09-10	CX-TBD	N	N	N	N	N	Y	
Deferred Maintenance Bundle 09-11	CX-TBD	N	N	N	N	N	Y	
Deferred Maintenance Bundle 09-12	CX-TBD	N	N	N	N	N	Y	
Deferred Maintenance Bundle 09-13	CX-TBD	N	N	N	N	N	Y	
Monitoring Well Project	CX	Y	N	N	N	N	N	
Firing Point Beryllium Mitigation, TA-15-312	CX-TBD	N	N	N	N	N	N	
R-306 JOPIN Modification	CX-TBD	N	N	N	N	N	N	
Stockpile Support Building (CSSR?)	CX-TBD	N	N	N	N	N	N	
DX Transition Office Building	EA/FONSI	N	N	N	N	N	N	DOE/EA-1447
TA-03-1698 Offices Above Microscope Labs	CX	Y	N	N	N	N	N	
DYNEX Assembly Facility	CX-TBD	Y	N	N	N	N	N	
TA-50-37 RAMROD Upgrade For Act. Chem.	CX	Y	N	N	N	N	N	LAN-03-019
Homeland Security Building	CX-TBD	N	N	N	N	N	N	
East Jemez Upgrade (Landfill to Royal Crest)	CX	Y	N	N	N	N	N	LAN-96-010
Parking Structure	CX-TBD	Y	N	N	N	N	N	
Replace Traffic Signals	CX-TBD	Y	N	N	N	N	N	
Upgrade R Site Road	CX-TBD	Y	N	N	N	N	N	
New TA-51/54 Intersection	CX	N	Y	N	N	N	N	
Anchor Ranch Road South	CX-TBD	N	Y	N	N	N	N	
Trip Hazard Mitigation	CX-TBD	N	Y	N	N	N	N	
ADA Compliance	CX-TBD	N	Y	N	N	N	N	
Anchor Ranch Road North	CX-TBD	N	N	Y	N	N	N	
W. Jemez From Casa Grande to West Road	CX-TBD	N	N	Y	N	N	N	
Roadside Safety - Obstacles & Guardrails	CX-TBD	N	N	Y	N	N	N	
East Jemez Road Widening	CX-TBD	N	N	Y	N	N	N	
Pistol Range Intersection	CX-TBD	N	N	N	Y	N	N	
Pajarito Rd. TA-59 To TA-64 Access & Parking	CX-TBD	N	N	N	Y	N	N	
Sign Upgrades	CX-TBD	N	N	N	Y	N	N	
Upgrade Eniwetok To Sigma Mesa	CX-TBD	N	N	N	N	Y	N	
TA-53 Sidewalks	CX-TBD	N	N	N	N	Y	N	
West Jemez Road Shoulders	CX-TBD	N	N	N	N	Y	N	
Open Graded Friction Course East Jemez Road	CX-TBD	N	N	N	N	N	Y	
CCF/LDCC Cooling and Power Improvements	CX	N	N	N	N	N	N	LAN-96-010
TA-3-261 Retrofit HVAC VAV Boxes	CX-TBD	N	N	N	N	N	N	
Upgrade of HVAC and Installation of Chem Fume Hoods	CX-TBD	N	N	N	N	N	N	
Replacement of Fire Station #1	CX-TBD	N	N	N	N	N	N	
Facility Inside Communication Infrastructure	CX-TBD	N	N	N	N	N	N	
Replacement of Fire Station #5	CX-TBD	N	N	N	N	N	N	
Center for Homeland Security Support Facility	CX-TBD	N	N	N	N	N	N	
TA-48 RC-45 Clan Chemistry Laboratory Addition	CX-TBD	N	N	N	N	N	N	
Bioinformatics and Computational Biology Office Bldg	CX-TBD	N	N	N	N	N	N	
New Fire Department Apparatus Garage	CX-TBD	N	N	N	N	N	N	
Parking Structure	CX-TBD	Y	N	N	N	N	N	
Badge Office Relocation	CX-TBD	Y	N	N	N	N	N	
Surface Parking Lots	CX-TBD	Y	N	N	N	N	N	
Gateway Parking Structure	CX-TBD	Y	Y	N	N	N	N	
Pajarito Parking Structure	CX-TBD	Y	Y	N	N	N	N	

Project Name	NEPA Status	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	NEPA Review
FY05 IGPP #1	CX-TBD	N	Y	Y	N	N	N	
FY06 IGPP #1	CX-TBD	N	N	Y	Y	N	N	
FY06 IGPP #2	CX-TBD	N	N	Y	Y	N	N	
TA-3 Steam Condensate Lines	CX	Y	Y	Y	Y	Y	Y	LAN-98-103
Replace 115kv oil circuit breaker	CX-TBD	Y	Y	Y	Y	Y	Y	
90 MVAR SVC Capacitor	CX-TBD	Y	N	N	N	N	N	
Water Leak Survey, Condition Assessment, Upgrades	CX-TBD	Y	Y	Y	Y	N	N	
Refurbish Power Plant Turbine #2	CX-TBD	Y	Y	N	N	N	N	
Replace Old 13.8kV Switchgears	CX-TBD	Y	N	N	N	N	N	
White Rock 115kv Ring Bus	EA-FONSI	Y	N	N	N	N	N	DOE/EA-1247
Reconductor Norton Line	CX-TBD	Y	Y	Y	Y	N	N	
Kirby Building TA-03-23	CX-TBD	Y	N	N	N	N	N	
Safety Upgrades To 13.2kV Circuits	CX-TBD	N	Y	Y	Y	Y	Y	
Replace Elevated 4" Gas Line, TA-53	CX-TBD	N	Y	N	N	N	N	
PP - Feed Water Piping	CX-TBD	N	Y	N	N	N	N	
Add 3rd 115kV transformer TA-53	CX-TBD	N	Y	N	N	N	N	
Replace 13.8 kv cable	CX-TBD	N	Y	Y	Y	Y	Y	
TA-3/58 Gravity Line	CX-TBD	N	Y	N	N	N	N	
Add 3rd 115kV Transformer TA-03	CX-TBD	N	Y	N	N	N	N	
Reconductor 13.2kV Circuits	CX-TBD	N	N	Y	N	Y	N	
115kV Transmission System Protection	CX-TBD	N	N	Y	N	N	N	
TA-53 Substation 115kV Ring Bus Upgrade	CX-TBD	N	N	Y	N	N	N	
TA-3 CMR Sewer Relief Project	CX-TBD	N	N	Y	N	N	N	
TA-43-01 Distributed Boiler Plant	CX-TBD	N	N	Y	N	N	N	
Express Feeder	CX-TBD	N	N	Y	N	N	N	
Uncross NL & RL 115kV Lines	EA-FONSI	N	N	N	Y	N	N	DOE/EA-1247
Replace 10" & 12" Steel Line TA-16 to TA-03	CX-TBD	N	N	N	Y	Y	Y	
Replace TA-03-2261 115/13.2kV Substation	CX-TBD	N	N	N	Y	Y	N	
100psi Natural Gas Lines, TA-03	CX-TBD	N	N	N	Y	Y	N	
Replace TA-53 (2) 115kV Transformers	CX-TBD	N	N	N	N	Y	Y	
TA-70 115/13.8kV Substation	CX-TBD	N	N	N	N	Y	N	
Replace TA-53-0937 115/13.2kV Substation	CX-TBD	N	N	N	N	Y	Y	
Water Treatment TA-03	CX-TBD	N	N	N	N	Y	N	
TA-03-0058 Cooling Tower	CX-TBD	N	N	N	N	N	Y	
TA-70 345/115kV Substation	CX-TBD	N	N	N	N	N	Y	
TA-3 Power Plant Backpressure Turbine	CX-TBD	N	N	N	N	N	Y	
Replace TA-05-0040 115/13.2kV Substation	EA-FONSI	N	N	N	N	N	Y	DOE/EA-1247
PP - Cooling Tower Piping Replacement	CX-TBD	N	N	N	N	N	N	
Replace TA-06-0129 115/13.2kV Substation	EA-FONSI	N	N	N	N	N	N	DOE/EA-1247
SM-43 D&D	EA-FONSI	Y	Y	Y	Y	N	N	DOE/EA-1375

3.3 Potential Environmental Consequences Identified in Environment Assessments (EAs) from 1999 to the Present

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Table 3.3-1 lists the past five years of environmental assessments for LANL activities. The tables following Table 3.3-1 summarize the potential environmental consequences identified in each EA.

Table 3.3-1. List of EAs Summarized

Agency	Report Number	Environmental Assessment Title	TA	FONSI date
DOE/EA	1216	Environmental Assessment for the Parallex Project Fuel Manufacture & Shipment	3	8/13/1999
DOE/EA	1238	Proposed Construction and Operation of the Nonproliferation and International Security Center	3	7/22/1999
DOE/EA	1247	Electrical Power System Upgrades at Los Alamos National Laboratory	99	3/9/2000
DOE/EA	1269	Environmental Assessment for the Decontamination & Volume Reduction System for Transuranic Waste at Los Alamos National Laboratory, Los Alamos, New Mexico	54	6/25/1999
DOE/EA	1329	Wildfire Risk Reduction & Forest Health Improvement	99	8/10/2000
DOE/EA	1332	Environmental Assessment for Leasing Land Siting Construction and Operation of a Commercial AM Radio Antenna at Los Alamos National Laboratory		2/16/2000
NNSA/EA	1375	Construction and Operation of a New Office Building and Related Structures within TA-3	3	7/26/2001
DOE/EA	1376	Proposed Construction and Operation of a New Interagency Emergency Operations Center at Los Alamos National Laboratory	59, 69	7/26/2001
DOE/EA	1381	Environmental Assessment for Atlas Relocation and Operation at the Nevada Test Site		6/5/2001
DOE/EA	1407	Environmental Assessment for the Proposed TA-16 Engineering Complex Refurbishment & Consolidation	16, 3, 11, 8	4/23/2002
DOE/EA	1408	Future Disposition of Constructed Flood Control & Erosion Damage Reduction Feature & The Flood Retention Structure	99	8/7/2002
DOE/EA	1409	Environmental Assessment for the Proposed Issuance of an Easement to the Public Service Company of NM for the Construction & Operation of a 12-inch Natural Gas Pipe Line	0	7/30/2002
DOE/EA	1410	Environmental Assessment for the Proposed Disposition of the Omega West Facility at Los Alamos National Laboratory	2	3/28/2002
DOE/EA	1429	Environmental Assessment for the Proposed Access Control and Traffic Improvement		8/23/2002
DOE/EA	1430	Environmental Assessment for the Installation & Operation of Combustion Turbine Generators at Los Alamos National Laboratory	3	12/11/2002
DOE/EA	1431	Environmental Assessment for the Proposed Los Alamos National Laboratory Trails Management Program, Los Alamos, NM		9/2/2003
DOE/EA	1447	Environmental Assessment for the Proposed Consolidation of Certain Dynamic Experimentation Activities at the Two-Mile Mesa Complex		11/3/2003
DOE/EA	1464	Environmental Assessment for the Proposed Corrective Measures at Materials Disposal Area Ahea within Technical Area 54 at Los Alamos National Laboratory	54	6/15/2004

Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
LAND USE			xx
VISUAL	NA-no change in aesthetics.		
NOISE	NA-no noise above normal highway traffic.		
GEOLOGY AND SEISMIC	NA-route, buildings meet codes.		
SOILS			xx
SURFACE WATER	NA-none affected.		
GROUND WATER	NA-none affected.		
RAD AIR QUALITY		No MOX fuel powder particles would be expected to be released from PF-4 into the environment.	
NON-RAD AIR QUALITY		Air emission from the fabrication of MOX fuel pellets and rods for the Parallex Project would be a very small percentage of the overall LANL annual air emissions. No change to the air quality along the route(s) to Canada would be expected since the MOX fuel would be sealed in rods and package container(s) during transportation. No measurable radioactive particles would be released into the air.	
FLOODPLAINS AND WETLANDS	NA-due to use of established interstates. No new transportation routes.		
T&E HABITAT	NA-due to use of established interstates. No new transportation routes.		
PUBLIC HEALTH		**MOX Fuel Fabrication:** The effect on human health from MOX fuel fabrication would come from the penetrating radiation environment within PF-4. Noninvolved workers, those performing other jobs as well as the usual PF-4 building personnel, would not be expected to receive a dose from the proposed operation. MOX fuel fabrication is not expected to measurably increase the airborne radioactive material emissions from PF-4 associated with routine operations, therefore, no effects to the public are expected.	

[1]Not Applicable indicates that the impact was addressed in the EA, but proposed action does not apply.
[2]Addressed addresses the impact from the proposed action.
[3]Not Addressed indicates that the impact from the proposed action was not addressed in the EA.

		MOX Fuel Transportation: Therefore, no adverse health effects to the public and truck crew would be expected from any scenario involving the shipment of MOX fuel across the U.S.	
WORKER HEALTH		**MOX Fuel Fabrication:** No excess fatal cancers would be expected from penetrating radiation exposures associated with MOX fuel production used in the Parallex Project at LANL. The 12 involved workers exposed to penetrating radiation during total MOX fuel fabrication for the Parallex Project (including both that for the fuel that already exists and for the additional amounts of fuel pins yet to be manufactured) are estimated to receive a maximum dose of 661 mrem (0.661 rem) per year at work. **MOX Fuel Transportation:** Therefore, no adverse health effects to the public and truck crew would be expected from any scenario involving the shipment of MOX fuel across the U.S.	
ENVIRONMENTAL JUSTICE		No disproportionally high and adverse human health or environmental effects on minority and lowincome populations adjacent to LANL would be expected if the Proposed Action to fabricate additional MOX fuel rods for use in the Parallex Project is implemented since there would be no anticipated measurable effects to the public from this action.	
CULTURAL RESOURCES	NA-no construction activities.		
SOCIO-ECONOMICS	NA-no change in socioeconomic conditions.		
UTILITIES (GAS, ELECTRICITY, WATER)			xx
WASTE MANAGEMENT		The estimated small quantities of solid LLW (169.9 ft3/4.8 m3) and TRU waste (21.95 ft3/0.62 m3) are well below the LANL yearly (1996) generation of LLW (162,790 ft3/4,609.8 m3) and TRU waste (3,291.3 ft3/93.2 m3).	
CONTAMINATED SPACE			xx

[1]Not Applicable indicates that the impact was addressed in the EA, but proposed action does not apply.
[2]Addressed addresses the impact from the proposed action.
[3]Not Addressed indicates that the impact from the proposed action was not addressed in the EA.

TRANSPORTATION (ON SITE, SHIPMENTS)		For purposes of analysis here, three possible shipment scenarios were developed based on the above uncertainties. In Scenario 1, all of the MOX material would be transported in a single shipment. This would include the 11.7 lb (5.3 kg) of lead test fuel, plus the entire test matrix quantities. In Scenario 2, the lead test fuel [11.7 lb (5.3 kg)] would be shipped separately, followed by a different shipment of the complete test matrix amounts. Scenario 3 is similar in that the lead test fuel is shipped first, but the test matrix quantities would be further divided into two shipments (one for each plutonium concentration). The specific quantities for each shipment scenario are described in Table 2-2. In all cases, the 6.6 lb (3.0 kg) of shim pellets were divided proportionally between the shipments.	
ENVIRONMENTAL RESTORATION	NA-no clean up required.		
ACCIDENTS		This EA evaluates three hypothetical accident scenarios (see Appendix D) that have a reasonable probability of occurrence and are provided as the bounding cases that could be associated with the fabrication and transportation of MOX fuel and rods under the Proposed Action and that could affect workers, the public, and the environment. One accident scenario occurs during MOX fuel and rod fabrication and the other two accident scenarios examined occur during fuel shipment(s). MOX Fuel Fabrication Fire Accident: This accident scenario is assumed to occur during a MOX fuel and rod fabrication shift in the PF-4 plutonium processing laboratory of TA-55. MOX Fuel Transportation Accidents: Two credible transportation accident scenarios were analyzed for the shipment of MOX fuel to the Canadian border. One accident involved the release of radioactive materials and the other did not release radioactive materials.	
D&D			xx
CUMULATIVE IMPACTS		Because the contributions to adverse effects from the Proposed Action would be extremely small, it is expected that activities associated with the Proposed Action would not exacerbate cumulative effects.	

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Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
LAND USE	The proposed construction and operation of the NISC would not alter the character of the site or introduce new land use elements.		
VISUAL	NISC design and operation would be compatible with surrounding facilities and would not introduce new incompatible visual elements or affect current aesthetics.		
NOISE		**Construction:** Noise levels during construction would be typical of this activity and can reach elevated levels adjacent to heavy equipment such as bulldozers. Although noise levels will be greater than ambient conditions during construction of the NISC, no long or short-term adverse effects are expected. **Operations:** Ambient noise during NISC operation would be generated primarily by vehicle traffic and facility heating and cooling systems. This noise would be typical for a lightly industrialized area such as TA-3 and is not expected to noticeably increase overall background noise levels.	
GEOLOGY AND SEISMIC		The NISC would be designed and constructed to current DOE seismic standards in conjunction with the Uniform Building Code.	
SOILS			xx
SURFACE WATER	There would no effect on water quality and no increase in water use.		

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	An erosion control plan would be in force during construction to prevent sediment runoff into local streams.		
GROUND WATER			xx
RAD AIR QUALITY	NISC operations would use only sealed radioactive sources; there would be no radioactive emissions during normal operations.		
NON-RAD AIR QUALITY	Construction and earth-moving activities would temporarily increase localized particulate and volatile organic compounds emissions. Based on air emission analyses conducted for other similar projects, no exceedences of air quality standards would be expected.		
FLOODPLAINS AND WETLANDS	The Proposed Action would not affect wetlands and is not in an area designated as floodplain.		
T&E HABITAT	The proposed NISC site is within a heavily developed area, characterized by buildings, roadways, and parking		

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	lots and is not in close proximity to nor does it contain suitable habitat for any of the Federal- or state-listed species.		
PUBLIC HEALTH		There would be no exposure to the general public as a result of NISC operations.	
WORKER HEALTH		**Construction:** No potential off-site human health effects would be expected from construction hazards. The construction workers would have the potential of encountering physical hazards during erection of the NISC. **Operations:** Worker exposure to radiation from operations conducted by NN program personnel amounted to 1.86 person rem in 1998, with 55 individuals having measurable doses. The doses ranged from 3 mrem to 191mrem (1000 mrem equals 1 rem), with an average dose of 34 mrem (PC 1999d). Therefore, using the worker dose-to-risk conversion factor, the calculated risk of excess cancer fatalities for this NISC population of workers would be 0.00074 deaths per year. Therefore, there would be no expected excess cancer fatalities from NISC operation.	
ENVIRONMENTAL JUSTICE	There is no disproportionately high and adverse human heath or environmental effects on minority or low-income populations.		
CULTURAL RESOURCES	On May 7, 1999, the State Historic Preservation Officer concurred with DOE that the project would have no effect on registered or eligible prehistoric or historic		

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	properties.		
SOCIO-ECONOMICS		**Construction:** During peak construction approximately 150 construction personnel may be working on the NISC (PC 1999e). Construction personnel (carpenters, electricians, equipment operators, ironworkers, laborers etc.) would be paid at an average journeymen base rate of $16.41 per hour. Construction is scheduled to take approximately 18 months (LANL 1998b). **Operations:** Minor indirect positive impacts could occur in the future because the NISC facility would include space for expansion (less than 50 additional personnel). Thus, some new employees may come to the area in the future, but impacts to socioeconomics would be minimal.	
UTILITIES (GAS, ELECTRICITY, WATER)		**Construction:** Construction impacts would be minor and limited to tying into existing utility infrastructure. **Operations:** The NISC facility would be heated and cooled using closed loop water-based systems. Water in both systems would be continuously recirculated. There would be no evaporative loss. Due to the salvage of numerous temporary and resource-inefficient structures there would be an expected decrease in water consumption compared to current conditions. In fact, because NISC would replace numerous old, inefficient structures and is designed for energy efficiency, overall energy use by Nonproliferation and International Security activities should decrease slightly.	
WASTE MANAGEMENT		**Construction:** It is estimated that approximately 2,500 cubic yards of debris could be generated during construction of the NISC. **Operations:** The current Nonproliferation and International Security operations use small quantities of hazardous materials including solvents and other flammable materials which may generate wastes that are regulated under the Resource Conservation and Recovery Act. The estimated flow into the existing sewage lines in the immediate area of the proposed NISC facility (based on a usage rate of 20 gallons/day/person at a capacity of 465 people) would be	

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		approximately 0.009 million gallons (0.034 million liters) per day. This would increase the total expected flow to 0.099 million gallons (0.375 million liters) per day, or 22 percent of capacity; however, a corresponding reduction from existing NN program operations would be realized.	
CONTAMINATED SPACE			xx
TRANSPORTATION (ON SITE, SHIPMENTS)		**Construction:** It is estimated that 150 construction personnel may be on-site at any one time (PC 1999e). Using a factor of 0.45 vehicles per person, approximately 68 cars may be added to local roadways during construction. **Operations:** NISC would be relocating about 160 personnel from TAs other than TA-3. Using a ratio of 0.45 vehicles per employee, approximately 75 more vehicles may be added to these roadways and parking areas as a result of Nonproliferation and International Security personnel relocation (LANL 1998a).	
ENVIRONMENTAL RESTORATION			xx
ACCIDENTS		**Construction:** Accidents associated with NISC construction would be primarily limited to the potential risk posed to construction workers from crush hazards, back injuries, and electrical injuries. **Operations:** Several accident scenarios (fire, building collapse, and chemical exposure), including the potential for nuclear criticality event, were analyzed for their potential impact to workers and the public. The NISC facility would be designed with a fire suppression system and would operate with restrictions regarding the combustion load and inventory of flammable items. Therefore, a major fire is a very low probability event. It should be noted that certified sealed sources are designed to remain in tact when exposed to high temperatures for a period of time sufficient for a response by fire fighting personnel and equipment. When not in use, sealed sources would be stored in a fire resistant vault. Should collapse occur when a non-certified source is not in the vault the source release to the public would be less than 1	

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		rem. There are no creditable chemical accidents that would result in severe health effects or death due to the low chemical inventory and implementation of both administrative and engineering controls. A nuclear criticality is not a credible event as the certified sealed sources are designed in such a way that regardless of the configuration in which they are stored a critically event could not occur. Uncertified sealed sources are not made with material that could undergo a fissionable reaction (PC 1999f). **External Accidents:** The Chemistry and Metallurgy Research Building is located in close proximity to the proposed NISC. A major release of radioactive material could adversely affect personnel in the NISC. Three accident scenarios involving a radiological release of plutonium at the Chemistry and Metallurgy Research Building were analyzed in the 1999 *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory*. The three accidents scenarios were: 1) a plutonium release due to a major aircraft crash at the building, with a probability of occurrence of 0.0000033 per year, or once every 300,000 years; 2) a release due to a LANL fire with a probability of occurrence of 0.000036 per year or once in 27,777 years; and 3) a fire in a building wing with a probability of occurrence of 0.000032 per year or once in 31,250 years (the probabilities remain the same under the No Action Alternative and the DOE preferred alternative of Increased Operations) (DOE 1999a). The NISC would be located near LANL's Central Chemical Receiving and Distribution Facility. A fire in that facility could result in the exposure of NISC personnel to toxic chemical fumes. An assessment of the receiving and distribution facility indicates that due to the small chemical inventory and a fire station located within 0.5 mile (0.8 kilometer) of the proposed NISC, the probability of a major chemical release is low.	
D&D			xx
CUMULATIVE IMPACTS		Because no new personnel or operations would be introduced as a result of occupying the proposed NISC facility, cumulative impacts are minimal.	

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Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
LAND USE		**Proposed Action** Potential changes in land use are consistent with BLM, USFS, and DOE plans. Most current land uses would continue. **Alternative 1** Potential changes in land use are consistent with BLM, USFS, and DOE plans. Most current land uses would continue. **Alternative 2** Potential changes in land use would be similar to the Proposed Action. **Alternative 3** Potential changes in land use would be similar to the Proposed Action. **Alternative 4** Potential changes in land use would be similar to the Proposed Action.	
VISUAL		**Proposed Action** Moderate visual effects. Contrasts with surrounding visual resources; visible against skyline from public areas but parallels existing line in part. **Alternative 1** Moderate visual effects similar to the Proposed Action. **Alternative 2** Moderate visual effects similar to the Proposed Action. **Alternative 3** Moderate visual effects. Contrasts with surrounding visual resources; visible against skyline but parallels existing power line in part; potentially less visually disruptive than the Proposed Action. **Alternative 4** Moderate to high visual effects; power line in direct line-of-view of Bandelier visitors; potentially much more visually disruptive than the Proposed Action.	
NOISE	The sounds generated by the proposed lines are expected to be well below these maximum levels.		

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GEOLOGY AND SEISMIC			xx
SOILS		A bounding total of about 5 ac (2 ha) of soil disturbance would be needed to provide new access roads that would be required under the Proposed Action. Up to a total of about 18 ac (7 ha) of soil around pole structures would likely be disturbed during the construction of the Proposed Action. The NPDES SWPP Plan would identify all site surface water drainage plans and best management practices (BMPs) that would be implemented to avoid unnecessary soil erosion during construction.	
SURFACE WATER		**Proposed Action** Water quality protected by NPDES permit and SWPP Plan. **Alternative 1** Water quality protected by NPDES permit and SWPP Plan. **Alternative 2** Water quality protected by NPDES permit and SWPP Plan. **Alternative 3** Water quality protected by NPDES permit and SWPP Plan. **Alternative 4** Water quality protected by NPDES permit and SWPP Plan.	
GROUND WATER		**Proposed Action** Water quality protected by NPDES permit and SWPP Plan. **Alternative 1** Water quality protected by NPDES permit and SWPP Plan. **Alternative 2** Water quality protected by NPDES permit and SWPP Plan. **Alternative 3** Water quality protected by NPDES permit and SWPP Plan. **Alternative 4** Water quality protected by NPDES permit and SWPP Plan.	
RAD AIR QUALITY			xx
NON-RAD AIR QUALITY	Construction activities would temporarily increase localized particulate and other criteria pollutants. This increase would raise		

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	short-term emissions by less than 2 percent over LANL's total 1998 emission levels, except for particulate matter (PM) and sulfur dioxides (SO2). PM emissions would increase by less than 9 percent for the one-year power line construction period. SO2 levels would increase by about 40 percent during the one-year power line construction period, but LANL emissions for this particulate are so low that even this increased amount would be less than ½ ton (0.45 metric ton) per year.		
FLOODPLAINS AND WETLANDS		**Proposed Action** Effects on wetlands and other sensitive areas are not anticipated. **Alternative 1** Effects on wetlands and other sensitive areas are not anticipated. **Alternative 2** Effects on wetlands and other sensitive areas are similar to the Proposed Action. **Alternative 3** Effects on wetlands and other sensitive areas are similar to the Proposed Action. **Alternative 4** Effects on wetlands and other sensitive areas are similar to the Proposed Action.	
T&E HABITAT		**Proposed Action**	

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		No adverse effects on the following Federal T&E species could occur: bald eagle, southwestern willow flycatcher, whooping crane, and Mexican spotted owl. Mitigation measures would be enforced during construction and maintenance activities. **Alternative 1** No adverse effects on the following Federal T&E species could occur: bald eagle, southwestern willow flycatcher, whooping crane, and Mexican spotted owl. Mitigation measures would be enforced during construction and maintenance activities. **Alternative 2** Effects on Federal T&E species are similar to the Proposed Action. **Alternative 3** Effects on Federal T&E species similar to the Proposed Action except that the area disturbed (22 ac/9 ha) would be slightly less. **Alternative 4** Effects on Federal T&E species are similar to the Proposed Action except that the area disturbed (30 ac/12 ha) would be slightly greater.	
PUBLIC HEALTH		**Proposed Action** No health effects from EMF or other hazards. No appreciable effect on human health expected. **Alternative 1** Essentially the same as the Proposed Action. **Alternative 2** Essentially the same as the Proposed Action. **Alternative 3** Essentially the same as the Proposed Action. **Alternative 4** Essentially the same as the Proposed Action.	
WORKER HEALTH		**Proposed Action** No health effects from EMF or other hazards. No appreciable effect on human health expected. **Alternative 1** Essentially the same as the Proposed Action. **Alternative 2** Essentially the same as the Proposed Action. **Alternative 3** Essentially the same as the Proposed Action.	

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		Alternative 4 Essentially the same as the Proposed Action.	
ENVIRONMENTAL JUSTICE	However, as none of the routes associated with the Proposed Action or the alternatives are located in populated areas, the 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.		
CULTURAL RESOURCES		**Proposed Action** It is likely that cultural resource sites and segments containing Native American traditional or spiritual use areas would not be directly affected by the construction and operation of this corridor. Resources can be avoided by relocation or rerouting of ground disturbing activities. If resources are unavoidable then testing or excavation may be required. **Alternative 1** It is likely that cultural resource sites and segments containing Native American traditional or spiritual use areas would not be directly affected by the construction and operation of this ROW. Resources can be avoided by relocation or rerouting of ground disturbing activities. If resources are unavoidable then testing or excavation may be required. **Alternative 2** It is likely that cultural resource sites and segments containing Native American traditional or spiritual use areas would not be directly affected by the construction and operation of this ROW. The slightly narrower width of this alternative, as currently scoped, could impact fewer sites than would the Proposed Action. Resources can	

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		be avoided by relocation or rerouting of ground disturbing activities. If resources are unavoidable then testing or excavation may be required. **Alternative 3** There are 25 known archaeological and historic resources within the 52% of the corridor covered by prior cultural resources surveys. Low likelihood that segments containing cultural and Native American traditional or spiritual use sites would be affected by the construction and operation of this corridor. Resources can be avoided by relocation or rerouting of ground disturbing activities. If resources are unavoidable then testing or excavation may be required. **Alternative 4** There are 24 known archaeological and historic resources within the 65% of the corridor covered by prior cultural resources surveys. Low likelihood that segments containing cultural and Native American traditional or spiritual use sites would be affected by the construction and operation of this corridor. Resources can be avoided by relocation or rerouting of ground disturbing activities. If resources are unavoidable then testing or excavation may be required.	
SOCIO-ECONOMICS	Because of the relatively low number of workers and short time frame needed to construct the proposed power line, construction activities would have a negligible effect on the socioeconomic character of the surrounding communities.		
UTILITIES (GAS, ELECTRICITY, WATER)	Construction of a new 19.5-mi (31-km) power line would ensure that a reliable electric transmission system exists to deliver		

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	electricity to operations and residents in the project area.		
WASTE MANAGEMENT	Wastes generated by the Proposed Action would either be recycled, left onsite (e.g., soils and rocks), or would go to an appropriate municipal solid waste landfill.		
CONTAMINATED SPACE			xx
TRANSPORTATION (ON SITE, SHIPMENTS)			xx
ENVIRONMENTAL RESTORATION	There are no environmental restoration sites on either BLM or USFS land. There are no PRSs in Segment 3. Two PRSs intersect Segment 4. These PRSs would be clearly delineated before construction began and would not be disturbed during construction of the power line.		
ACCIDENTS		Three hazards with the potential to cause loss of life in constructing and maintaining the power line are 1) electrocution, 2) falls from elevated heights, and 3) potential events related to the use of helicopters for construction or maintenance. **Electrocution:** This frequency translates to a probability of 9.6 × 10-4 fatalities per year from electrocution for this project. **Falls:**	

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		Assuming a 30-year career, the probability of a fatality from a fall for this one-year project is 3.4 × 10-5. **Helicopter Use:** Although guidelines and rules have been developed for various aspects of airborne power line construction and maintenance, injury statistics related to this specific, relatively new technique are not available.	
D&D		As the proposed power line system approaches its minimum life expectancy, the system would either be upgraded or decommissioned.	
CUMULATIVE IMPACTS		The proposed route from the Norton Substation to the WTA at LANL is not expected to conflict with any current land uses or potential future development on BLM, USFS. or DOE lands. Any potential environmental effects are expected to be negligible. Therefore, the Proposed Action is not expected to have an adverse cumulative effect on Federal land uses or the environment.	

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DOE/EA-1269

Decontamination and Volume Reduction System for Transuranic Waste at Los Alamos National Laboratory, Los Alamos, New Mexico Environmental Assessment

Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
LAND USE	NA (would be located within a previously developed area)		
VISUAL	NA (would be located within a previously developed area)		
NOISE	NA (noise levels would fall within the range of noise due to existing operations at TA-54, Area G)		
GEOLOGY AND SEISMIC			xx
SOILS			xx
SURFACE WATER	NA (would generate only 120 gal. (456 L) of wastewater total to be treated at Rad Liquid Waste Treatment Plant)		
GROUND WATER	NA (would generate only 120 gal. (456 L) of wastewater total to be treated at Rad Liquid Waste Treatment Plant)		
RAD AIR QUALITY		Increases in radioactive air emissions that could adversely affect air quality would not be expected.	
NON-RAD AIR QUALITY		During routine operations under the Proposed Action, all air emissions would pass through a series of HEPA filters that would remove 99.99 percent of any particulates and would meet all applicable standards and regulations.	
FLOODPLAINS AND WETLANDS	NA (would be located within a previously developed area)		
T&E HABITAT	NA (would be located within a previously developed area)		

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PUBLIC HEALTH		Risk was computed for two local residential populations—White Rock and the Los Alamos townsite. Using the highest of the three accident doses computed for White Rock and Los Alamos as shown in Appendix C —9.4 × 10-2 and 3.2 × 10-4 rem per year, respectively—and population estimates of 10,000 and 10,000 for White Rock and Los Alamos, respectively, a total of 940 person-rem collective population dose is estimated for White Rock and 3.2 person-rem is estimated for Los Alamos. Applying the dose conversion factor of five excess LCFs per 10,000 person-rem (5 × 10-4 cancer deaths per person-rem), these population doses are estimated to result in totals of less than one excess LCF for both White Rock (0.47 LCFs) and Los Alamos (1.6 × 10-3 LCFs).	
WORKER HEALTH		Based on past experience at Area G, it is estimated that the proposed DVRS operations would be performed by a base work force of five persons with a combined exposure of less than 500 mrem per year or an individual exposure of less than 100 mrem per person per year. If any individual achieved an accumulated exposure approaching the DOE administrative limit for workers of 2,000 mrem per year, they would be moved to a different assignment and a new person assigned to the team.	
ENVIRONMENTAL JUSTICE	No (no off-site effects)		
CULTURAL RESOURCES	NA (would be avoided)		
SOCIO-ECONOMICS	NA (assembled quickly and operated by five persons)		
UTILITIES (GAS, ELECTRICITY, WATER)		The Proposed Action may involve pouring a concrete pad and placing a pre-engineered structure on it, but probably would involve only minor modifications to an existing facility. These modifications are estimated to include the installation of the modular containment structure within the selected dome, modification of the existing ventilation system (in Dome 226, or installation of ventilation system if one of Domes 229, 230, or 231 were selected) to allow for connection to the modular containment structure and associated gloveboxes, installation of a breathing air system, installation of a compressed air system, installation of the prefabricated combination	

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		shearer and baler, and modification of existing utilities to support the DVRS. If the pre-engineered structure was selected, a concrete pad would be poured immediately adjacent to the concrete pad already in place under Dome 226. The pre-engineered structure would then be placed on the concrete pad.	
WASTE MANAGEMENT		No additional on-site or off-site shipment of waste would be required by the Proposed Action except for the disposal of the small amount of anticipated secondary wastes generated by this process. The secondary wastes would consist of those materials used in or resulting from stations of the decontamination process and are process dependent. If mechanical decontamination processes were used, secondary wastes would be rags, brushes, etc., with a total anticipated volume of 26 yd3 (20 m3). If an ultra-high-pressure wash were used, secondary wastes would primarily be water with an anticipated volume of less than 120 gal. (456 L) and 39 yd3 (30 m3) of water filters as TRU waste. Two hundred fifty-four yd3 (195 m3) of HEPA filters would be appropriately disposed of in accordance with applicable regulations. This waste volume estimate assumes that LANL would process both the current inventory (7.020 yd3 [5,400 m3]) plus anticipated decontamination and decommissioning wastes (3,900 yd3 [3,000 m3]).	
CONTAMINATED SPACE			xx
TRANSPORTATION (ON SITE, SHIPMENTS)		Lead would be moved from TA-54 to TA-50 by truck. The road would be closed during shipments if necessary in order to comply with Department of Transportation requirements.	
ENVIRONMENTAL RESTORATION	NA (no change in status of Area G)		
ACCIDENTS		This EA documents the analysis of three hypothetical accident scenarios that have a reasonable chance of occurrence at the DVRS. The three accidents are a fire, an aircraft crash, and a spill or rupture of a crate. **Fire:** Using methods detailed in Appendix A, this type of accident would have, at worst, an estimated likelihood of occurrence of about once in 10,000 years (1 × 10-4 per year), which is considered to be a "very unlikely event."	

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		Aircraft Crash: The likelihood or chance of this accident occurring was computed using the methods prescribed by DOE-STD-3014-96, as shown in Appendix B. The frequency of occurrence of this accident scenario is about two occurrences in one million years (2 × 10-6 per year). For calculating the dose consequence, it was assumed that the entire inventory allowed within the dome—three crates—is involved and that one of the three crates has the maximum inventory of TRU waste. The MEOI dose consequence was estimated to be 0.018 rem (Appendix C), which equates to a calculated risk of excess LCF of 9 in 1 million or 9.0 × 10-6. A CEDE of 1.8 × 10-2 rem is not expected to cause adverse health effects, disability, or lost work time. **Spill or Ruptured Crate:** The frequency of occurrence, or chance, of this accident scenario is between once in 100 years and once in 10,000 years (1 × 10-2 to 1 × 10-4 per year). For calculating the dose consequence, the same conservative assumptions about number of drums within the facility and container contents were made. The MEOI dose consequence was estimated as 1.3 × 10-4 rem (Appendix C), which equates to a calculated risk of excess LCF of 6.5 in 100 million (6.5 × 10-8). A CEDE of 1.3 × 10-4 rem is not expected to cause adverse health effects, disability, or lost work time.	
D&D		At the completion of the proposed project (e.g., when LANL's current inventory and project wastes totaling about 7,020 yd3 [5,400 m3] of oversized metallic TRU wastes have been processed), the DVRS may be dismantled, decontaminated, crated, and moved to another DOE site away from LANL or processed into LLW and disposed of on-site. The DVRS could even be decommissioned before any decontamination and decommissioning wastes (3,900 yd3 [3,000 m3]) were treated. The actual final disposition of the DVRS facility and the required NEPA compliance review(s) to implement such actions would be determined at that time.	
CUMULATIVE IMPACTS		Use of the DVRS at LANL would contribute a negligible increase to the air emissions and LLW generation from routine LANL operations. Potential radiation exposures to workers would be maintained below as low as reasonably achievable guidelines. The	

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		small amounts of secondary solid waste and air emission volumes generated from operating the DVRS would not affect the life expectancy of the waste disposal facility at LANL or WIPP, nor would it affect the air emission management program at LANL. Environmental effects resulting from the Proposed Action would be minimal. Cumulative effects on human health and the environment at LANL resulting from implementing the Proposed Action would also be minimal. Under routine operating conditions, cumulative effects would result from the generation of about 585 yd3 (459 m3) of LLW for on-site disposal and about 195 yd3 (150 m3) of TRU waste for shipment to WIPP. However, the overall volume of waste currently in storage would be reduced from the existing 3,120 yd3 (2,400 m3) into these two smaller volumes. In addition, without the DVRS, the entire 3,120 yd3 (2,400 m3) would ultimately be shipped to WIPP. If the additional 3,900 yd3 (3,000 m3) of similar waste is generated by facility upgrades (i.e., replacement of old equipment) and decontamination and decommissioning activities, 732 yd3 (563 m3) of LLW and 244 yd3 (188 m3) of TRU waste would be generated.	

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Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
LAND USE	Wildfire treatments at LANL would not change any existing land uses. Forested areas around and between facilities would continue to be used as safety and security buffer zones. Outdoor testing and operational activities would continue to occur in certain treated areas.		
VISUAL		**Proposed Action Effects (No Burn Alternative):** The effects of vegetation removal at LANL would have no adverse effect on the degraded panoramas of the Pajarito Plateau and Jemez Mountains. **Limited Burn Alternative Effects (Forest Waste Only):** The Limited Burn Alternative would have a minimal effect on visual resources. The effects on visual resources under this alternative would be similar to the Proposed Action. The two primary aspects of this alternative that would affect visual resources are vegetation removal and waste pile burning activities. Vegetation removal would occur as a result of selected thinning activities and burning activities would be temporary. **Burn Alternative Effects (Both Treatment and Forest Waste):** The overall effects on visual resources would be similar under this alternative to the Proposed Action. The two primary aspects of this alternative that would affect visual resources are burning activities and vegetation removal. Burning activities would be temporary and vegetation removal would occur as a result of selected thinning activities.	
NOISE	Noise associated with certain treatment activities (e.g., mechanical tree		

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	trimming and cutting) would be temporary and of short duration and would occur mostly in unoccupied and remote areas at LANL. No prolonged or permanent changes in existing noise levels would be expected to occur.		
GEOLOGY AND SEISMIC			xx
SOILS		**Proposed Action Effects (No Burn Alternative):** Thinning activities under the Proposed Action would result in minimal disturbance of the surface forest litter layer and, therefore, no erosion is anticipated. **Limited Burn Alternative Effects (Forest Waste Only):** The effects on water quality and soil erosion under the Limited Burn Alternative would be minimal. The potential for an uncontrolled wildfire to degrade water quality or increase soil erosion would be reduced under this alternative. **Burn Alternative Effects (Both Treatment and Forest Waste):** Minimal effects on water quality and soil erosion would be expected under this alternative. The potential for an uncontrolled wildfire to degrade water quality or increase soil erosion would be reduced under this alternative.	
SURFACE WATER		**Proposed Action Effects (No Burn Alternative):** The potential for an uncontrolled wildfire to degrade water quality or increase soil erosion would be reduced under this proposal. **Limited Burn Alternative Effects (Forest Waste Only):** The effects on water quality and soil erosion under the Limited Burn Alternative would be minimal. The potential for an uncontrolled wildfire to degrade water quality or increase soil erosion would be reduced under this alternative.	

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		Burn Alternative Effects (Both Treatment and Forest Waste): Minimal effects on water quality and soil erosion would be expected under this alternative. The potential for an uncontrolled wildfire to degrade water quality or increase soil erosion would be reduced under this alternative.	
GROUND WATER			xx
RAD AIR QUALITY		**Proposed Action Effects (No Burn Alternative):** Emissions from the burning of HE- or DU-contaminated wood material would be the same under this alternative as under the current LANL waste management practices (see the No Action Alternative in Section 2.4). Burn permits administered by NMED would be required; these would limit allowable emissions relative to National Ambient Air Quality Standards and New Mexico Ambient Air Quality Standards. **Limited Burn Alternative Effects (Forest Waste Only):** Over the years, extensive modeling, using site-specific data, has been conducted at LANL to assess the effects on air quality from burning wood potentially contaminated with HE and DU. Specific air pollutants considered included criteria pollutants such as carbon monoxide, nitrogen oxides, PM, sulfur oxides, and DU. The emissions from all regulated pollutants were shown to be well below the ambient standards at all affected locations. Emissions from the burning of HE- or DU-contaminated wood material would be the same under this alternative as under the current LANL waste management practices (see the No Action Alternative in Section 2.4). **Burn Alternative Effects (Both Treatment and Forest Waste):** Over the years, extensive modeling, using site-specific data, has been conducted at LANL to assess the effects on air quality from burning wood potentially contaminated with HE and DU. Specific air pollutants considered included criteria pollutants such as carbon monoxide, nitrogen oxides, PM, sulfur oxides, and DU. The emissions from all regulated pollutants were shown to be well below the ambient standards at all affected locations.	

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NON-RAD AIR QUALITY		**Proposed Action Effects (No Burn Alternative):** Effects on air quality would be minimal under this alternative. Emissions of criteria pollutants would come from equipment used to perform mechanical and manual treatments. The total amount of emissions would be minimal from these activities. In addition, no burning as a treatment measure would be conducted under the Proposed Action. Routine low-level emissions from mechanical treatment would occur more often and on more days per year. . The emissions from all regulated pollutants were shown to be well below the ambient standards at all affected locations. **Limited Burn Alternative Effects (Forest Waste Only):** Effects on air quality would be minimal under the Limited Burn Alternative. Waste pile burning would result in short-term temporary increases in criteria air pollutants from burning waste from tree thinning activities on a maximum of about 50 ac (20 ha) a day. Before burning, meteorological conditions would be modeled using SASEM, which is NMED's preferred model to determine the range of humidity, temperature, and wind speed and direction that is necessary to ensure that the air quality standard for particulate emissions (150 $\mu g/m^3$) is not exceeded during the burn. **Burn Alternative Effects (Both Treatment and Forest Waste):** The effects on air quality would increase under the Burn Alternative but would not pose an unacceptable health or environmental hazard. Controlled burning would result in short-term temporary increases in criteria air pollutants from burning up to 100 ac (40 ha) a day. Before burning, meteorological conditions would be modeled using SASEM, which is NMED's preferred model to determine the range of humidity, temperature, and wind speed and direction that is necessary to ensure that the air quality standard for particulate emissions (150 $\mu g/m^3$) is not exceeded during the burn. Mechanized equipment used for cutting, hauling, and chipping fuels would have about the same daily exhaust emissions associated with a small-scale construction project (such as a project using one loader and two dump trucks). However, the total amount of equipment emissions	

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		would be less under this alternative than what would occur under the Proposed Action or the Limited Burn Alternative.	
FLOODPLAINS AND WETLANDS		**Proposed Action Effects (No Burn Alternative):** Floodplains would be treated by cutting. Protection for floodplains includes all of the previously listed environment protective measures. However, wetlands would not be treated. Workers would not stage equipment in wetland areas, nor drive through them to reach treatment areas or allow cut trees to fall into wetlands. When planning a treatment, DOE would consider potential effects to wetlands downslope of the treatment areas and take protective measures. **Limited Burn Alternative Effects (Forest Waste Only):** Floodplains would be treated by both cutting and chipping and by slash pile burning. Protection for floodplains includes all of the previously listed environment protective measures. However, wetlands would not be treated. **Burn Alternative Effects (Both Treatment and Forest Waste):** Floodplains would be treated by cutting or burning. Protection for floodplains includes all of the previously listed environment protective measures. However, wetlands would not be treated.	
T&E HABITAT		**Proposed Action Effects (No Burn Alternative):** The proposed ecosystem-based wildfire management measures would produce an array of biological effects ranging from transient to long-term and from subtle to pronounced. Some of these effects may be considered positive and some negative. In the long term, the major positive effect that the proposed measures would have is to create conditions that are consistent with a more natural historic ecological process with accompanying improved health and vigor and with increased biological diversity. A general improvement in forest health would correspondingly benefit federally-listed threatened and endangered species by producing generally higher quality habitat. Strict adherence to the provisions of the HMP accompanied by environmental protection measures developed during consultation on project plans with USFWS would ensure the continued protection and welfare of these species. New Mexico State threatened or endangered species with a moderate to high	

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		probability of occurring at LANL and possibly being affected by the Proposed Action include the Jemez Mountains salamander, gray vireo, spotted bat, and New Mexican jumping mouse. Only the Jemez Mountains salamander and the spotted bat use mature forests like those expected to receive extensive treatment at LANL. Forest thinning should not affect either of these species. **Limited Burn Alternative Effects (Forest Waste Only):** Under the Limited Burn Alternative, the effects on biological resources, including all the federal and state listed threatened and endangered species, would be similar to the Proposed Action. **Burn Alternative Effects (Both Treatment and Forest Waste):** Under the Burn Alternative, the effects on biological resources, including all the federal and state listed threatened and endangered species, would be similar to the Proposed Action. Vegetation alterations and tree thinning activities would still occur. Because there would be controlled burns, there would also be temporary disturbance resulting from burning activities, and a slight temporary decrease in habitat modification and disturbance resulting from chipping and spreading of slash.	
PUBLIC HEALTH		**Proposed Action Effects (No Burn Alternative):** Application of wildfire treatment techniques under the Proposed Action should not adversely affect worker or public health. Members of the public would be excluded from areas where treatment activities were occurring and would therefore not be exposed to any potential health risks from such activities. Wood released for public use would be free of contamination and would not pose any health risks to the general public. **Limited Burn Alternative Effects (Forest Waste Only):** Slash pile burning and the associated smoke would have a minimal effect on worker and public health under this alternative. Because of the limited amount of fuel and area to be burned, smoke from this alternative should not affect members of the public; no adverse effects on the health of the general public are expected from limited slash pile burning activities at LANL. **Burn Alternative Effects (Both Treatment and Forest Waste):** The effects on human health would be minimal under this alternative. Although health hazards from fire and smoke would	

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		occur, exposures to mechanical hazards would decrease as compared to the Proposed Action. Controlled burns and their associated smoke have the potential to affect worker and public health. The public could be exposed to smoke. Smoke emissions would be short term and occur only during optimal dispersion conditions in accordance with applicable air permit requirements. The primary regulated components of wood smoke (i.e., particulates, hydrocarbons, and carbon monoxide) would be limited to levels that would not adversely affect human health or welfare. However, the smoke could be a temporary irritant to nearby members of the public. No adverse effects on the health of the general public are expected from burning activities at LANL.	
WORKER HEALTH		**Proposed Action Effects (No Burn Alternative):** Application of wildfire treatment techniques under the Proposed Action should not adversely affect worker or public health. Experienced wildfire management experts would be used to design and implement treatment programs at LANL. **Limited Burn Alternative Effects (Forest Waste Only):** Slash pile burning and the associated smoke would have a minimal effect on worker and public health under this alternative. Although workers could be directly exposed to fire hazards and smoke inhalation, potential worker health effects would be kept to a minimum by burning only small slash piles and through the use of physically fit and specially trained personnel and administrative controls. **Burn Alternative Effects (Both Treatment and Forest Waste):** The effects on human health would be minimal under this alternative. Although health hazards from fire and smoke would occur, exposures to mechanical hazards would decrease as compared to the Proposed Action. Controlled burns and their associated smoke have the potential to affect worker and public health. Workers could be directly exposed to fire hazards and smoke inhalation. Potential worker health effects would be kept to a minimum through the use of physically fit and specially trained personnel and administrative controls. These administrative controls would be established as part of the plan formulation and worker protection phases of the Proposed Action described in Section 2.1.	

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ENVIRONMENTAL JUSTICE	Populations that are subject to environmental justice considerations are present within 50 mi (80 km) of Los Alamos County. However, as none of the treatments associated with the Proposed Action or the alternatives would occur in populated areas, the 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.		
CULTURAL RESOURCES		**Proposed Action Effects (No Burn Alternative):** Adverse effects on cultural resources are not expected to occur under the Proposed Action. As identified in Section 2.1.3, cultural resources would be avoided or protected during thinning, road or fire break construction, maintenance, and wood disposal activities. **Limited Burn Alternative Effects (Forest Waste Only):** Adverse effects on cultural resource sites would not be expected to occur under this alternative. As planned under the Proposed Action, cultural resource sites would be avoided during thinning, road or fire break construction, maintenance, and wood disposal activities. **Burn Alternative Effects (Both Treatment and Forest Waste):** Minimal adverse effects on cultural resources would be expected to occur under this alternative. Known cultural resources would be avoided during all treatments and not burned under this alternative.	
SOCIO-ECONOMICS		**Proposed Action Effects (No Burn Alternative):**	

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		No substantial changes to either the local or regional populations or economies are expected under the Proposed Action. Potential socioeconomic benefits are associated with timber sales, salvaging, fuel wood permits, and local contracting that may occur as part of the programmatic strategy for uses of timber cleared from treated sites. There could be as much as 1,000 board feet of saw timber and three cords of firewood per acre. Saw timber is valued at about $0.15 per foot, and firewood at about $20.00 per cord based on actual sales at LANL. This would total about $2M over ten years, or about $200 thousand per year. These programmatic strategies are expected to be beneficial to local and regional contractors and the general public. **Limited Burn Alternative Effects (Forest Waste Only):** Socioeconomic benefits would be essentially the same under this alternative as under the Proposed Action. Timber sales, wood salvaging, and local contracting would still occur. Neither local nor regional socioeconomic changes would be expected under this alternative. Since mechanical and manual thinning treatments would occur under this alternative, the number of workers would remain high but would be slightly less than for the Proposed Action. This slight decrease in the number of workers, along with slightly lower equipment costs, could decrease the overall cost of the Limited Burn Alternative compared to the Proposed Action. **Burn Alternative Effects (Both Treatment and Forest Waste):** Socioeconomic benefits would be essentially the same under this alternative as under the Proposed Action. Timber sales, wood salvaging, and local contracting would still occur. Neither local nor regional socioeconomic changes would be expected under this alternative. Since thinning and controlled burn treatments would be allowed under this alternative, a decrease in the number of workers would occur. This decrease in workers, along with reduced equipment costs, would decrease the overall cost of the Burn Alternative compared to the Proposed Action.	
UTILITIES (GAS, ELECTRICITY, WATER)		**Proposed Action Effects (No Burn Alternative):** The Proposed Action would have a beneficial effect on water, gas, and electric utilities at LANL. . Benefits would include improved access to both utilities and infrastructure from additions of new fire	

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		breaks and improved maintenance of existing fire breaks in and around utility lines and facilities. Thinning activities would also improve access to buried water and gas lines as well as electric and communication lines that are located in areas that are currently overgrown with vegetation. **Limited Burn Alternative Effects (Forest Waste Only):** Benefits to utilities and infrastructure at LANL would be essentially the same under this alternative as described under the Proposed Action. Activities associated with wildfire treatments would improve access to buried utilities, facilities in forested areas, and improve the visibility and safe use of roadways at LANL. **Burn Alternative Effects (Both Treatment and Forest Waste):** Benefits to utilities and infrastructure at LANL would be essentially the same under this alternative as described under the Proposed Action. Activities associated with wildfire treatments would improve access to buried utilities, facilities in forested areas, and improve the visibility and safe use of roadways at LANL.	
WASTE MANAGEMENT		**Proposed Action Effects (No Burn Alternative):** Ashes produced from burning would be collected and disposed of under standard LANL waste management procedures. Wood contaminated with DU could also be disposed of on-site at Area G. **Limited Burn Alternative Effects (Forest Waste Only):** As with the Proposed Action, uncontaminated wood would be salvaged or chipped and left in place or moved to another location on-site. In addition, slash and debris could be piled and burned. Ashes produced from burning would be collected and disposed of under standard LANL waste management procedures. Wood material contaminated with DU could also be disposed of on-site at Area G. **Burn Alternative Effects (Both Treatment and Forest Waste):** As with the Proposed Action, uncontaminated wood would be salvaged or chipped and left in place or moved to other locations at LANL. It could also be piled and burned. As under the Proposed Action, there would be no hazardous or radioactive waste generated from construction of new fire roads or maintenance of old fire roads. Ashes produced from burning wood would be collected and disposed of under standard LANL waste management procedures. Wood	

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		material contaminated with DU could also be buried on-site at Area G.	
CONTAMINATED SPACE			xx
TRANSPORTATION (ON SITE, SHIPMENTS)			xx
ENVIRONMENTAL RESTORATION		**Proposed Action Effects (No Burn Alternative):** There are some contaminated areas within the boundaries at LANL that may need to undergo treatment. If the project area contains a PRS, then the trees would be cut but left in place on the PRS (either whole or after chipping), or removed and disposed of at an appropriate permitted disposal facility. **Limited Burn Alternative Effects (Forest Waste Only):** If the project area contains a PRS, then the trees would be cut but left in place on the PRS (either whole or after chipping), or removed and disposed of at an appropriate permitted disposal facility. **Burn Alternative Effects (Both Treatment and Forest Waste):** If the project area was a PRS, then the trees would be cut but left in place on the PRS (either whole or after chipping), or removed and disposed of at an appropriate permitted disposal facility.	
ACCIDENTS		Potential accident initiating events were identified and reduced to a credible list. These credible accident initiators included cutting, chipping, and other mechanical processes (e.g., the use of skidders); burning, maintenance, and waste management/material disposal. No accidents that are likely to result in a fatality are expected to occur from implementing the Proposed Action or any of the alternatives. Accidents could arise from mechanical processes such as using chain saws to fell trees during the thinning process, chipping tree and branch thinnings, and the use of skidders to move thinnings to a staging or processing area. A wide range of effects could result from these kinds of activities, including minor perturbations such as scrapes, cuts, and bruises as well as more serious injury, illness, and death. The rate of fatal occupational injury in the forestry and logging occupations is about 155 per 100,000 workers per year (NSC 1994). This equates to a fatal accident every 645 years for each worker, which is in the range of once per ten years to once per hundred years (1×10^{-1}/yr – 1×10^{-2}/yr). . However, because of the	

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		rigorous health and safety planning required to perform treatments, it is estimated that the frequency of a fatal occupational injury at LANL from the Proposed Action would be less than once in 100 years (less than 1×10^{-3}/yr).	
D&D			xx
CUMULATIVE IMPACTS		No long-term adverse cumulative effects are expected to occur from implementing the Proposed Action, the Limited Burn Alternative, or the Burn Alternative. . The Proposed Action and each alternative, except the No Action Alternative, would have a long-term beneficial contribution to any cumulative effects on various resources resulting from actions at LANL or by surrounding land managers.	

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LAND USE	X		
VISUAL		The Proposed Action would affect the visual environment in the vicinity of the project both during and after construction. During construction, there would be short-term visual effects caused by creation of a construction staging area and equipment used during the construction process. Revegetation after construction would return the disturbed area to a more natural condition within a few years. After construction, the radio broadcasting antenna would be visible to a number of homes and businesses in the nearby community of White Rock. The radio broadcasting antenna would be visible from the San Ildefonso Indian Reservation Sacred Area and potentially visible from any identified TCPs. The radio broadcasting antenna would not have artificial lighting. Overall Effects: The radio broadcasting antenna would introduce features (a vertical line and, possibly colors) that would contrast with the natural contours, shapes, and colors of the landscape. The capacity of the viewsheds to absorb the visual effect of the antenna is relatively low. Non-reflective materials or coatings that mimic the colors of vegetation and sky, such as a non-metallic blue or green paint in a matte finish, would be used. In a letter to DOE dated January 12, 2000, the Pueblo of San Ildefonso stated they find the proposed site for the antenna would have little impact to the immediate environment in reference to aesthetics (SAN I, 2000). Effects on viewsheds of the community of White Rock: The community of White Rock has scenic vistas and pleasant views in many directions, but only a few homes on the higher areas of the southern part of White Rock are likely to have a scenic view that includes the proposed antenna location. These homes are predominantly in the area of La Vista Street, where the terrain is higher, and along State Highway 4 between Piedra Loop and Grand Canyon Drive. Other areas of White Rock are too low in elevation or have intervening vegetation and development that obscure scenic views in the direction of the White Rock Tract and the proposed antenna location.	

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VISUAL		The proposed radio broadcasting antenna would likely result in a modest alteration of the existing view. The degree of change in the view would probably be small due to the presence of the meteorological tower and power lines in the area. The visual quality of the area immediately around the antenna would probably not be degraded to low public value classification. Effects on viewsheds on the San Ildefonso Indian Reservation Sacred Area: The views from the higher parts of the San Ildefonso Indian Reservation Sacred Area (Sacred Area) would include scenic vistas in nearly all directions. These views include an approximate 60-degree field of view to the south and southeast that includes the meteorological tower, the power lines, and most of the community of WhiteRock. From the Sacred Area to the north, the proposed radio broadcasting antenna would be visible from several of the mesa tops and benches. The Sacred Area is not permanently occupied but does receive occasional visits by members of San Ildefonso Pueblo. Although the antenna would be a noticeable addition to the vistas from the Sacred Area, the degree of change would be modest since the antenna would be integral with the existing meteorological tower, power lines, and the community of White Rock. Effects of viewsheds from State Highway 4: Travelers along State Highway 4 through White Rock would notice the radio broadcasting antenna, as well as the shorter meteorological tower, primarily while passing through White Rock. Scenic views in this area occur primarily when a vehicle approaches White Rock from the south. The antenna would be visible and would modify scenic views of perhaps moderate public value over about a stretch of one mile south of White Rock. The number of persons affected would be relatively high but travelers would typically only see the antenna briefly.	
NOISE	X		
GEOLOGY, SEISMIC, & SOILS			X

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GROUND WATER & SURFACE WATER	X		
AIR QUALITY	X		
WETLANDS & FLOOD-PLAINS	X		
T&E HABITAT	X		
HUMAN HEALTH		Adverse health effects to LANL workers and members of the general public are not expected as a result of the Proposed Action. The current use of the proposed site is a buffer zone, with infrequent LANL worker occupancy of the land near the proposed radio broadcasting antenna site. In this EA, human health considers the effects of the construction and operation of the radio broadcasting antenna on nearby LANL workers and the general public residing in the vicinity of White Rock. The lease would stipulate that the radio station would ensure that all applicable worker health and safety regulations are followed during the construction and operation of the radio broadcasting antenna. The human health effects on radio station employees or their contracted workers are not included in this EA. There would be no workers occupying the antenna site. Workers would be there on a periodic basis only. Since FCC regulations require that radio broadcasting antenna and support facilities be fenced to prevent vandalism and to be protective of members of the general public, accidents such as electrocution or falls are not considered credible (1 x 10-6). Therefore, the risks of such accidents and related health effects were not analyzed. Both LANL workers near the antenna site and the general public would have the potential for EMF exposures as a result of radio broadcasting operations. The nearest LANL workers are located about 4,000 feet (1,210 m) to the northwest from the proposed antenna site. Currently, the nearest residences from the proposed antenna site are located about 650 ft (200 m) to the southeast. EMF emissions from the radio broadcasting antenna are projected to be less than International Radiation Protection Association (IRPA) general public exposure limits of 100 mW/cm2 for the 0.9-1.5 MHz frequency range (IRPA 1998) to both of these populations (Appendix A). Immediately outside the fence the expected EMF exposures would be only 1.35 x 10-2 mW/cm2, which are less than the IRPA permissible limit stated above. Thus, adverse human health effects would not be	

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HUMAN HEALTH		expected from the operation of the radio broadcasting antenna.	
ENVIRONMENTAL JUSTICE	X		
CULTURAL RESOURCES		The proposed radio broadcasting antenna site would be located within an area that contains potential construction effects to two archaeological sites, and is in close proximity to the boundary of the San Ildefonso Indian Reservation Sacred Area. Adverse effects to archaeological resources are not expected under the Proposed Action, as the ground wires would be placed so as to avoid these sites. The radio broadcasting antenna and any associated road or utility corridor would also be located to avoid all known cultural sites. Additionally, construction would be monitored by a qualified archaeologist. As stated, clearing or excavation activities during site construction have the potential to encounter previously buried materials. If buried material or remains of cultural significance are encountered during construction, activities would cease until their significance was determined. As outlined in the CT EIS, consultations with the four Accord Pueblos are ongoing. The 3-acre land parcel in the Proposed Action is not known to contain Native American TCPs and, therefore, no effects are anticipated. The Pueblo of San Ildefonso (in the above mentioned letter) encourages continued consultation with regards to the antenna's effects on TCPs.	
SOCIO-ECONOMICS	X		
UTILITIES (GAS, ELECTRICITY, WATER)			X
WASTE MANAGEMENT	X		
CONTAMINATED SPACE			X
TRANSPORTATION (ON SITE, SHIPMENTS)			X
ENVIRONMENTAL RESTORATION	X		
ACCIDENTS			X
D&D			X

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CUMULATIVE IMPACTS		This section considers the cumulative effects of the AM radio broadcasting antenna together with other actions occurring within and directly adjacent to the potentially affected region (approximately 1 mile). The principle issue associated with the Proposed Action is visual effects (see section 4.1.1), although cumulative effects on TCPs, cultural resources, and human health effects are also examined. The cumulative visual effect of implementing the Proposed Action would be small. As stated, the area in which the Proposed Action would be located contains a 160-ft tall meteorological tower, overhead power lines, and a few small support structures. The scenic class in which the Proposed Action would be located is moderate public value. The antenna would be most consistent with this rating and its introduction would not likely degrade this rating. Although there are no known plans for future antenna placement in the area of influence, proposed future uses of the adjacent White Rock Tract, when transferred, are assumed to be commercial and residential development (e.g., RV parking and multi-story high density residential development), which would modify this rating to a condition similar to that of Rating Unit 1, low public value. While the Proposed Action would add an additional visual element to the region of influence, its impact, when combined with reasonably foreseeable future actions, would be small and would not contribute to a degradation of the scenic class rating. The cumulative human health effects of implementing the Proposed Action would be negligible. EMF exposures at the boundaries of the antenna fence would be less than IRPA permissible exposure limits. The potential future use of the adjacent White Rock Tract for commercial and residential development would increase the chances that members of the general public would climb over the fence and onto the antenna, providing a scenario where EMF exposures could exceed permissible limits or where injuries from a fall could occur. This scenario is highly speculative and unmeasurable, and its associated effect is assumed to be small, due in part to the installation of an engineered climb stop on the antenna as part of the proposed action. Greater EMF exposure risks would be expected from the two nearby existing 115-kV electric power lines. The cumulative effect of implementing the Proposed Action on TCPs and	

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CUMULATIVE IMPACTS		cultural resources would likely be small. As stated, the antenna would be sited and constructed under the supervision of a qualified archaeologist, in order to avoid known cultural resources sites. The future use of the adjacent White Rock Tract for commercial and residential development would have a high potential for disturbing cultural resources sites and affecting TCPs. The siting, construction, and operation of the antenna would not contribute to the disturbance of TCPs or cultural resources expected from the commercial and residential development. In summary, the effects of the Proposed Action, when combined with those effects of other actions defined in the scope of this section, do not result in cumulatively significant impacts.	

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Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
LAND USE	No. Land uses and land use designations in TA-3 as a result of the Proposed Action would not change or be affected.		
VISUAL		The Proposed Action would have some beneficial and some disruptive effects. The existing administration building is part of the "dense mixed development" within TA-3 that constitutes an adverse visual impact because it contains unusually discordant structures. The removal of Environmental Assessment for Proposed Construction and Operation of a New Office Building and Related Structures NNSA/LAAO July 26, 2001 34 Building 3-43 would be considered a beneficial effect. The Proposed Action would be consistent with LANL's Comprehensive Site Plan (LANL 2000b). The proposed office building, lecture hall, and parking structure would be visually compatible with nearby office and computing structures, such as the SCC and NISC buildings and the Los Alamos Research Park, this would enhance the overall appearance of the Core Planning Area. The proposed office building would stand about 105 ft (32 m) above grade and would be one of the taller structures at TA-3. The vent stack for the new NISC would be about 90 ft (27 m) high. The proposed office building would be about 20 ft (6 m) higher than the SSC and thus would be a prominent landmark building. From various viewpoints, the office building would be clearly visible at the base of the Jemez Mountains and would be one of a number of visually disruptive elements against the natural lines of the background landscape from distant viewers. The parking structure and lecture hall would be lower and would not be expected to be visible from a distance. Close by, the building would be consistent with nearby new office and computing structures within TA-3.	
NOISE		**Construction:** The erection of an office building, parking structure, lecture hall, and smaller support structures, as well as the demolition of some buildings would require the use of heavy equipment for clearing, leveling, construction, and demolition activities. Heavy equipment such as front-end loaders and backhoes could produce intermittent noise levels at around 73 to 94 dBA at 50 ft (15 m) from the work site under normal working conditions. Construction truck traffic would occur frequently but would	

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		generally produce noise levels below that of the heavy equipment. **Operations:** Not addressed	
GEOLOGY and SEISMIC		A site-specific investigation was performed as the proposed office building would have high occupancy and serve a vital mission. Six boreholes up to 115 ft (35 m) deep were excavated at the proposed site for the new office building. This task has confirmed the presence of faulting in the area shown in Figure 5 and provided a general location. The potential fault across the existing parking lot east of Building 3-261 also runs through the proposed location for the parking structure. As with the fault near the proposed location for the office building, studies indicate the probability of surface rupture is less than the performance goal of the parking structure. Thus the site is acceptable for this type of construction.	
SOILS		The project would generate excess uncontaminated soil from excavation activities. The soil would be stockpiled at a location on Sigma Mesa (TA-60) or other approved material management area for future use. BMPs would be implemented to prevent erosion and migration of disturbed soil from the site caused by storm water or other water discharges or wind.	
SURFACE WATER		Water quality would not change as a result of operations of the new office building. Storm water runoff from the new office building and parking structure would be managed under the SWPP Plan.	
GROUND WATER		The water quality in this area would not be affected by the Proposed Action. The plumbing for the new office building would be separated from LANL's potable water supply system by an approved backflow prevention device located immediately downstream of the service entrance to the facility.	
RAD AIR QUALITY			Xx
NON-RAD AIR QUALITY		Construction and operation of the new office building and associated structures would be expected to produce only temporary and localized nonradioactive air emissions. The effects on air quality would also be temporary and localized. None of the activities proposed for the new office building would produce new air emissions. There would be no increase in steam or power production from the TA-3 power plant that would cause increased emissions of regulated air pollutants. Since vehicle use at TA-3 would not change substantially as a result of constructing the new building, emissions from the use of the parking structure would be the same as	

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		existing conditions at TA-3.	
WETLANDS	xx		
T&E HABITAT	xx		
FLOOD-PLAINS	xx		
PUBLIC HEALTH	Public health is not considered because no members of the general public would work in the proposed new buildings or be affected by the demolition of existing buildings. In addition, no activities performed in the proposed new buildings would pose health risks to members of the public.		
WORKER HEALTH		**Construction:** The Proposed Action is expected to have no effect on the health of any non-UC construction or demolition workers under normal operation conditions. **Operations:** The Proposed Action is not expected to have an effect on the health of any LANL workers under normal operating conditions (non-accident conditions).	
ENVIRONMENTAL JUSTICE	No. Populations that are subject to Environmental Justice considerations are present within 50 miles (mi) (80 kilometers [km]) of Los Alamos County; potential effects of this project would be localized within a 10 mi (16 km) radius. Populations nearest to the construction site and within this radius are not predominantly minority and low income		

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	populations.		
CULTURAL RESOURCES		The planned construction and use of the office building, parking structure, lecture hall, and TA- 60 government vehicle parking lot would not affect recorded cultural resources. The demolition of Building 3-43 would have an adverse effect on an historic structure. Because the demolition of this building has an adverse effect to the property under Section 106 of the *National Historic Preservation Act of 1966* (as amended) and 36 CFR Part 800.5, "Assessment of Adverse Effects," a treatment plan to resolve these adverse effects would be negotiated between the SHPO and the DOE. The treatment plan would include a combination of the following elements: archival large format photos, existing architectural blueprints, preparation of a current set of as-built drawings, preparation of a detailed report on the building's history, and interviews with past and present workers. Additions to the treatment plan could result from negotiations with the SHPO over the resolution of the adverse effects. A Memorandum of Agreement for resolution of adverse effects would be prepared following SHPO concurrence on the NRHP eligibility assessment and would implement the treatment plan and proceed parallel with this EA. The Advisory Council on Historic Preservation would be notified of the Memorandum of Agreement and would have an opportunity to comment.	
SOCIO-ECONOMICS		There would be no increase in the number of employees as a result of this project, and the additional 200 peak construction jobs would be filled by the existing employees in the regional work force, which includes mostly Los Alamos, Rio Arriba, and Santa Fe Counties.	
UTILITIES (GAS, ELECTRICITY, WATER)		Utility services are sufficient and available on-site to serve the new buildings and structures. Utility lines are located adjacent to the proposed building sites and would require minimal trenching to connect them to the new structures. Minor repairs to existing underground sewer or water lines may be necessary.	
WASTE MANAGEMENT		Solid waste from the demolition and construction of buildings 03-43, 03-490 equals 17,700 cubic yards. Asbestos from the demolition of 03-43 equals 6,200 cubic yards. Lead from the demolition of 03-43 equals 1 cubic yard. Beryllium from the demolition of 03-43 equals 60 cubic yards. Photo-chemicals from the demolition of 03-43 equal TBD cubic yards.	
CONTAMINATED			xx

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SPACE			
TRANSPORTATION (ON SITE, SHIPMENTS)		It is estimated that 200 construction personnel would be on-site at the peak construction period. This means approximately 90 vehicles could be added to local roadways during construction of the office building and the parking structure, assuming a 0.45 vehicle/employee ratio. Construction personnel would park on-site and at remote designated parking areas. Truck volumes that would carry waste material to either local or regional landfill sites are shown in Table 4 (Page 32).The government vehicle remote site at Sigma Mesa would increase traffic along Eniwetok Drive and at the intersection of Eniwetok Drive and Diamond Drive, particularly during the morning and evening peak periods. The addition of up to 227 additional vehicle trips in this area would not substantially affect this intersection.	
ENVIRONMENTAL RESTORATION	No known potential release sites (PRSs) of hazardous materials are present within the identified structure footprints (Figure 5) at the construction site.		
ACCIDENTS		**Construction:** The Proposed Action of constructing three structures and demolishing an existing structure presents many construction-type low-effect hazards that are common to standard industry. **Transportation:** The chance of a disabling injury occurring to a driver of a medium or heavy truck hauling hazardous waste is about 1.3 in ten thousand. **Operations:** Once the project is completed there would be a reduction of risk to tenants of the new office building associated with better protection from hazards such as those created by earthquakes.	
D&D		The two buildings and parking structure would be designed with a lifetime expectancy of 30 years (minimum) of operation. At the end of each facility's useful life, final decontamination and demolition would be performed as needed.	
CUMULATIVE IMPACTS		Section 5.0	

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LAND USE		The Proposed Action would not be in conflict with land use designations in this area. "Reserve" is a land use designation defined in the CSP 2000 as "areas that are not otherwise included in one of the previous (land use) categories, such as experimental or high-explosives R&D." Although this area of LANL is not envisioned for immediate development, it is not excluded as potential land for development. The proposed Center site would also be within land the CSP 2000 defines as good to excellent for future development potential.	
VISUAL		The Proposed Action would be visible from the townsite along with other discordant features, but not from higher elevation areas in both the Bandelier and Dome Wilderness areas.	
NOISE		**Construction:** 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. **Operations:** Once the facility becomes operational, noise generated by building operations would be similar to noises encountered around typical office buildings (such as ventilation fans, testing of back-up power and emergency response systems, and light vehicle traffic).	
GEOLOGY and SEISMIC		To determine the location and condition of a potential fault line in this area, a 300-ft (90-km) long seismic investigation trench was opened at the site. A probabilistic risk analysis was performed and the site has been determined to be within standards established by DOE's "Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components," (DOE-STD-1021.93).	
SOILS			xx
SURFACE WATER		A SWPPP would be developed to prevent sediment runoff into local streams.	
GROUND WATER			xx
RAD AIR QUALITY			Xx
NON-RAD AIR QUALITY		The Proposed Action would result in a minimal effect on air quality. Construction of the proposed Center would produce only temporary and localized nonradioactive air emissions. Normal operations at the Center would result in small emissions of regulated air pollutants. The emissions from natural gas heating and cooling systems and from the use of emergency generators would be similar to those of small office buildings at LANL and elsewhere.	
WETLANDS	xx		
T&E HABITAT	xx		
FLOOD-PLAINS	xx		

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PUBLIC HEALTH		Cumulative potential adverse health effects to construction workers should be minimal and cumulative beneficial or adverse effects on public health are not expected to occur under normal conditions.	
WORKER HEALTH		**Construction:** Normal construction accidents. **Operations:** Less than one LCF from CMR accidents	
ENVIRONMENTAL JUSTICE	xx		
CULTURAL RESOURCES	xx		
SOCIO-ECONOMICS		This project will employ 40 construction workers during the construction phase and 5 to 6 new LA county emergency personnel.	
UTILITIES (GAS, ELECTRICITY, WATER)		Utility access to the proposed TA-69 site would require the extension of several utilities to service the facility as described in Chapter 2. Potable water service would need to be extended and pumped about 0.5 mi (0.8 km) to a new potable water storage tank to service the proposed Center site. A fire suppression water storage tank would also be installed at the Center. Sewer service to the Center is available along Anchor Ranch Road. Electric service to the Center is available along West Jemez Road from an existing 13.2-kilovolt line. Utility trenches would need to be provided across both disturbed and undeveloped land to the proposed Center site for the individual utilities. Communication lines could be attached or routed along one or more of these individual utility corridors and would not require additional trenching.	
WASTE MANAGEMENT		This project would require the handling and disposal of site and construction solid waste material. Construction waste is estimated at 1,000 cubic yards (yd3) (760 cubic meter [m^3]) and would be hauled to the Los Alamos County Landfill or its replacement facility. Construction debris, primarily comprised of wood, metal, and asphalt, would be the typical waste expected to be generated during construction of the new Center, parking lot, and garage.	
CONTAMINATED SPACE			Xx
TRANSPORTATION (ON SITE, SHIPMENTS)		One public transportation highway and a public infrastructure facility are located in the general area of the proposed Center site. The public transportation route is the adjacent West Jemez Road, also designated as New Mexico State Route 501 (SR 501). This highway is defined as an arterial road in the CSP 2000. This route is located along the western side of the Center site and would be within about 300 ft (90 m) of the Center. Two other internal LANL roads are located in this area: Anchor Ranch Road and Two-Mile Mesa Road. The entrance to both the Experimental Engineering and the Dynamic Testing areas (TAs 69, 8, 9, 15, 22) is located near the proposed Center site near Guard Station 502, which is off Anchor Ranch Road.	

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ENVIRONMENTAL RESTORATION		The Proposed Action site is not known to contain any potential release sites (PRSs).	
ACCIDENTS		No fatalities are expected during the construction of the Center facility. The 1993 incidence rate of serious injury or illness and death for all types of construction reported by the National Safety Council was 0.89 per 100 full-time employees (NSC 1994).	
D&D		The Center would be designed to operate as a typical office building, which, together with the garage, would have a minimal lifetime use expectancy of about 30 years of operation. At the end of each facility's useful life, final decontamination and demolition would be performed as needed.	
CUMULATIVE IMPACTS		Section 5.0	

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Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
LAND USE		The proposed Atlas facility would be within an area designated in the NTS EIS as an Industrial, Research and Support site. The development of the Atlas facility would result in the disturbance of approximately 1 acre of land. Use of the proposed facility within this area is consistent with the NTS land use and the NTS EIS ROD. There would be no conflicts with land uses in areas surrounding the NTS.	
VISUAL	The proposed Atlas facility would not be visible from accessible public lands, including U.S. Highway 95. The construction of any additional structures within the industrial area would not result in a notable change to the view of the Yucca Dry Lake area.		
NOISE		Construction of the Atlas facility would create some elevated noise levels but these would likely not be discerned above the ambient noise levels in the area. Operation of the Atlas facility would probably result in periodic sudden and short-term noises, which could be heard at some distance. Hearing protection would be required of all workers that could be potentially adversely affected by increased noise levels. Operational noise from the Atlas facility may create short term startle reactions in some species of wildlife but would not be expected to have any other effects.	
GEOLOGY, SEISMIC, & SOILS		The geology of the site is generally fa vorable for construction of the proposed Atlas facility. Soils are typically fined grained and caliche is generally not	

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GEOLOGY, SEISMIC, & SOILS		present in amounts that will complicate excavation or grading. Maintenance of natural drainage will require some engineering in the forms of ditches or culverts, or both. Although Area 6 is within Seismic Zone 2b for natural seismicity, the potential for conducting underground nuclear tests in the vicinity requires that the Atlas facility be designed to a greater seismic zone to preclude damage. Structures built in areas of past nuclear weapons testing were typically designed to Seismic Zone 3 or 4 criteria, and sometimes additional means of protection, such as shock mounts, were employed to preclude damage from ground motion. Seismic Zone 4 criteria would be used for the design of the Atlas facility with consideration for potential ground motion from underground nuclear testing.	
GROUND WATER & SURFACE WATER	No deterioration of surface water quality or quantity is expected to result from the proposed action. Any spills of contaminants would be cleaned up expeditiously to prevent contamination of runoff water and groundwater.		
AIR QUALITY		Fugitive dust would be generated during construction of the Atlas facility. Standard dust suppression techniques, such as watering, would be used as needed. Other potential impacts to air quality from construction of the Atlas facility include emissions from fuel-burning construction equipment such as scrapers and front-end loaders, and from gasoline and diesel powered vehicles and trucks. Emissions generated during facility operations would result primarily from conducting experiments and from the use of solvents as cleaning agents. Minute	

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AIR QUALITY		quantities of the metal targets used during experiments would vaporize and be deposited onto the inside surface of the target chamber. Other portions of the target would be liquefied or shattered. Liquefied portions would resolidify moments after the experiment was completed. Only minute quantities of metals would stay volatilized**.** The contents of the target chamber would be exposed to the atmosphere only during reentry for cleanup. The quantity of emissions generated from each experiment would be small, and therefore would require no facility air filtration or scrubbers. The majority of solvents used during cleaning operations would evaporate. Hazardous chemicals such as isopropyl alcohol, trichlorethylene and 1,1,2- richloroethane would be used occasionally and in small amounts, so that the quantity of emissions generated would not harm workers, collocated workers or members of the public. Ethanol, which would be used in larger quantities, i.e., approximately 42 gallons per year, is not considered a hazardous air pollutant (HAP) under the Clean Air Act. However, ethanol is highly flammable and vapor/air mixtures are explosive. The majority of the ethanol used for cleaning would evaporate. Adequate ventilation would be provided. The argon/SF6 system that would be used to supply railgap switches with pressurized dielectric gas is non-hazardous albeit an asphyxiant; however, some of the decomposition products, in particular sulfur tetrafluoride (SF4) and also hydrofluoric acid (HF), are toxic or corrosive. Four exhaust fans, each 30,000 cubic feet per minute (cfm) would be used to vent the shot products, including SF4, to the ambient air. Ceiling limits defined by the American Conference of Governmental Industrial Hygienists (ACGIH) for concentrations of SF4 are discussed in Section 4.1.10, Occupational and Public Health and Safety. Some of the metal targets (including lead) and the solvents are classified as HAPS and are regulated by the State of Nevada. Emissions limits for HAPS and toxics in the State of Nevada (and under the Clean Air Act) are 10 tons per year of any one HAP or toxic, or 25 tons per year for any combination of HAPS or toxics. Emissions from the metal targets used during experiments were calculated to be less than 1 gram (g) [0.0022 pounds (lb)] per experiment. Emissions from use of the solvents were calculated to be less than 30 g (0.066 lb) per experiment (DOE, 1996c). The number of experiments to be conducted is estimated at 40 per year, with no more than 1-2 per week. Engineering	

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AIR QUALITY		considerations for Atlas limit the maximum shot rate to approximately 100 per year. Assuming the maximum100 experiments per year, annual emissions from the metal targets would be approximately 100 g (0.22 lb). Annual emissions from each of the solvents would be approximately 3000 g (6.6 lb). Combined emissions, assuming the use of one metal per target twice a week and use of 3 different solvents, would be approximately 20 lbs, i.e., much less than one ton/yr. Beryllium is one of 7 HAPS for which there are national emission standards, and it is regulated by the United States Environmental Protection Agency under the National Emissions Standards for Hazardous Air Pollutants (NESHAP). The emissions from use of beryllium as a target material would be similar to the emissions from the metals discussed in the previous paragraph, and would fall well below the NESHAP emissions limit of 10 grams per 24-hour period (40 CFR 61.32). Emissions of HAPS would be considered an insignificant source by the State of Nevada. Depleted uranium (DU) is regulated under Subpart H of NESHAP. In accordance with Subpart H, potential DU emissions would be evaluated using an EPA-approved computer model, such as CAP-88, to determine whether monitoring would be required. Emissions from use of DU as a target material would be similar to the emissions from the metals discussed previously, and would fall well below the NESHAP dose limit of 10 mrem per year (40 CFR 61.92). The quantity of fugitive dust emissions generated by vehicles and equipment during construction would affect air quality in the project area, but these impacts would be minor and short term in nature. The construction site would be watered, as necessary, to help reduce fugitive dust due to equipment activity.	
WETLANDS & FLOOD-PLAINS			X
T&E HABITAT		The development of the Atlas facility would result in the disturbance of approximately 1 acre of previously disturbed habitat. A survey would be conducted to determine the presence of the western burrowing owl, which has been known to inhabit disturbed areas, and any other sensitive species. If any sensitive species were found, project activities would be planned to minimize disturbance to the species.	

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HUMAN HEALTH		The potential for activities at the NTS to impact the health and safety of the general public is minimized by a combination of the remote location of the NTS, the sparse population surrounding it, and a comprehensive program of administrative and design controls. Visitors to the NTS are subject to essentially the same safety and health requirements as workers. Access to areas of the NTS where working conditions require special hazard controls is restricted through the use of signs, fences, and barricades. The health and safety of NTS workers is protected by adherence to the requirements of federal and state law, DOE orders, and the plans and procedures of each organization performing work on the NTS. Small amounts of lead, DU or other similar heavy metals might deposit or be released as particulate metal dust from the target chamber following certain experiments. Toxic/hazardous emissions would be generated by the Atlas facility following each experiment due to the evaporation of solvents used to clean the inside of the target chamber. The quantity of air emissions generated from each experiment would be small and therefore would require no facility air filtration or scrubbers (DOE, 1996c). Exposure to the metals and solvents used during operations would be minimized through wearing proper protective clothing and following established health and safety procedures. Beryllium, which would also be used in the target chamber in small amounts, can be highly toxic if inhaled and can cause lung fibrosis (Homberger, 1983). Particulate metal dust from DU in targets also poses a modest radiological hazard if inhaled. Respiratory protection would be used when working with target debris and in cleanup of the target chamber. The Argon/SF6 system, which supplies railgap switches in the Atlas machine with a pressurized dielectric gas mixture, would be composed of 85% Argon and 15% SF6. As mentioned previously in Section 4.1.6, this is a non-hazardous system, although argon is a simple asphyxiant and the SF6 can decompose to toxic products, such as SF4. The current Atlas facility uses 4 exhaust fans that vent shot products, including sulfur tetrafluoride (SF4), to the ambient air. Calculations for emissions of SF4, indicated that 0.0004 parts per million (ppm) SF4 could be generated (Stafford, 2000). This is worst case and assumes complete mixing with the air in the high bay. This is well below the Ceiling limit of 0.01 ppm established by the	

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HUMAN HEALTH		American Conference of Governmental Industrial Hygienists (ACGIH). The majority of solvents used during cleaning operations would evaporate. Exposure to ethanol, which would be used in larger quantities, can result in dizziness, headaches, burning eyes and other hazards including unconsciousness. Exposure would be minimized by providing adequate ventilation and/or breathing protection, protective gloves, and safety goggles. Potential health hazards to site workers, collocated workers, and the general public during experiments conducted as part of the normal operations of the Atlas facility may include electrical hazards, strong magnetic fields, and x-rays. 4.1.10.1 Electrical Hazards Electrical hazards would be present at the Atlas facility while conducting experiments because the capacitors associated with Atlas would be charged to a high voltage. The Atlas capacitor bank could deliver an instantaneous lethal current if special operating precautions were not taken. To minimize electrical risks associated with Atlas experiments, all applicable electrical codes specified by DOE Order 6430.1A (such as adequate grounding and lightning protection) would be incorporated into the Atlas capacitor bank, facility, and related electrical components. In conjunction with meeting local electrical codes and DOE Order requirements, the Atlas capacitor bank would be isolated in an interlocked personnel containment area with controlled access. Other engineering safety features would include making all switches fail safe, providing a direct cut-off to the Atlas facility systems in event of a computer malfunction, and utilizing interlocks to control operation of switches. These Atlas facility engineering controls, as well as administrative controls, such as personnel training and standard operating procedures, would significantly decrease the probability of an electrical accident occurring during normal operations. 4.1.10.2 Magnetic Fields By employing advanced capacitor design and because of developments in high voltage switching, there is no longer a need to charge the capacitors in a fraction of a second as described previously in Appendix K of the *Programmatic EIS for Stockpile Stewardship and Management* (DOE, 1996c). Because the Atlas system can be charged by conventional power supplies over a longer time period, there is no need for the inductor or the high voltage generator as	

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HUMAN HEALTH		originally planned for installation in Los Alamos. Thus there will be minimal magnetic fields being generated by the charging system. The large magnetic field that is generated by the pulse of electric current in the target liner material will be confined to the region between the target and the return conductor which are both housed inside the vacuum vessel. The return current basically cancels out a magnetic field existing beyond the vacuum vessel. Fringing magnetic fields from the vertical transmission lines are confined to the VTL tanks by metal covers. Any measurable magnetic field outside this volume would be very small, and the room that houses the Atlas machine would be an exclusion area. All Atlas facility workers and nearby collocated workers would be informed of the magnetic hazards associated with individual proposed experiments and those with pacemakers, etc., would be moved to a safe location. Administrative and engineering controls would be in place during experiments to keep magnetic field exposure as low as reasonably achievable. Magnetic fields would be monitored at various locations at and near the Atlas facility during experiments. 4.1.10.3 X-Rays The Atlas facility experiments would utilize a target chamber that would have walls of stainless steel 2.54-cm (1-inch) thick, twice the thickness of the Pegasus II facility's target chamber walls. An individual target implosion would produce an estimated one to four Megajoules (MJ) of 100 to 200 electron volt (eV) x-rays at the time of the experiment. These low-energy x-rays are not expected to penetrate the stainless steel target chamber; the energy would be converted to heat and dissipated into the target chamber walls. Standard NTS radiological protection procedures would be followed and additional procedures specifically developed for the Atlas facility as needed. Diagnostic x-ray apparatus used to take radiographs of the events occurring during experiments within the target chamber would be located outside the chamber and would use high-energy xrays, similar to medical x-rays. The diagnostic x-ray apparatus operation would be interlocked with the entrances to the target area such that the apparatus would not operate if an exterior door were opened. Existing standard operating procedures and facility shielding would be used to protect workers. In addition, personnel protection staff would conduct surveys in and around the target area to measure radiation produced by the diagnostic x-ray apparatus when in operation. Additional shielding would be added if needed.	

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HUMAN HEALTH		Collocated workers or members of the public, either on site or off site, would not be exposed to high-energy x-rays. These x-rays would be shielded and contained within the interlocking room housing the capacitor bank.	
ENVIRONMENTAL JUSTICE		Due to the relatively small size of this project and limited number of employees, there would be no impacts to public health and no subsection of the population, including minority or lowincome population, would receive disproportionate impact.	
CULTURAL RESOURCES		The proposed site for the Atlas facility is within a previously cleared and developed industrial, research support site. Because the proposed project would be located within this already developed area, it is very unlikely that any cultural resources would be found there. If, during construction, significant cultural resources were found, attempts would be made to avoid them or if they were unavoidable, NNSA would consult with the Nevada State Historic Preservation Officer to identify mitigation measures sufficient to achieve a status of no adverse effect.	
SOCIO-ECONOMICS		At full operation, the Atlas facility operations crew is estimated to consist of about 15 personnel, the majority being engineers and scientists. It is not expected that the small number of new employees would generate noticeable additional secondary jobs related to purchases of goods and services in either Clark or Nye Counties.	
UTILITIES (GAS, ELECTRICITY, WATER)		The proposed action would require construction of the Atlas facility and parking lot as described in Chapter 2.1.1. As identified in Chapter 3 the existing utility infrastructure would support all activities with minor upgrades to the infrastructure as drops from utility lines and water mains and wastewater systems. At the NTS, it is anticipated that the Atlas facility, including the machine and the buildings, would consume approximately 500,000 kilowatt hours/year. Assuming an average use of 35 gal/day per person, water usage and wastewater produced by 15 people would be approximately 525 gal/day. The existing wastewater sewage lagoon system located in Area 6 and the planned 5,000 gallon septic tank and leach field would provide adequate wastewater disposal capacity for all activities conducted at the Atlas facility. The existing NTS potable water distribution system would be connected to the Atlas facility. In order to protect the main water distribution system, the facility	

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		would have appropriate backflow prevention devices installed and periodically checked.	
WASTE MANAGEMENT		It is assumed that a small amount (less than 1 m3 annually) of liquid or solid hazardous waste, and an even smaller amount (less than 0.1 m3 annually) of low level or low level mixed waste would be generated by occasional experiments involving lead and/or DU. This waste would be staged in on-site waste accumulation areas and shipped to offsite commercial permitted treatment, storage, and disposal facilities or disposed on site as appropriate. Solid non-hazardous waste such as paper and dielectric insulation would be disposed of on site in a permitted land fill; the amount of non-hazardous solid waste would not be expected to exceed 7 m3 (240 ft3) (DOE, 1996c) per year, resulting in minimal impacts from the Atlas operation.	
CONTAMINATED SPACE			X
TRANSPORTATION (ON SITE, SHIPMENTS)		Transportation of the Atlas machine from LANL to the NTS would be via commercial trucksover established roads. This is not expected to result in any impacts on land use or the roads other than impacts normally incurred by trucking transport. Upon completing construction of the new building and assembly of the Atlas facility, transportation would mainly consist of the daily commute by approximately 15 personnel employed at the Atlas facility and occasional shipments of materials used in operations. Existing roads to the facility would be sufficient to handle transportation of Atlas and the vehicles that would be used to carry personnel and material to the facility.	
ENVIRONMENTAL RESTORATION			X
ACCIDENTS			
D&D			
CUMULATIVE IMPACTS		**Land Use and Transportation** The Atlas facility fits within the expected land use of an Industrial, Research, and Support site, as identified in the NTS EIS (DOE, 1996a). Use of the land for activities planned under the Atlas project would not be expected to adversely impact activities at surrounding NTS or off- site facilities. Relocation of Atlas from the existing location at LANL would provide space within an industrial/research facility that could be used for other appropriate	

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CUMULATIVE IMPACTS		activities. Combined with other land uses at LANL, relocation of Atlas would not result in adverse cumulative impacts on laboratory or other land uses. An increase of approximately 30 one-way vehicle trips daily, generated by an additional 15 workers employed at the Atlas facility, would contribute only slightly to the total annual mileage on U.S. Highway 95 and the NTS. This slight increase in mileage is well within the daily vehicle trips projected for the year 2005 by the Regional Transportation Plan. There would be no noticeable impact to traffic or transportation on public highways or on the NTS. There would be a slight net decrease in vehicle trips at LANL if Atlas were moved to the NTS. The decrease in traffic would be beneficial but virtually unnoticeable cumulatively. **Topography and Physiographic Setting** The Atlas facility would be constructed in a previously disturbed area within the Area 6 Construction Facilities. The existing Atlas facility at LANL is within a previously developed area, which would not be demolished or removed. There would be no cumulative effects on topography or the physiographic setting at either location. **Geology and Soils** During the construction phase, grubbing and grading activities, as well as excavation, would be minor. The amount of aggregate used during construction would be minor and would not result in any impacts to regional aggregate mining. The existing Atlas facility is within a previously developed area, which would not be demolished or removed. The cumulative impact on geology and soils at both locations would be negligible. **Hydrology** Naturally occurring surface waters at the NTS are limited to ephemeral streams resulting from snowmelt and precipitation runoff and drainage into playas to form temporary lakes. There would be no cumulative impacts to surface waters from construction and operation of the proposed Atlas facility. Groundwater use at the NTS is now less than one- fifth of the historic peak (DOE, 1996). Withdrawal of groundwater for construction and operation of the proposed Atlas facility would add incrementally to the amount currently used; however, this additional water use combined with currently used and anticipated uses would be well within the quantity analyzed in the NTS EIS (DOE, 1996)	

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CUMULATIVE IMPACTS		and would not represent a cumulative increase in impacts over those previously addressed. **Biological Resources** Approximately 1 acre would be utilized for construction of facilities associated with the Atlas facility. All of the land that would be used for the Atlas facility is within an existing industrial complex and no new land would be disturbed. Therefore, wildlife habitat and existing plant communities would not be affected by construction or operation of the Atlas facility. Noise generated by operation of Atlas may elicit a startle response from wildlife in the immediate vicinity of the facility but this would be intermittent and transitory and would not adversely impact the local fauna. There would be no cumulative impact to wildlife habitat or plant communities and noise generated by the operation of Atlas when combined with noises from existing industrial operations in the area would result in a negligible cumulative impact on wildlife. Because the existing Atlas facility at LANL is within an existing developed area and reclamation of the site is not planned, relocation of the facility would not result in any cumulative impacts to biological resources. **Air Quality** Construction activities would take less than one year for the Atlas facility and calculations have shown that less than one ton of fugitive dust (PM10) would be generated. This quantity of fugitive dust would comprise less than one percent of the total of 177,660 tons associated with land disturbance activities throughout the region represented by the Stateline and Tonopah resource areas and the Las Vegas Valley (DOE, 1996a). Emissions generated as a result of operations would be small enough to be exempt from permitting and would not result in a degradation of air quality. The cumulative effect on air quality of constructing and operating the Atlas facility would be minimal. **Noise** Noise impacts associated with activities at the Atlas facility would be restricted to the immediate vicinity and would not affect persons or residents in adjacent areas or add measurably to regional noise levels. Relocation of Atlas from LANL would result in a net decrease in noise at that location but unnoticeable cumulatively. **Visual Resources**	

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CUMULATIVE IMPACTS		The visual character of the region would change only slightly with the addition of one new building and minor appurtenances such as trailers, an oil storage tank, and parking lot. The new facility would be erected in an already developed area, not visible from off-site, so that there would be no impact to the general public. The cumulative visual impact of the Atlas facility at the NTS would be negligible. **Cultural Resources** The site of the proposed project has been previously disturbed. Hence, there would be no cumulative impacts to cultural resources. **Occupational and Public Safety and Health** Based on occupational injury rates for construction and other industrial activities cited in the NTS EIS (DOE, 1996a), Atlas facility activities would result in only one or two potential injury cases per year, with a similar estimated number of lost workdays. The Atlas facility activities would not affect the regional rate. Atlas facility activities would be conducted within the proposed project boundaries and would not affect the public. Hazards posed to workers, collocated workers and the public during operations would be minimized by following established procedures that included various administrative controls and ensuring that Atlas personnel were properly trained in dealing with the potential ha zards. Cumulative impacts from operation of the facility would be minimal. **Socioeconomics** There would be no measurable effect on the number of jobs, average wages and household earnings, and tax revenues in Nye County from the addition of the Atlas facility. Similarly, because there are relatively few employees at the Atlas facility, there would be little effect on the number of jobs, household income and tax revenues in Los Alamos County if the facility were moved to the NTS. **Environmental Justice** There would be no impacts to minority and low- income populations in the region of influence from the development of the Atlas facility. Thus, there is no contribution to the cumulative impact. **Waste Management** Small amounts of haza rdous wastes could be generated from Atlas operations. Solid and liquid non-hazardous wastes would be generated in greater quantities	

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CUMULATIVE IMPACTS		but would only result in minimal impacts. The additional waste streams resulting from operation of Atlas would represent a very minor increase in waste volumes currently generated at the NTS. There would be little cumulative impact from the generation of these wastes.	

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LAND USE	X		
VISUAL		The visual effects of the Proposed Action would be confined to the immediate area of the current engineering complex.	
NOISE		The Proposed Action would result in limited short-term increases in noise levels associated with various construction, remodeling, and demolition activities. Standard for construction and demolition activies.	
GEOLOGY		None of the new buildings to be constructed as part of the Proposed Action would be sited over the fault trace or within 50 ft (15 m) of any known active fault. Existing facilities proposed for remodeling, especially those that are situated over the trace of Fault F2, may require additional structural inforcements to meet current building codes with respect to seismic hazards.	
SEISMIC		See GEOLOGY above.	
SOILS			X
SURFACE WATER		Because mitigations will occur, the water quality in this area would not be affected by the Proposed Action.	
GROUND WATER		See SURFACE WATER	
RAD AIR QUALITY			X
NON-RAD AIR QUALITY		Construction, renovation, and demolition activities for the proposed TA-16 engineering complex refurbishment would be expected to produce only temporary and localized air emissions and the effects on air quality would also be temporary and localized. There would be no long-term degradation of regional air quality.	
WETLANDS		No construction would be conducted within a floodplain or a wetland.	
T&E HABITAT		NNSA has determined that no consultation with the U.S. Fish and Wildlife Service regarding the potential effect of the Proposed Action on federally protected threatened or endangered species or their critical habitat is necessary as there would be no effect to these sensitive species or their critical habitat from the Proposed Action.	
FLOOD-PLAINS		No construction would be conducted within a floodplain or a wetland.	
PUBLIC HEALTH		Members of the public are not considered because they are not likely to be affected by routine operations, construction or demolition activities, or any potential accident scenarios that could result from the Proposed Action.	
WORKER HEALTH		Because mitigations will be taken, construction, remodeling, and demolition work planned under the Proposed Action would not be expected to have any	

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		adverse health effects on LANL workers.	
ENVIRONMENTAL JUSTICE	X		
CULTURAL RESOURCES		The planned consolidation and refurbishment of the TA-16 engineering complex would not affect the recorded prehistoric archaeological site. The demolition and remodeling of various buildings would have an adverse effect on NRHP-eligible historic structures. Mitigations will be taken.	
SOCIO-ECONOMICS		This project would not have a long-term effect on socioeconomic conditions in this area. There would be no increase in the number of UC employees as a result of this project, and the additional 80 peak construction jobs would be filled by existing employees in the regional work force, which includes mostly Los Alamos, Rio Arriba, and Santa Fe counties. 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. Construction would begin in 2002 and last for about five years.	
UTILITIES (GAS, ELECTRICITY, WATER)		Onsite utilities (gas, water, sewer, electric, communications, computer networks) would be reconfigured and upgraded for efficient distribution to the existing and new buildings. Whenever possible, utilities would be consolidated into “corridors” that would facilitate maintenance. This integration would require approximately 3,000 ft (900 m) of trenching to establish the corridors. Connections and upgrades to the existing underground utilities would be necessary. Average water and power use and waste generation amounts in the new facilities would be similar to other modern office and shop buildings. Utility corridors would be established and utilities relocated to provide a consolidated, efficient utility network that can be serviced without major disruption to the engineering complex. Electrical power distribution may need to be upgraded to TA-16 to serve the proposed new and remodeled buildings in the engineering complex; however, no additional electrical power transmission lines are anticipated. Other utility capacities within TA-16 may also need to be upgraded to serve the refurbished engineering complex, although no major changes in utility mains outside TA-16 are anticipated.	
WASTE MANAGEMENT WASTE MANAGEMENT		Construction solid waste is estimated at 5,270 yd3 (4,023 m3).	

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Table 5. Estimated Waste Source, Quantity, Traffic Effect, and Disposal Location: Construction Phase

Source	Quantity yd^3 (m^3)	Traffic (truck/week)	Start Date	Duration	Potential Disposal Location
Advanced Manufacturing Office Building	900 (684)	2	FY02	10 months	Los Alamos Landfill or Replacement Facility
Stockpile Support Office Building	900 (684)	2	FY03	10 months	Los Alamos Landfill or Replacement Facility
Crafts Support Building	900 (684)	2	FY02	10 months	Los Alamos Landfill or Replacement Facility
Cold Machine Shop	1200 (918)	3	FY02	10 months	Los Alamos Landfill or Replacement Facility
Hot Machine Shop	300 (240)	1	FY04	7 months	Los Alamos Landfill or Replacement Facility
Calibration Laboratory	650 (494)	2	FY05	9 months	Los Alamos Landfill or Replacement Facility
Shock and Vibration Testing Laboratory	220 (167)	1	FY03	6 months	Los Alamos Landfill or Replacement Facility
Renovation of TA-16-193	100 (76)	1	FY03	6 months	Los Alamos Landfill or Replacement Facility
Renovation of TA-16-202	100 (76)	1	FY03	6 months	Los Alamos Landfill or Replacement Facility

Impact	Not Applicable	Addressed	Not Addressed
CONTAMINATED SPACE			XX
TRANSPORTATION (ON SITE, SHIPMENTS)		See WASTE MANAGEMENT AND D&D sections.	
ENVIRONMENTAL RESTORATION		No building construction is expected to disturb potential release sites[6] (PRSs) (Figure 5); however, asphalt removal, utility corridor excavation, or post construction landscaping could disturb some of these areas.	
ACCIDENTS ACCIDENTS		Potential accidents associated with the Proposed Action and alternatives are most likely to occur during either construction or demolition activities. No fatalities are likely to result from any likely accident scenarios. Operational hazards of the Proposed Action have been previously assessed in the LANL SWEIS (DOE 1999a) at the current locations of those operations. As there would be no substantial changes (such as in quantities of hazardous materials at risk) in operations from implementing the Proposed Action, the potential outcomes of accidents involving operations-related hazards are bounded by the operational hazard analyses in the SWEIS. This EA tiers from the broader	

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		scope of analyses in the SWEIS.	
D&D		The volume of solid waste from demolition activities is estimated to be approximately 30,000 yd3 (22,800 m3). Table 6 identifies estimated waste types and bounding volumes generated by demolition activities and potential disposal locations. Transportation needs are also shown in Table 6.	

Table 6. Estimated Waste Type, Quantity, Traffic Effect, and Disposal Location: Demolition

Type/Source	Quantity yd^3 (m^3)	Traffic (truck/week)	Duration	Potential Disposal Location
Uncontaminated building debris	30,000 (22,800)	10	36 months	Los Alamos Landfill or Replacement Facility
Asbestos building components	120 (91.2)	1	6 months	Mountainair, NM, or Phoenix, AZ
Lead-based paint	1 (0.76)	1	1 day	Albuquerque, NM
Photo-chemicals (silver) from TA 8-70	1 (0.76)	1	1 day	Fernley, NV
HE-contaminated material from demolished TA-16 300-line buildings	145 (110)	1	6 months	Lake Charles, LA
LLW from TA-3-102 (Hot Machine Shop)	10 (7.6)	1	2 weeks	LANL, Area G, TA-54

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CUMULATIVE IMPACTS		This analysis concludes that there would not be cumulative effects on cultural resources, waste management, or other aspects of the environment.	

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
LAND USE			**Proposed Action** **Alternative 1** **Alternative 2 (No Action)**
VISUAL		**Proposed Action** Demolition and debris removal under the Proposed Action would have a temporary effect on visual resources if the staging areas for the concrete removal were to be located near Pajarito Road. ***Flood Retention Structure*** Partial removal of the FRS would take place in an access-restricted area and would not be visible from the road. A staging area for crushing concrete and loading trucks would be visible to traffic passing on Pajarito Road; this would be temporary. ***Low-head Weir and Detention Basin*** Under the Proposed Action, the low-head weir and detention basin would remain in place, with routine maintenance and sediment removal if necessary. Maintenance activities would be visible to passers-by on SR 4. ***Road Reinforcements*** Under the Proposed Action, the road reinforcements would remain in place. There would be no change in the visual environment. ***Steel Diversion Wall*** Removal of the steel diversion wall would result in a temporary disruption. The demolition would take place in an access-restricted area and would not be visible to the public. **Alternative 1** Disassembly of the subject structures would cause disruption lasting for several days to as long as several months for the FRS. Both the FRS and the steel diversion wall are located in access-restricted areas and demolition of these	

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Alternative 1: Disassembly of All Structures Alternative
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VISUAL		structures would not be visible to the public. The low-head weir and detention basin and the road reinforcements are visible to passers-by, and their removal would have a temporary effect on visual resources. None of these would disrupt any vistas. ***Flood Retention Structure*** Total disassembly of the FRS would take place in an access-restricted area and would not be visible from the road. A staging area for crushing concrete and loading trucks would be visible to traffic passing on Pajarito Road; this would be temporary. ***Low-head Weir and Detention Basin*** Disassembly of the low-head weir would be visible from SR 4. This would be a temporary disruption in the visual environment to traffic passing on this road. ***Road Reinforcements*** Removal of the road reinforcements would be visible to passers-by. This would have a temporary effect on the visual environment. ***Steel Diversion Wall*** Removal of the steel diversion wall would result in a temporary disruption. The demolition would take place in an access-restricted area and would not be visible to the public. **Alternative 2 (No Action)** The No Action Alternative would not affect visual resources. Routine maintenance would only temporarily affect the area near the structures and would not affect vistas near the subject structures. ***Flood Retention Structure*** Under the No Action Alternative, the FRS would remain in place with routine maintenance. There would be no change to the visual environment. ***Low-head Weir and Detention Basin*** Under the No action Alternative, the low-head weir and detention basin would remain in place, with routine maintenance and sediment removal if necessary. Maintenance activities would be visible to passers-by on SR 4.	

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Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
VISUAL		***Road Reinforcements*** Under the No Action Alternative, the road reinforcements would remain in place. There would be no change in the visual environment. ***Steel Diversion Wall*** Under the No Action Alternative, the steel diversion wall would remain in place. There would be no change in the visual environment. Removal of the steel diversion wall would result in a temporary disruption. The demolition would take place in an access-restricted area and would not be visible to the public.	
NOISE		**Proposed Action** Noise generated by the Proposed Action would not be expected to affect workers or members of the public. Work would be performed according to site-specific work plans and workers would wear hearing protection as required. ***Flood Retention Structure*** No adverse effects on 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 and highly localized in remote and unoccupied areas at LANL. The Proposed Action would result in limited short-term increases in noise levels associated with various demolition activities. Following the completion of these activities, noise levels would return to existing levels. ***Low-head Weir and Detention Basin*** The low-head weir would remain in place under the Proposed Action as would be the case under the No Action Alternative. Therefore, ambient noise levels would remain unchanged in the vicinity of the low-head weir and detention basin. Ongoing routine maintenance activities would continue; these have the potential for creating low levels of noise that would be temporary and short-term in nature. ***Road Reinforcements*** Road reinforcements would remain in place under the Proposed Action as would be the case for the No Action Alternative. Ambient noise levels would remain unchanged in the vicinity of the road reinforcements.	

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Alternative 1: Disassembly of All Structures Alternative
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Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
NOISE		Ongoing routine maintenance activities would continue; these have the potential for creating short-term increases in noise levels. ***Steel Diversion Wall*** Removal of the above ground portions of the steel diversion wall would have the same noise issues as those described previously in this section. Total removal of the steel panels would result in limited short-term increases in noise levels associated with various demolition activities. Following the completion of these activities, noise levels would return to existing levels. **Alternative 1** Noise generated by the Disassembly Alternative would not be expected to affect workers or members of the public. Work would be performed according to site-specific work plans and workers would have hearing protection as required. ***Flood Retention Structure*** The Disassembly Alternative would have the same issues as the Proposed Action for the FRS described in Section 4.1.9 above; however, the duration of demolition and site remediation activities would be extended by about three months. The Disassembly Alternative would result in limited short-term increases in noise levels associated with various demolition activities. Following the completion of these activities, noise levels would return to existing levels. Noise generated by this alternative would not be expected to have an adverse effect on workers. ***Low-head Weir and Detention Basin*** This alternative would have the same issues as those described previously in Section 4.1.9, the Proposed Action for the FRS. A crew of five would be required to work for approximately three weeks to accomplish the removal. The Disassembly Alternative would result in limited short-term increases in noise levels associated with various demolition activities. Following the completion of these activities, noise levels would return to existing levels. Noise generated by this alternative would not be expected to have an adverse effect on workers.	

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NOISE		***Road Reinforcements*** This alternative would have the same issues as those described previously in Section 4.1.9, the Proposed Action for the FRS. A crew of 10 would be required to work for approximately six weeks to accomplish the removal. The Disassembly Alternative would result in limited short-term increases in noise levels associated with various demolition activities. Following the completion of these activities, noise levels would return to existing levels. Noise generated by this alternative would not be expected to have an adverse effect on workers. ***Steel Diversion Wall*** Removal of the steel diversion wall would have the same issues as those described previously in this section. A crew of eight would be required to work for approximately six weeks to accomplish the removal. Total removal would result in limited short-term increases in noise levels associated with various demolition activities. Following the completion of these activities, noise levels would return to existing levels. **Alternative 2 (No Action)** Ambient noise levels would remain unchanged in the vicinities of the flood control structures. Environmental noise levels in and around the flood control and erosion reduction structures would be expected to remain below 80 dBA on average. ***Flood Retention Structure*** Under the No Action Alternative, ambient noise levels would remain unchanged in the vicinity of the FRS. Potential noise from demolition activities associated with the Proposed Action would not occur, but ongoing routine maintenance activities would continue. Environmental noise levels in and around the FRS and facilities or operations at LANL would be expected to remain below 80 dBA on average with no resulting adverse effects. ***Low-head Weir and Detention Basin*** Under the No Action Alternative, ambient noise levels would remain unchanged in the vicinity of the low-head weir and detention basin. Ongoing routine maintenance activities would continue. Environmental noise levels in and around the low-head weir and	

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NOISE		detention basin and facilities or operations at LANL would be expected to remain below 80 dBA on average with no resulting adverse effects. ***Road Reinforcements*** Under the No Action Alternative, ambient noise levels would remain unchanged in the vicinity of the road reinforcements. Ongoing routine maintenance activities would continue. Environmental noise levels in and around the road reinforcements and facilities or operations at LANL would be expected to remain below 80 dBA on average with no resulting adverse effects. ***Steel Diversion Wall*** Under the No Action Alternative, ambient noise levels would remain unchanged in the vicinity of the steel diversion wall. Potential noise from demolition activities associated with the Proposed Action would not occur, but ongoing routine maintenance activities would continue. Environmental noise levels in and around the road reinforcements and facilities or operations at LANL would be expected to remain below 80 dBA on average with no resulting adverse effects.	
GEOLOGY GEOLOGY		**Proposed Action** Proper engineering design and controls to ensure slope stability would be employed during demolition activities. No effect on the geology of the structure sites would be expected to occur from implementing the Proposed Action. ***Flood Retention Structure*** Partial removal of the FRS would leave “wings” of RCC attached to the walls of Pajarito Canyon. Continued erosion and enlargement of grooves already formed in the RCC could reduce the overall stability of the “wings” over time; these grooves and cracks could also become enlarged by freeze-thaw cycles and rainfall. Additionally, the wings of the FRS would be susceptible to any seismic vibrations and ground movements resulting from an earthquake (possible proximity to the Guaje Mountain Fault Zone may increase this risk) should one occur in the area. No effects are expected from implementing the Proposed Action on geology due to the use of BMPs and the design of the structure’s below-surface portions, which would remain intact.	

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GEOLOGY		The construction, maintenance, grading, and other activities related to access roads to Pajarito Canyon are not anticipated to have an effect on local geology. Access road enhancement activities would be performed to engineering specifications that should eliminate or minimize effects to the overall stability of the north side of the canyon. If TA-18 relocates, improvements and road maintenance of the unimproved existing road in the bottom of Pajarito Canyon, from TA-18 to the FRS, could increase need for additional BMPs to control erosion. ***Low-head Weir and Detention Basin*** The Proposed Action, as for the No Action Alternative, is to leave the low-head weir in place and provide periodic maintenance. Some accumulation of sediments behind the weir is expected; periodic maintenance would include silt removal. No other effects on local geology would be expected. ***Road Reinforcements*** Under the Proposed Action, the road reinforcements would be left in place. Regular inspections and periodic maintenance would be performed to ensure that outlet structures do not become blocked. No effects to local geology would be expected from implementing either the Proposed Action or the No Action Alternative. ***Steel Diversion Wall*** Total removal of the above ground portions of the steel diversion wall would be a part of the Proposed Action. No effects to local geology would be expected. **Alternative 1** Proper engineering design and controls would be employed to ensure slope stability during demolition activities. No adverse effect on the geology of the structure sites would be expected to occur from implementing the Disassembly Alternative. ***Flood Retention Structure*** Total removal of the FRS would result in exposure of the canyon sides to accelerated and increased sloughing or erosion. Road	

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		upgrades necessary for removal of the structure may have some effect on slope stability or erosion and sedimentation rates as discussed above. ***Low-head Weir and Detention Basin*** Total removal of the low-head weir would essentially return this portion of Los Alamos Canyon to its natural state. There would be no effects on local geology. ***Road Reinforcements*** Removal of the road reinforcements would not effect the geology in the vicinity of the individual reinforcements. Soil would be exposed that could, until revegetation occurred, be slightly more susceptible to erosion. BMPs would be installed to reduce adverse erosion effects. ***Steel Diversion Wall*** Total removal of the steel diversion wall would essentially return this portion of Pajarito Canyon to its natural state. No effects to local geology would be expected. **Alternative 2 (No Action)** Inspections would take into consideration slope stability, erosion, excessive rainfall, flooding events, and seismic events. Routine maintenance would include stabilizing slopes and reducing erosion, which could threaten the stability of the various structures. There would be no adverse effects to the geology of the subject structure areas as a result of the No Action Alternative ***Flood Retention Structure*** Under the No Action Alternative, if the FRS were maintained and inspected on a regular basis, it should continue to retain floodwaters and release them slowly as designed for the life of the structure. However, slope stability would still be subject to natural processes such as erosion, landslides, rockfalls, rainfalls, freezing and thawing, and seismic events. Erosion deemed to be a threat to the stability of the FRS would need to be dealt with in an appropriate manner and timeframe. No adverse effect to the geology in the vicinity of the FRS would be likely as a result of implementing the No Action Alternative. ***Low-head Weir and Detention Basin*** The No Action Alternative is the same as	

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
GEOLOGY		the Proposed Action for this structure. Some accumulation of sediments behind the weir would be expected; periodic maintenance would include sampling and silt removal as appropriate. No adverse effect to the geology of the weir site would be expected from implementing the No Action Alternative. ***Road Reinforcements*** The No Action Alternative would not be expected to result in adverse effects to the geology of the reinforcement areas. Regular inspections and periodic maintenance would be performed to ensure that outlet structures do not become blocked. ***Steel Diversion Wall*** The No Action Alternative would not be expected to result in adverse effects to the geology in the vicinity of the steel diversion wall. Periodic inspections and routine maintenance would not be expected to have an adverse effect on local geology.	
SEISMIC		See GEOLOGY	
SOILS		See GEOLOGY	
SURFACE WATER		**Proposed Action** Minor effects to surface and subsurface water quality would be expected in Pajarito Canyon from implementing the Proposed Action. Controlled demolition and proper removal actions, including BMPs, would be put in place to preserve water quality during actual demolition activities. Long-term site stabilization at each of the subject structures would help protect surface water quality. Site remediation actions would be required if contamination were present to prevent surface water quality downstream and to preserve subsurface water quality conditions. **Flood Retention Structure** Demolition of the FRS would be performed in a controlled manner to ensure containment of potentially contaminated sediments so that there would be no adverse effect to water quality. If the contamination levels in Pajarito Canyon were to be below action limits established by regulators, the accumulation of sediments behind the FRS would have no effect, or only a small effect, on either surface or groundwater quality. If the sediments	

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SURFACE WATER		were to be contaminated at levels above which remediation would be required, contamination of surface and shallow groundwater could result. Periodic sampling and proper remediation actions, if needed, would preserve water quality within Pajarito Canyon and points downstream of the FRS. The installation of BMPs during demolition activities would protect surface water quality from siltation; revegetation and stabilization of the sides of the canyon would protect surface-water quality long term. Excavation or demolition debris would not be placed in or near drainages or on the floodplain. Excavated materials would be properly disposed of at an appropriate receiving site. If sediments were to be contaminated, they would be disposed of appropriately (see Section 4.1.1 on Waste Management). No adverse effects to surface or groundwater quality would be expected from improving the road down the north slope of Pajarito Canyon from Pajarito Road or the road up the canyon floor from TA-18. BMPs would prevent effects to water quality by controlling the streambed and decreasing erosion and sediment load in the streams. ***Low-head Weir and Detention Basin*** If the low-head weir and detention basin were to remain in place under the Proposed Action, water resource effects would be the same as for the No Action Alternative. The weir would provide some containment of sediments washing down Los Alamos Canyon. Elevated constituents present within the sediments could affect water quality in surface waters, shallow groundwater, and, potentially, the regional aquifer. Routine sampling and periodic removal of sediment would occur based on the levels of constituents in the silt in the detention basin. ***Road Reinforcements*** There would be no measurable effect on water resources or quality by allowing the road reinforcements to remain in place under the Proposed Action as would be the case for the No Action Alternative. Periodic inspection would occur and routine maintenance activities would be conducted with BMPs in place. ***Steel Diversion Wall*** Total removal of the above ground portions of the steel	

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SURFACE WATER		diversion wall would be conducted under the Proposed Action. There would be no placement of excavation or demolition debris in or near drainages or on the floodplain. Excavated materials would be properly recycled or taken to an appropriate receiving site. If sediments at the diversion wall were contaminated, they would be disposed of appropriately (see Section 4.1.1 on Waste Management). **Alternative 1** Minor effects to surface and subsurface water quality would be expected from implementing the Disassembly Alternative. Controlled demolition and proper removal actions, including BMPs, would preserve water quality during actual demolition activities. Long-term site stabilization at each of the subject structures would help protect surface water quality. Site remediation actions would be required if contamination were to be present to prevent surface water quality downstream and to preserve subsurface water quality conditions. ***Flood Retention Structure*** The Disassembly Alternative would have the same issues as the Proposed Action described above. BMPs would prevent effects to water quality by controlling the streambed and decreasing erosion and sediment load in the streams. ***Low-head Weir and Detention Basin*** Total removal of the low-head weir would return the streambed to its natural state. The demolition of the weir would be performed in a controlled manner to ensure containment of possible elevated constituents (in sediments) so that no adverse effect to water quality would likely occur. No placement of excavation or demolition spoils in or near drainages or on the floodplain would occur. Excavated materials would be properly disposed of at an appropriate receiving site. If sediments were contaminated, they would be dealt with as radioactive low level or mixed waste as previously described in Section 4.1.1. BMPs derived from the SWPP Plan would be implemented to prevent erosion and migration of disturbed soil from the site caused by storm water or other water discharges.	

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SURFACE WATER		***Road Reinforcements*** Activities involved in removal of road reinforcement structures would be similar to those described above for removal of the low-head weir and detention basin. BMPs would control storm water runoff effects during demolition activities to protect surface water quality. ***Steel Diversion Wall*** Total removal of the diversion wall would return the streambed to its natural state. Issues involved in removal of this structure would be the same as those described above for removal of the low-head weir and detention basin. **Alternative 2 (No Action)** If accumulated sediments were contaminated, they could adversely affect surface water and shallow groundwater quality. Long-term site stabilization at each of the subject structures would help to protect surface and groundwater quality, as would routine maintenance and removal of sediment at the subject sites. There would be no adverse effect to water quality as a result of the No Action Alternative. ***Flood Retention Structure*** With the No Action Alternative, sediment would continue to accumulate behind the FRS (as designed). As such, studies would be conducted to determine if the sediments are contaminated as this could have a detrimental effect on water quality of surface water and shallow groundwater. Proper remediation actions would be conducted to preserve water quality within Pajarito Canyon and points downstream of the FRS. BMPs would also be in place during maintenance activities to protect surface water quality from erosion effects. No adverse effect to water quality would be expected as a result of implementing the No Action Alternative. ***Low-head Weir and Detention Basin*** The No Action Alternative is the same as the Proposed Action. The low-head weir and detention basin would provide some containment of sediments washing down Los Alamos Canyon. Routine sampling and periodic removal of sediments would occur based on the levels of constituents in the silt in the detention basin. No adverse effect would be	

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

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SURFACE WATER		expected to water quality as a result of implementing the No Action Alternative ***Road Reinforcements*** The No Action Alternative is the same as the Proposed Action. There would be no adverse effect on water resources or quality by allowing the road reinforcements to remain in place. ***Steel Diversion Wall*** Under the No Action Alternative, the steel diversion wall would remain in place. No adverse effect to water quality would be expected as a result of implementing this alternative.	
GROUND WATER		See SURFACE WATER	
RAD AIR QUALITY			**Proposed Action** **Alternative 1** **Alternative 2 (No Action)**
NON-RAD AIR QUALITY		**Proposed Action** Air quality would be unchanged as a result of implementing the Proposed Action. Standard emissions associated with demolition activities. **Alternative 1** Air quality would be unchanged as a result of implementing the Disassembly Alternative. During demolition, there would be a temporary increase in localized particulate emissions (dust). Use of heavy equipment and vehicles would also cause an increase in NO_x emissions for short-term temporary periods. Control measures would be in place to suppress dust generated during demolition activities. ***Flood Retention Structure*** This demolition activity would cause a temporary increase in localized particulate and NO_x emissions at the demolition site, along the roadways used to transport the concrete debris, at the 3-ac (1.2-ha) staging	

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NON-RAD AIR QUALITY		area along Pajarito Road, and at LANL's storage location (currently Sigma Mesa). If controlled blasting is used during demolition, materials and equipment used to blast the concrete may contain or emit air pollutants or toxic chemicals reportable under EPCRA. Particulate emissions would be reduced through the use of dust suppression activities. ***Low-head Weir and Detention Basin*** Demolition of this structure would produce temporary, localized particulate and NO_x emissions (dust and vehicle exhaust). Dust would be generated short term during any sediment removal activities. Emissions would be reduced through the use of control measures. ***Road Reinforcements*** Air quality effects would be minor. Removal activities would have the potential for generating small amounts of dust over a few days duration; truck and equipment exhaust would be similar. Emissions would be temporary and localized and would be reduced by dust suppression activities. ***Steel Diversion Wall*** Removal of this structure would cause a temporary increase in localized particulate emissions at the demolition site and along the roadways used to transport the concrete debris. Removal activities would be short term in nature. **Alternative 2 (No Action)** Air quality would be unchanged from ongoing conditions as a result of the No Action Alternative. Routine maintenance procedures may produce temporary, localized particulate emissions. Control measures would be put in place to minimize emissions during maintenance activities. ***Flood Retention Structure*** Routine maintenance procedures may produce temporary, localized particulate emissions. There would be no change from ambient air quality effects associated with this alternative. ***Low-head Weir and Detention Basin*** Routine maintenance procedures may produce temporary, localized particulate emissions. There would be no change	

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NON-RAD AIR QUALITY		from current air quality conditions. ***Road Reinforcements*** Routine maintenance procedures may produce temporary, localized particulate emissions. There would be no change from current air quality conditions. ***Steel Diversion Wall*** Routine maintenance procedures may produce temporary, localized particulate emissions. There would be no change from current air quality conditions.	
WETLANDS (and FLOODPLAINS)		**Proposed Action** The Proposed Action could have short-term effects on the floodplains in Pajarito Canyon. BMPs would be placed to prevent or minimize any adverse effects, however. Wetlands in lower Pajarito Canyon would not be adversely affected. A floodplain/wetland assessment is included as an appendix in this EA. ***Flood Retention Structure*** The downstream wetland area east of TA-18 would not likely be adversely affected due to the BMPs that would be employed at the site and the distance to the wetlands. Work conducted in Pajarito Canyon could contribute to an increase in the potential for sediment movement. If large quantities of sediment were moved downstream, there could be some retention of those sediments by the wetlands downstream in Pajarito Canyon. All excess materials, including demolition debris, soils, and dead vegetation, would be removed from the area so that normal flows could resume after the conclusion of the project. The area would be reseeded to stabilize the site. ***Low-head Weir and Detention Basin*** Implementing the Proposed Action would leave this structure in place with routine inspection and maintenance. There would be no adverse effect on the floodplains. Depending on available moisture, the one-quarter acre potential wetland area could continue to develop and become established or it may fail to become established. If removal of sediments were necessary during maintenance of the structure under this alternative, as would be the case for the No Action Alternative, appropriate permitting and regulatory compliance measures would be undertaken. As the	

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WETLANDS (and FLOODPLAINS)		Los Alamos Canyon ecosystem recovers over time, the amount of runoff reaching the detention basin is expected to decrease. Either this decrease in available surface moisture or the disruption to the area from silt removal activities could result in the reduction or elimination of the potentially developing wetland area. ***Road Reinforcements*** Effects to the floodplain would be the same as for the No Action Alternative, namely, no effects would result except from maintenance activities. Maintenance activities could potentially result in a minor temporary increase in localized erosion. BMPs would be used to minimize soil erosion into the floodplains ***Steel Diversion Wall*** Removal of the steel diversion wall would disturb vegetation in the floodplain. BMPs would be used during demolition. Reseeding of the area would occur after site work was completed. **Alternative 1** The Disassembly Alternative could have short-term effects on the floodplains. BMPs would be in place to prevent or minimize any adverse effects to floodplains. Effects to wetlands could occur and adverse effects to a potentially developing wetland could result. A floodplain/wetland assessment is included as an appendix in this EA. ***Flood Retention Structure*** The downstream wetland area east of TA-18 would not likely be adversely affected due to BMPs that would be employed at the site and the distance to the wetlands. With total removal of the FRS, there would be a proportional increase in erosion potential of the canyon walls since the sides of the FRS structures would be completely removed. Work conducted in Pajarito Canyon could contribute to an increase in potential for sediment movement. If large quantities of sediment move downstream, there could be some retention of those sediments by the wetlands downstream in Pajarito Canyon. All excess materials, including demolition debris, soils, and dead vegetation, would be removed from the area so that normal flows could resume at the conclusion of	

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WETLANDS (and FLOODPLAINS)		the project. It is not likely that potential siltation to the Pajarito Canyon wetlands would reduce or eliminate their functional capabilities. ***Low-head Weir and Detention Basin*** If the sediment in the detention basin and the weir were to be removed, demolition work would be taking place within an area that might be the site of a developing wetland. Removing the sediment that allowed the wetland to develop could destroy the wetland itself if it becomes established over time as discussed for the Proposed Action and No Action Alternatives. ***Road Reinforcements*** Total removal of these structures would cause a slight increase in erosion potential because the roads would be left without any reinforcements; rehabilitation work performed after the Cerro Grande Fire replaced the original reinforcements on these roads and enhanced them. BMPs would be in place to minimize or prevent any adverse short-term effects. Reseeding of the area would also help minimize or prevent long-term adverse effects. ***Steel Diversion*** Wall Removal of the steel diversion wall could disturb vegetation in the floodplain. BMPs would be used during demolition and reseeding of the area. **Alternative 2 (No Action)** The No Action Alternative would have minimal effects on the floodplain. Routine maintenance activities would not be expected to have any adverse effects on floodplains but could adversely affect a potential wetland area in Los Alamos Canyon. A floodplain/wetland assessment is included as an appendix in this EA. ***Flood Retention Structure*** The No Action Alternative activities for maintenance and repair of the FRS would reduce the potential for crumbling of the structure and subsequent long-term release of construction materials that could affect the floodplain and wetlands downstream in TA-18. Routine maintenance is expected to remove vegetation growth in the sediment upstream	

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

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WETLANDS (and FLOODPLAINS)		of the structure. No adverse effect or change to the wetland and floodplain functions and values within Pajarito Canyon would likely occur from the No Action Alternative. ***Low-head Weir and Detention Basin*** The No Action Alternative would have the same effects as the Proposed Action with regard to this structure. Leaving this structure in place and providing routine maintenance could allow the wetland to continue to either develop or it could decline and disappear. The No Action Alternative could have an adverse effect on the potential wetland area if sediment were removed periodically on an "as needed" basis should the small wetland area survive. No change to the floodplain would be expected from the No Action Alternative. ***Road Reinforcements*** The No Action Alternative would result in leaving these structures in place. With maintenance, these structures would continue to provide reinforcement along the road. Maintenance would not likely have adverse effects to the floodplain or wetlands below the structures. ***Steel Diversion Wall*** Leaving this structure in place would not affect the floodplains or wetlands. Routine maintenance would have no adverse effect on either floodplains or wetlands.	
T&E HABITAT		**Proposed Action** There could be a minor effect on biological resources, although these effects would be short term and temporary in nature. Timing of site work could be altered to avoid breeding seasons and migration periods, if necessary, to avoid adverse biological effects to sensitive species. ***Flood Retention Structure*** Under the Proposed Action, disturbance of the potential Mexican spotted owl habitat is possible and this may affect, but is not likely to adversely affect, the habitat. Some overstory and understory vegetation would be disturbed along the mesa top and partially down into the canyon. If TA-18 facilities and capabilities remain in their present location, the use of a continuous conveyor belt to transport debris out of Pajarito Canyon would	

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T&E HABITAT		potentially increase the amount of disturbed vegetation and generate noise. At the end of the demolition and removal of concrete debris and sediment, the streambed would be graded and the remaining sides of the FRS would be stabilized. To replace the vegetation loss, the banks would be reseeded and potentially planted with sapling trees. If TA-18 capabilities and facilities are relocated and the road below the FRS used for transportation and staging of the concrete debris, there would be disturbed vegetation. Reseeding would be required once clean up has been completed. Constraints on the timing of activities and noise levels allowed may be required if Mexican spotted owls occupy habitat in the area; these constraints would be necessary to avoid any adverse effects to the AEI use by individual owls. Noise and activities associated with the demolition activities and post-demolition site revegetation activities may temporarily disperse animals that use the area or modify their migration patterns. These would be short-term effects and the animals would be expected to reoccupy the area. ***Low-head Weir and Detention Basin*** The low-head weir and detention basin are not located in any AEI and are not major features of the site ecology. There would be no effect on threatened or endangered species from the Proposed Action, as would be the case for the No Action Alternative, and no effect to other animals in the area would be expected either. Routine siltation removal could periodically disrupt plants growing in the detention basin. ***Road Reinforcements*** The road reinforcements are not located in any AEI. There would be no effect on threatened and endangered species or other animals or plants in the area from the Proposed Action, as would be the case for the No Action Alternative. ***Steel Diversion Wall*** Temporary, short-term effects to animals and plants could result from demolition of the steel diversion wall. Noise and activity constraints during the breeding season of the Mexican spotted owl would avoid any adverse effects to the nearby AEI if the area were to become occupied by that species. The area would be reseeded after all demolition activities.	

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

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T&E HABITAT		**Alternative 1** There could be a minor effect on biological resources, although these effects would be short term and temporary in nature. Timing of site work could be altered to avoid breeding seasons and migration periods, if necessary, to avoid adverse biological effects to sensitive species. ***Flood Retention Structure*** Under this alternative, to completely remove the FRS, disturbance of Mexican spotted owl habitat is possible and this may affect but is not likely to adversely affect the habitat. There would be noise and activity constraints during the breeding season of the Mexican spotted owl. Vegetation disturbance would be the same as identified for the Proposed Action. At the end of demolition and removal of debris and sediment, the streambed would be graded and the canyon sides would be stabilized. To replace the vegetation loss, the banks would be reseeded and potentially planted with sapling trees. ***Low-head Weir and Detention Basin*** The low-head weir and detention basin are not located in any AEI and are not major features of the site ecology. There would be no effect on threatened and endangered species from any of the alternatives and no effect to other animals or plants in the area. Plants growing within the detention basin may be removed along with the detention basin. ***Road Reinforcements*** The road reinforcements are not located in any AEI. There would be no effect on threatened and endangered species from of this alternative and no effect to other animals or plants in the area. ***Steel Diversion Wall*** Temporary, short-term effects to animals and plants could result from demolition of the steel diversion wall. Noise and activity constraints during the breeding season of the Mexican spotted owl would lessen any adverse effects to the nearby AEI if the area were to become occupied by that species. The area would be reseeded after all demolition activities.	

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T&E HABITAT		**Alternative 2 (No Action)** Under the No Action Alternative, there would be no effect on threatened or endangered species or their potential critical habitat in the Los Alamos area. Other plants and animals would not be adversely affected long term, except for small-scale removal of vegetation associated with maintenance activities. ***Flood Retention Structure*** Under the No Action Alternative, with the FRS staying in place, there would be no effect on the potential Mexican spotted owl habitat. Threatened or endangered species would therefore not be affected. Small-scale removal of vegetation within the sediment may occur periodically. ***Low-head Weir and Detention Basin*** The low-head weir and detention basin are not located in any AEI. There would be no effect on threatened or endangered species from the No Action Alternative. No effect to animals in the vicinity of the structure would be likely but routine sediment removal on an "as needed" basis could remove small amounts of vegetation. ***Road Reinforcements*** The road reinforcements are not located in any AEI. There would be no effect on threatened or endangered species or other animals and vegetation from the No Action Alternative. ***Steel Diversion Wall*** Under the No Action Alternative, the steel diversion wall would remain in place. There would be no effect on the potential Mexican spotted owl habitat in the area or to other plants and animals in the vicinity of the structure.	
FLOOD-PLAINS		See WETLANDS (and FLOODPLAINS)	
PUBLIC HEALTH		**Proposed Action** The Proposed Action would not be expected to affect the health of demolition and maintenance workers or the public. Routine demolition activities and maintenance activities would be conducted according to site-specific work plans.	

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

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PUBLIC HEALTH		***Flood Retention Structure*** The Proposed Action is not expected to result in an adverse effect on the health of demolition and maintenance workers who would be actively involved in potentially hazardous activities such as heavy equipment operations and removal of waste concrete from the FRS. Potentially serious exposures to various hazards or injuries are possible during the breeching of the FRS under the Proposed Action. Adverse effects could range from relatively minor incidents (such as respiratory irritation, cuts, or sprains) to major injuries (such as lung damage or broken bones). To prevent serious injuries, all site construction contractors would be required to adhere to a Construction Safety and Health Plan (Plan) as described in the Proposed Action. Adherence to an approved Plan, use of PPE and engineered controls, and completion of appropriate hazards training would be expected to prevent adverse health effects on construction workers performing work to implement the Proposed Action. Routine maintenance of flood control structures would be performed along with occasional removal of debris or repair of site features. For maintenance that requires the removal of large amounts of debris or performance of structural repairs, heavy equipment and the application of concrete to perform repairs may be needed. Hazards associated with the operation of heavy equipment and the application of concrete could pose a minimal health risk to maintenance workers. ***Low-head Weir and Detention Basin*** Under the Proposed Action, as for the No Action Alternative, injuries to workers and members of the public would be unlikely from leaving the low-head weir and detention basin in place. No exposures to waste concrete and debris would occur because no demolition activities would take place. Ongoing routine maintenance activities would continue. Potential health risks to workers from maintenance activities, such as repair of gabions, would be minimal. ***Road Reinforcements*** Road reinforcements would stay in place under the Proposed Action. There would be little potential for injuries to workers and members of the public under this alternative, as would be the case for the No	

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PUBLIC HEALTH		Action Alternative. No exposures to waste concrete and debris would occur because no demolition activities would take place. Ongoing routine maintenance activities would continue. Potential health risks to maintenance workers would be minimal. ***Steel Diversion Wall*** Removal of the steel diversion wall would have similar potential health risk issues as those described above in the FRS section, because heavy equipment would be used. However, as described in the Proposed Action, all site construction contractors would be required to adhere to a Construction Safety and Health Plan, and to use PPE and engineer controls. Therefore, this action is not expected to result in an adverse effect on the health of demolition workers. **Alternative 1** The Disassembly Alternative would not be expected to affect the health of demolition and maintenance workers. Routine demolition activities would be conducted according to site-specific work plans. **Flood Retention Structure** The Disassembly Alternative would have the same issues as the Proposed Action described above. Approximately the same number of demolition workers and debris removal vehicles would be required; however, the duration of demolition and site remediation activities would be extended by three months. This alternative would not be expected to result in an adverse effect on the health of demolition workers. **Low-head Weir and Detention Basin** This alternative would have the same issues as those described previously in the Proposed Action for the FRS because heavy equipment would be used. A crew of five would be required to work for approximately three weeks to accomplish total removal of the low-head weir and detention basin. This alternative would not be expected to result in an adverse effect on the health of demolition workers. **Road Reinforcements** This alternative would have the same issues as those described previously in the Proposed Action for the FRS because heavy	

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
PUBLIC HEALTH		equipment would be used. A crew of 10 would be required to work for approximately six weeks to accomplish the removal. This alternative is not expected to result in an adverse effect on the health of demolition workers. **Steel Diversion Wall** This alternative would have the same issues as those described previously in the Proposed Action for the FRS because heavy equipment would be used. A crew of eight would be required to work for approximately six weeks to accomplish removal of the steel diversion wall. This alternative would not be expected to result in an adverse effect on the health of demolition workers. **Alternative 2 (No Action)** Potential health risks to maintenance workers would be minimal. Routine maintenance activities would not be expected to affect workers if the No Action Alternative were implemented. **Flood Retention Structure** Under the No Action Alternative, there would be no potential for injuries to demolition workers and members of the public from the breeching of the FRS. No exposures to waste concrete and debris would occur because no demolition activities would take place. However, routine maintenance of the existing FRS would continue. Potential health risks to maintenance workers would be minimal and adverse health effects would be unlikely to occur under the No Action Alternative. **Low-head Weir and Detention Basin** Under the No Action Alternative, there would be no potential for injuries to demolition workers and members of the public. No exposures to waste concrete and debris would occur because no demolition activities would take place. Ongoing routine maintenance activities would continue. Potential health risks to maintenance workers would be minimal and adverse health effects would be unlikely to occur under the No Action Alternative. **Road Reinforcements** Under the No Action Alternative, there would be no	

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
PUBLIC HEALTH		potential for injuries to demolition workers and members of the public. There would be no exposures to waste concrete and debris because no demolition activities would take place. Ongoing routine maintenance activities would continue. Potential health risks to maintenance workers would be minimal and adverse health effects would be unlikely to occur under the No Action Alternative. **Steel Diversion Wall** Under the No Action Alternative, the steel diversion wall would remain in place and be maintained. Potential health risks to maintenance workers would be minimal. No exposures to waste concrete and debris would occur because no demolition activities would take place. No adverse health effects would be likely to occur under the No Action Alternative	
WORKER HEALTH		See PUBLIC HEALTH	
ENVIRONMENTAL JUSTICE			**Proposed Action** **Alternative 1** **Alternative 2 (No Action)**
CULTURAL RESOURCES		**Proposed Action** Prehistoric archaeological sites were identified at the sites before construction of the structures occurred and were avoided during construction. Implementation of the Proposed Action would not affect known cultural resources. ***Flood Retention Structure*** The demolition of part of the FRS could potentially affect prehistoric archaeological sites near the structure; however, these resources would be marked with flagging or temporary fencing during demolition activities so that they could be avoided. No adverse effects would be likely to occur to these cultural resources. ***Low-head Weir and Detention Basin*** The Proposed Action, as would be the	

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
CULTURAL RESOURCES		case for the No Action Alternative, would not affect the recorded prehistoric archaeological sites that occur near the weir. Cultural resource artifacts, objects, or fragments of objects may wash downstream into the detention basin over time; however, it would not be possible to identify the original location of these objects to place them in context. ***Road Reinforcements*** A single recorded historic cultural site is located near one of the road reinforcement sites. Leaving the road reinforcements in place with routine maintenance activities would not affect the recorded historic cultural site that occurs just downstream of the road reinforcements as it would be flagged or fenced and avoided. Implementing the Proposed Action would result in no different type or level of effects from those of the No Action Alternative. ***Steel Diversion Wall*** Cultural resources are present near the steel diversion wall along the cliff walls above the canyon floor. These resources would be adequately flagged or fenced before demolition activities commenced and avoided so there would be no expected effects. Removal of this structure would have no effect on cultural resources in the area. **Alternative 1** Prehistoric archaeological sites were identified at the sites before construction of the structures occurred and avoided. Implementation of the Disassembly Alternative would not affect known cultural resources. ***Flood Retention Structure*** Removal of the entire FRS would have the same potential effects as removal of a part of the FRS. See discussion above for Proposed Action. ***Low-head Weir and Detention Basin*** The Disassembly Alternative would not affect the recorded prehistoric archaeological sites that occur near the weir. It is possible that traditional cultural properties and cultural artifacts moving downstream could be trapped in the silt and would be removed along with the detention structure.	

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
CULTURAL RESOURCES		***Road Reinforcements*** There would be no effect on cultural resources with the Disassembly Alternative. The only historic cultural site located near one of the road reinforcements would be flagged and fenced. ***Steel Diversion Wall*** There would be no effect on cultural resources with the Disassembly Alternative. Cultural resources near the steel diversion wall would be adequately flagged and fenced before the initiation of any demolition activities. **Alternative 2 (No Action)** There would be no effect on cultural resources with the No Action Alternative. Routine maintenance activities would not be expected to affect archaeological sites. ***Flood Retention Structure*** There would be no effect on cultural resources with the No Action Alternative. Routine maintenance activities would not be expected to affect archaeological sites. ***Low-head Weir and Detention Basin*** There would be no effect on cultural resources with the No Action Alternative. Routine maintenance activities would not be expected to affect archaeological sites. ***Road Reinforcements*** There would be no effect on cultural resources with the No Action Alternative. Routine maintenance activities would not be expected to affect archaeological sites. ***Steel Diversion Wall*** There would be no effect on cultural resources with the No Action Alternative. Routine maintenance activities would not be expected to affect archaeological sites.	
SOCIO-ECONOMICS			**Proposed Action** **Alternative 1**

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
			Alternative 2 (No Action)
UTILITIES (GAS, ELECTRICITY, WATER)			**Proposed Action** **Alternative 1** **Alternative 2 (No Action)**
WASTE MANAGEMENT		**Proposed Action** Waste management effects would be minor because waste resulting from the Proposed Action would be disposed of in existing landfills, which have the capacity to accept the waste. Most of the debris generated by the Proposed Action would be recycled for future use in construction projects at LANL. ***Flood Retention Structure*** A large part of the approximately 25,000 yd^3 (19,000 m^3) of reclaimed concrete rubble and 200 yd^3 (153 m^3) of gabion rock resulting from partial demolition of the FRS would be recycled for use in construction projects at LANL. Uncontaminated soil would either be reused onsite for site restoration after demolition was completed or would be staged at the building debris storage yards on Sigma Mesa (TA-60) or another approved material management area for future use at LANL. Final disposition of the approximately 48,400 yd^3 (36,785 m^3) of removed sediments would depend on sampling and characterization results. Sediment accumulated at the FRS is not expected to be contaminated. ***Low-head Weir and Detention Basin*** The structure would remain in place with continued routine inspection and maintenance including sampling of sediments and periodic sediment removal and disposal as required. ***Road Reinforcements*** there would be inconsequential waste generation under the Proposed Action at this structure from the repair of the ACMs and shotcrete surfaces. ***Steel Diversion Wall*** Removal of this structure would have a minimal effect on waste management resources. About 25 yd^3 (19 m^3) of steel panels and beams	

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WASTE MANAGEMENT		generated by the demolition would be removed and shipped offsite for recycling. **Alternative 1** Waste management effects would be minor because waste resulting from this alternative would be disposed of in existing landfills that have the capacity to accept the waste. Most of the debris generated by the Disassembly Alternative would be recycled for future use in construction projects at LANL. ***Flood Retention Structure*** A large part of the approximately 50,000 yd^3 (38,000 m^3) of reclaimed concrete rubble and 300 yd^3 (230 m^3) of gabion rock resulting from demolition of the FRS would be recycled for use in construction projects at LANL. Uncontaminated soil would either be reused onsite for site restoration after demolition was completed or would be staged at the building debris storage yards on Sigma Mesa (TA-60) or another approved material management area for future use at LANL. Uncontaminated sediments and concrete rubble that cannot be recycled would be disposed of at the Los Alamos County landfill or its replacement facility. Uncontaminated scrap metal generated by demolition activities would be recycled. Final disposition of the approximately 48,400 yd^3 (36,785 m^3) of removed sediments would depend on sampling and characterization results. ***Low-head Weir and Detention Basin*** An estimated 1,700 yd^3 (1,300 m^3) of gabion rocks would be removed and stockpiled for further use at LANL. Sediments that have collected would be analyzed for elevated constituents and disposed of appropriately. Approximately 17,000 yd^3 (12,900 m^3) of sediment could be removed. Approximately 11,900 yd^3 (9,044 m^3) of soil and rock excavated and banked along the sides of the canyon during construction of the low-head weir and detention basin would be returned to the site to fill the basin area. ***Road Reinforcements*** Approximately 500 yd^3 (380 m^3) of concrete rubble resulting from total removal of the road reinforcements would be staged at the building debris storage yards on Sigma Mesa (TA-60) or another approved material management area for future use at LANL.	

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Alternative 1: Disassembly of All Structures Alternative
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WASTE MANAGEMENT		***Steel Diversion Wall*** Removal of this structure would have a minimal effect on waste management resources. Approximately 25 yd^3 (19 m^3) of steel panels and beams generated by the demolition would be recycled. **Alternative 2 (No Action)** A small amount of debris from routine maintenance procedures would require appropriate disposal. Waste management effects from the No Action Alternative would be minor because this waste would be disposed of in existing landfills that have the capacity to accept the waste. ***Flood Retention Structure*** There would be minimal waste management effects associated with implementing the No Action Alternative. On the yearly maintenance plan, debris such as brush, sticks, and branches, would continue to be removed and disposed of in accordance with applicable laws, regulations, and DOE Orders. Contaminated sediment would be removed and disposed of appropriately. ***Low-head Weir and Detention Basin*** There would be minimal waste management associated with implementing the No Action Alternative. Routine inspection and maintenance would continue. Contaminated sediment would be removed and disposed of appropriately. ***Road Reinforcements*** There would be minimal waste management associated with implementing the No Action Alternative. Routine inspection and maintenance would continue. ***Steel Diversion Wall*** There would be minimal waste management associated with implementing the No Action Alternative. Routine inspection and maintenance would continue.	
CONTAMINATED SPACE			**Proposed Action** **Alternative 1**

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
			Alternative 2 (No Action)
TRANSPORTATION (ON SITE, SHIPMENTS)		**Proposed Action** Demolition and debris removal activities at the FRS and the steel diversion wall would cause a temporary increase in traffic on Pajarito Road. This would be short term and would have an imperceptible effect on traffic at LANL. ***Flood Retention Structure*** Partial removal of the FRS would have a short-term, temporary effect on traffic on Pajarito Road during the demolition phase when material from the FRS and sediments that have accumulated behind the structure are removed. Approximately 1,250 loads would be required to remove an estimated 25,000 yd^3 (19,000 m^3) of concrete debris out of the canyon along the existing access road to the staging area on Pajarito Road. Approximately 10 loads would be required to remove about 200 yd^3 (153 m^3) of gabion rocks out of Pajarito Canyon. An additional 2,420 loads may be required to remove accumulated sediment out of the canyon. This would result in about an additional 7,360 truck trips on LANL roads over the seven-month anticipated duration period, which would be within the expected carrying capacity of the transportation conditions. ***Low-head Weir and Detention Basin*** Allowing the low-head weir and detention basin to remain in place under the Proposed Action, as for the No Action Alternative, would not affect traffic or transportation in the area. No changes in the traffic rate or patterns would occur at LANL. ***Road Reinforcements*** Allowing the road reinforcements to remain in place would not affect traffic or transportation in the areas of the road reinforcements. No changes in the traffic rate or pattern would occur at LANL ***Steel Diversion Wall*** Total removal of the above ground portions of the steel diversion wall would not likely affect local traffic along roads at TA-18. Approximately two truckloads would be required to move the steel panels	

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TRANSPORTATION (ON SITE, SHIPMENTS)		offsite for recycling, resulting in an increase of four truck trips on LANL roads. No perceptible changes in traffic rate or patterns would occur at LANL. **Alternative 1** Demolition and debris removal activities would cause a temporary increase in traffic on Pajarito Road. This would be short term and temporary and would have an imperceptible effect on traffic at LANL. ***Flood Retention Structure*** Total removal of the FRS could affect traffic on Pajarito Road during the demolition phase when material from both the FRS and the sediments that have accumulated behind the structure would be removed. It is estimated that approximately 2,500 loads would be required to remove about 50,000 yd^3 (38,000 m^3) of concrete debris out of the canyon along the existing access road and along Pajarito Road. Approximately 48,400 yd^3 (36,785 m^3) of removed sediments could require an additional 2,420 loads to remove this material. Approximately 10 loads would be required to remove about 200 yd^3 (153 m^3) of gabion rocks from the canyon bottom. This would result in about an additional 9,860 truck trips on LANL roads over the ten-month duration period, which would be within the expected carrying capacity of the transportation corridors. ***Low-head Weir and Detention Basin*** Total removal of the weir could have a minor effect on adjacent roads during the demolition phase when materials or sediments would be transported elsewhere. Approximately 1,700 yd^3 (1,300 m^3) of gabion rocks and 17,000 yd^3 (12,900 m^3) of sediment would be removed, resulting in 935 truckloads and 1,870 trips on LANL roads. ***Road Reinforcements*** Removal of road reinforcements would have a minor temporary effect on traffic during demolition activities. Approximately 500 yd^3 (380 m^3) would be removed resulting in 25 truckloads and 50 trips on LANL roads. ***Steel Diversion Wall*** Total removal of the steel diversion wall would not likely	

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TRANSPORTATION (ON SITE, SHIPMENTS)		affect local roads at TA-18. Approximately two truckloads would be required to move the steel panels and beams offsite for recycling, resulting in an increase of four truck trips on LANL roads. **Alternative 2 (No Action)** The No Action Alternative would not affect traffic and transportation. Routine maintenance would not be expected to affect roads in the vicinity of the flood control and erosion reduction structures. ***Flood Retention Structure*** The No Action Alternative would leave the FRS in place and would not affect Pajarito Road traffic. No changes in traffic patterns or rates would occur. ***Low-head Weir and Detention Basin*** The No Action Alternative is the same as the Proposed Action. No changes in the traffic rate or pattern would occur at LANL. ***Road Reinforcements*** The No Action Alternative is the same as the Proposed Action. No changes in the traffic rate or pattern would occur at LANL. ***Steel Diversion Wall*** The No Action Alternative would leave the steel diversion wall in place and would not affect Pajarito Road traffic. No changes in the traffic rate or pattern would occur at LANL.	
ENVIRONMENTAL RESTORATION			**Proposed Action** **Alternative 1** **Alternative 2 (No Action)**
ACCIDENTS		**5.1 FRS Structural Failure Hazards** The Pajarito Canyon FRS was designed and built to withstand a range of environmental loading conditions and not fail or cause a major accident to	

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Proposed Action: Partial removal of Flood and Sediment Retention Structures.
Alternative 1: Disassembly of All Structures Alternative
Alternative 2: No Action

Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
ACCIDENTS		occur. The structure is constructed of RCC on volcanic tuff. Its primary function is to provide retention and controlled release of water associated with the 100-year, six-hour storm. It was evaluated for four loading conditions: • Loading conditions 1, normal, reservoir empty; • Loading conditions 2, unusual, floodwaters from 100-year, six-hour storm; • Loading conditions 3, extreme, floodwaters from probable maximum flood; and • Loading conditions 4, extreme, reservoir empty subjected to 0.22 g peak ground acceleration earthquake. The evaluation also looked at available information on the geological and subsurface features at or near the structure and the construction records. The conclusions from this evaluation are as follows. 1. For all loading conditions, the structure can be considered stable against overturning. 2. For sliding through or separating RCC sections, the analysis indicates that major factors of safety in excess of target levels exist for all loading conditions using the RCC strength assumed in the design of the structure. 3. For sliding through or shifting the FRS on the foundation materials, the factors of safety are much greater than the target factors of safety for three of the four loading conditions evaluated. For the probable maximum flood loading condition, the factor of safety is at the target level. In summary, an evaluation of the design parameters of the FRS and the limited amount of geological information for the site did not reveal any serious or potential problems concerning the integrity of the structure. Therefore, a catastrophic collapse or failure of the FRS would not be expected to occur under	

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Alternative 1: Disassembly of All Structures Alternative
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ACCIDENTS		various normal, unusual, or extreme conditions. **5.2 Demolition (Construction) Hazards** Potential accidents associated with the Proposed Action and Disassembly Alternative are most likely to occur in relation to demolition activities. Demolition is considered in national statistics on construction accidents and, so, can be considered by comparing national statistics on construction with project worker information for the Proposed Action and Disassembly Alternative. Hazards for the Proposed Action (partial removal of the FRS) and the Disassembly Alternative can be grouped into construction hazards and transportation hazards. No fatalities are likely to result from any demolition (construction) or transportation accident scenarios. To estimate the potential number of fatalities that might occur from demolition-related activities of the Proposed Action, the estimated number of workers was compared to recent risk rates of occupational fatalities. Although fewer than 20 workers would be employed during the non-peak period of work activity over the duration of the project (7 months), 20 workers for the duration of the project was used in the risk calculations as a conservative measure. The average fatality rate in the U.S. is 3.9 deaths per 100,000 workers per year (Saltzman 2001). No deaths (0.0005) would be expected from implementing the Proposed Action demolition- (construction-) related activities from causes that include falls, exposure to harmful substances, fires and explosions, and being struck by objects, equipment, or projectiles. Based upon calculations of risks for 20 workers over 10 months for the Disassembly Alternative, no deaths (0.0007) would be expected from causes that include falls, exposure to harmful substances, fires and explosions, and being struck by objects, equipment, or projectiles as based on the average fatality rate in the U.S. for this type of work (Saltzman 2001). The risk of death for the Disassembly Alternative is only slightly higher than for the Proposed Action.	

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ACCIDENTS		**5.3 Transportation Hazards** Transportation activities could involve the transport of debris (mostly concrete, gabion rock, and sediment) that would result from FRS demolition activities up to the 3-ac (1.2 ha) staging area located along Pajarito Road. Depending on which alternative is selected, between approximately 3,680 and 5,892 loads could be transported. Part (up to 2,505 loads) of this total could be hazardous waste if any accumulations of chemicals or radionuclides in the sediment were to occur; however, the dilution factor would likely be so great within the sediments that it is unlikely that the sediment would be considered hazardous or radioactive wastes requiring special management and disposal. 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 chance of a fatality occurring to a driver of a medium or heavy truck hauling hazardous waste is about three in one million (2.7×10^{-6} per driver per year) based on 1993 nationwide statistics (NSC 1994). No statistics were found for trucks hauling waste on special roads such as the access road described in Chapter 2; however, the long distances and higher speeds that are included in the national statistics would not occur in this project and the number of driver-years would be very low; therefore, no transportation fatalities are expected for this project under any of the alternatives considered.	
D&D		See WASTE MANAGEMENT	
CUMULATIVE IMPACTS		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). The Proposed Action and alternatives addressed in this EA are expected to take place by 2010. As discussed in Chapter 2.0, these alternatives are based on the continuance of LANL mission support activities and capabilities for the foreseeable future and on the recovery of the area watersheds to pre-fire conditions or to conditions that approximate the pre-fire conditions within the	

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CUMULATIVE IMPACTS		next eight years. The analysis of effects is based on an estimate of conditions at LANL at that time. NNSA has issued a draft EIS on the proposed relocation of TA-18 capabilities and materials to TA-55 or to another DOE NNSA site (DOE 2001). Because NNSA has not issued the final EIS and a Record of Decision for the EIS, this EA includes two options for the FRS disposition alternatives. For each of the alternatives, Option A describes disposition if the TA-18 capabilities or materials are not relocated, and Option B describes disposition if the TA-18 capabilities or materials are relocated. If NNSA decides to relocate the capabilities and materials to TA-55 or to upgrade the facilities at TA-18, there is potential for a major construction project along Pajarito Road. Construction of a new facility at TA-55 would last 24 months and would involve a peak construction employment level of 300 workers. Construction would generate about 108 yd^3 (83 m^3) of solid waste, which would be disposed of in the Los Alamos County Landfill or its replacement. Demolition of the TA-18 facilities was not addressed in the TA-18 EIS, because this is not ripe for decision; when NNSA is ready to make a decision about the disposition of these facilities, further NEPA review will be performed. Other actions that would likely occur at LANL that might cause cumulative effects in the area of the Proposed Action would include any construction projects that would affect traffic in the demolition area. DOE is considering some construction at TA-55 that could increase traffic in that area. Within the next year, DOE will prepare an EIS on replacing the Chemistry and Metallurgy Research (CMR) Building; one of the alternatives would be to construct a new CMR Building at TA-55. If construction of this building were to take place in the same timeframe as the Proposed Action for this EA, additional construction traffic could affect traffic flow on Pajarito Road. There have been studies on the traffic patterns on Pajarito Road, including controlling access on the road and rerouting traffic from Pajarito Road around TA-3 for security reasons. DOE has issued a predecisional draft EA to address	

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CUMULATIVE IMPACTS		the environmental effects of restrictions on Pajarito Road traffic and a bypass road around TA-3 (DOE 2002). In addition, LANL is proposing to widen Pajarito Road to include turning lanes and access and egress lanes near the technical area entrances. If implemented, these measures should improve the traffic flow on Pajarito Road, so that truck traffic would have less effect. In conclusion, there are some proposals in the physical area of the Proposed Action that could affect its implementation. However, it is unlikely that there would be significant cumulative impacts associated with these proposals.	

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LAND USE		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.	
VISUAL		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.	
NOISE		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,	

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NOISE		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.	
GEOLOGY, SEISMIC, & SOILS		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	

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GEOLOGY, SEISMIC, & SOILS		as part of the pipeline project would contribute to slope stability and minimize erosion.	
GROUND WATER & SURFACE WATER		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.	
AIR QUALITY		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.	
WETLANDS & FLOOD-PLAINS		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	

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WETLANDS & FLOOD-PLAINS		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.	
T&E HABITAT		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	

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T&E HABITAT		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.	
HUMAN HEALTH		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	

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HUMAN HEALTH		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.	
ENVIRONMENTAL JUSTICE	X		
CULTURAL RESOURCES		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	

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CULTURAL RESOURCES		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.	
SOCIO-ECONOMICS	X		
UTILITIES (GAS, ELECTRICITY, WATER)		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.	
WASTE MANAGEMENT		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,	

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WASTE MANAGEMENT		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 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.	
CONTAMINATED SPACE			X
TRANSPORTATION (ON SITE, SHIPMENTS)		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.	
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	

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ENVIRONMENTAL RESTORATION		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.	
ACCIDENTS		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 these 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	

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ACCIDENTS		the 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, the 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.	
D&D			X
CUMULATIVE IMPACTS		**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. **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	

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CUMULATIVE IMPACTS		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 (DOE 1996). As a result, there currently would not be any known cumulative effects associated with the AHF project with regard to the Proposed Action. **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 1944 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. **Post Cerro Grande Fire Cleanup**	

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CUMULATIVE IMPACTS		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. **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.	

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LAND USE	X		X
VISUAL		**Proposed Action** Removal of the Omega West Facility and associated structures under the Proposed Action would return the scenery in the project area to a state similar to its preconstruction configuration. However, the facility is located within a restricted area in a position that is not easily visible from a distance. Therefore, it is anticipated that effects on visual resources, while essentially positive in nature, would not likely be noticeable by large numbers of offsite viewers. **Phased Removal Alternative** Removal of part of the Omega West Facility and associated structures under the Phased Removal Alternative would return little of the scenery in the project area to a state similar to its pre-construction configuration during the first phase. The Omega West Facility is located within a restricted area in a position that is not easily visible from a distance by a large number of offsite viewers. Therefore, it is anticipated that effects on visual resources, while essentially positive in nature, would not likely be noticeable for a long period of time, possibly until after 2025.	
NOISE		**Proposed Action** Noise levels during demolition activities would be consistent with those typical of construction activities. As appropriate, workers would be required to wear hearing protection to avoid adverse effects on hearing. Non-involved workers at the edges of the mesas above the Omega West Facility would be able to hear the activities below; however, the level of noise would not be distracting. Construction noise at LANL is common. Some wildlife species may avoid the immediate vicinity of the Omega West Facility as demolition proceeds due to noise; however, any effects on wildlife resulting from noise associated with the Proposed Action's demolition activities are expected to be temporary. Wildlife effects due to potential noise at the site are discussed in the following section. **Phased Removal Alternative** Noise levels during demolition activities would be consistent with those typical of construction activities. Non-involved workers at the edges of the mesas above the Omega West Facility would be able to hear the activities below; however, the level of noise would not be distracting. Construction noise at LANL is common. Some wildlife species may avoid the immediate vicinity of the Omega	

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NOISE		West Facility as demolition proceeds due to noise; however, any effects on wildlife resulting from noise associated with demolition activities are expected to be temporary. Wildlife effects due to potential noise at the site are discussed in the following section.	
GEOLOGY, SEISMIC, & SOILS		**Proposed Action** The potential effect on soils at the Omega West Facility would result from removal of up to 4 ft (~1 m) of soil (depending on whether contamination is present) from beneath the reactor vessel and the removal of foundations and concrete flooring from the Omega West Facility and associated structures. These activities would result in the generation of approximately 25,920 ft3 (734 m3) of radioactively contaminated soil, which would be removed from the site for disposal. Because any negative features (depressions) resulting from the Proposed Action would be graded even with the surrounding land surface, it is unlikely that the Proposed Action would result in soil erosion. Use of best management practices would prevent the movement of soils downstream during the D&D activities. If soil contamination is present at the site at greater than 4 foot depths, soil removal could be much greater. Fill dirt may be required to be trucked to the site and placed at locations were excess soil removal was required in order to be able to establish a natural contour and blend the site into the surrounding areas. **Phased Removal Alternative** Under the Phased Removal Alternative, Building 2-1 would not be demolished immediately. Only the outlying structures would be removed. Therefore, the amount of soils that would be disturbed would be minor in the immediate phase of the project. Because any negative features (depressions) resulting from the Phased Removal Alternative would be graded even with the surrounding land surface, it is unlikely that the Phased Removal Alternative would result in effects due to erosion. The long-term actions associated with contaminated soil removal after the eventual demolition of Building 2-1 are discussed under the Proposed Action.	
GROUND WATER & SURFACE WATER		See WETLANDS AND FLOODPLAINS	
AIR QUALITY		**Proposed Action** Removal of the facility under the Proposed Action would result in emissions	

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		associated with vehicle and equipment exhaust as well as radiological and particulate (dust) emissions from demolition activities. No discernible effects on air quality would be expected to result from the Proposed Action. During reactor operations, airborne releases of radioactive noble gases and activation gases were the primary radiological emissions. Currently, no gaseous radionuclides are present or being generated at the Omega West Facility. Therefore, no releases of gaseous radionuclides are anticipated from the D&D of the Omega West Facility. The Proposed Action would generate very small amounts of particulate air emissions (dust) from size reduction of activated lead, metal and concrete. The dust could include lead, asbestos, and a small amount of radionuclides, primarily radioactive 137Cesium, and 60Cobalt isotopes. The location of the Omega West Facility in the Los Alamos Canyon bottom limits the transport of and promotes the deposition of airborne particulates, thus reducing the concentration of airborne particulates at the site boundary. Effects of the Proposed Action with regards to air quality would be negligible compared with potential annual air contaminant emissions from the LANL site as a whole. **Phased Removal Alternative** Effects to air quality would be similar to those anticipated for the Proposed Action, but would be spread out over a greater duration. Equipment exhaust resulting from demolition of the reactor vessel would occur at a different time from that associated with demolition of support structures, resulting in a lower annual emissions of carbon monoxide. Dust suppression techniques would be employed during D&D activities.	
WETLANDS & FLOOD-PLAINS WETLANDS & FLOOD-		**Proposed Action** Little or no effect on water resources is anticipated. The Proposed Action would not result in the disturbance of watercourses or generation of liquid effluents that would be released to the surrounding environment. Silt fences, hay bales, or other appropriate Best Management Practices would be employed to ensure that fine particulates are not transported by stormwater into surface water features in the vicinity of the Omega West Facility. Potable water use at the site would be limited to that necessary for equipment washdown, dust control, and sanitary facilities for workers. The Proposed Action would take place in the floodplain. Since the goal of this soil disturbance is to clean up existing contamination, the	

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PLAINS		action would overall have a beneficial effect on the floodplain. The disturbance of soils due to the Proposed Action is discussed in Section 4.1.9. The action would benefit the floodplain. Removal of the Omega West Facility would restore floodplain values by removing obstructions to the conveyance capability of the floodplain. It would remove a source of potential contamination to the downstream floodplain. **Phased Removal Alternative** Little or no effect on water resources is anticipated. The Phased Removal Alternative would not result in the disturbance of watercourses or generation of liquid effluents that would be released to the surrounding environment. Silt fences, hay bales, or other appropriate methods would be employed to ensure that fine particulates are not transported by stormwater into surface water features in the vicinity of the Omega West Facility. Because of the extended timeframe under this alternative, more maintenance of BMP would be required by NNSA. Water use at the site would be limited to that necessary for equipment washdown, dust control, and sanitary facilities for workers.	
T&E HABITAT T&E HABITAT		**Proposed Action** All D&D activities associated with the Proposed Action would take place within TA-2, at an area that has been dedicated to industrial use since the early 1940s. The entire Omega West Facility is enclosed within an 8-ft (2.4-m) high security fence and provides very little wildlife habitat. There are some small trees and brush overgrown areas around buildings, but the Omega West Facility is dominated by asphalt roads, parking areas, concrete pads, and foundations of buildings previously razed. Wildlife in canyon lands adjacent to the Omega West Facility could be intermittently disturbed by construction activity and noise over the 12 to 18 month period when the reactor vessel and components are removed, structures razed, building foundations and buried utilities removed, contaminated soils excavated, and waste trucked to disposal sites. Noise generated from construction activities should attenuate to below Habitat Management Plan limits within 0.25 mi (0.4 km) of the construction site (BA 2001). No Mexican spotted owls have been observed in Los Alamos Canyon in 7 years (1994 to 2001) of monitoring specifically for that species. It is anticipated that activities associated with implementing the Proposed Action would not result in an adverse affect to potential Mexican spotted owl habitat	

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T&E HABITAT		located in the vicinity of TA-2. Ongoing D&D activities would likely preclude future use of the canyon habitat for their duration. Ultimately, the canyon habitat would be restored, which would be a beneficial effect on the potential Mexican spotted owl habitat in the area. Although noise levels would be relatively low outside the immediate area of construction, the combination of demolition noise and human activity would probably displace small numbers of animals (birds and mammals) that forage, roost, nest, rest, or den in adjacent canyon lands. Construction- related disturbances are likely to create effects to wildlife that would be small, intermittent, and localized. Species most likely to be affected are those commonly associated with Mixed-Conifer Forest, Ponderosa Pine Forest, and Pinyon-Juniper woodland communities, all found in Los Alamos Canyon in the vicinity of TA-2. **Phased Removal Alternative** Under the Phased Removal Alternative, the demolition activities would be conducted in two separate phases. During the initial phase of the project, substantially less waste would be generated (approximately 10 percent of the volume expected under the Proposed Action). This would reduce the number of heavy trucks moving in and out of the canyon and the associated site disturbance during the first phase from the total number of truck trips expected over the same timeframe as described in the Proposed Action. The level of disturbance for the second phase of activities would be greater than that generated during the first phase; however, it is not anticipated that activities conducted under either phase would result in adverse affects to potential Mexican spotted owl habitat in the vicinity of TA-2. Although the disturbance would be generally lower than that projected for implementation of the Proposed Action, the measures for protection of sensitive biological resources recommended in the HMP would still apply. All D&D activities associated with the Phased Removal Alternative would take place within TA-2, at an area that has been dedicated to industrial use since the early 1940s. The entire Omega West Facility is enclosed within an 8-ft (2.4-m) high security fence and provides very little wildlife habitat. Disturbance of the potential Mexican spotted owl and effects to the habitat would be extended over a longer period; it would take much longer for the habitat to be returned to a nonindustrial state if the Phased Removal Alternative were implemented. This extension in timeframe may	

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		result in greater stress on the species.	
HUMAN HEALTH HUMAN HEALTH		Removal of the Omega West Facility under the Proposed Action would result in emissions associated with vehicle and equipment exhaust as well as radiological and particulate (dust) emissions from demolition activities. No discernible effects on air quality would result and no negative effects on human health would be anticipated. The primary source of potential consequences to workers and off-site members of the public would be associated with the release of radiological contaminants during the demolition process. Due to the large distance between the Omega West Facility site and the nearest non-involved worker locations, the only radiological effect on non-project workers at the LANL site or members of the public would be from radiological air emissions (see Section 4.1.2, Air Quality). Any emissions of contaminated particulates would be reduced by the use of plastic draping and contaminate containment coupled with HEPAfilters. Contaminate releases of radioactive particulate from D&D activities are expected to be lower than the dose estimated during past reactor operations. The dose would be a very small fraction of the public and worker dose resulting from current and future LANL site operations (DOE 1999a). Depending on the location of the workers and members of the public, the average radiation dose levels are estimated to range between background and 10 mrem per hour, with the highest levels anticipated to occur in the vicinity of the ion exchangers if used. Ion exchangers could be used onsite or at TA-50 to treat water that would be placed in the reactor vessel for shielding purposes and later removed. Worker exposure from direct radiation at TA-2 would be limited to less than 1 rem per worker and the estimated collective worker dose would be approximately 5.5 person-rem. Based on an occupational risk factor of 0.0004 fatal latent cancers per person-rem (ICRP 1991), workers engaged in the Proposed Action would incur a calculated annual 0.00022 collective risk for a fatal latent cancer. Federal regulations found at 40 CFR Part 61, §61.92, limit the dose to any member of the public to 10 mrem per year. The technologies and practices that wold be employed in D&D of the Omega West Facility would result in doses of less than 10 mrem per year to members of the public, based on observed population risk factors. The Proposed Action would involve removal of some asbestos-contaminated material; however, such removal would be conducted according to existing asbestos management programs at LANL in	

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HUMAN HEALTH		compliance with strict asbestos abatement guidelines. Workers would be protected by PPE and other engineered and administrative controls, and no asbestos would likely be released that could be inhaled by members of the public. No cases of asbestosis are anticipated as a result of the Proposed Action. **Phased Removal Alternative** As with the Proposed Action, the only radiological effect on non-project workers at the LANL site or members of the public would be from radiological air emissions from the D&D activities at the Omega Facility (see Section 4.2.2, Air Quality). The radiological effects from air emissions from the immediate activities would be slightly less than those discussed for the Proposed Action because the reactor vessel and its surrounding structure would not be removed. Therefore, there would be much less emission of radiologically contaminated particulates in the immediate phase of the project. As with the Proposed Action, the potential average radiation exposure levels are estimated to range between background and 10 mrem per hour. Worker personnel exposures from direct radiation are expected to average less than 1 rem per worker. The estimated total collective worker dose for all workers would be approximately 1.4 person-rem. Based on an occupational risk factor of 0.0004 fatal latent cancers per person-rem (ICRP 1991), workers engaged in the Proposed Action would incur a 0.000055 collective risk for a fatal latent cancer during the initial phase of the Phased Removal Alternative. The remainder of the 0.00022 would be associated with the eventual completion of the reactor vessel removal activities. Worker exposure to radiation during the D&D activities would be controlled under established procedures that require doses be kept ALARA and that limit any individual's dose to less than 1 rem per year. Some exposure to workers would occur during security, maintenance, and animal control activities. The amount of time these workers would spend in the remaining structure would be limited. The effect on the individual workers' health would be negligible. Overall, under this alternative a greater number of workers would be expected to receive small levels of exposure due to implementing the Phased Removal Alternative as compared to the Proposed Action. The primary source of potential effects to members of the public would be associated with the release of radiological contaminants during the demolition process. Federal regulations, (40 CFR Part 61, §61.92), limit the dose to any member of the public to 10 mrem per year.	

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		This limit ensures that the releases are below levels that could result in adverse effects to public health. Since the releases would be below these levels, no effects to public health are anticipated. The majority of radiological contaminants at the Omega West Facility are likely contained within the reactor vessel. Radiological emissions and the potential for worker exposures during the first phase of the project would therefore be less than those associated with the ultimate demolition of the reactor vessel and Room 101 of Building 2-1.	
ENVIRONMENTAL JUSTICE	X		
CULTURAL RESOURCES CULTURAL RESOURCES		**Proposed Action** No prehistoric or other archaeological resources are known to be present in TA-2, which was disturbed during the construction of the Omega West Facility and associated structures. The Omega West Facility Building 2-1 is a Cold War-period structure eligible for the NRHP (LANL 2000). The Proposed Action would involve the demolition of this structure. The structure has been extensively documented photographically, and historical information has been compiled describing the Facility's history. A draft Memorandum of Understanding between DOE and the SHPO regarding demolition of the Omega West Facility has been submitted to the SHPO for consideration, and demolition activities would be conducted only after a final agreement is reached regarding the appropriate level of documentation of the site and its history. Because the site's history would be documented to the point that no further useful information would likely be obtainable from inspection of the facility, and preservation of the facility is not advisable for safety reasons, no effect to the historical record of the Omega West Facility would result from the demolition. **Phased Removal Alternative** As with the Proposed Action, the Phased Removal Alternative would involve removal of the Omega West Facility. As discussed in Section 4.1.7, removal of the facility and associated structures would have little effect on the historical information available regarding the Omega West Facility.	
SOCIO-ECONOMICS			Only addressed in "Affected

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			Environment" section, not in Consequences section.
UTILITIES (GAS, ELECTRICITY, WATER)	X		
WASTE MANAGEMENT		**Proposed Action** Waste types and quantities generated by removal of the structures would be within the capacity of existing waste management systems, and would not result in substantial impact to existing waste management disposal operations. It is anticipated that the majority of the waste produced during D&D activities under the Proposed Action would be LLW (optional disposition) all of which could be transported offsite for disposal. For the purpose of this analysis, however, DOE has evaluated both onsite and offsite disposal options for LLW (optional disposition) to ensure that the potential environmental consequences of all these potential waste management options for the Proposed Action have been bounded. **Phased Removal Alternative** As with the Proposed Action, the Phased Removal Alternative would result in the generation of a variety of waste types. The categories of waste would be handled, stored, and disposed of in the same manner as discussed for the Proposed Action. However, the waste volumes resulting from implementing the immediate timeframe would be substantially lower than those estimated for the Proposed Action. Therefore, the amounts of waste would be well within the handling, storage, and disposal capacities of the waste management facilities, including Area G's current footprint disposal area. By the time Room 101 of Building 2-1 and the OWR would be demolished, it is likely that the expansion of Area G would have already occurred. Long-term effects to LANL waste management facilities would be similar to those that would occur under the Proposed Action; however, consequences would be spread out over a longer period. The removal of the remaining portion of the Omega West Facility would occur at some point in the future before 2025, and therefore, the total amount of waste generated would be essentially the same	

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WASTE MANAGEMENT		as that discussed in Section 4.1.3. The only difference is that the activity of some of the radioactive waste could be slightly lower in radioactive energy in the future as a result of radioactive decay.	
CONTAMINATED SPACE			X
TRANSPORTATION (ON SITE, SHIPMENTS)		**Proposed Action** The Proposed Action would produce D&D wastes that would need to be transported to storage or disposal sites. These sites could be at LANL or an offsite location. The results of NNSA's analysis indicate that no excess fatal cancers are likely to result from implementing the Proposed Action. Transportation has potential risks to workers and the public from incident-free transport such as radiation exposure as the waste packages are transported along the highways. There is also increased risk from traffic accidents (without release of radioactive material) and radiological accidents (in which radioactive material is released). This section addresses the potential effects of incident-free transportation for the Proposed Action. Sections 4.2.4 and 4.3 address the consequences of the Phased Removal and the No Action Alternatives, respectively. Appendix D presents the methodology for the transportation analysis. The effects from incident-free transportation of demolition wastes under both waste options for the worker population and the general public are presented as collective dose in person-rem resulting in excess latent cancer fatalities (LCFs) in Table 4-1. Excess LCFs are the number of excess cancers estimated to occur in the exposed population over the lifetimes of the individuals. If the number of LCFs is less than one, the subject population is not expected to incur any LCFs resulting from the actions being analyzed. Statistically, nearly 20 percent (1 in 5 persons) of the U.S. population is expected to develop LCFs within their lifetimes from all causes. The risk for development of excess LCFs is highest for workers under the offsite disposition option. This is because of the duration of exposure during transport.	

Table 4-1. Incident-Free Transportation Impacts

	Occupational Impacts		Public Impacts	
	Collective Dose (rem)	LCFs	Collective Dose (rem)	LCFs
Onsite disposition	29	0.012	0.011	0.0000055
Offsite disposition	720	0.29	1.0	0.00050

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TRANSPORTATION (ON SITE, SHIPMENTS)		**Phased Removal Alternative** The Phased Removal Alternative would produce decontamination wastes that would need to be transported to storage or disposal sites. No excess fatal cancers are likely to result from implementing the Phased Removal Alternative; however, the probability is highest for workers under the offsite disposition option, because of the duration of the proximity to the waste during ransportation of each shipment. Implementing the Phased Removal Alternative would result in almost the same effects as the Proposed Action with regards to transportation effects.	
ENVIRONMENTAL RESTORATION			X
ACCIDENTS		Accidents could occur in all phases of the Proposed Action including onsite and offsite transportation, characterization, disassembly, and packaging for disposal. Potential causes of accidents could include vehicles, contact with objects and equipment, and falls. Based on an estimate of 11,450 person hours of effort required to implement the Proposed Action and an occurrence rate for fatalities of about 0.00000006 fatalities per hour for construction-related activity (BLS 2001a), no fatal accidents would be expected to occur during the Proposed Action. Based on a rate of nonfatal occupational injuries and illnesses of about 0.00002 cases per hour for construction workers (BLS 2001b), no nonfatal occupational injuries and illnesses are anticipated. The numbers of fatalities and injuries estimated for the Proposed Action (less than one) are based on average construction industry rates. Accident rates for the Proposed Action would be expected to be lower because of the safety programs that would be in place for D&D workers at LANL. Two recently completed D&D projects at Argonne National Laboratory, the Experimental Boiling Water Reactor and the Janus Reactor, involved 80,000 person hours of work. No lost-time accidents and only three minor injuries (non-fatal) occurred during the performance of these projects (ANL1998). **Transportation Accidents** Transport of decontamination and demolition wastes is subject to transportation accidents. For purposes of analysis, these accidents are classified as vehicle-	

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ACCIDENTS		related (traffic accidents without release of radioactive material) and cargo-related (radiological accidents in which radioactive material is released). This section addresses both types of accidents for the Proposed Action and the Phased Removal Alternative. The methodology is presented in Appendix D. **Vehicle-Related Accidents** Table 4-2 presents the impacts from vehicle-related transportation accidents for both the Proposed Action and the Phased Removal Alternative. The results are provided as number of accidents and number of fatalities for both the onsite and the offsite disposition scenarios. The results indicate that no traffic fatalities would be expected under either the Proposed Action or its alternative, but that the offsite disposition scenario produces a 70-times greater probability of a traffic accident fatality than for the on site disposition scenario.	

Table 4-2. Vehicle-Related Transportation Impacts.

	Number of Accidents		Number of Fatalities	
	Proposed Action	Phased Removal Alternative	Proposed Action	Phased Removal Alternative
Onsite Disposition	0.0025	0.00019	0.00026	0.000020
Offsite Disposition	0.42	0.032	0.019	0.0014

Cargo-Related Accidents

Table 4-3 presents the impacts from cargo-related transportation accidents. The only shipment for which the radioactivity content has been characterized is the demineralizer resin in its vessel. These values apply to both the Proposed Action and the Phased Removal Alternative. The impacts are presented as collective dose risk [in person-rem and latent cancer fatality risk (LCFs)] and dose to the maximally exposed individual (MEI). The results of DOE's analysis indicate that no excess fatal cancers are likely to happen from the Proposed Action or its alternative.

Table 4-3. Cargo-Related Transportation Impacts.

	Collective Dose Risk		MEI
Shipment	Person-rem	LCFs	Rem
Demineralizer Resin	3.8×10^{-15}	1.9×10^{-18}	1.6×10^{-5}

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D&D		**Proposed Action** **Waste Generation During D&D**. The waste types and volumes expected to be generated under the Proposed Action's two disposal options are summarized and compared in Table 2-3 of Section 2.2.4. The wastes are discussed below according to category. The various recyclable wastes would be reused and recycled to the extent practicable and allowed under DOE policy. Some of the LLW generated by the proposed D&D activities would have to be disposed of onsite at Area G, TA-54, facilities currently used at LANL. This amount would not affect the Area G operations. However, most of the LLW generated by the proposed D&D activities would be LLW (optional disposition). The LLW (optional disposition) could be disposed of onsite or offsite. Two options are evaluated below for the LLW (optional disposition). While the Proposed Action waste management Option 1 is to ship the LLW (optional disposition) offsite for disposal, the possibility that some or even all of the LLW (optional disposition) may be disposed of onsite as described in Option 2 is considered as well. Option 1. Under this option, DOE would pursue offsite disposal of the LLW (optional disposition) resulting from D&D of the Omega West Facility including concrete, soil, steel, and personal protective equipment (PPE). Both the Nevada Test Site facilities for waste disposal and the existing commercial facility at Clive, Utah, have the capacity to accept the amount of these types of waste. Under this option, there would be little reduction of LANL's remaining LLW disposal capacity at Area G, TA-54. Option 2. Under this option for waste disposal, the LLW (optional disposition) would be disposed of onsite at Area G, TA-54, at LANL. The current disposal site footprint has limited waste capacity, although adequate room for expansion exists. The current footprint is expected to be adequate for the amount of LLW (optional disposition) and the remaining type of LLW that would be generated by the Omega West Facility D&D activities. Implementing this option of the Proposed Action would reduce the remaining capacity. This reduction could result in expediting the planned expansion of Area G by up to one year or in the prioritization and potential delay of other LLW generating activities at LANL. All other wastes expected to be generated by the Omega West Facility D&D activities would be handled, managed, packaged, and disposed of in the same manner as the same wastes generated by other activities at LANL (see Section	

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D&D		2.2.4). Any contaminated demolition debris that is characterized as LLMW would be stored onsite at Area G, TA-54 pending identification of an off-site treatment and disposal facility. Most LLMW generated at LANL is sent offsite to other DOE or commercial facilities for treatment and disposal. The Proposed Action would generate LLMW that would be within the current disposal capacity of both the NTS and the existing commercial facility at Clive, Utah. Asbestos contaminated with radioactive material would be disposed of in a disposal cell in Area G that is dedicated to the disposal of radioactively contaminated asbestos waste. This amount of waste is within the capacity of the disposal cell at Area G. The asbestos waste that is not radiologically contaminated generated during the proposed D&D activities would be packaged according to applicable requirements and sent to the LANL asbestos transfer station for shipment offsite to a permitted asbestos disposal facility along with other asbestos waste generated at LANL. It is not expected that the anticipated amount of waste would be beyond the disposal capacity of the existing disposal facilities. Some of the wastes generated from the Omega West Facility D&D activities would be considered residual radioactive material. Some of these materials can be recycled or reused as backfill, topsoil cover. The steel and lead could be stored and reused or recycled at LANL to the extent practicable and in accordance with DOE policy. The rest of the material would be disposed at the Los Alamos County Landfill or its replacement facility. The Los Alamos County Landfill is expected to be closed within the next 3 years, although this is not due to having been filled to capacity. LANL, along with Los Alamos County, would have to contract for waste disposal with another solid waste disposal facility offsite. Up to 212 ft3 (6.0 m3) of lead that was potentially contaminated would be generated by the D&D of the Omega West Facility. It is not expected that this amount of lead would be beyond the management or storage capacity at LANL. Radioactive liquid waste would be transferred to the RLWTF in TA-50 at LANL for treatment. The liquid waste from the D&D activities for the Omega West Facility would be well within the treatment and disposal capacity of the RLWTF. No affect on RLWTF is anticipated. Although not anticipated, if any small amounts of hazardous waste were generated during the Omega West Facility D&D activities they would be handled, packaged, and disposed of according to	

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D&D		LANL's hazardous waste management program. These small amounts would be well within the capacity of LANL's hazardous waste management and disposal program. **Phased Removal Alternative** **Waste Generation During D&D**. The waste types and volumes expected to be generated under the Proposed Action's two disposal options are summarized and compared in Table 2-3 of Section 2.2.4. The wastes are discussed below according to category. The various recyclable wastes would be reused and recycled to the extent practicable and allowed under DOE policy. Only 10 percent of the LLW discussed for the Proposed Action would be generated in the immediate timeframe under the Phased Removal Alternative. This is due to the majority of LLW being associated with the OWR and Room 101. Option 1. Under this option, NNSA would pursue offsite disposal for the LLW (optional disposition) resulting from D&D of the Omega West Facility including concrete, soil, steel, and PPE. Both the Nevada Test Site facilities for waste disposal and the existing commercial facility at Clive, Utah, have the capacity to accept the amount of these types of waste. Under this option, there would be little reduction of LANL's remaining LLW disposal capacity at Area G, TA-54. Option 2. Under this option for waste disposal, the LLW (optional disposition) would be disposed of onsite at Area G, TA-54, at LANL. The current disposal site footprint has sufficient waste capacity for the amount of waste expected in the immediate timeframe. By the time Room 101 of Building 2-1 and the OWR would be demolished, it is likely that the expansion of Area G would have already occurred. There would be little reduction of LANL's remaining LLW disposal capacity at Area G, TA-54, and no impact to other LLW generating activities at LANL. All other wastes expected to be generated by the Omega West Facility D&D activities would be handled, managed, packaged, and disposed of in the same manner as the same wastes generated by other activities at LANL (see Section 2.2.4). The effects of the total amount of waste expected over the immediate and long-term timeframes would be the same as for the Proposed Action. The waste categories and quantities generated by removal of	

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D&D		the structures would be within the capacity of existing waste management systems, and would not result in substantial impact to existing waste management disposal operations. The effects of the amount of waste expected from the immediate timeframe would be less than the total, and would also be within the capacity of existing waste management systems, and would not result in substantial impact to existing waste management disposal operations.	
CUMULATIVE IMPACTS		**Proposed Action** **LANL Operations at TA-2 and Los Alamos Canyon.** Land use within TA-2 would remain the same. No new types of operations and no new personnel would be introduced into LANL as a result of the Proposed Action. The canyon would remain restricted to the public. It is currently planned that TA-41, west of Omega West Facility in the canyon, would also undergo D&D. However, this action has yet to be scheduled. The land use for the TA-41 area would also remain unchanged and restricted to the public. Future foreseeable actions in Los Alamos Canyon consist of ongoing erosion control activities. The paved road in Los Alamos Canyon would be maintained for use in inspecting and servicing the wells to the east of TA-2. The overall visual quality within Los Alamos Canyon would change with the D&D of the Omega West Facility and TA-41. The area in Los Alamos Canyon and on both rims is currently restricted to the public; there are currently no public viewpoints of Omega West Facility or TA-41. The land on the north rim would be transferred to Los Alamos County and the public would have viewpoints of Los Alamos Canyon in the TA-2 and TA-41 areas. Under the Proposed Action, the D&D of Omega West Facility would be comple ted before the transfer of land so the public view of the canyon bottom would increase after the removal of Omega West Facility. Therefore, the view for this vantage point would not be effected. It is uncertain whether the D&D of TA-41 would take place before or after the transfer of the canyon rim. If the D&D of TA-41 occurs after the transfer of land, TA-41 would be visible to the public and the D&D activities would be visible as well. After the D&D of TA-41, the only man- made structure in the viewshed of the canyon would be the road. Implementing the Proposed Action would generate noise primarily during the daytime hours during D&D activities. This noise generation would be mostly confined to the immediate area of generation and would mostly be heard by the	

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CUMULATIVE IMPACTS		involved workers. Due to the general manner in which sound attenuates across mesas and canyons, residents should not be disturbed by the sound originating from these projects. Some species may avoid the immediate vicinity of the Omega West Facility as noise proceeds due to demolition; however, any effects on wildlife resulting from noise associated with demolition activities is expected to be temporary, and should not adversely affect wildlife longterm in the project area. No suitable Mexican spotted owl habitat would be removed or lost as a result of implementing the Proposed Action, but noise levels from the Proposed Action would temporarily exceed the limits (6 decibel units above background) imposed by the Threatened and Endangered Species Habitat Management Plan (LANL 1998b). However, noise generated from construction activities should attenuate to below Habitat Management Plan limits within 0.25 mi (0.4 km) of the construction site (BA 2001). No Mexican spotted owls have been observed in Lo s Alamos Canyon in 7 years (1994 to 2001) of monitoring. However, the D&D of the Omega West Facility may affect and is likely to adversely affect the Mexican spotted owl's potential habitat use in the area of TA-2 for a short temporary period of time. Overall effect would be positive with the removal of the Omega West Facility and restoring of the site, subsequent revegitation, and decrease in human activity would benefit the habitat. The Proposed Action would generate very small amounts of dust from size reduction of activated lead, metal and concrete. The dust would include lead, asbestos, and a small amount of the radionuclides 137Cesium, 60Cobalt. Due to the long distance between the Omega West Facility site and the nearest non-involved worker locations, the only radiological effect on nonproject workers at the LANL site or members of the public would be from radiological air emissions. The location of the Omega West Facility in the Los Alamos Canyon bottom reduces the concentration of airborne particulates at the site boundary. Effects of the Proposed Action with regards to air quality would be negligible compared with potential annual air contaminant emissions from the LANL site as a whole. No discernible effects on air quality would be expected to result from the Proposed Action, and no negative effects on human health are anticipated. Worker exposures from direct radiation are expected to average less than 1 rem per worker and the estimated collective worker dose would be	

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CUMULATIVE IMPACTS		approximately 5.5 person-rem. **Nearby Areas Within LANL and Offsite Areas Administered by Others.** Other activities that would likely occur at or nearby to LANL over the next 10 years include the conveyance of most of the northern rim of Los Alamos Canyon to Los Alamos County and the subsequent demolition of the existing DOE Los Alamos Area Office Building at TA-43. The ultimate visual character of the conveyed land would depend on any new construction. The northern rim is already developed and has existing structures. New structures could be built with more aesthetic aspects than the current buildings. The visual impact of the new buildings is anticipated to be the same or slightly improved. The newly constructed buildings are expected to result in only a very slight increase in nighttime lighting of the area. The addition of more people along the canyon rim would be expected to increase motion and noise stresses to wildlife in the area and would decrease the likelihood that sensitive species would use potential habitat in the canyon reach. LANL, the Forest Service, Bandelier National Monument and Los Alamos County will all be conducting wildfire hazard reduction activities that would include forest thinning activities over the Pajarito Plateau (including within LANL) and possib ly some prescription burns outside the areas of immediate LANL and urban interfaces within the forested areas nearby. The resulting forest areas in and around LANL would be more open in appearance than currently and the hazard from wildfires is expected to be reduced. Although wildfires would still occur, they would be much easier to control and manage as lower and mid-level fires rather than as crownfires of the type exemplified by the Cerro Grande Fire. Within LANL, forests would be managed according to the Wildfire Hazard Reduction and Forest Health Improvement Program, with specific project plans, such as the Wildfire Hazard Reduction Project Plan (LANL, LA-UR-01-2017). Use of the forest areas west and south of LANL and Los Alamos County for recreation, habitat management purposes, and timber production (only within the Santa Fe National Forest) should remain unchanged. Waste volume generation during the next 10 years from D&D and decommissioning of buildings and through ER efforts would be large. The wastes would likely be a variety of types, including nonhazardous waste,	

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CUMULATIVE IMPACTS		hazardous wastes, mixed wastes, and radioactive wastes (both LLW and TRU wastes). Proposed actions elsewhere within LANL include the decontamination and decommissioning of TA-18 facilities within Pajarito Canyon, and their possible demolition (in whole or in part), and some small-scale building and structure construction and demolition activities within the TA-8 and TA-16 areas. Additional construction and demolition actions may be proposed at TA-3, TA-55 and other technical areas at LANL to replace aging structures and facilities; these are currently being contemplated in very general terms. These contemplated actions could include some additional construction and demolition work as infrastructure, structures and buildings approach 50 years of continuous use and may include demolition and replacement of the Chemical and Metallurgy Research Building. The Los Alamos County Landfill is expected to be closed within the next 3 years, although this is not due to having been filled to capacity. LANL, along with the county, would have to contract for waste disposal with another solid waste disposal facility offsite or develop a new facility. Low- level radioactive waste can be disposed of at Area G at LANL. The current disposal site footprint has limited waste capacity. However, plans to expand Area G are under development that would ensure adequate room to accommodate waste generation estimates beyond the next 10 years as identified in the 1999 LANL SWEIS and Record of Decision. TRU waste generated at LANL from ER activities would be managed and stored at LANL but no disposal path is currently available for this non-defense generated waste type. Mixed wastes (both LLMW and TRU-mixed wastes) are managed and stored at LANL; however, there is currently no disposal of this waste type available and the majority is sent offsite to DOE commercial facilities. Hazardous wastes generated at LANL are managed and stored onsite and shipped offsite for treatment and disposal as adequate and appropriate facilities become available. Detailed projections of wastes by types are provided in the 1997 Final Waste Management Programmatic EIS for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste and DOE's subsequent Record of Decision based on that analysis. Additionally, the waste generated at LANL over the next 10 years would be managed in accordance with the analysis	

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CUMULATIVE IMPACTS		provided in the 1999 LANL SWEIS and the DOE's Record of Decision. The implementation of the Proposed Action considered in this EA, together with other site waste generations, would be in accordance with DOE's Record of Decision and is not expected to result in any waste generation projection exceedences. Cleanup from the Cerro Grande Fire has mostly been accomplished; waste generation within the County of Los Alamos peaked in mid to late 2000 and early 2001. Waste generation is now within its historical range and no anticipated actions are expected that wo uld result in greater than normal waste generation levels over the next 10 years. Data and analysis of LANL surface and groundwater quality samples taken from test wells indicate that LANL operations and activities have influenced the surface water within LANL boundaries and some of the alluvial and intermediate perched zones within the LANL region. Detail on surface and groundwater quality can be found in the annual LANL Environmental Surveillance and Compliance Report (LANL 2000b). No LANL activities or projects are foreseen over the next 10 years that would cause increased deterioration of surface and groundwater quality in the region. Efforts underway to control erosion downstream from LANL and within the LANL boundaries resulting from the Cerro Grande Fire and its recovery efforts are expected to address potential problems resulting from storm events until up- gradient vegetation has been reestablished. Cultural resources, especially prehistoric archaeological sites are very prevalent in the Pajarito Plateau area. DOE and UC have developed an Integrated Cultural and Natural Resource Management Plan which includes a detailed assessment of the cultural resources on DOE lands. The Proposed Action would document historic aspect of the Omega West Facility prior to the D&D, but it is not expected to affect any other cultural resources. Implementation is not anticipated to result in any changes to the management of these resources.	

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LAND USE	X		
VISUAL	X		
NOISE		The Proposed Action would result in limited short-term increases in noise levels associated with various demolition and construction activities. Following the completion of these activities, noise levels would return to existing levels. Noise generated by the Proposed Action is not expected to have an adverse effect on LANL workers, or members of the public, or on the environment. The demolition of existing structures, earth-moving activities, and road and structure construction would require the use of heavy equipment for removal of debris, dirt, and vegetation and for paving of the new road. Heavy equipment, such as front-end loaders and backhoes, used during construction of the various structures and roadways 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. PPE would protect workers hearing if site-specific work produced noise levels above the LANL action level of 82 dBA. 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 most publicly accessible areas or undisturbed wildlife habitats, sounds from construction activities should not be noticeable to most members of the public and should not disturb most local wildlife. Noise levels are not expected to exceed the established TLV.	
GEOLOGY & SEISMIC		The local geologic setting is expected to have minimal effects on the Proposed Action; and no effect on the local geology is anticipated from implementing the Proposed Action. Seismic activity could affect the new bypass roads; however, the probability of a seismic event is very low. The proposed bypass roads would be designed with structural reinforcements to meet current building codes with respect to seismic hazards.	
SOILS		The local soils may have a slight affect on the Proposed Action. Local soils may need to be stabilized, or possibly replaced with a more suitable substrate to support the bypass roads.	

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		Vegetation reduction from canyon slopes would expose mineral soils due to excavation and heavy equipment. BMPs for runoff control, such as silt barriers and straw bales, would be used during this project.	
WATER QUALITY (GROUND WATER, SURFACE WATER, WETLANDS, and FLOODPLAINS)		Vegetation reduction from canyon slopes would expose mineral soils due to excavation and heavy equipment. BMPs for runoff control, such as silt barriers and straw bales, would be used during this project. Siltation into the floodplains would be minor and temporary in nature. No long-term effects to surface water quality would be likely. The proposed bypass road corridors would cross several PRSs that would either be remediated before construction begins or avoided so that future cleanup could be accomplished. In some cases, ER Project may permit work if it determines that the PRS does not pose a threat to people or the environment. A Storm Water Pollution Prevention Plan would be developed and implemented, including the placement of BMPs to prevent erosion of disturbed soil by storm water runoff or other water discharges. A Clean Water Act Section 404 Dredge and Fill Permit and a State of New Mexico section 401 Water Quality Certification would be obtained if required. All vehicles and equipment used for construction purposes would be inspected for leaks before arrival at the construction site to avoid inadvertent surface contamination from hydrocarbon fuel products. The addition of new impermeable road surfaces in the TA-3 area would increase storm water run-off and would decrease surface water infiltration. While decreased infiltration is not expected to have an adverse effect on groundwater quality, the increased amount of run-off from road surfaces may have a slight effect on surface water quality and on residual contaminant transport within canyon sediments, streams, and area wetlands. BMPs should keep sediment and residual contaminant transport from occurring. The wetlands in Sandia and Mortandad Canyons could also be affected by runoff from the proposed Eastern Bypass Road, but the Sandia Canyon wetland presently receives contaminants from PRSs located within TA-3 and from general runoff from TA-3. No long-term effects are anticipated for any floodplain or wetland. The Western Bypass Road corridor is not in a floodplain or wetland area; however, portions	

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		of the Eastern Bypass Road corridor span floodplain and are located at or near wetland areas in Mortandad Canyon. These would be avoided by bridging the canyon. During construction, only selected larger trees that interfere with bridge structures would be removed. BMPs would be employed during and after the construction phase to control runoff into the floodplains and drainage areas along both of the proposed bypass road corridors.	
AIR QUALITY		Potential temporary effects on air quality would be associated with the Proposed Action. Construction of the proposed bypass roads would result in 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 NAAQS or the NMAAQs. Effects of the Proposed Action on air quality would be negligible compared to potential annual air pollutant emissions from LANL as a whole. No increases in non-point source emissions would be expected once access controls and traffic improvements were implemented, because there would be no appreciable net increase in vehicle trips or trip lengths within Los Alamos. Distances whether using Pajarito or East Jemez are nearly identical, and rerouted trips from White Rock to East Jemez Road would account for no more than a seven percent increase in average daily trips on a road that now carries fewer than 10,000 vehicles a day. Safety improvements resulting from the Proposed Action and LANL routine maintenance projects may also result in less congestion and therefore no net increase in emissions. Hazardous wastes from some PRSs would be removed by the ER Project before the proposed construction activities begin. ER Project remediation activities could potentially affect air quality on a temporary basis. Excavation activities for the purpose of removing contaminated soil from ER Project sites for treatment or transport could result in a minor amount of airborne fugitive dust and the dispersion of volatile contaminants. The amounts of air emissions would be kept to a minimum by the control measures proposed as part of the Proposed Action, such as the use of water spray trucks and soil tackifiers. Radionuclide emissions from the PRSs would be monitored as part of LANL's	

[1] The purpose of the State Implementation Plan is to ensure that federal emission standards are being implemented and NAAQs are being achieved.

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		ongoing air monitoring program. Potential emissions of radionuclides would not be expected to exceed the EPA National Emission Standards for Hazardous Air Pollutants requirement, which is designed to protect the public from hazardous air pollutants. Emissions from internal combustion and diesel engines would result from excavation and construction activities. All air emissions associated with the operation of excavation and construction equipment would be below ambient air quality standards. Total emissions of criteria pollutants and other air emissions associated with the operation of heavy equipment for excavation and construction activities would contribute greater emissions than other vehicles due to the types of engines and their respective emission factors. Heavy equipment would emit small quantities of criteria pollutants subject to the NAAQS and NMAAQS as adopted by the State of New Mexico in its State Implementation Plan[1].	
T&E HABITAT (and ECOLOGICAL RESOURSES)		Larger wildlife species that currently move through the Western and Eastern Bypass Road corridors would be temporarily disturbed during the construction activities. Most of these species, however, would likely continue using the areas around the proposed road for foraging and migration after construction was complete. The Western Bypass and Eastern Bypass Road corridors also would be partially within an AEI for the Mexican spotted owl. The area of potential sensitive habitat disturbed would be approximately 5.3 ac (2.2 ha). This comprises less than one percent of habitat loss in this AEI. Timing restrictions would be imposed to mitigate effects on the AEI in accordance with the LANL HMP (LANL 1998a) so that there would not likely be any adverse affects from implementing the Proposed Action.	
HUMAN HEALTH		Building demolition and road and access-control station construction and maintenance work planned under the Proposed Action would not be expected to have any adverse health effects on LANL workers. LANL workers would not be directly involved in demolition, site clearing, earthmoving, heavy equipment operations, or access-control station construction. Non-UC support and maintenance contractors would be actively involved in demolition, road construction, and maintenance activities under the Proposed Action. Approximately two NNSA workers and about 20 LANL workers would perform site inspections and monitor demolition activities during periods of peak	

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		activity. Applicable safety and health training and monitoring, PPE, and work-site hazard controls would be required for these workers.	
ENVIRONMENTAL JUSTICE	X		
CULTURAL RESOURCES		The planned construction of the TA-3 bypass roads would not affect recorded prehistoric archaeological sites or recorded TCP in the construction area. These sites would be marked as appropriate and avoided during construction. The demolition of a portion of Building 3-40 would be an adverse effect on an historic structure. Because the demolition of a portion of this building would be an adverse effect to the property as identified in Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800.5, "Assessment of Adverse Effects," a treatment plan to resolve these adverse effects would be negotiated between the SHPO and the NNSA through an interagency Memorandum of Agreement (MOA). The treatment plan would include a combination of the following elements: archival medium format photos, existing architectural blueprints, preparation of a current set of as-built drawings, preparation of a detailed report on the building's history, and interviews with past and present workers. Additions to the treatment plan could result from negotiations with the SHPO over the resolution of the adverse effects. The Advisory Council on Historic Preservation would be notified of the MOA and would have an opportunity to comment. No other adverse effects to historic structures would be expected to occur from implementing the Proposed Action.	
SOCIO-ECONOMICS	The Proposed Action would not have long-term effects on social or economic resources and issues in Los Alamos or the region. It is unlikely that access controls		

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	along Pajarito Road would measurably affect the economic outlook of businesses or accessibility to residences in White Rock.		
UTILITIES (GAS, ELECTRICITY, WATER)		Infrastructure effects would primarily occur during construction of the proposed access controls. Several existing utilities, including water and telecommunications, would be relocated or rerouted. While this would have no long-term effect it would involve trenching and placement of new lines and the capping and abandonment of existing lines or removal of the lines. Most of the trenching that would impact traffic would occur for approximately 3,000 ft (900 m) along Pajarito Road to serve the access-control station proposed at the east end.	
WASTE MANAGEMENT		The Proposed Action would not require the construction of new waste landfills. The reuse of existing recyclable materials stockpiled at LANL would be a beneficial effect to the overall waste management program at LANL. The Proposed Action would generate a very small amount of solid waste from construction that would be disposed of at the Los Alamos County Landfill or other New Mexico solid waste landfills in accordance with practices required by LANL's LIR for General Waste Management (LANL 1998c). All excavated material is expected to be re-used in the construction of the proposed bypass road. Any soil excavated during the geotechnical investigation of the Sandia Canyon rubble pile would be replaced. Concrete and asphalt removed from the top of the Sandia Canyon rubble pile or from other locations such as from existing parking areas or streets would be recycled for use as road base material. Use of the existing construction debris staging area currently located at Sigma Mesa (TA-60) may be necessary for a short period of time during road construction to stockpile soil and other recyclable materials that would be used	

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		later for roadbase and fill along the proposed bypass road corridors. Construction waste would be generated from the demolition of the high bay portion of Building 3-40 in TA-3. Approximately 200 cubic yards (yd^3) (155 cubic meters [m^3]) of construction debris are estimated to result from demolition of the high bay area. Recyclable material would be packaged and shipped to an appropriate recycling facility. Material that is not recyclable would be disposed of at the Los Alamos County Landfill or other New Mexico solid waste landfills. Hazardous waste generated by implementing the Proposed Action would be asbestos from the demolition of the Building 3-40 high bay and from cleanup of PRSs. Approximately one cubic yard of asbestos-contaminated material would be appropriately disposed of offsite at permitted landfills. Hazardous wastes from PRSs would be removed, as necessary, by the ER Project before roadwork was begun; approximately 800 yds^3 (608 m^3) of hazardous waste is estimated to be generated. Approximately 200 trees would be removed to prepare the corridor for construction activities. Brush, trees, or vegetation would be chipped onsite and spread along the corridor. Chipped material would not be spread in or near any floodplain or drainage area.	
CONTAMINATED SPACE			X
TRANSPORTATION (ON SITE, SHIPMENTS)		The Proposed Action would have some long-term effects on the existing transportation network at LANL because new roads would be constructed around the TA-3 area while existing roads such as Diamond Drive would no longer serve as part of the major road network. Effects on traffic and infrastructure would be minor. Project design and sequencing would be used to minimize traffic and infrastructure impacts during construction of the proposed bypass roads and related access controls, including delayed response times for emergency vehicles. Traffic control plans would be implemented to minimize delays and congestion during the construction. Nevertheless, those traveling to and from the LANL core would experience some inconvenience and delays during construction. In	

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		the long term, traffic patterns would change for some non-LANL commuter traffic between White Rock and Los Alamos town site because unauthorized vehicles would be routed to East Jemez Road and the Main Hill Road. Most of the residents of White Rock work at LANL and could continue to use Pajarito Road. While East Jemez Road is used for most school bus trips, there are also six school buses that use Pajarito Road. Pajarito Road currently carries an average of 8,000 vehicle trips in both directions each workday while East Jemez carries 6,000. It is estimated that approximately 7,340 of these Pajarito Road trips are LANL-related, and that 660 or fewer "non-authorized" average daily vehicle trips would divert from using Pajarito Road and use East Jemez Road once access-controls were instituted. Vehicles rerouted to East Jemez Road would use State Road 4, thereby increasing average daily trips by about seven percent over the current level of 9,500. A segment of SR4 from Rover Boulevard in White Rock to East Jemez Road traverses the Pueblo of San Ildefonso. The DOE and San Ildefonso Pueblo renegotiated a 30-year easement on this stretch of highway in 2000. Total available parking at LANL would remain the same, but location and access would change following construction, resulting in more circuitous trips and longer walks to work places. The TA-3 parking lot shuttle would operate within the proposed access-controlled area and service would not be disrupted because new parking lot access roads would be constructed.	
ENVIRONMENTAL RESTORATION		There are eight PRSs within the proposed bypass road corridors (see Table 5). Most of the PRSs in the proposed area of construction are located either in storm drain pipelines, liquid radioactive waste pipelines, or sanitary waste pipelines. Sampling, characterization, and remediation of some PRSs would occur before construction. Hazardous or radioactive wastes from PRSs impacted by construction activities would be removed and disposed of by the ER Project before construction activities begin. Some PRSs would be avoided by bridging or routing the road away from the area. Table 5. PRSs in the Path of the Bypass Roads	

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PRS ID	Description
SWMU 03-014(a)-99	Consolidated unit representing the former WWTP
SWMU 03-009(i)	Debris area located east of the Liquid and Compressed Gas Facility
SWMU 03-015-00	Outfall located between Eniwetok Road and security fence northeast of Building 03-141
SWMU 03-045(h)-00	Consolidated unit consisting of cooling tower outfalls
SWMU 61-002	Storage area east of the Radio Repair Shop (Building 61-23) on East Jemez Road
SWMU 61-005	30-acre Los Alamos County Landfill
SWMU 61-006	Waste oil recycling area located in Los Alamos County landfill
SWMU 03-010(a)	Surface disposal site located on the rim of Two-mile Canyon west of Building 03-30

The PRSs that would be affected by the proposed construction of the Eastern Bypass Road include the following eight sites:

SWMU 03-014(a)-99: A consolidated unit representing the former WWTP. Several of the PRSs that make up this SWMU would be affected by the proposed road construction; some would require sampling and analysis to determine the nature and extent of contamination requiring cleanup while others could need Voluntary Corrective Actions. The Proposed Action would bridge this location and also possibly apply limited remediation as appropriate.

SWMU 03-009(i): A debris area located east of the Liquid and Compressed Gas Facility (TA-3-170). This SWMU requires further investigation. The Proposed Action would include remediation of this site as appropriate.

SWMU 03-015-00: NPDES-permitted Outfall 04A140 located between Eniwetok Road and the security fence northeast of Building 3-141 (Rolling Mill Building). This SWMU has been investigated but requires further study. The Proposed Action would include remediation of this site as appropriate.
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		SWMU 03-045(h)-00: A consolidated unit consisting of two NPDES-permitted outfalls associated with cooling towers. Sampling for former SWMU 03-049(a) suggests no contaminants of concern exist at this SWMU. Former SWMU 03-045(h) never had hazardous constituents or hazardous wastes in its effluent, and structure 03-187 had no history of chromate use. These former SWMUs were recommended for No Further Action. This PRS would be avoided by routing the road away from the SWMU. SWMU 61-002: A storage area east of the Radio Shop (Building 61-23) on East Jemez Road that was used to store PCB-containing wastes. The SWMU was historically used to store capacitors and transformers, unmarked containers, and several oil-filled containers. Leaking containers with PCB-contaminated oil were also stored at SWMU. Elevated PCB concentrations were found in two samples in the drainage pathway, the furthest downgradient locations that were sampled. Further investigations were recommended to identify the extent of contamination. The Proposed Action would involve cleanup as appropriate. SWMU 61-005: The 30-acre County Landfill. The landfill is located on the rim of Sandia Canyon near East Jemez Road. The landfill consists of pits excavated into tuff designed so that stormwater runoff does not enter the canyon. Waste is deposited into the active pit and covered with soil daily. When full, the pit is capped and a new pit is put into service. The landfill was established in 1974 and is expected to close in 2004. Long-term monitoring of ground water and surface water quality will be conducted post-closure. The Proposed Action includes relocating affected surface activities in the vicinity of the landfill entrance, offices, and scales, and remediating as appropriate. SWMU 61-006: An active oil recycling area located at the County Landfill (SWMU 61-005). This lined pit holds a 2,500-gal. holding tank. An 8-ft-long pipe leads to a filling bin at ground level. The Proposed Action would route the road to avoid this SWMU. One PRS that would be affected by the proposed construction of the Western Bypass Road is the following site: SWMU 03-010(a): A surface disposal site located on a steep slope along the rim of Two-mile Canyon west of Building 3-30. Discarded vacuum pump oil	

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		containing radionuclides and mercury was disposed of at this site in the 1950s. Remediation of this mixed waste site, which also contains VOCs, has been ongoing since 1992. Many of the soil contaminants have been removed. Stormwater runoff data does not indicate that this SWMU has had an effect on surface water quality. The Proposed Action would bridge this disposal site; however, remediation would occur if necessary.	
ACCIDENTS		*Construction.* No fatalities are likely to result from the proposed construction and demolition activities. The Proposed Action of constructing and operating eastern and western bypass roads and access roads around TA-3 and of constructing and operating various vehicle access-control stations would consist primarily of activities that are performed on a routine basis in the road construction industry. These activities can be mostly considered common practice in a standard industry. An exception would be unanticipated exposure to low levels of radiation or chemicals resulting from accidental disturbance of a previously unidentified SWMU. This activity would be considered a specialized accident type that is somewhat unique to DOE nuclear facilities, and environmental restoration would occur before construction of the bypass roads and related improvements. The most serious potential accident considered for the Proposed Action would be a fatality during the following construction activities: • site environmental restoration (cleanup SWMUs as required); • demolition, relocation, and salvaging of affected structure; • relocation, demolition, and tie-ins for existing utilities (east side, west side); • clearing and grubbing roadways (east side, west side); • preparation of roadbed, drainage, retaining walls, approaches, and dirt work (east and west sides); • construction of bridges, roads, curbs, gutters, sidewalks, new utilities, etc (east and west sides); • construction of access-control stations and new utilities (east and west sides); • construction of intersections, installation of traffic signals, and other	

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Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
		associated articles at interface locations with existing roads (east and west sides); • testing and turnover of access-control stations for operations; and • closing existing roads and re-routing traffic through new roads. 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. The estimated number of workers was compared to recent risk rates of occupational fatalities for construction. Up to 100 full-time workers could be employed for as long as 24 months. 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). Based on this statistic and the estimated worker information, no deaths (0.0029) from these causes are expected from implementing the Proposed Action. *Transportation.* Two aspects of transportation safety were considered: potential accidents associated with construction lasting up to a two-year period and potential safety associated with the post-construction period upon use of the new road system. Approximately ten pickup trucks, ten large dump trucks, and other large earth-moving equipment would be used on the project. Transportation activities during construction of the new road are expected to include the transport of road construction materials to the site and waste and recyclable materials away from the site. Of the different types of transportation occupations nationwide, drivers of all types of trucks experience the highest fatality rate (26 deaths per 100,000 full-time workers per year) (Saltzman 2001). Presumably, most of the fatalities as associated with “semi” style, tractor and trailer rigs; therefore, the statistics are not directly comparable to transportation associated with the project. However, the transportation activities for the Proposed Action are expected to constitute a minor fraction of the amount of travel on which transportation fatality rates for industry are based. Therefore, no fatalities (0.004) are expected from transportation directly relating to the	

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		Proposed Action. Use of the new bypass roads, after construction, would be expected to be safer for passenger vehicles than the current roads because of the more modern road and intersection designs and lower traffic volumes. Traffic would be restricted to approved vehicles that would largely be driven by LANL workers who are generally more familiar with the area, as opposed to the No Action Alternative (the status quo) where members of the general public (including area tourists) are allowed unrestricted access to TA-3. *Exposure to Environmental Levels of Radiation.* Road construction activities have the potential to result in exposure to low levels of radiation or hazardous chemicals when an unknown PRS is accidentally breached. The exposure would be limited to the involved workers that may not be wearing appropriate PPE for the site's contamination constituents. The probability of accidental breach of an unknown PRS is low. No fatalities would be expected from such an event. *Wildfire.* Hot catalytic converters associated with internal combustion engines have the potential to cause ignition of a wildfire when they come into contact with tall vegetation. Since the proposed alignment of the bypass roads would cross small forested areas where heavy equipment would be used to clear the vegetation, the potential for this type of accident exists. Extreme wildfire prevention measures are enforced when necessary at LANL. These measures are based on current site conditions. Normal operational site wildfire hazard reduction measures are directed by the LANL Wildfire Hazard Reduction Program. The likelihood of this accident occurring would be, among other events, related to the failure to adhere to the restriction on driving or parking off of established roadways. If appropriate site requirements and restrictions are followed, then there is no likelihood of any fatalities from wildfire as a result of implementing the Proposed Action.	
D&D			X
CUMULATIVE IMPACTS		Cumulative effects on any affected resources as a consequence of the Proposed Action are expected to be negligible.	

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		Four resources are dismissed from cumulative effects consideration because it has been determined they would not be affected by the Proposed Action and therefore could not contribute collectively to ongoing or reasonably foreseeable actions (see Table 3). These resources were socio-economics, land use, visual, and environmental justice. Five other resources analyzed in this EA would not contribute significantly to cumulative effects, because the Proposed Action would not have significant long-term or irreversible effects on water quality, air quality, geology (and soils), noise, and human health resources. Transportation, ecological resources, cultural resources, environmental restoration, and waste management are discussed further in this section. This analysis concludes that there would be insignificant slight cumulative effects on these resources as a consequence of the aggregate of the Proposed Action and past, present, and reasonably foreseeable future actions. Moreover, some positive effects to resources, including transportation, infrastructure, and environmental restoration, would occur as a consequence of the Proposed Action controlling access to the LANL TA-3 core area. *Transportation*. The Proposed Action would modify the existing LANL and Los Alamos County transportation network by placing access restrictions on vehicles using Pajarito Road and those entering into TA-3. These modifications would reallocate traffic primarily to two of the other three roads leading to Los Alamos town site but not cause significant impacts to the network. The proposed gas line project could affect the transportation network and traffic should the no action alternative to leave it in its current condition within the Main Hill Road right-of-way be selected. This is because future gas line repair or maintenance could require closing the road for some period. The placement of access-control points would be designed and phased to minimize vehicle waits, congestion, and effects on LANL roadways restricted to use by the public, while East Jemez Road (Truck Route) would remain open for unrestricted vehicle access. UC would coordinate with Los Alamos County to assure acceptable emergency response actions during and after the construction. Traffic within the LANL TA-3 area and to vehicle parking lots would be rerouted due to newly constructed road closures into TA-3 and internal access-control points. Access controls would actually enhance traffic safety by	

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		restricting vehicles to certain locations and reducing the number of vehicles within the Pajarito corridor and LANL TA-3 area. Traffic and infrastructure impacts on U.S. Forest Service and Bandelier National Monument areas adjacent to LANL would not change as these lands would likely continue to be used for recreation, habitat management purposes, and timber production (only within the Santa Fe National Forest). Bandelier National Monument has long-term plans for rebuilding its main access road and possibly relocating parking closer to SR 4, but this should not have an effect on inter-LANL transportation. Parcels identified for land transfer are outside the proposed access-controlled areas and would not contribute to unforeseen traffic or infrastructure impacts. Similarly, there would be no long-term effects on other infrastructure. These access controls would be expected to enhance the safety and security of LANL utilities. *Ecological Resources*. The Proposed Action would involve AEIs that include potential habitat, wetlands, and floodplains. The proposed bypass roads would create corridors of varying width from 50 to 200 ft where some vegetation would be removed or disturbed. Construction within these areas would be accomplished using BMPs to minimize impacts. Structural bridges would be used to span canyons over areas designated as AEIs. UC is implementing an Integrated Resource Management Plan to coordinate responsible environmental stewardship at LANL that is consistent with its missions. This management plan will also help LANL management operate the facility without incurring adverse cumulative environmental effects pursuant to the SWEIS ROD. The Proposed Action would not contribute significantly to adverse cumulative effects on ecological resources. *Cultural Resources*. The Proposed Action would result in demolition of the Building 3-40 high bay, which is eligible for the NRHP. There are a number of actions planned for LANL that would adversely affect LANL historic structures over the next several years, and many of the historic buildings at LANL would be demolished. Examples of buildings that are under consideration for demolition activities include the Administration Building in TA-3, Omega West	

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		facility (TA-2), the Manhattan Project detonator buildings at TA-6, several structures at TA-41, several structures at TA-21 related to early thermonuclear weapons, the Hollow at TA-15 where the Rex accelerator was located, several buildings at TA-33 associated with early gun development, and the Van de Graff accelerator (TA-3). Hundreds of buildings are on the LANL excess property list or may be proposed for demolition over the next several years, including most of the permanent buildings that date to the early Cold War era (1947–63). A small number of these buildings may have reuse potential; this potential must be considered as part of NNSA's management of historic properties. In response to these factors, NNSA and UC are preparing a Cultural Resources Management Plan (CRMP) in accordance with the mitigation action plan set forth in the SWEIS ROD. This management plan, which is due to be completed by the end of 2002, will address the rapid attrition of historic buildings and will establish a framework for identifying historic properties with exceptional importance in LANL history. The Proposed Action is not expected to result in a significant adverse cumulative effect on historic resources at LANL because the NNSA and the SHPO would negotiate a treatment plan for documenting the importance of Building 3-40 for future reference. *Environmental Restoration*. There are eight SWMUs within or nearby the Proposed Action and most of these are located in drainage areas. Any of the PRSs impacted by construction would be sampled, characterized, and remediated as appropriate before construction of the bypass roads and associated facilities by the LANL Environmental Remediation Program. Wastes generated by these remediation efforts would be handled in accordance with applicable RCRA procedures and regulations and transferred to appropriate waste management facilities so that the Proposed Action would not contribute to significant adverse cumulative effects. Some PRSs would be bridged or avoided to allow for future remediation. *Waste Management*. The Los Alamos County Landfill is located adjacent to the Eastern Bypass Road component of the Proposed Action, and its possible closure is contemplated within the next five years. Part of the site could continue being used as a transfer station and recycling facility. NNSA and the	

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		County are studying new landfill sites or alternate means of sanitary waste disposal at this time, and NNSA will develop an appropriate NEPA compliance strategy. Waste generation is expected to be minimal for the Proposed Action; however, overall waste generation at LANL during the next ten years, both from decontamination and demolition of buildings and through environmental restoration efforts, could be large. Construction and demolition wastes would be recycled and reused to the extent practicable. Existing waste treatment and disposal facilities would be used according to specific waste types. Solid wastes would be disposed of at the Los Alamos County Landfill or other appropriate permitted solid waste landfills. Demolition wastes would similarly be disposed of at appropriate permitted facilities. No aspect of the Proposed Action or other planned actions would individually result in NNSA establishing a new disposal facility or expanding an existing one.	

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LAND USE	No. Land uses and land use designations would not be affected as a result of the Proposed Action or alternatives.		
VISUAL	No. All alternatives involve only local construction in an existing industrial area. No construction would result in buildings higher or more visible than the existing buildings.		
NOISE		The Proposed Action would result in limited short-term increases in noise levels associated with various demolition and construction activities. Following the completion of these activities, noise levels would remain below 82 dBA at 10 ft (3 m) from the proposed new CTGs. Noise generated by the Proposed Action is not expected to have an adverse effect on LANL workers, members of the public, or on the environment.	
GEOLOGY AND SEISMIC		The local geologic setting is expected to have minimal effects on the Proposed Action. Seismic activity may affect the new CTGs, however, the probability of a seismic event is very low.	
SOILS		Five other resources analyzed in this EA would not contribute significantly to cumulative effects, because the Proposed Action would not have major long-term or irreversible effects on water quality, geology **(and soils)**, noise, and human health.	
SURFACE WATER	No. There would be no effect on water quality. There would be a decrease in water use. There would be no discharge to the Co-generation Complex outfall as a result of the		

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	Proposed Action. Cooling requirements for the CTGs are accomplished by a closed (dry) cooling system.		
GROUND WATER	No. There would be no effect on water quality. There would be a decrease in water use. There would be no discharge to the Co-generation Complex outfall as a result of the Proposed Action. Cooling requirements for the CTGs are accomplished by a closed (dry) cooling system.		
RAD AIR QUALITY			xx
NON-RAD AIR QUALITY		Potential temporary effects on air quality would be associated with the Proposed Action. Installation activities, including demolition, site preparation, and trenching, would result in temporary, localized emissions associated with vehicle and equipment exhaust as well as particulate (dust) emissions from excavation and construction activities. Air emissions from the installed CTGs would not be expected to exceed either the NAAQS or the NMAAQs as adopted by the State of New Mexico in its SIP. Cumulative NOx emissions from the Co-generation Complex would not exceed 99.6 tpy per unit. Emissions from all new sources would be limited to 40 tpy NOx. Effects of the Proposed Action on air quality would be negligible.	
FLOODPLAINS AND WETLANDS	No. The Proposed Action would not be located in a floodplain and wetland. The Co-generation Complex		

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	outfall and Sandia Canyon wetland would not be affected as a result of this action.		
T&E HABITAT	No. The Proposed Action would be located within previously disturbed and developed land or adjacent to disturbed areas within an industrialized area of LANL. The Proposed Action site is adequately distant from potential core habitat for areas designated as sensitive habitat for Federally listed threatened and endangered species.		
PUBLIC HEALTH			xx
WORKER HEALTH		The Proposed Action is not expected to result in adverse long-term effects on the health of construction or maintenance workers. Adverse effects during installation activities could range from relatively minor events (such as cuts or sprains) to major injuries (such as broken bones or fatalities). To prevent serious injuries, all non-LANL site workers are required to adhere to a Contractor Safety Plan (Plan) for construction activities.	
ENVIRONMENTAL JUSTICE	No. Populations that are subject to environmental justice considerations are not located within the area of influence of the Proposed Actions or alternatives.		

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	Populations nearest to the Proposed Action site are not predominantly minority and low-income populations.		
CULTURAL RESOURCES	No. There are no known archaeological or historic resources within the area of the Proposed Action.		
SOCIO-ECONOMICS	No. Demolition and construction activities would employ only 20 new workers at the peak activity and would have little noticeable effect on local economy.		
UTILITIES (GAS, ELECTRICITY, WATER)		Option A and Option B under the Proposed Action would have negligible adverse effects during construction, but would produce a long-term positive benefit. The proposed 20-MW simple-cycle CTGs and combined-cycle co-generation CTGs would assure there is adequate power for existing and approved LANL operations.). The proposed CTGs would enhance power reliability at LANL by providing redundancy in the event of service disruptions. The approximately 40-MW capability from the proposed CTGs and the potential 20-MW steam-generating capability at the TA-3 Co-generation Complex could provide the capability to meet minimum electric loads for LANL and Los Alamos County in the event of a total blackout of the northern New Mexico grid. The Proposed Action would require the installation of approximately 400 ft (20 m) of natural gas line that would be tied into an existing service line.	
WASTE MANAGEMENT		Option A Construction waste would be generated from the demolition of cooling tower Building 3-285 (see Figure 4). Approximately 2,250 yd^3 (1,710 m^3) of construction debris is estimated to result from	

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		demolition of this structure. . The only hazardous wastes expected to be generated by implementing the Proposed Action would be a small amount of asbestos from the demolition of the cooling towers and possibly contaminated soil resulting from cleanup of the PRS, if sampling and characterization activities indicate that this is required. Option B Building 3-58 would be demolished to vacate space for the installation of the HRSG. Construction waste would be generated from the demolition of cooling tower Building 3-58 (see Figure 4). Approximately 2,750 yd^3 (2,090 m^3) of construction debris is estimated to result from demolition of this structure. Approximately 2.5 yd^3 (1.9 m^3) of asbestos-contaminated material would be disposed of offsite. Similar to Option A, remediation of the consolidated PRS may also be required under Option B.	
CONTAMINATED SPACE			xx
TRANSPORTATION (ON SITE, SHIPMENTS)	No. The Proposed Action would not affect traffic rates or patterns on LANL or Los Alamos County roads.		
ENVIRONMENTAL RESTORATION		The PRS of concern is a consolidated unit identified as SWMU 03-012(b)-00. The constituents of concern are chromates, lead, cyanide, mercury, and silver. In the past, chromates were used to treat the cooling-tower water for corrosion control and it is possible that the overspray from the towers is the cause of the contamination in the area.	
ACCIDENTS		Without the presence of radiological materials or significant quantities of hazardous chemicals, the Proposed Action can be considered common practice in a standard industry. Lastly, replacement of gas turbine engines is a comparably simple task with little risk of potential injury. The existing steam turbine generator system has been operated free of serious accidents since 1977	
D&D		Two existing structures, cooling towers Building 3-58 and Building 3-285 (Figure 3), may be demolished at various times during the site preparation stage. CTG 2 would be installed where Building 3-285 is presently sited. Building 3-58 would be demolished to install the	

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		HRSG system for combined-cycle co-generation operation as described in Option B.	
CUMULATIVE IMPACTS		The effects of the Proposed Action when combined with the effects of other actions discussed in this section do not result in cumulatively significant impacts. See Section 6 for more detail.	

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LAND USE	The Proposed Action, the Trails Closure Alternative, and the No Action Alternative would not alter current land use designations at LANL.		
VISUAL	The Proposed Action, the Trails Closure Alternative, and the No Action Alternative would not affect visual resources.		
NOISE		**Proposed Action:** Noise generated by the Proposed Action is not expected to have an adverse effect on either LANL workers or members of the public or on wildlife that may be using forested trail areas. Noise generated by trail maintenance, repair, construction, or closure activities would be very short term in duration and highly localized and would be consistent with noise levels in nearby developed areas at LANL. 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. **Trails Closure Alternative:** Implementing the Trails Closure Alternative would be expected to result in limited, short-term increases in noise levels similar to those described in the previous subsection regarding the Proposed Action. Most noise would be generated during trail closure activities and there would not likely be any associated noise generated during construction activities using heavy equipment.	
GEOLOGY AND SEISMIC		**Proposed Action:** No effect on the local geology is anticipated from implementing the Proposed Action. Seismic activity could affect trails; however, the probability of a seismic event is very low. **Trails Closure Alternative:**	

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		No effect on the local geology is anticipated from implementing this alternative. Seismic activity could affect trails; however, the probability of a seismic event is very low.	
SOILS		**Proposed Action:** Construction and maintenance activities associated with the proposed Trail Management Program would have minimal effects on soils in certain areas of LANL. Siltation and stabilization controls would limit or control soil erosion and rockfalls. Trails on mild slopes and on weathered tuff would require BMPs to minimize erosion. **Trails Closure Alternative:** Maintenance and closure activities associated with the Trails Closure Alternative would have minimal effects on soils in certain areas of LANL. These effects would be less than the Proposed Action because many if not most of the social trails at LANL would be closed and appropriate BMPs and other techniques would be used to preclude further erosion damage.	
SURFACE WATER		**Proposed Action:** The proposed Trail Management Program would have a negligible effect on surface water quality. Existing erosion problems along trails would be corrected through trails maintenance activities and the use of BMPs during maintenance and construction. Some minimal silting could occur as a consequence of the same activities. **Trails Closure Alternative:** The Trails Closure Alternative would have a negligible effect on surface water quality. Existing erosion problems would be corrected through trails maintenance activities on selected trails that remain available for use by workers at LANL and officially invited guests. BMPs to prevent further erosion would be used on trails being closed. Some minimal silting could occur as a consequence of the same activities.	
GROUND WATER	There would be no effects on groundwater quality.		
RAD AIR QUALITY			xx
NON-RAD AIR		**Proposed Action:**	

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QUALITY		Effects on air quality in the LANL area would be expected to be temporary and localized as well. There would be no long-term degradation of regional air quality. The air emissions would not be expected to exceed either the NAAQS or the NMAAQS. **Trails Closure Alternative:** Implementation of the Trails Closure Alternative would be expected to result in temporary, localized emissions associated with vehicle and equipment exhaust as well as in particulate (dust) emissions from trail repair or closure activities. The air emissions would not be expected to exceed either the NAAQS or the NMAAQS.	
FLOODPLAINS AND WETLANDS			xx
T&E HABITAT		**Proposed Action:** No long-term or permanent changes to ecological resources would be expected from implementing the Proposed Action with regard to existing trails. Short-term, temporary effects to animals that live along trail reaches could result from trail construction, maintenance, or closure activities. Federally-listed threatened or endangered species, or other sensitive species currently present at LANL, would not likely be adversely affected, nor would their critical habitat be adversely affected, by activities associated with implementation of the Proposed Action. **Trails Closure Alternative:** Few long-term or permanent changes to ecological resources would be expected from implementing the Trail Closure Alternative. Short-term, temporary effects to animals that live along trail reaches could result from trail maintenance or trail closure activities. Federally-listed threatened or endangered species, or other sensitive species currently present at LANL, would not likely be adversely affected, nor would their critical habitat be adversely affected by activities associated with implementation of the Trail Closure Alternative.	
PUBLIC HEALTH		The Proposed Action would have a minimal adverse effect on worker and public health.	
WORKER HEALTH		The Proposed Action would have a minimal adverse effect on worker and public health.	
ENVIRONMENTAL		**Proposed Action:**	

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JUSTICE		There are no concentrations of minority or low-income populations in Los Alamos County, which is the county that would be most directly affected by the Proposed Action. Pueblo members of San Ildefonso and Santa Clara believe that adverse direct and indirect environmental effects to cultural resources could result if some trails remain open for public use and also if some trails were closed at LANL because trespassing could increase on lands belonging to these Pueblos. Nevertheless, this alternative has the potential to interfere with the use of TCPs by members of surrounding Pueblos. **Trails Closure Alternative:** Pueblo members of San Ildefonso and Santa Clara believe that adverse indirect environmental effects to cultural resources could result if all trails at LANL were closed to the public because trespassing could increase on lands belonging to these Pueblos.	
CULTURAL RESOURCES		**Proposed Action:** Trail construction, maintenance, and closure activities associated with the implementation of the Proposed Action could provide some benefit to cultural resources protection. Activities would be coordinated with LANL archeologists in consultation with appropriate Native American tribes to minimize damages to any cultural resources present along trail reaches. In the event that a cultural resource is present along an existing trail such that it would be adversely affected by certain user group activities or would be unavoidably damaged by maintenance workers, the trail may be slated for permanent closure to all or certain users or it may be closed until the involved segment of trail can be rerouted around the cultural resource. **Trails Closure Alternative:** Implementing the Trail Closure Alternative would enhance the protection of cultural and historic resources from trail-user-incurred damages at LANL since all trails would be closed to recreational users and some trails would be closed to all user groups.	
SOCIO-ECONOMICS		**Proposed Action:** The proposed Trails Management Program at LANL would not have a long-term effect on socioeconomic conditions in north-central New Mexico. There could be some short-term benefits derived from trail	

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		construction, maintenance, and closure activities. LANL workers or contractors who are part of the existing regional workforce would likely accomplish these tasks. Consequently, there would be no effect on local or regional population or an increase in the demand for housing or public services in Los Alamos or the region as a result of the Proposed Action. **Trails Closure Alternative:** The Trails Closure Alternative would not have a long-term effect on socioeconomic conditions in north-central New Mexico. There could be some short-term benefits derived from trail maintenance or closure activities. LANL workers or contractors who are part of the existing regional workforce would likely accomplish these tasks.	
UTILITIES (GAS, ELECTRICITY, WATER)			xx
WASTE MANAGEMENT		**Proposed Action:** About one to six truckloads of recyclables or wastes would be expected to be generated per year. This would amount to a maximum of about 120 yd3 (91 m3) per year of wastes requiring disposal. This quantity of waste is well within the waste management capabilities of LANL facilities. **Trails Closure Alternative:** Implementation of the Trails Closure Alternative would result in waste management and waste recycling impacts similar in character and quantities to those described for the Proposed Action.	
CONTAMINATED SPACE			xx
TRANSPORTATION (ON SITE, SHIPMENTS)		**Proposed Action:** Transportation patterns within LANL and the surrounding areas would be expected to slightly change; there would be no infrastructure changes expected, however, as a result of implementing the Proposed Action. Parking for trail users could be slightly enhanced at LANL. **Trails Closure Alternative:** Transportation patterns within LANL and the surrounding areas	

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		would be expected to slightly change. Such closures could change traffic patterns both for recreational users and LANL workers and could inconvenience some trail users because they would have to choose alternative transportation routes and means.	
ENVIRONMENTAL RESTORATION		**Proposed Action:** Implementing the Proposed Action would not likely affect ER Project sites because these are fenced, closed off, or otherwise identified where human health concerns are at issue. There would be no new trail construction in areas of contaminant concern. **Trails Closure Alternative:** The Trails Closure Alternative would not likely affect ER Project sites because these are fenced, closed off, or otherwise identified where human health concerns are at issue. Closure of all existing trails to the public would eliminate the problem of non-LANL trail users possibly disturbing and destabilizing existing PRSs.	
ACCIDENTS		**Proposed Action:** Under the Proposed Action there would be more trails work, maintenance, and, possibly, trail use, creating more opportunities for accidents; however, the risk would be reduced by enhanced training and worker protection, a safer design to the trail system, better maintenance, and more safety information such as warning signs and alarms; all of which would occur under a Trails Management Program. **Trails Closure Alternative:** As previously discussed, under this alternative there would be fewer trails and use would be restricted to workers at LANL and officially invited guests. Accident frequencies would be even less than with the Proposed Action. Generally, this alternative is the safest with regard to potential accident impacts because there would be fewer trails and less use of the remaining trails. In addition, fewer worker hours would be spent on trails. This alternative would most likely have a lower likelihood of accidents than the Proposed Action, which is expected to be minimal.	
D&D			xx
CUMULATIVE IMPACTS		Ecological resources, cultural resources, environmental justice, and socioeconomics are the affected resources that are discussed further	

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		in this section, because the analysis in Chapter 4 and the scoping for this EA indicated that there could be some minor direct or indirect effects on ecological, cultural, socioeconomic resources, and environmental justice as a consequence of the Proposed Action and the Trails Closure Alternative; and some irreversible effects on cultural resources as a result of the No Action Alternative, as well as some minor direct and indirect effects on environmental justice.	

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Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
LAND USE	X		
VISUAL		Overall, the removal of buildings would enhance the visual characteristics of the areas where they are currently located.	
NOISE		The Proposed Action would result in limited short-term increases in noise levels associated with various construction and demolition activities. Following the completion of these activities, noise levels would return to existing levels.	
GEOLOGY		The Proposed Action would not affect or be affected by geological conditions.	
SEISMIC		There are currently insufficient data to determine exactly where faults pass through the Two-Mile Mesa Complex.	
SOILS		Soil and reclaimed asphalt material and crushed concrete rubble would be staged at an existing site on Two-Mile Mesa for potential construction use at the Two-Mile Mesa Complex or at other existing LANL storage yards until these materials could be reused at LANL or at other offsite locations.	
SURFACE WATER		Water quality in this area would not be affected by the Proposed Action.	
GROUND WATER		See SURFACE WATER.	
RAD AIR QUALITY		See NON-RAD AIR QUALITY	
NON-RAD AIR QUALITY		Construction and demolition activities for the proposed Two-Mile Mesa Complex would be expected to produce only temporary and localized air emissions and the effects on air quality would also be temporary and localized. There would be no long-term degradation of regional air quality.	
WETLANDS		The Proposed Action would not entail any direct effects on floodplains or wetlands since there are none within the areas proposed for construction or demolition.	
T&E HABITAT		There would be no effects to sensitive species or their critical habitat due to construction under the Proposed Action. Several technical areas where demolition activities would occur are within the AEI for the Mexican spotted owl. In these areas, BMPs, such as noise and activity restrictions, would be followed so that there would be no effect to this species. Certain decontamination and demolition activities would be restricted between March and mid-May when surveys are completed or until August 31 if it is determined that the AEI is occupied.	
FLOOD-PLAINS		See WETLANDS	
PUBLIC HEALTH			X
WORKER HEALTH		Construction and demolition work planned under the Proposed Action would	

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		not be expected to have any adverse health effects on LANL workers or construction workers.	
ENVIRONMENTAL JUSTICE	X		
CULTURAL RESOURCES		The planned consolidation of the DX complex would not affect the recorded historic archaeological site or the recorded prehistoric archaeological sites. The demolition of various historic buildings would have an adverse effect on NRHP-eligible and potentially eligible historic structures.	
SOCIO-ECONOMICS		This project would not have a long-term effect on socioeconomic conditions in north-central New Mexico but there would be short-term benefits during construction in the form of jobs and procurement.	
UTILITIES (GAS, ELECTRICITY, WATER)		Onsite utilities (gas, water, sewer, electric, communications, computer networks) would be reconfigured and upgraded for efficient distribution to the existing and new buildings.	
WASTE MANAGEMENT		(see Tables 5 and 9 below)	

Table 5. Estimated Construction Wastes: Sources, Quantities, and Transportation

Source	Quantity yd^3 (m^3)	Traffic (truck/week)	Start Date	Duration (months)
SDP Building	806 (613)	2	FY 03	6
CERL Building	806 (613)	2	FY 05	6
CHEM Laboratory	2,465 (1,873)	6	FY 05	6
EDF Building	806 (613)	2	FY 05	6
High Bay Laboratory	616 (468)	1–2	FY 07	6
Contained Firing Capability structures	806 (613)	2	FY 05	6
Gas Gun Facility building(s)	806 (613)	2	FY 08	6
Three Office/Laboratory buildings	2,418 (1,839)	6	FY 04	6
Classified HE Storage Building	616 (468)	1–2	FY 10	6
Detonator Qualification Laboratory	616 (468)	1–2	FY 10	6
Lecture Hall	616 (468)	1–2	FY 10	6
Machine Shop	616 (468)	1–2	FY 10	6

Construction solid waste is estimated at 11,993 yd3 (9,115 m3).

Table 9. Combined TA-16 and DX Estimated Waste Quantity, Traffic Effect, and Disposal Location: Construction Phase

Quantity yd^3 (m^3)	Traffic truck(s) per year	Potential Disposal Location
20,517 (15,593)	142	Los Alamos County Landfill or other offsite facility

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CONTAMINATED SPACE			X
TRANSPORTATION (ON SITE,		See WASTE MANAGEMTENT and D&D	

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<tr><th>Impact</th><th>Not Applicable[1]</th><th>Addressed[2]</th><th>Not Addressed[3]</th></tr>
<tr><td>SHIPMENTS)</td><td></td><td></td><td></td></tr>
<tr><td>ENVIRONMENTAL RESTORATION</td><td></td><td>The Proposed Action is not expected to adversely affect PRSs. The PRSs near the intersection of the proposed road and Two-Mile Mesa Road have all been characterized.</td><td></td></tr>
<tr><td>ACCIDENTS</td><td></td><td>Hazards for the Proposed Action can be grouped into operational hazards, construction hazards, and transportation hazards. Potential accidents associated with the Proposed Action are most likely to occur during construction (including demolition) activities.</td><td></td></tr>
<tr><td>D&D</td><td></td><td>
Table 6. Estimated Demolition Waste Types, Quantities, Traffic Effects, and Disposal Locations
<table>
<tr><th>Type/Source</th><th>Quantity yd³ (m³)</th><th>Traffic over a 96 month period (truck/year)</th><th>Potential Disposal Location</th></tr>
<tr><td>Uncontaminated building debris</td><td>21,001 (15,961)</td><td>131</td><td>Los Alamos County Landfill or other Offsite Facility</td></tr>
<tr><td>Asbestos building components</td><td>610 (464)</td><td>less than 4</td><td>Mountainair, NM, or Phoenix, AZ</td></tr>
<tr><td>Lead-based paint</td><td>2 (1.5)</td><td>less than 1</td><td>Albuquerque, NM</td></tr>
<tr><td>Photochemicals (silver)</td><td>9 (7)</td><td>less than 1</td><td>Fernley, NV</td></tr>
<tr><td>HE-contaminated material</td><td>160 (122)</td><td>less than 20</td><td>Lake Charles, LA</td></tr>
<tr><td>LLW (DU)</td><td>20 (15)</td><td>less than 1</td><td>LANL, Area G, TA-54</td></tr>
</table>
The volume of solid waste from demolition activities is estimated to be approximately 21,800 yd3 (16,568 m3). Most of the waste would be uncontaminated building debris. Some buildings at TA-9, TA-14, TA-36, TA-39, and TA-40 that may be demolished are likely to be HE-contaminated or DU-contaminated.

Table 10. Combined TA-16 and DX Estimated Waste Quantity, Traffic Effect, and Disposal Location: Demolition
<table>
<tr><th>Type/Source</th><th>Quantity yd³ (m³)</th><th>Traffic truck(s) per year</th><th>Potential Disposal Location</th></tr>
<tr><td>Uncontaminated building debris</td><td>51,001 (38,761)</td><td>143</td><td>Los Alamos County Landfill or other offsite facility</td></tr>
<tr><td>Asbestos building debris</td><td>730 (555)</td><td>3</td><td>Mountainair, NM, or Phoenix, AZ</td></tr>
<tr><td>Lead-based paint</td><td>3 (2.3)</td><td><1</td><td>Albuquerque, NM</td></tr>
<tr><td>Photochemicals (silver)</td><td>10 (7.6)</td><td><1</td><td>Fernley, NV</td></tr>
<tr><td>HE contaminated material</td><td>305 (232)</td><td>16</td><td>Lake Charles, LA</td></tr>
<tr><td>LLW</td><td>30 (22.8)</td><td><1</td><td>LANL, Area G, TA-54</td></tr>
</table>
</td><td></td></tr>
<tr><td>CUMULATIVE IMPACTS</td><td></td><td>See WASTE MANAGEMENT and D&D and CULTURAL RESOURCES</td><td></td></tr>
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LAND USE	X		
VISUAL	X		
NOISE		**Proposed Action** ***Corrective Measure Option 1: Upgrade Existing Surface*** The Proposed Action could result in a temporary increase in noise levels associated with various remediation activities proposed for MDA H over the six-month time period required for implementation. At the completion of these activities, noise levels would return to existing levels. Noise generated by the Proposed Action is not expected to have an adverse effect on either LANL or site workers or members of the public. Heavy equipment would be used during site preparation and for earthmoving work. 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. PPE would be required if site-specific work produced noise levels above the action level at LANL of 82 dBA. Based upon a number of physical features that can attenuate noise, such as topography or vegetation, 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 particularly noticeable to members of the public or disturb local wildlife. ***Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover*** Noise effects under corrective measure Option 2 would be essentially the same as those discussed previously under corrective measure Option 1. Routine site containment activities would include the construction of an engineered cover, but these operations would continue to have only a temporary and minor effect on noise levels. ***Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover***	

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NOISE		Temporary noise effects under corrective measure Option 3 would be greater than those discussed under corrective measure Option 1 during the 12-month implementation period. Routine site containment activities would be expanded to include waste encapsulation operations including the use of a high-pressure slurry delivery line. The use of a high-pressure delivery line and supporting equipment could pose an additional noise hazard to site workers. Equipment required to maintain pressure and push the grout through the delivery line (such as engines or pumps) would generate noise. Workers in the vicinity of this equipment may be exposed to elevated noise levels requiring hearing protection. Adherence to safe operating procedures (such as designated worker exclusion areas, use of PPE, and operator training) should preclude serious injuries from noise exposures associated with grout line operations. Noise levels would return to background levels when grouting operations are completed. ***Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal*** Excavation and offsite disposal activities proposed under corrective measure Option 4 would increase the potential for noise effects on workers and the public over the 48-month implementation period. Waste excavation, packaging, and transportation activities would generate similar types of noise but also a higher noise level than site containment operations described under corrective measure Option 1. This higher noise level may require hearing protection for workers under certain conditions but should not adversely affect the public. Worksite monitoring for noise, adherence to safe work protocols, and the use of PPE should reduce the risk of injuries to site workers from elevated noise levels. ***Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal*** Potential noise effects from excavation and transportation activities under corrective measure Option 5 would be similar to those identified under corrective measure Option 4. Excavation activities at MDA H would pose potential noise risks to workers and the public as discussed under corrective measure Option 4. However, onsite disposal at a location other than MDA H	

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NOISE		(such as at Area G or TA-16) would be by way of DOE and public roads. These roads could be closed when wastes are transported thereby reducing noise levels on publicly accessible roads. The total number of truck trips required to move wastes to a landfill or disposal site would not change. If materials are disposed of at Area G, the transportation of wastes over publicly accessible roads may not be needed, which would also reduce or eliminate public exposure to noise. **No Action** Under the No Action Alternative, ambient noise levels would remain unchanged in the vicinity of MDA H. Environmental noise levels in and around MDA H would be expected to remain below 80 dBA on average.	
GEOLOGY & SEISMIC		**Proposed Action** ***Corrective Measure Option 1: Upgrade Existing Surface*** Under this corrective measure option, the waste would be left in place within the disposal shafts. Potential geologic effects on corrective measure Option 1 are the same as those expected for the No Action Alternative. ***Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover*** Under this corrective measure option, the waste would be left in place within the disposal shafts. Potential geologic effects on corrective measure Option 2 are the same as those expected for the No Action Alternative. ***Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover*** Under this corrective measure option, the waste would be left in place within the disposal shafts. Potential geologic effects on corrective measure Option 3 are the same as those expected for the No Action Alternative. ***Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal*** Total excavation of the MDA H shafts would essentially return this portion of Mesita del Buey to its natural state. A minor geologic effect would be expected	

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GEOLOGY & SEISMIC		from implementation of this corrective measure option. The shafts that would be backfilled with the soil and tuff overburden material would not be solid ground and would be susceptible to subsidence (settling) unless the tuff is packed well as it is put into the shafts. ***Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal*** Total excavation of the MDA H shafts would essentially return this portion of Mesita del Buey to its natural state. Geologic effects expected to result from implementation of this corrective measure option would be similar to those described for corrective measure Option 4. **No Action** Under the No Action Alternative, the waste would be left in place within the disposal shafts. There would be no effects to geology resources as a result of implementing the No Action Alternative. The waste disposal shafts are located at a suitable distance (about 90 ft [30 m] for the shaft closest to the road break) from the Pajarito Road break (the cliff edge), so that it is expected that they should remain intact for more than 10,000 years. Slope stability would be subject to natural processes such as erosion, landslides, rockfalls, rainfalls, freezing and thawing, and seismic events. These mass-wasting mechanisms could cause cliff edge instability and retreat towards the disposal shafts over time, but would be unlikely to adversely affect waste within MDA H shafts over the next 10,000 years or more.	
SOILS			**X**
SURFACE WATER & GROUNDWATER		**Proposed Action** ***Corrective Measure Option 1: Upgrade Existing Surface*** It is unlikely that either surface or ground water quality would be adversely affected from implementing this corrective measure option over the next 1,000 years. It is not expected that major contaminant transport over the next 1,000 years would result from implementing this corrective measure option because of chemical and isotope decay and waste material that is non-leaching. Water quality consequences that could result from implementing this corrective	

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SURFACE WATER & GROUNDWATER		measure option include the possibility of minor contaminant transport by groundwater and vapors (LANL 1992b, LASL 1973). Upgrading and maintaining the MDA H surface cover would provide additional protective measures minimizing the amount of moisture that could migrate through the waste materials disposed in the shafts over the No Action Alternative. In addition, the 3-ft- (0.9-m-) thick concrete caps present over each shaft would provide additional moisture protection to the shafts ***Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover*** It is not expected that either surface or groundwater quality would be adversely affected from implementing this corrective measure option over the next 1,000 years. Environmental effects that could result from implementing this corrective measure option include the possibility of minimal contaminant transport by groundwater and vapors (LANL 1992b, LASL 1973); potential environmental effects from implementing this corrective measure option are also as described above for corrective measure Option 1. The engineered ET cover would likely enhance the performance of the retardation of moisture migration through the shafts and also erosion of the cover over time as compared to corrective measure Option 1. ***Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover*** It is not expected that either surface or ground water quality would be adversely affected from implementing this corrective measure option over the next 1,000 years. Waste left in place would still be subject to minor contaminant transport by groundwater or vapors (LANL 1992b, LASL 1973). Potential adverse environmental effects from implementation of this corrective measure might result from the potential for an Alkali-Silica Reaction (ASR). This reaction can occur between certain aggregate types (in this case, tuff) and the alkalis in the pore solutions of concrete grout to form a silica gel. If ASR were to occur after implementation, the confinement mechanism of corrective measure Options 3a and 3b could provide little additional physical containment. Although 100	

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SURFACE WATER & GROUNDWATER		percent integrity of the beneath shaft seal could not be verified, the correct cement mixture formulation would still achieve the primary objective of corrective measure Option 3, to minimize the potential for human and biotic intrusion. ***Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal*** The long-term effects to water resources that could result from implementing this corrective measure option would likely be slightly beneficial. Total excavation of the inventory of the MDA H shafts would essentially return this portion of Mesita del Buey to its natural state and would minimize any potential for radionuclide, heavy metal, and organic contaminant transport from wastes present in the shafts at MDA H. Gaseous state contamination in the tuff surrounding the shafts would be expected to self remediate over time. ***Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal*** The long-term effects to water resources that could result from implementing this corrective measure option would likely be slightly beneficial. Total excavation of the inventory of the MDA H shafts would essentially return this portion of Mesita del Buey to its natural state and would minimize any potential for any radionuclide, heavy metal, and organic contaminant transport from the shafts as the waste would be removed. Gaseous state contamination in the tuff surrounding the shafts would be expected to self remediate over time. Disposal of the waste at another permitted disposal area at LANL could result in the development of the same issues that have necessitated a corrective action at MDA H. **No Action** Under the No Action Alternative, the MDA H site would be left in its current state. Groundwater and surface water quality would not likely be adversely affected from implementation of the No Action Alternative. Even the more stable and long-lived radionuclides and heavy metals would not be expected to migrate to the regional aquifer within 1,000 years, if at all. Potential water	

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SURFACE WATER & GROUNDWATER		resources effects from implementing the No Action Alternative could include the presence of minor amounts of water in the disposal shafts that could lead to minor migration of contaminants from the disposal shafts.	
AIR QUALITY		**Proposed Action** ***Corrective Measure Option 1: Upgrade Existing Surface*** No change to the air quality in the Los Alamos airshed would be expected to result from implementing corrective measure Option 1. Air emissions would be expected to be similar to those expected for the No Action Alternative if corrective measure Option 1 were implemented. No MDA H shaft contaminants would be disturbed. Wind erosion at the site would be reduced by the upgrades to the cover of the shaft over conditions of the No Action Alternative. NNSA and UC staff at LANL would continue to be in compliance with air quality standards and the attainment status of the area would not change. Tritium and VOC emissions from MDA H would be similar to, or less than, those associated with the No Action Alternative; VOC and tritium emissions would decline over time as a result of bioremediation, decomposition, volatilization, and radioactive decay. ***Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover*** No change to the air quality in the Los Alamos airshed would be expected to result from implementing corrective measure Option 2. Air emissions would be expected to be similar to those expected for the No Action Alternative if corrective measure Option 2 were implemented. No MDA H shaft contaminants would be disturbed. Wind erosion at the site would be reduced by the enhancements to the cover and shaft caps over the conditions of corrective measure Option 1. NNSA and UC staff at LANL would continue to be in compliance with air quality standards and the attainment status of the area would not change. Tritium and VOC emissions from MDA H would be similar to, or less than, those associated with the No Action Alternative. VOC and tritium emissions would decline over time as a result of bioremediation, decomposition, volatilization, and radioactive decay.	

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AIR QUALITY		***Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover*** No change to the air quality in the Los Alamos airshed would be expected to result from implementing corrective measure Option 3. Air emissions would be expected to be similar to those expected for the No Action Alternative if corrective measure Option 3 were implemented. Wind erosion at the site would be reduced by the enhancements to the cover and shaft caps, as well as the construction of side walls to the shafts. NNSA and UC staff at LANL would continue to be in compliance with air quality standards and the attainment status of the area would not change. Tritium and VOC emissions from MDA H would be less than those associated with the No Action Alternative. Tritium and VOC emissions would decline over time as a result of bioremediation, decomposition, volatilization, and radioactive decay. ***Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal*** No change to the air quality in the Los Alamos airshed would be expected to result from implementing corrective measure Option 4. The LANL area would remain an attainment area for air quality. Air emissions would be greater than anticipated for the No Action Alternatives or for corrective measure Options 1 through 3. Emissions would be regulated by NMED and the EPA. Corrective measure operations would conform to applicable NMED and EPA permitting requirements for LANL. Other LANL operations might be curtailed to maintain LANL emissions within permitted levels. Dust or PM, HAPs, and VOCs would result from excavating, transporting, and storing soil and waste from MDA H over the short term. Particulate emissions would be controlled with specific best available control measures, such as wetting soil or applying tackifiers, that would be implemented for the removal operations. Potential localized air quality effects would be temporary. Emissions of PM, HAPs, VOCs, and radioactive materials would result from waste segregation and sorting operations, from processes used to declassify materials (particularly from incineration of plastics), and from burning HE-	

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AIR QUALITY		contaminated materials. The volume of HE-contaminated waste that would require treatment at TA-16 is in excess of 5,196 lbs (2,318 kg). Treatment of the entire HE inventory would probably require that the waste treatment be performed over several years for these operations and the rest of LANL operations to remain within the annual emissions parameters of the TA-16 Open Burn Permit. Bounding estimates for radioactive emissions, using the entire contaminant inventory of the shafts as the source term, for recovering, sorting, segregating, and declassifying materials at MDA H were calculated according to RAD NESHAP (40 CFR 61) protocols. The potential dose from the recovery and processing operations to the maximally exposed individual (MEI) member of the public, at the White Rock Nazarene Church (which is the nearest permanent offsite residence or business hypothetically located to MDA H), would be 0.26 millirem (mrem) per year if no mitigating measures were employed. However, under the Proposed Action, the recovery, sorting, segregating, and declassification (such as crushing, cutting, dissolving, or heating to temperatures below 3632°F [2000°C]) operations would be conducted in a HEPA-filtered enclosure. The resulting potential dose to the MEI would be 0.017 mrem per year. Radioactive air emissions would be monitored and would not exceed applicable air quality standards. No long-term adverse effects to air quality from implementing corrective measure Option 4 would be expected to occur. Contaminants already present in the soil around MDA H would continue to decay or be decomposed and would lessen over time. ***Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal*** Air emissions resulting from implementing corrective measure Option 5 would be the same as those expected from implementing corrective measure Option 4. No change to the air quality in the Los Alamos airshed would be expected to result from implementing corrective measure Option 5. The LANL area would remain an attainment area for air quality. Potential doses from emissions of radioactive material and hazardous wastes are expected to be the same as for corrective measure Option 4.	

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AIR QUALITY		**No Action** No change to the air quality in the Los Alamos airshed would be expected to result from implementing the No Action Alternative. Under the No Action Alternative, particulates, HAPs, and VOCs would continue to be emitted from MDA H at very low levels similar to current levels. These levels are well below the threshold limits established by the CAA (40 CFR 50). Tritium and VOC emissions would decline over time due to natural bioremediation, decomposition, volatilization, and radioactive decay. LANL would continue to be in compliance with air quality standards and the air quality attainment status of the area would not change.	
FLOOD-PLAINS & WETLANDS	No floodplains or wetlands are located nearby.		
T&E HABITAT	No sensitive species habitat areas are located nearby.		
HUMAN HEALTH		**Proposed Action** Based on the results of the long-term risk assessments conducted for corrective measure Options 1, 2, and 3 at MDA H, potential human health effects related to cancer risk from chemicals, systemic hazard from chemicals, and radiation dose from radionuclides would be minimal even beyond the point in time when institutional controls were removed after 100 years. Corrective measure Options 2 and 3 are variations of corrective measure Option 1 with additional controls designed to enhance system performance. Therefore, corrective measure Options 2 and 3 would be less likely to affect human health, if implemented. Corrective measure Options 1, 2, and 3 would provide minimum exposure to workers. No local long-term potential human health effects would be associated with corrective measure Options 4 and 5 because the material in the MDA H shafts would be removed and disposed of in permitted facilities or recycled, where appropriate. There could be human health effects associated with implementing these Proposed Action options	

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HUMAN HEALTH		based on construction risks. These potential effects are discussed below. ***Corrective Measure Option 1: Upgrade Existing Surface*** Routine hazardous waste site corrective actions conducted under corrective measure Option 1 would pose very minor adverse health risks to LANL workers. Potential adverse effects could range from relatively minor (such as cuts or sprains) to major (such as broken bones, excessive exposures, or fatalities). To reduce the risk of serious injuries, all site corrective action contractors would be required to submit and adhere to a Health and Safety Plan. In addition, LANL staff would provide site-specific hazard and radiological training to workers, as needed. ***Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover*** Human health effects under corrective measure Option 2 would be essentially the same as those discussed under corrective measure Option 1. ***Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover*** Human health effects under corrective measure Option 3 would be similar to those discussed under corrective measure Option 1. Site containment activities would be expanded to include waste encapsulation operations including the use of a high-pressure grout delivery line. Adherence to safe operating procedures (such as formal start-up and shut-down protocols, designated worker exclusion areas, emergency shut-offs, and operator training) would reduce the risk of serious injuries due to a high-pressure delivery line failure. Longer-term adverse health effects on LANL workers and members of the public from maintenance activities at the site would be reduced even further than under corrective measure Option 1. Very minor adverse health effects would still be possible. ***Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal***	

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HUMAN HEALTH		Under corrective measure Option 4, the waste in MDA H would be removed and sent to a permitted offsite disposal facility. Any such facility would be required to have equivalent performance in terms of protecting human health and the environment as met by corrective measure Options 1 through 3. Thus, corrective measure Option 4 would provide the same level of protection for human health as corrective measure Options 1, 2, and 3, and complies with all standards for protection of human health but to a different community. However, both corrective measure Options 4 and 5 would result in the maximum exposure to workers during waste excavation, sorting, and declassification under both inert atmosphere or ambient air conditions. Excavation and offsite disposal activities proposed under corrective measure Option 4 would increase the short-term potential for adverse health effects on workers and the public during the removal operations at MDA H. About 75 to 85 employees would be required during peak waste removal operations. Waste and contaminated soil excavation, packaging, and transportation activities are generally more hazardous than site containment operations described under corrective measure Options 1, 2, and 3. Excavation could pose physical hazards from the removal of large amounts of dirt, rock, and wastes. There is also a potential for workers to be struck by falling materials or to experience falls when working in or near excavated trenches. The need for workers, especially heavy equipment operators and truck drivers, to work in proximity to excavated materials may pose additional chemical, radiation, and explosives hazards. Inhalation and ingestion of and dermal contact with contaminated dust could also pose a health hazard to site workers. Adherence to safe work protocols, use of remote handled devices, use of PPE, and the development of safety mitigation (such as monitoring for chemicals, radiation, and HE) would reduce the risk of contaminant exposures or injuries to site workers. Excavation of the MDA H wastes would be complex, but it would be safe due to training and experience of workers and implementation of the Integrated Safety Management process. The safety analysis and authorization basis process would also be a key element in the safe excavation of wastes from the shafts. Members of the public could be exposed to chemical, radiation, and HE hazards when wastes are removed from the shafts and transported to offsite disposal	

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HUMAN HEALTH		facilities. On average, about one vehicle per week over 48 months would be loaded with waste and traveling on public roads. The use of road closures when onsite at LANL, the use of public roads designated for the transport of hazardous materials when offsite, and properly packaged wastes and placarded trucks should preclude unplanned exposures or serious adverse health effects to the public. Under this corrective measure option, no local long-term health effects would occur to LANL workers or members of the local community since the wastes would no longer be present at MDA H. Because the offsite disposal facility would be designed, built, and permitted in accordance with RCRA requirements, long-term health effects from offsite disposal should pose only a minor health risk to the public. ***Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal*** Under corrective measure Option 5, the waste in MDA H would be removed and disposed of as LLW at Area G at TA-54 or, as appropriate, at a DOE or commercial offsite permitted RCRA-regulated landfill or recycle facilities. Such facilities are required to meet the same human health criteria of dose, risk, radon flux, and hazard index that have been demonstrated to be met by corrective measure Options 1 through 4. Thus, corrective measure Option 5 would provide the same level of protection for human health as corrective measure Options 1 through 4 and comply with all standards for protection of human health. Corrective measure Option 5 would provide workers with the maximum exposure to contaminants during waste excavation, sorting, and declassification. Potential human health effects from excavation activities under corrective measure Option 5 would be similar to those identified under corrective measure Option 4. Transportation activities offsite and onsite would pose the same kinds of potential health risks to workers and the public as discussed under corrective measure Option 4. However, the quantity of waste to be hauled offsite would be less than under corrective measure Option 4. Fewer truckloads of waste would decrease the potential exposure of members of the public to hazards related to	

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HUMAN HEALTH		waste transport. **No Action** Under the No Action Alternative, there would be no potential for injuries to LANL or site workers from waste removal or site maintenance activities. The current design of the MDA H cover has been reliable and effective in preventing releases of wastes (with the exception of subsurface vapor releases of VOCs and tritium) from the shafts at MDA H. This cover has had minimal maintenance in its 40-year lifetime.	
ENVIRONMENTAL JUSTICE		**Proposed Action** ***Corrective Measure Option 1: Upgrade Existing Surface*** Under corrective measure Option 1, there would be no waste removal from MDA H. Environmental justice effects would be the same as those for the No Action Alternative. ***Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover*** Under corrective measure Option 2, there would be no waste removal from MDA H. Environmental justice effects would be the same as those for the No Action Alternative. ***Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover*** Under corrective measure Option 3, there would be no waste removal from MDA H. Environmental justice effects would be the same as those for the No Action Alternative. ***Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal*** No long-term issues regarding environmental justice would be expected as a result of implementing corrective measure Option 4. Transporting wastes from LANL to another location would require that trucks use roads that traverse or are located near minority and low-income communities, including the Pueblos	

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ENVIRONMENTAL JUSTICE		of San Ildefonso and Pojoaque, and possibly others depending upon the selected route to a disposal site. Implementation of corrective measure Option 4 would minimize the potential of possible future releases of contamination from MDA H. ***Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal*** No long-term issues regarding environmental justice would be expected as a result of implementing corrective measure Option 5. Transporting wastes from LANL to another location would require that trucks use roads that traverse or are located near minority and low-income communities, including the Pueblos of San Ildefonso and Pojoaque, and possibly others depending upon the selected route to a disposal site. Users of the San Ildefonso Sacred Lands north of TA-54 would not be affected by implementation of corrective measure Option 5 since onsite LLW disposal at Area G is a normal, routine operation. **No Action** There would likely be no short-term disproportionate adverse effects to minority populations subject to environmental justice concerns under the No Action Alternative. No long-term issues regarding environmental justice would be expected as a result of implementing the No Action Alternative. Residents of San Ildefonso Pueblo have expressed concern that waste disposed of at TA-54 poses a possible environmental justice concern because this technical area is adjacent to their sacred lands. As discussed in Sections 4.1, 4.2, and 4.3, implementation of any of these corrective measure options would not be expected to adversely affect air or water quality or result in any contaminant releases above regulatory limits for a period of at least 1,000 years.	
CULTURAL RESOURCES	Field surveys and onsite inspection by trained archaeologists reveal that there are no cultural resources within the vicinity of MDA H.		

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SOCIO-ECONOMICS		**Proposed Action** ***Corrective Measure Option 1: Upgrade Existing Surface*** Socioeconomic effects for corrective measure Option 1 would be expected to be the same as for the No Action Alternative. Temporary construction jobs for 10 to 12 workers during the six-month implementation time period would be filled by existing LANL workers. ***Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover*** Socioeconomic effects for corrective measure Option 2 would be expected to be the same as for the No Action Alternative. Temporary construction jobs for 10 to 12 workers during the six-month implementation time period would be filled by existing LANL workers. ***Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover*** Socioeconomic effects for corrective measure Option 3 would be expected to be the same as for the No Action Alternative. Temporary construction jobs for 24 to 38 workers during the 12-month implementation time period would be filled by regional workers. ***Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal*** Socioeconomic effects for corrective measure Option 4 would be expected to be the same as for the No Action Alternative. Temporary construction jobs for 75 to 85 workers during the 48-month implementation time period would be filled by regional workers. ***Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal*** Socioeconomic effects for corrective measure Option 5 would be expected to be the same as for the No Action Alternative. Temporary construction jobs for 75 to 85 workers during the 48-month implementation time period would be filled	
SOCIO-ECONOMICS			

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		by regional workers. **No Action** The population in Los Alamos County would not be expected to change as a result of implementing the No Action Alternative. Site maintenance and monitoring activities would be performed by existing LANL workers. There would be no increase in LANL employees and no effect on housing and public services.	
TRANSPORTATION & UTILITIES TRANSPORTATION & UTILITIES		**Proposed Action** Each of the corrective measure options affects transportation and utilities differently because of equipment and personnel requirements and the amount of excavated materials. The effects are all temporary. All waste requiring offsite disposal would be transported along Pajarito Road and SR 4. Negligible increases in LANL electric and water consumption would occur because of the implementation of any of the corrective measure options considered; work at the site under corrective measure Options 1, 2, and 3 would require few, if any, water trucks for dust suppression, proposed office personnel, and waste removal workers uses. Corrective Measure Options 4 and 5 would require water and electric use over about 48 months of site work but consumption would be minor compared to total LANL energy consumption. ***Corrective Measure Option 1: Upgrade Existing Surface*** Under corrective measure Option 1, there would be no waste removal from MDA H. There would be no additional truck trips to haul generated waste materials offsite. In the short term, there would be a few construction vehicles used for upgrading the existing cover; the construction vehicles would use Pajarito Road and connecting LANL roads. Implementing this corrective measure option would not appreciably affect area traffic because the additional vehicle trips would be a negligible increase on Pajarito Road and connecting roads. ***Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover*** Under corrective measure Option 2, there would be no waste removal from	

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TRANSPORTATION & UTILITIES		MDA H. Effects on transportation are expected to be the same as those described for corrective measure Option 1. ***Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover*** Under corrective measure Option 3, there would be no waste removal from MDA H. Effects on transportation are expected to be the same as those described for corrective measure Option 1. ***Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal*** Under corrective measure Option 4, all waste requiring offsite disposal would be transported via Pajarito Road. It is estimated that a maximum of 1,500 yd^3 (1,140 m^3) of excavated waste, including LLW, recyclable metal, hazardous, and mixed waste, and an additional 5,000 yd^3 (3,800 m^3) of overburden material would be transported on public roads over about 48 months. About 325 to 650 truckloads, depending on their capacity, would be outbound with an equal number of return trips with empty haulers; this would mean, on average, one truck every day or every other day added to the local traffic and offsite road use. Transport of about 5,000 lb (2,250 kg) of HE to TA-16 at LANL would be performed at night in trucks designed especially for this purpose. A study would be performed to evaluate waste quantity shipped at one time, hours of transport, safeguards and security, and possible road closures. Utilities along Mesita del Buey Road would have to be protected or relocated, including the water line supplying Areas G and L. ***Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal*** Under corrective measure Option 5, LLW requiring onsite disposal would be transported to Area G via Mesita del Buey Road; HE waste would be transported within LANL to TA-16 via Mesita del Buey Road, Pajarito Road, and West Jemez Road; waste requiring offsite disposal would be transported via Pajarito Road. It is estimated that a maximum of 1,500 yd^3 (1,140 m^3) of	

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		excavated waste, including LLW and some hazardous and mixed waste to be treated at LANL, and an additional 5,000 yd^3 (3,800 m^3) of overburden material would be transported on LANL roads over about 48 months. About five to six truckloads of recyclable metal and about four to eight truckloads of hazardous or mixed waste that cannot be treated at LANL may be transported offsite over about 48 months. This would mean about one truckload of waste every three or four months added to the local traffic and offsite road use. About 325 to 650 truckloads, depending on their capacity, would be required with an equal number of return trips with empty haulers; this would mean, on average, one truck every day or every other day added to the traffic within LANL. Transport of about 5,000 lb (2,250 kg) of HE to TA-16 would be performed at night in trucks designed especially for this purpose. A study would be performed to evaluate waste quantity shipped at one time, hours of transport, safeguards and security, and possible road closures. Utilities along Mesita del Buey Road would have to be protected or relocated, including the water line supplying Areas G and L. **No Action** Under the No Action Alternative, MDA H would not undergo corrective measure activities. There would be no additional transportation needs or truck transport trips generated by the movement of people, services, goods, and, possibly, wastes related to closure of MDA H. There would be no changes to existing utilities at TA-54 and no changes to the electric power consumption or water consumption at LANL.	
ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT ENVIRONMENTAL RESTORATION & WASTE		**Proposed Action** Environmental restoration workers at LANL would be involved in any corrective measure option implemented at MDA H. The waste generated by implementing corrective measure Options 1 through 5 would be well within the capability of the existing LANL waste management program. Corrective measure activities at MDA H would decrease the number of LANL mesa-top MDAs requiring remedial action by about 10 percent. All five corrective measure options would fail to address minor vapor phase transport and contamination already present in the tuff. Even the excavation and	

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MANAGEMENT		removal options would not address this issue because residuals would likely still be present even after complete excavation. Some measure of vapor phase migration of VOCs and tritium would continue under all corrective measure options and the No Action Alternative, but would decrease with time due to bioremediation, decomposition, volatilization, and radioactive decay. ***Corrective Measure Option 1: Upgrade Existing Surface*** Under corrective measure Option 1, there would be no waste removal from MDA H. There would be no effect to existing waste management systems. Routine monitoring and maintenance activities may produce a very small amount of operational waste from site workers. ***Corrective Measure Option 2: Replacement of the Existing Surface with an Engineered ET Cover*** Under corrective measure Option 2, there would be no waste removal from MDA H. The effects for this option are expected to be the same as for corrective measure Option 1. ***Corrective Measure Option 3: Partial or Complete Encapsulation and Use of Engineered Caps and an Engineered ET Cover*** Under corrective measure Option 3, there would be no waste removal from MDA H. There would be no effect to existing waste management systems. No new landfills would be needed. Corrective measure Options 3a and 3b would produce implementation wastes: uncontaminated borehole cuttings would be stockpiled as crushed tuff for incorporation into the final onsite cap; contaminated drill cuttings would be disposed of in accordance with existing LANL waste management procedures. Routine monitoring and maintenance activities may produce a very small amount of operational waste from site workers.	
ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT		***Corrective Measure Option 4: Complete Excavation with Maximal Offsite Disposal*** Waste types and quantities generated by the excavation and removal of wastes	

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ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT		from the MDA H shafts would not be likely to result in substantial effects to existing waste management disposal operations. No new landfills would be required. Under corrective measure Option 4, DOE would pursue maximal offsite disposal of wastes resulting from the implementation of excavation and removal activities. It is expected that the majority of waste produced by corrective measure activities at MDA H would be LLW. The NTS facilities for waste disposal, as well as existing commercial waste disposal facilities in Washington and Utah, have the capacity to accept the waste types and waste volumes expected to be generated by implementation of this corrective measure option. Small amounts of waste generated by site workers during excavation and removal activities would be handled, packaged, and disposed of in the same manner as the wastes generated by other activities at LANL. About 45,000 yd^3 (34,200 m^3) of clean overburden material would be returned to the MDA H site to be used as backfill material. About 5,000 yd^3 (3,800 m^3) of overburden material (about 10 percent of the total) is likely to be characterized as LLW, hazardous waste, or mixed waste and would require transportation offsite to the NTS for LLW or to existing commercial waste disposal facilities for hazardous or mixed waste. In addition to this volume, an additional 1,500 yd^3 (1,140 m^3) of excavated waste may require transportation offsite to existing commercial waste disposal facilities. About 187,000 lbs (84,150 kg) of LLW DU and an additional 94,000 lbs (42,300 kg) of non-DU LLW of other radionuclides could be shipped offsite from LANL to the NTS or to appropriately licensed commercial facilities such as the above ground engineered disposal cell facility near Clive, Utah. A portion of the lithium compounds, plastics, and graphite (an estimated total of 74,000 lbs [33,300 kg], about 40 yd^3 [30.4 m^3]) may require disposal offsite in a hazardous waste permitted disposal unit. The estimated amount of metal that could be recycled or disposed of in the DOE system, including LANL, is about 129,000 lbs (58,050 kg). The 5,000 lb (2,250 kg) of HE in the MDA H inventory would be packaged in billets, as described previously, and transported to TA-16 at LANL for deactivation through burning (flashing). After flashing, any residual ash would be sampled, analyzed to ensure that no detonable HE remains, packaged, and	

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ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT		sent to Area G for storage and final disposition. Depending on the nature of the HE waste, there may be no ash remaining after flashing. ***Corrective Measure Option 5: Complete Excavation with Maximal Onsite Disposal*** Waste types and quantities generated by the excavation and removal of wastes from the MDA H shafts would not be likely to result in substantial effects to existing waste management disposal operations. It is expected that the majority of waste produced by excavation and removal activities under corrective measure Option 5 would be LLW. LLW generated by excavation and removal activities would be disposed of at Area G, TA-54, and would not affect the Area G operations. Although the current disposal site footprint has limited waste capacity, adequate room for expansion exists within Area G for additional LLW disposal (DOE 1999a). The SWEIS analyzed expansion into Zones 4 and 6 of Area G and DOE made the decision in 1999 to expand LLW disposal at LANL into these areas. Zone 4 is about 30 ac (12 ha), but some of this area would likely not be developed for disposal cells due to the presence of groundwater monitoring wells, a utility easement, and archaeological sites. Zone 6 is slightly less than 40 ac (16 ha). Some of this area may not be developed for disposal cells because the required 50-ft (15-m) setback from the cliff edge may be difficult to attain and still avoid Mesita del Buey Road. Even with these development constraints, the expansion footprint into Areas 4 and 6 would likely be sufficient for as long as 130 years or more of LLW disposal at LANL. About 45,000 yd^3 (34,200 m^3) of clean overburden material would be returned to the MDA H site to be used as backfill material. About 5,000 yd^3 (3,800 m^3) of overburden material (about 10 percent of the total) is likely to be characterized as LLW, hazardous waste, or mixed waste and would require disposition at Area G for LLW or at existing commercial waste disposal facilities for hazardous and mixed waste. About 187,000 lbs (84,150 kg) of LLW DU and an additional 94,000 lbs (42,300 kg) of non-DU LLW of other radionuclides could be disposed of at Area G. A portion of the lithium compounds, plastics, and graphite (an estimated total of 74,000 lbs [33,300 kg], about 40 yd^3 [30.4 m^3]) may require disposal offsite in a hazardous-waste-	

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		permitted disposal unit. The estimated amount of metal that could be recycled or disposed of in the DOE system, including LANL, is about 129,000 lbs (58,050 kg). The 5,000 lb (2,250 kg) of HE in the MDA H inventory would be managed at TA-16, as described in corrective measure Option 4. Any residual ash would be disposed of at Area G. A portion of the lithium compounds, plastics, and graphite (an estimated total of 74,000 lbs [33,300 kg]) may require disposal offsite in a hazardous-waste-permitted disposal unit. LANL would treat about 4,340 lb (1,953 kg) of waste lithium hydride to remove the hazardous waste characteristics. Successful treatment could result in no regulated hazardous residuals requiring disposal. Residual waste would be discharged to the LANL sanitary wastewater treatment system. Small amounts of waste generated by site workers during excavation and removal activities would be handled, packaged, and disposed of according to LANL's waste management program (LANL 1998a). **No Action** Under the No Action Alternative, MDA H would not undergo any corrective measure implementation. There would be no effect to waste management facilities at LANL currently receiving wastes.	
CONTAMINATED SPACE			X
ACCIDENTS ACCIDENTS		**Proposed Action** The Proposed Action is the implementation of a corrective measure at MDA H. All of the corrective measure options are centered around either containment of or excavation and complete removal of the waste inventory at MDA H. NEPA guidance recommends the use of a sliding-scale approach for considering, analyzing, and reporting accidents that might occur for a Proposed Action (DOE 2002). As such, only the risk-dominant accidents for the excavation and removal corrective measure options were chosen to represent the spectrum of postulated accidents considered and analyzed for the Proposed Action and discussed in this chapter. A discussion of a full spectrum of accidents analyzed for the excavation alternatives can be found in a report by Omicron (Omicron	

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ACCIDENTS		2001). A risk assessment on potential worker and public risks from postulated accidents has concluded that accidents involving exposure of the public to radioactive or hazardous materials left in place at MDA H are not credible[1] (Omicron 2001). Excavation and removal corrective measure options including associated transportation pose the greatest risk to members of the public, albeit a small one. The risk to the public from all other activities is negligible. The risk to workers is dominated by standard industrial accidents and explosions and is most associated with site excavation activities. Radioactive wastes were disposed of in MDA H from May 1960 through August 1986. The majority of the waste is DU (about 24 percent) and other radioactive material (an additional 24 percent). DU is almost 60 percent less radioactive than natural uranium and the potential chemical effects of DU can be of more concern than the radioactive effects. About 4,800 lbs (2,160 kg) of HE were disposed of in a single shaft and 47,000 lbs (21,150 kg) of HE-contaminated material (containing less than 1 percent HE) was disposed of throughout the nine shafts. Slightly more than 150 potential accident scenarios have been postulated for the proposed MDA H corrective measure options. Process hazard analyses were performed on postulated accidents that failed to be screened out based on the likelihood of their occurrence and their potential effect on human health. Unmitigated and mitigated public, worker, and transportation risks associated with excavating MDA H have been assessed. The corrective measure activities assessed included site preparation; site excavation; sorting and segregation of waste; declassification, packing, and loading of waste; waste transportation; and site restoration. The spectrum of hazards considered included industrial hazards, fires, explosions, spills, and penetrating radiation. **Risk to the Public** Excavation of the waste would pose more threat to human health from accidents than containment of the waste; however, even excavation is relatively safe because it is not an extraordinary action for LANL workers. The relatively	

[1] Credible means having a chance of occurrence of one in one million.

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ACCIDENTS		small quantity of potentially dispersible radioactive or hazardous material expected to be present in the shafts would minimize the risk of exposure to members of the public. Many accidents were postulated in which exposure to radiological material was the accident type, but all of these scenarios resulted in no or negligible dose consequences to members of the public (Omnicron 2001). The quantities of dispersible radiological and hazardous materials estimated to date to be present within MDA H and the resultant consequences from accidental exposure scenarios are too low to warrant quantitative consequence analysis. Potential human health impact from chronic (non-accident) exposures was addressed in the CMS Report (LANL 2003) and is summarized in Section 4.5 of this EA. Regarding industrial accidents and the public, of 33 hazards (most with two or more initiating events) analyzed for the project, only an offsite transportation accident posed a credible threat to the public and the most serious effects were death or serious injury from the physical forces of the accident; thus a common industrial accident. Using current DOT statistics and an estimated maximum total number of miles of truck travel to move MDA H waste offsite, no (1.13×10^{-3} persons per year or about once every 900 years) member of the public would likely be killed from this activity for the duration of the project (Omicron 2001). Likewise, no (2.03×10^{-2} persons per year or about once every 50 years) member of the public would likely be seriously injured from this activity over the duration of the project. **Worker Risks** Most of the worker accident scenarios of relatively high-risk (likelihood multiplied by consequence) categories were standard industrial accidents that are common across the U.S. More than 30 standard industrial accidents that could result in severe worker injuries were identified. Most of these accidents were vehicle accidents, explosions, equipment failures, lightning strikes, electrocution, and operator errors. Explosives are thought to constitute less than 1 percent (4,800 lb [2,160 kg]) of the waste in MDA H. This quantity is enough to be involved in explosion accidents; this was thoroughly evaluated in the risk assessment (Omicron 2001).	

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ACCIDENTS		Numerous postulated unmitigated accidents involving HE and potentially pyrophoric uranium in excavation corrective measure options could result in severe consequences to workers leading to immediate health effects or loss of life. Although the risk could be effectively mitigated through measures that substantially reduce the likelihood of such accidents (such as use of remote manipulators and excavation in an inert atmosphere), the consequences of such accidents could remain severe. Remote handling is a technology that would be used if an excavation corrective measure option were to be selected (LANL 2003); this would substantially reduce the potential adverse consequences to site workers from an accident of this type. **Containment Corrective Measure Options (1, 2, and 3)** Corrective measure options revolving around containment are safe and relatively free of accident hazards in comparison to the bounding accidents considered for the excavation and removal corrective measure options. Specifically, in the containment corrective measure options, the uranium hydride present in the shafts would be unlikely to result in a fire because the amount of oxygen present is not sufficient to allow the ignition of or sustain a hydride fire. Thus, the formation and presence of hydride in the shafts at MDA H would not pose a fire hazard (LANL 2003). In addition, any postulated accident involving the inhalation of uranium oxide scale would be virtually eliminated if one of the containment corrective measure options were selected. **Excavation Corrective Measure Options (4 and 5)** Explosion accidents were considered. Explosions caused by corrective measure activities are generally considered to occur with a frequency ranging from once every 100 years to once every 10,000 years. These events can result from the rupture of tanks used to store flammable gas or liquids to support corrective measure activities and could result in severe injuries or fatalities to workers. Explosions resulting in severe injuries or fatalities to workers could also occur if buried HE is impacted during remediation activities. The risk from explosion scenarios would be mitigated by implementing preventative controls, but the mitigated health effects to workers from such scenarios could still be severe. Therefore, risk is still considered to be of concern, and could require formally implementing more controls into procedures and training. The analyses	

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		(Omicron 2001) had sufficient scope to adequately represent the health risks associated with many types of explosions that could occur with the excavation corrective measure options. The need for engineering controls has also been identified to address three potential accidents, fire involving pyrophoric uranium hydride, ignition of HE, and inhalation of uranium oxide dust, that were identified in the CMS Report (LANL 2003) as associated with the excavation corrective measure options. Remote operations for the excavation and removal of waste while in an inert atmosphere would enable the safe conduct of these activities. Standard dust control technologies and the use of personal protective equipment would effectively eliminate the uranium oxide dust hazard.	
D&D			X
CUMULATIVE IMPACTS CUMULATIVE IMPACTS		The effects of the Proposed Action when combined with the effects of other actions discussed in this section do not result in cumulatively significant impacts. Several resources were dismissed from cumulative effects consideration because they would not be affected by the Proposed Action and could not contribute collectively to ongoing or reasonably foreseeable actions (see Table 2). These were land use, floodplains and wetlands, and cultural, visual, and biological resources. Five other resources analyzed in this EA would not contribute significantly to cumulative effects, because the Proposed Action would not have major long-term or irreversible effects on water quality, geology (and soils), noise, human health, transportation, infrastructure, environmental justice, and socioeconomics. Air quality and waste management are discussed further in this section. This analysis concludes that there would not be cumulative effects on air quality, waste management, or other aspects of the environment. Moreover, some positive effects to resources, such as environmental restoration, would occur as a consequence of the Proposed Action to implement a corrective measure at MDA H within TA-54. In addition, the closure of Pajarito Road also reduces potential for negative cumulative effects since the public is less exposed to potential accidents associated with any corrective exposure option.	

[1]Not Applicable indicates that the impact was addressed in the EA, but proposed action does not apply.
[2]Addressed addresses the impact from the proposed action.
[3]Not Addressed indicates that the impact from the proposed action was not addressed in the EA.

Impact	Not Applicable[1]	Addressed[2]	Not Addressed[3]
		Air Quality The Proposed Action would not result in cumulatively significant impacts to air quality at LANL **Waste Management and Environmental Restoration** Cumulative effects are postulated to be additive. For example, the impacts of corrective action-related waste management could be connected to management of waste from day-to-day routine operations, particularly if the same waste management facilities were used. The disposition of LLW from the MDA H inventory would contribute to the total volume of waste already in Area G. Further, estimated cumulative impacts are intended to represent the environmental impact range associated with specifically proposed actions or similar types of actions that may be undertaken eventually, in accordance with NMED-approved RFI and CMS implementation. Waste generation at LANL during the next 10 years, both from decontamination and demolition of buildings and through environmental restoration efforts, could be large. However, waste types and quantities generated by the proposed excavation and removal of wastes from the MDA H shafts would be within the capacity of existing waste management systems and would not be likely to result in substantial effects to existing waste management disposal operations. When added to the much larger volume of environmental restoration waste generated at LANL, the Proposed Action would not contribute to significant adverse cumulative effects. Implementation of a corrective measure option at MDA H would provide long-term beneficial impacts through the reduction of risks from contamination. Currently, LANL programs operate within regulatory requirements. The Proposed Action is an extension of LANL operations. It is expected that the cumulative effects would be commensurate with existing effects. DOE and LANL are pursuing an active program of reducing potential health risk through an as-low-as-reasonably-achievable (ALARA) policy for all personnel and the public. In addition to the reduction of cumulative effects associated with the Proposed Action, reduction of cumulative effects would be anticipated through meeting ALARA standards, preventing pollution, and minimizing waste.	

[1]Not Applicable indicates that the impact was addressed in the EA, but proposed action does not apply.
[2]Addressed addresses the impact from the proposed action.
[3]Not Addressed indicates that the impact from the proposed action was not addressed in the EA.

4.0 Assessment of SWEIS Affected Environment

(Contact: Sam Loftin, RRES-ECO, 665-8011, sloftin@lanl.gov)

Introduction

The period between 1999 and 2004 has seen significant environmental change on the Pajarito Plateau and subsequent LANL institutional changes to address them. Drought, wildfire, and bark beetle damage to surrounding forests have had the most widespread and detrimental impacts and are likely to continue to impact the LANL area well into the future.

Drought

Perhaps the most widespread and pervasive change in the region was drought. Los Alamos precipitation records (Figure 4-1) show that since 1995 there has been only one year (1997) with above average precipitation (LANL 2004). Precipitation patterns leading into the current drought are strikingly similar, but of greater duration, to the period from 1953 to 1956, commonly referred to as the 1950's drought. The 50's drought consisted of four years of progressively declining rainfall with a sharp increase in 1957 to end the drought. Los Alamos is currently in its sixth consecutive year of below average rainfall and the 2003–2004 winter period was again below average. The drought has been partially responsible for several disturbances that have greatly affected the regional environment. Dry weather facilitated the Cerro Grande Fire in May 2000 and set the stage for the bark beetle infestation that started around the summer of 2002.

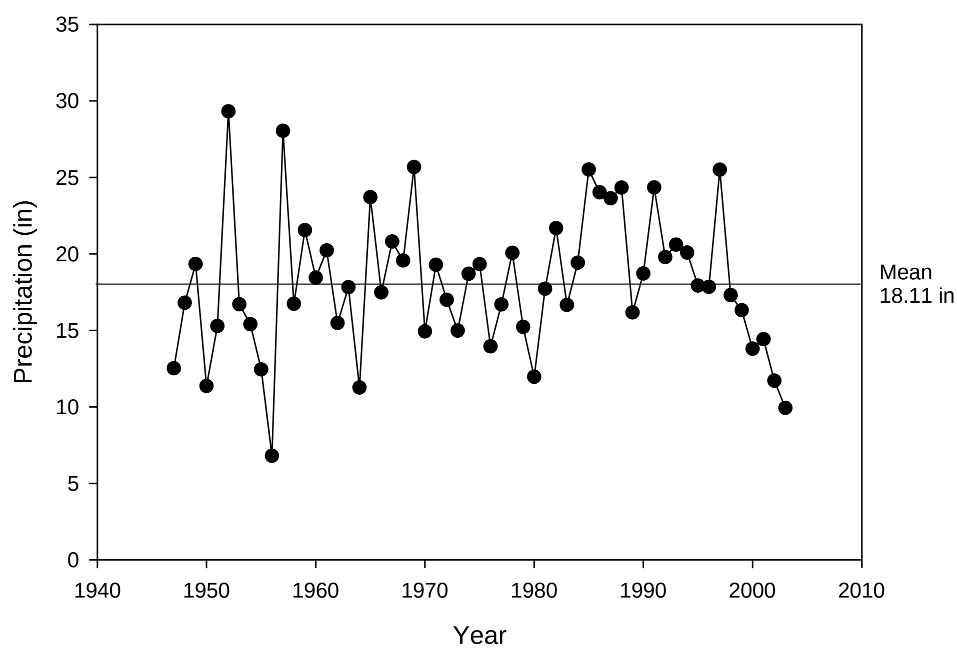

Figure 4-1. Los Alamos annual precipitation.

Cerro Grande Fire

Perhaps the first serious manifestation of the drought was the increase in wildfire activity in the region. Four out of the past five years have been above average for number of acres burned (Figure 4-2) in the Southwest Area (Arizona, New Mexico, and West Texas). Much of the regions' forests and woodlands are suffering from the effects of negligence and mismanagement. Livestock grazing and wildfire suppression have led to an increase in tree density and fuel accumulation, with a subsequent increase in competition between trees for water. Under these conditions, drought will reduce the live tree fuel moisture below levels that would normally be observed in a healthy forest. Combine this with the gusty winds and low humidity typical for fire season weather and the outcome can be catastrophic.

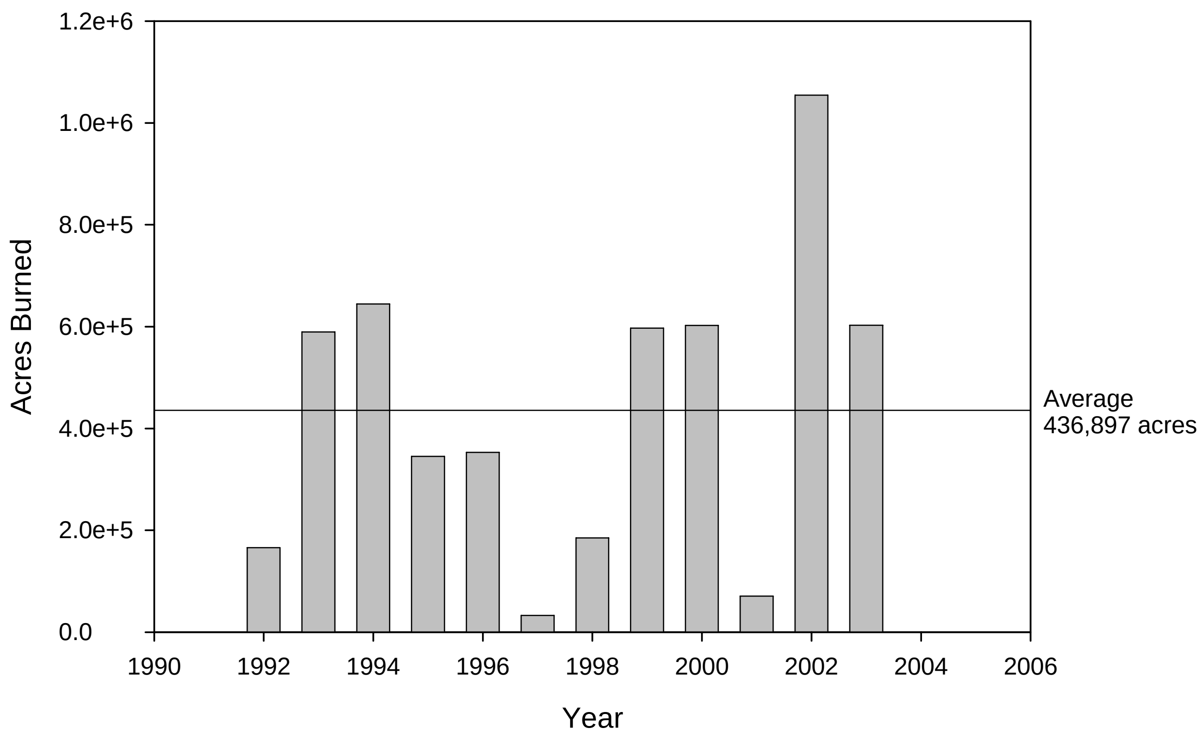

Figure 4-2. Acres burned in wildfire for Southwest Area (Arizona, New Mexico, and West Texas). Data from the Southwest Area Wildland Fire Operations (SAWFO) website (6/28/04).

In the evening of Thursday, May 4th, 2000, a fire crew from Bandelier National Monument (BNM) was conducting a prescribed fire on Cerro Grande, approximately 3.5 miles west of LANL (LANL 2000). The fire was being used to reduce fuels and woody plants in a high mountain meadow. Gusty winds carried the fire out of containment and it was declared a wildfire less than 24 hours later. By Monday, May 8th the fire had progressed east to SR 501 and north to the rim of Los Alamos Canyon. Spot fires were reported on LANL property and the Laboratory suspended all programmatic work. On

Wednesday, May 10th the fire moved into upper Los Alamos Canyon, which prompted the evacuation of the remainder of the Los Alamos townsite. The fire burned about 20,000 acres including portions of the Los Alamos townsite. The greatest advance came on Thursday, May 11th with the main fire burning north through US Forest Service (USFS) property across Rendija and Guaje Canyons, almost to Santa Clara Canyon. The fire on LANL burned north and east across the Lab and onto San Ildefonso property. In all, approximately 33,000 acres burned with about 5,000 acres on LANL. By the time the fire was fully contained on June 8th, the fire had consumed close to 43,000 acres with about 7,500 acres on LANL (Figure 4-3).

Immediately after the fire an Interagency Burned Area Emergency Rehabilitation (BAER) team was organized to assess fire impacts and to design and implement mitigations on non-DOE property. The LANL Emergency Rehabilitation Team (ERT) was organized to execute a similar function for DOE. Although the BAER team was not responsible for actions on LANL, many of the BAER assessments included DOE property and many of the mitigations applied to non-DOE lands were also used at LANL. The BAER team and the ERT worked together to assess the fire intensity and subsequent burn severity using a combination of aerial surveys and ground truthing. The BAER team mapped approximately 5,900 ha (14,500 acres) of high burn severity, 1,300 ha (3,300 acres) of moderate burn severity and 10,000 ha (25,000 acres) of low severity and/or unburned areas within the entire burn perimeter (CGBAER 2000, p. 279). LANL had approximately 82 ha (203 acres) of high severity, 334 ha (825 acres) of moderate severity, and 2,580 ha (6,376 acres) of low burn severity (Buckley et al. 2002).

High intensity wildfire often results in a high severity burn. The severity of a fire refers to the impact on soils and to some extent, vegetation. High intensity fires often consume standing vegetation as well as the soil organic layers and associated seed bank. In addition, a common characteristic of high burn severity is hydrophobic, or water-repellant, soils. Hydrophobic soils are formed when compounds from plant litter are volatilized by the heat of the fire, forced deeper into the soil and precipitate out on cooler soil particle surfaces. Together, these factors can lead to the potential for substantial runoff, soil erosion, downslope flooding, and degradation of water quality.

The upper portions of watersheds were treated to provide some stability to burned soils. The BAER team arranged for aerial seeding of approximately 8,500 ha (21,000 acres) of Forest Service and Bureau of Indian Affairs (BIA) lands (Kuyumjian 2004), including approximately 300 ha (700 acres) of DOE property (Buckley et al. 2002). The seed mix was composed of 30 percent annual ryegrass (*Lolium multiflorum*), 10 percent barley (*Hordeum vulgare*), 30 percent slender wheatgrass (*Elymus trachycaulus*), and 30 percent mountain brome (*Bromus marginatus*). The ryegrass and barley were fast-germinating annuals for quick cover and the wheatgrass and brome were relatively short-lived perennials that should protect soils for up to ten years before dying out and being replaced by native plant species. Overall, the aerial seeding program was effective on north-facing slopes and areas where straw mulch was applied over the seed. Unmulched, south-facing slopes were too hot and dry for successful seed germination and survival.

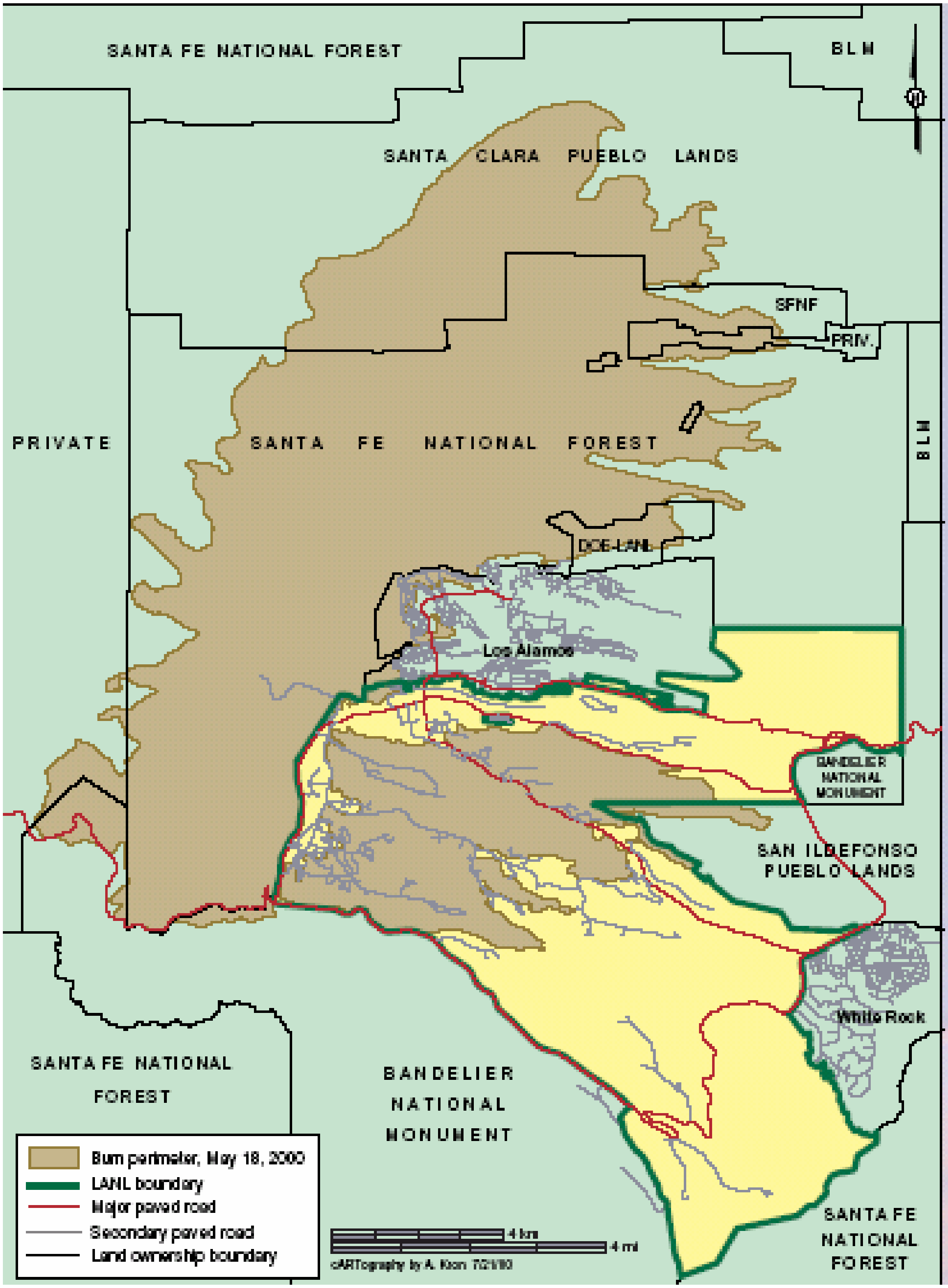

Figure 4-3. Cerro Grande Fire, total area burned.

Other watershed treatments included raking, hand seeding and straw mulching, hydromulching, log erosion barrier, contour felling, and straw wattle installation. The Forest Service implemented approximately 4,250 ha (10,500 acres) of these other watershed treatments (Kuyumjian draft report). The acreages are not additive since many of these treatments were made in combination. The total acreage that received some combination of watershed treatment other than just aerial seeding is approximately 2,500 ha (6,300 acres). LANL implemented over 700 ha (1,800 acres) of watershed treatments on high and moderate severity sites (Buckley et al. 2002). Results from three years of vegetation monitoring on LANL rehabilitation units show that most units are stable but cover has been decreasing through time, probably another consequence of the current drought (Buckley et al. 2003). If cover continues to decline, additional treatments may be necessary.

In addition to soil and watershed treatments, a number of in-channel treatments were implemented and structures installed by LANL (DOE/SEA-03, *Special Environmental Assessment in Response to the Cerro Grande Fire*) and the BAER team to protect downstream property and resources from potential flooding. Flows generated from summer thunderstorms in the major canyons that originate in the Sierra de los Valles, cross LANL, and discharge into the Rio Grande were estimated to increase up to 16 times their preburn rates (USDOE 2003). Floatable debris was removed from channels to prevent damming and clogging culverts. Trash racks were installed above road crossings to catch debris. Road crossings were reinforced and undersized culverts were replaced. The reservoir in upper Los Alamos Canyon was drained and the dam reinforced. It has since been dredged to retain its capacity to store stormwater and sediment and there are plans to dredge it again in 2003. A low-head weir was installed in lower Los Alamos Canyon near Hwy 4 to prevent sediments from moving off site. A flood retention structure was constructed in Pajarito Canyon approximately 3 km (2 miles) upstream from TA-18 to prevent flooding at TA-18 and White Rock. Watershed and in-channel treatments will need to be monitored and maintained until watersheds are recovered or hydrologically stable. Given the extent and severity of the fire and the erosion after the fire, it is unlikely that many watersheds will return to prefire hydrology. A more realistic goal is to attain hydrologic stability in the watersheds. Current data suggest that many of the watersheds are relatively stable. Pueblo, Rendija, and Guaje Canyons appear to have been altered to a greater extent than Los Alamos, Pajarito, Canon de Valle and Water Canyons and are expected to continue to discharge at rates much greater than those recorded before the fire (Kuyumjian 2004).

Following the fire, LANL received funding from Congress to continue postfire activities initiated under the LANL ERT and to address remaining wildfire risks at the Lab. The Cerro Grande Rehabilitation Project (CGRP), housed within the Facilities and Waste Operations Division, was created to facilitate and implement these activities in collaboration with other LANL organizations. An ambitious, sitewide project was initiated to assess and reduce the risk of wildfire to LANL personnel, facilities, and infrastructure. The Wildfire Hazard Reduction Project Plan (LANL 2001) was developed to identify and prioritize projects and to provide guidelines for project implementation. Up to 35 percent or approximately 4,000 ha (10,000 acres) of LANL property would be treated under this program. Thinning activities started in January 2001 and some carry-over funds have allowed the program to operate through the end of FY04. To date, 2,000 ha (5,100 acres) of piñon-juniper and 1,500 ha (3,900 acres) of ponderosa pine on LANL have been treated. This includes defensible space around facilities, firebreaks around roads and firing sites, utility corridor thinning, and forest health thinning. Future wildfire risk assessment, mitigation, and monitoring roles and responsibilities will be described in the LANL Wildland Fire Management Plan due out in September 2004.

Bark Beetle Impacts

Following the Cerro Grande Fire, regional land management agency personnel were on the alert for signs of bark beetle activity. Bark beetles often attack trees that are weakened by fire and can quickly reach epidemic proportions. Some bark beetle activity was recorded in the first year after the fire but not enough to cause undue concern. It wasn't until the following summer (2002) that widespread activity was observed in the regional piñon and ponderosa pine populations. Interestingly, despite the concern that the fire would initiate a bark beetle outbreak, it appears to be more a consequence of drought stress. Extensive bark beetle-induced tree mortality has been recorded throughout the southwestern United States, roughly coincident with the extent of the drought. Multiple species of bark beetle are involved in attacking several species of trees. Mortality estimates (Balice 2004) at LANL range from 97 percent mortality of piñon pine >3 m (10 ft) in 2,350 ha (5,800 acres) of unthinned piñon-juniper woodland, 14 percent mortality of ponderosa pine >3 m (10 ft) in 525 ha (1,300 acres) of unthinned ponderosa pine forest, and 96 percent mortality of ponderosa pine, Douglas-fir, and white fir >3 m (10 ft) in 250 ha (600 acres) of unthinned mixed conifer forest (acreage estimates from McKown et al. 2003).

The potential environmental consequences of the tree mortality are largely unknown. The 1950's drought led to extensive mortality of ponderosa pine on the Pajarito Plateau and it is thought to be partially responsible for the overall low herbaceous plant cover and high erosion rates that are common to the area (Allen and Breshears 1998). With sufficient rainfall, herbaceous plant species could colonize much of the space left vacant by the trees and actually reduce runoff and erosion from some of these sites. If the drought continues, erosion rates could increase. There are concerns about the fire hazard associated with the standing dead trees, particularly while the dead needles remain on the trees. In general, piñon pine, Douglas-fir and white fir trees appear to lose their leaves in less than a year while ponderosa pine can retain leaves for many years, thus the threat may be greater in the mid elevational range occupied by ponderosa pine. Previous CGRP defensible space and forest thinning activities should greatly reduce the risk of wildfire to personnel and facilities. However, wildfire in beetle-killed forest and woodland could have substantial impacts to hydrologic stability and negatively impact soil erosion, contaminant transport, and water quality. Eventually however, the dead trees will fall and provide surface material that would stabilize soils and promote the growth of herbaceous plants.

Summary

Despite the dramatic changes to the regional environment over the past five years, the future could be equally dynamic. Vegetation recovery on the burned areas and in bark beetle-impacted forests and woodlands could be rapid, given adequate rainfall. Unfortunately, short-term projections show little relief from the drought and long-term projections are fraught with uncertainty. Wildfire will continue to be a major environmental risk for LANL and the surrounding region. If the drought continues it is likely that continued tree mortality will add to the woody fuel base and if the drought ends there should be an increase in understory fuels. The hydrologic response is largely dependent on the vegetation. Although counterintuitive, more rainfall generally increases herbaceous vegetation and decreases runoff. Less rainfall reduces herbaceous vegetation and leads to higher runoff rates during summer thunderstorms. With all this uncertainty, the best strategy is a strong monitoring and management program to identify and mitigate risks before they become problems.

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Land Cover Map

The Ecology group of the Risk Reduction and Environmental Stewardship division (RRES-ECO) at LANL, with the support of the Earth Data Analysis Center (EDAC) at the University of New Mexico, has developed a post-Cerro Grande Fire land cover map. This map was developed to support wildfire hazard reduction activities, fire behavior modeling, forest growth and yield modeling, endangered species habitat modeling, and other region-wide environmental studies.

RRES-ECO and EDAC have previously collaborated in the production of a land cover map for the Los Alamos region (Koch et al. 1997). However, the Cerro Grande Fire resulted in catastrophic landscape changes in May 2000, causing the earlier land cover map to become obsolete. To meet current LANL management needs, a new land cover map was required. A Landsat Enhanced Thematic Mapper Plus satellite scene, acquired over the area on June 4, 2001, was used to map the natural vegetation of the study area. This area includes Los Alamos County, Los Alamos National Laboratory, Bandelier National Monument, the Valles Caldera National Preserve, and parts of Santa Fe National Forest. As in the previous mapping exercise, Landsat Enhanced Thematic Mapper Plus (ETM+) satellite imagery was chosen to develop the new map because of its high spectral discrimination, its adaptability for producing a final product over a large area relatively quickly, and its comparatively low cost. The quarter-hectare version of the land cover map is shown in Figure 4-4.

Reference

LA-UR 14029 *Land Cover Map for the Eastern Jemez Region*, by Brad McKown, Steven W. Koch, Randy G. Balice, and Paul Neville, 2003.

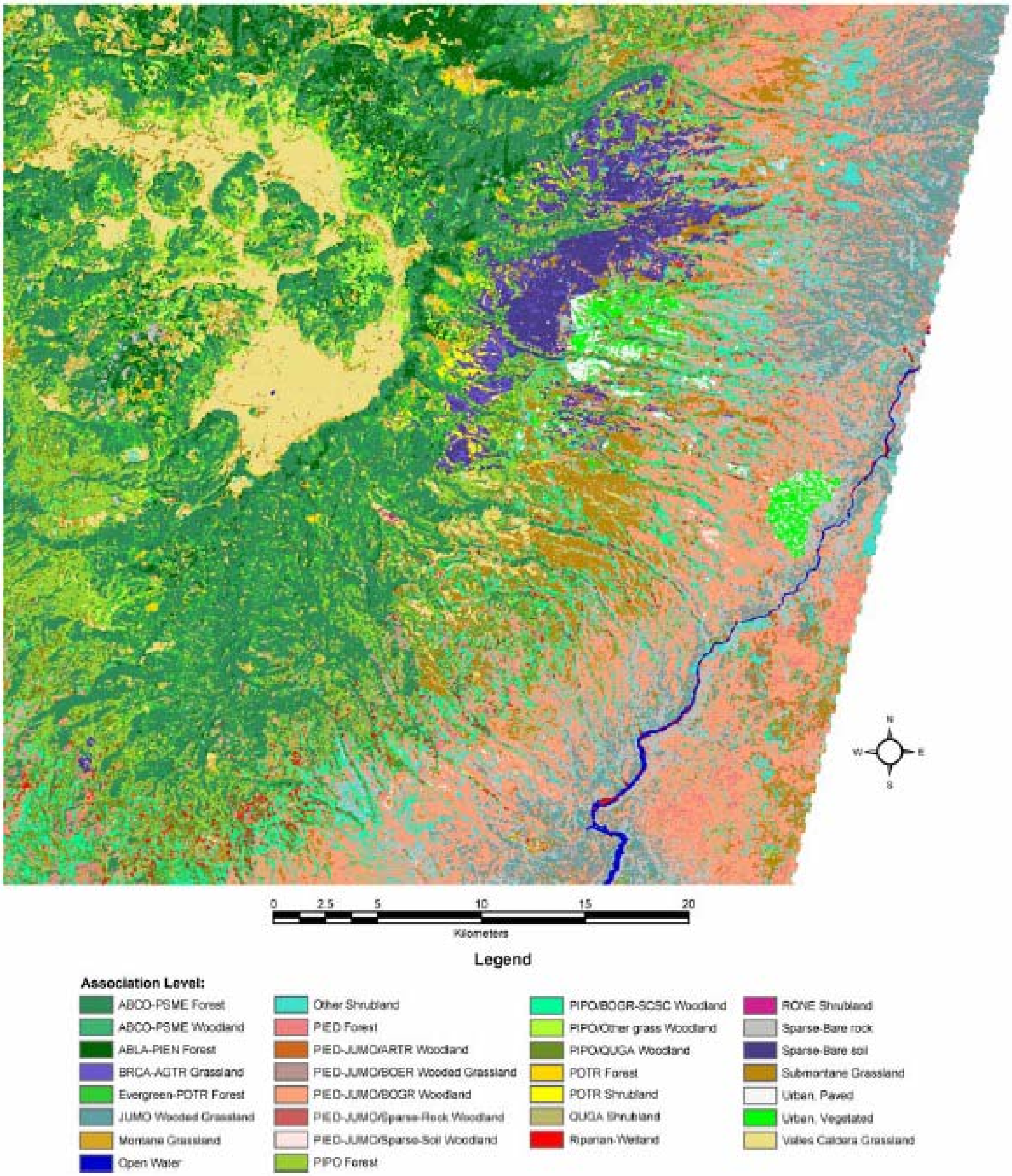

Figure 4-4. Quarter-hectare land cover map.

4.1 Land Resources

4.1.1 Land Use

(Contact: Kirt Anderson, PM-1, 665-2335, kirt@lanl.gov)

The size of LANL has changed because of land transfers. During 2002, 2,209 acres were transferred to Los Alamos County and the Pueblo of San Ildefonso; the change was mostly at TA-74 where 2,089.9 acres were transferred to the Pueblo of San Ildefonso in Santa Fe County. Table 3.7.5-2 on page 3-26 of the 2002 SWEIS Yearbook provides specifics on these land transfers. Another 2,558 acres could be transferred to Los Alamos County, San Ildefonso and the State Highway Department between now and 2007.

In 1999, the SWEIS reported that LANL was 27,832 acres or 43 square miles. The size of LANL depends on how it is measured and there are several different ways to measure the area. As of February 2003, the sum of DOE land in the Los Alamos area is 41.376 square miles or 26,480 acres. These data are not based on field survey data, but computer GIS data. This number includes Rendija Canyon that is owned by DOE, but is not managed by UC. The total of UC-managed land is now undergoing a new boundary survey. As the new boundary survey and the land transfer field surveys are completed, more precise numbers will evolve. However, the LANL's GIS committee did accept these numbers as the numbers everyone is to use until field surveyed data are available.

4.1.1.1 Stewardship and Land Use Authority

There have been changes to ownership with Los Alamos County as a consequence of land transfers. Land ownership as of February 2003 is shown in the following tables: Table 4.1.1.1-1 shows area totals by owner; Table 4.1.1.1-2 shows area totals by land management type; and Table 4.1.1.1-3 describes parcel areas. Figure 4-5 is a map of the current land management and ownership within the Los Alamos area.

Table 4.1.1.1-1. Area Totals by Owner

Owner	Acres	Square Miles
DOE (including Rendija Canyon)	26,479.978	41.376
Private (within LANL boundary)	27.183	0.043
USFS (Fenton Hill)	16.591	0.026

Table 4.1.1.1-2. Area Totals by Land Management Type

Type	Acres	Square Miles
DOE Managed	917.725	1.434
Leased (within LANL boundary)	197.043	0.308
Private (within LANL boundary)	27.183	0.043
UC Managed	25,381.801	39.660

Table 4.1.1.1-3. Parcel Areas

Owner	Type	Description	Square Feet	Acres	Square Miles
DOE	Leased	Research Park	190,075.125	43.636	0.068
DOE	DOE Managed	Rendija Canyon/Sportsman Club	39,976,092.000	917.725	1.434
DOE	UC Managed	TA-74 small piece	1,019,949.750	23.415	0.037
DOE	Leased	Airport	4,219,268.000	96.861	0.151
DOE	Leased	Research Park, small piece	69,849.297	1.604	0.003
DOE	UC Managed	LANL, large piece	1,103,888,640.000	25341.795	39.597
DOE	Leased	Landfill and Concrete Plant	2,376,384.500	54.554	0.085
DOE	Leased	ICON Facility at TA-46	16,898.398	0.388	0.001
Private	Private	Ice Rink	102,901.195	2.362	0.004
Private	Private	Royal Crest Mobile Home Park	1081,191.375	24.821	0.039
USFS	UC Managed	Fenton Hill, larger piece	600,966.625	13.796	0.022
USFS	UC Managed	Fenton Hill, smaller piece	121,767.500	2.795	0.004

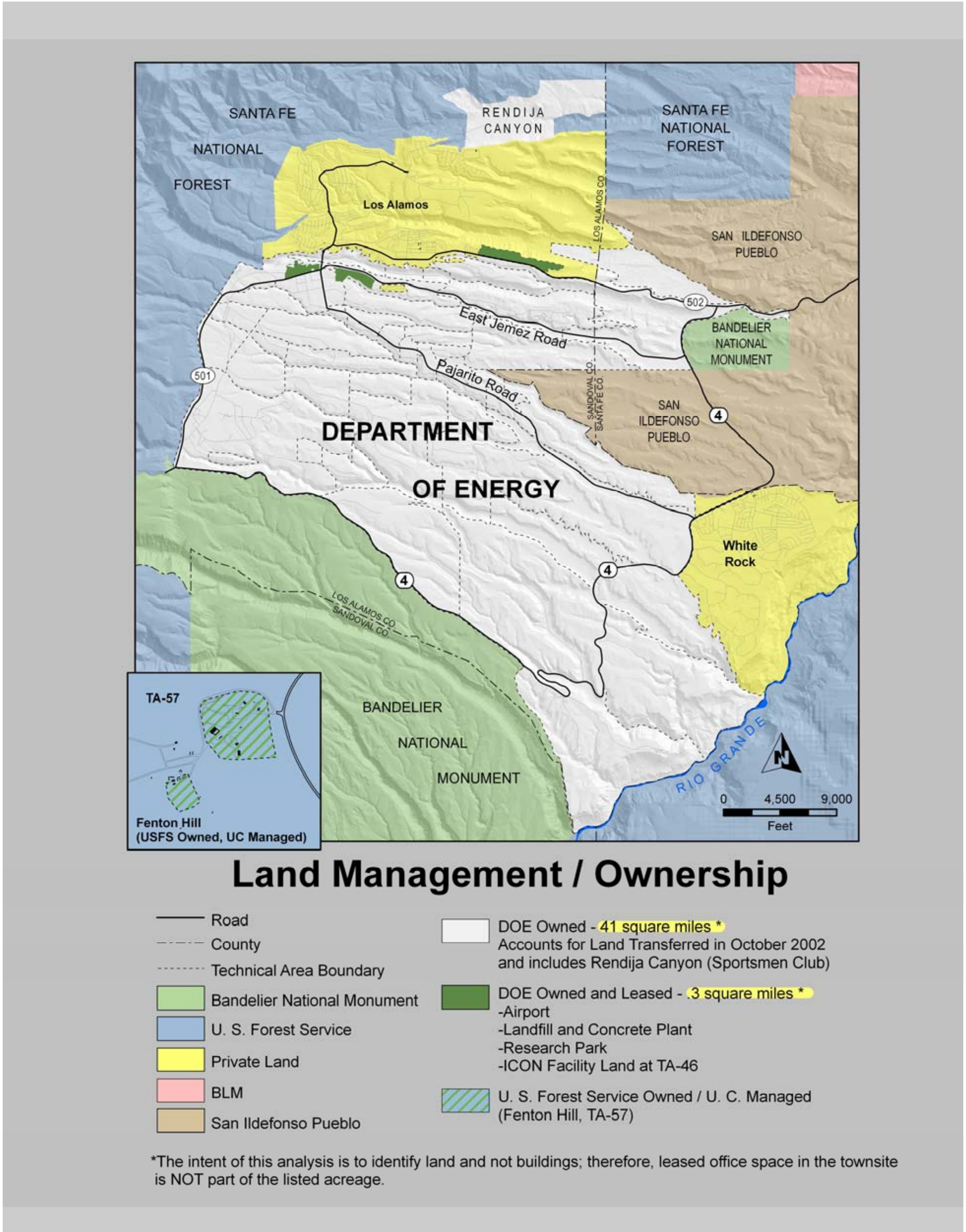

Figure 4-5. Land management and ownership.

4.1.1.2 LANL Land Use

(Contact: Dan Pava, RRES-ECO, 667-7360, dpava@lanl.gov)

LANL is divided into 48 separate technical areas (TAs) with location and spacing that reflect the site's historical development patterns, regional topography, and functional relationships. While the number of structures changes slightly with time (in particular, there is frequent addition or removal of temporary structures and miscellaneous buildings), a recent publication reflected the following breakdown of structures at LANL: there are approximately 916 permanent structures (including 34 plant and utility structures); 512 temporary structures (e.g., trailers, transportable buildings); and 1362 miscellaneous buildings (e.g., sheds) with approximately 5,800,000 square feet (538,800 square meters) that could be occupied. However, only 1,572,877 square feet (146,125 square meters) of space, in 610 buildings, is designed to house personnel in an office environment. In addition to on-site office space, 442,168 square feet (41,079 square meters) of space is leased within the Los Alamos townsite and White Rock community to provide workspace for an additional 1545 people (LANL). These rented or leased spaces are considered part of TA–0 and the research park in TA-3. Overall, 43 percent of the LANL structures (not including leased or rented space) are more than 40 years old, and 52 percent are more than 30 years old. A recent DOE assessment survey reflected the condition of LANL facilities as follows: 24 percent are in excellent condition; 10 percent are in good condition; 12 percent are adequate; 20 percent are fair; 15 percent are poor; and 11 percent fail condition review requirements (LANL). Condition review requirements cover a wide range of criteria and standards (e.g., safety, severity, seismic, etc.)

4.1.1.3 Los Alamos County Land Use

This discussion needs to be updated to reflect the impending adoption of a new Comprehensive Plan by Los Alamos County that will supercede the 1987 Plan. County staff advised that adoption could occur later this year. While some of the facts won't change (e.g., 54 percent of land exceeds 20 percent slopes and cannot reasonably be developed); the new Plan is more prescriptive and less policy based, according to County staff consulted on April 12. An excerpt from the Los Alamos County Comprehensive Plan (not yet adopted by County Council) is included in Attachment C.

4.1.1.4 Potential Land Transfers and Related Land Use Issues

(Contact: Ken Rea, RRES-ECO, 665-8969, khrea@lanl.gov)

Land Transfer (from Yearbook 2002, section 5.2.3.2)

On November 26, 1997, Congress passed Public Law 105-119. Section 632 of that law directed the Secretary of Energy to convey to the Incorporated County of Los Alamos, New Mexico, or to the designee of the County and transfer to the Secretary of the Interior, in trust for the Pueblo of San Ildefonso, parcels of land under the jurisdictional administrative control of the Secretary at or in the vicinity of LANL. Such parcels, or tracts, of land had to meet the suitability criteria established by the law, that is, they were not required for the national security mission before the end of 11/26/2007; could be restored or remediated by 11/26/2007; and were suitable for historic, cultural, or environmental preservation, economic diversification, or community self-sufficiency. The DOE[1] identified 10 tracts of land for potential conveyance to the County of Los Alamos or transfer to San Ildefonso Pueblo. These 10 tracts of land have been further divided into subparcels for disbursal purposes.

The 10 tracts, which total approximately 4,600 acres, include the following:

- TA-21 tract, 244 acres - located on the eastern end of the same mesa on which the central business district of Los Alamos is located.
- DP Road tract, 50 acres - located between the western boundary of TA-21 and the major commercial districts of the Los Alamos town site.
- DOE Los Alamos Area Office tract, 13 acres - located within the Los Alamos town site between Los Alamos Canyon and Trinity Drive.
- Airport tract, 198 acres - located east of the Los Alamos town site, close to the East Gate Business Park.
- White Rock tract, 99 acres - located north of Pajarito Acres residential development and west of the White Rock town site.
- Rendija Canyon tract, 909 acres - located north of and below Los Alamos town site's Barranca Mesa residential subdivision.
- White Rock Y tract, 435 acres - a complex area that incorporates the alignments and intersections of State Routes 502 and 4 and the easternmost part of Jemez Road.
- Site 22 tract, 0.3 acres - located at the edge of the Los Alamos town site mesa, south of Trinity Drive and above Los Alamos Canyon.
- Manhattan Monument tract, a fraction of an acre in size; located adjacent to Ashley Pond and consists of a plaque covered by a small pavilion.
- TA-74 tract, 2,698 acres - located east of the Los Alamos town site and includes much of Pueblo Canyon.

Table 4.1.1.4-1 identifies those subparcel transferred during CY 2002. This resulted in a boundary change of LANL and a loss of about 2,209 acres of land changing the size of LANL from about 43 square miles to about 40 square miles.

Table 4.1.1.4-1. Land Subparcels Transferred during CY 2002

Designator	Description	Recipient	Transfer Date	Acreage
A-1	Manhattan Monument	Los Alamos County	October 31, 2002	0.07
A-12	Los Alamos Area Office-1 (East)	Los Alamos County	October 31, 2002	4.51
A-17	TA-74-1 (West)	Los Alamos County	October 31, 2002	5.52

1 Congress established the NNSA within the DOE to manage the nuclear weapons program for the United States. LANL is one of the facilities now managed by the NNSA. The NNSA officially began operations on March 1, 2000. Its mission is to carry out the national security responsibilities of the DOE, including maintenance of a safe, secure, and reliable stockpile of nuclear weapons and associated materials capabilities and technologies; promotion of international nuclear safety and nonproliferation; and administration and management of the naval nuclear propulsion program.

A-19	White Rock-1	Los Alamos County	October 31, 2002	76.33
A-2	Site 22	Los Alamos County	October 31, 2002	0.17
A-3	Airport-1 (East)	Los Alamos County	October 31, 2002	9.44
A-6	Airport-4 (West)	Los Alamos County	October 31, 2002	4.18
A-9	DP Road-2 (North) (Tank Farm)	Los Alamos County	October 31, 2002	14.94
B-1	White Rock-2	Pueblo of San Ildefonso	October 31, 2002	14.94
B-2	TA-74-3 (North) (Includes B-4)	Pueblo of San Ildefonso	October 31, 2002	2,089.88
Total				2,209.29

Figure 4-6 presents an overview of the land transfers. The dates of transfer have slipped due to NMED's not accepting DOE's recommendation for "No Further Action" on several of the tracts. It appears that additional sampling will be done, and then these will be able to be transferred. Everything but the green on the overview map should be transferred by November 07. Figure 4-7 is the Airport map; the area labeled A-5-1 and perhaps A-5-2 will also be transferred. By combining these two maps, the complete projection of the land transfers is shown.

Table 4.1.1.4-2 shows the projected schedule for the remaining land transfers.

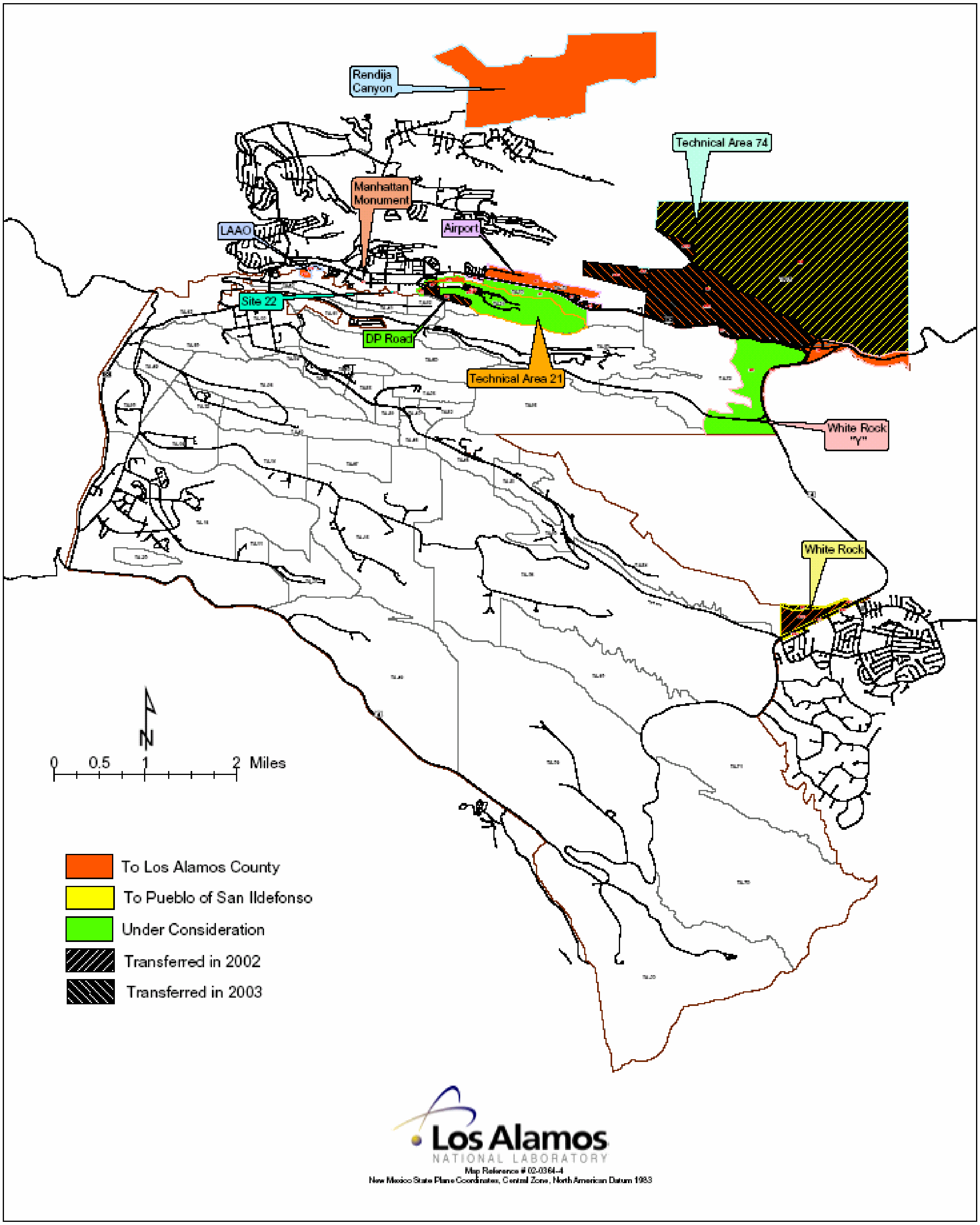

Figure 4-6. Overview of land transfer.

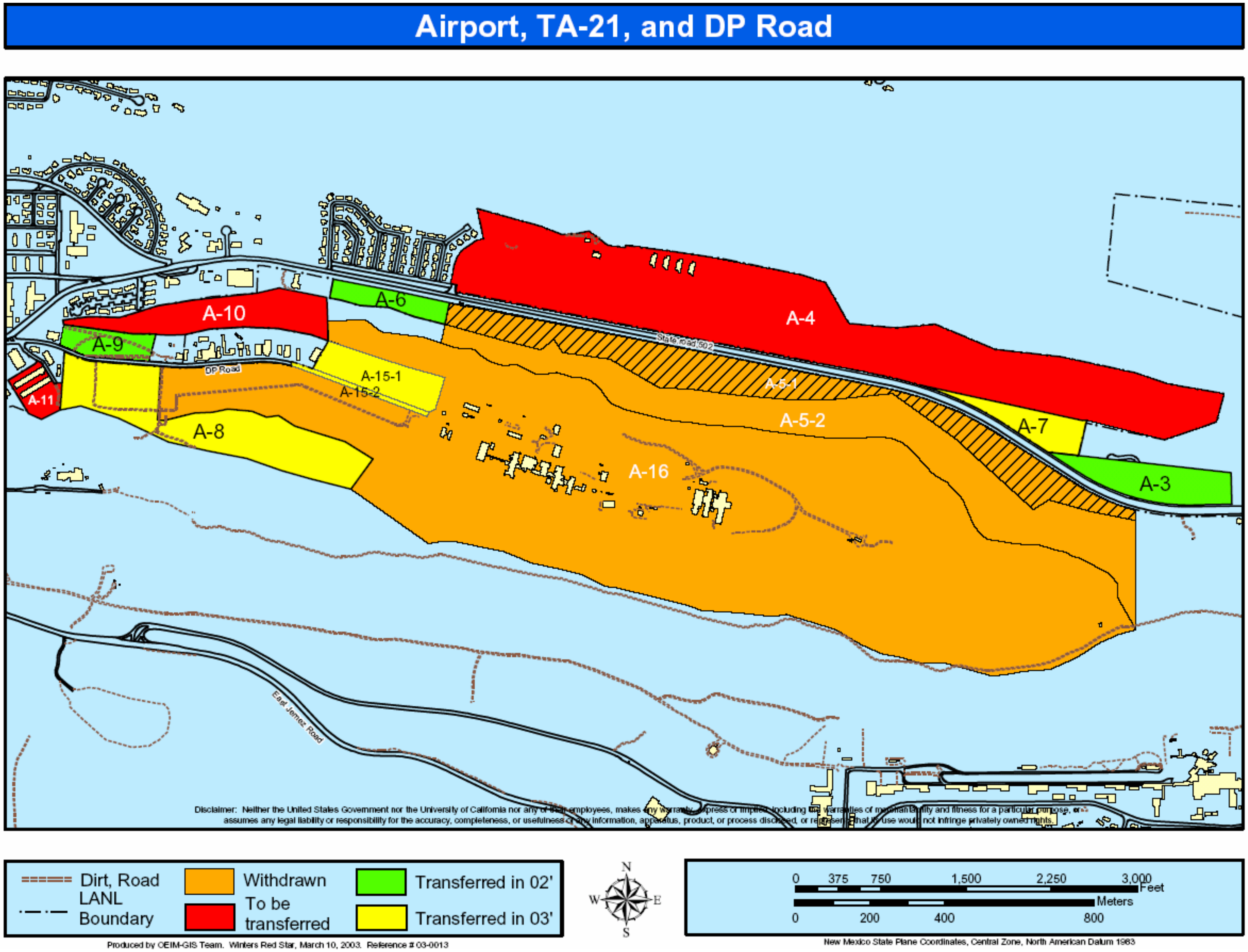

Figure 4-7. Airport, TA-21, and DP Road land transfers.

Table 4.1.1.4-2. Projected schedule for the remaining land transfers.

Designator	Description	Recipient	Transfer	Acerage	EBS Start (1)	EBS Finish (1)	Cultural Excavation Start (2)	Cultural Excavation Finish (2)	Cultural Analysis & Report (2)	Historic Building Compliance Start	Historic Building Compliance Finish
To Be Transferred											
A-07	Airport-5 (Central) (7 ac.)	County	9/30/2003	5.83	Complete	3/20/2003	4/1/2003	9/30/2003	9/30/2004	None	None
A-08	DP Road-1 (South) (25 ac.)	County	9/30/2003	24.92	Complete	9/30/2003	None	None	None	None	None
A-15	TA-21-1 (West)	County	9/30/2003	7.55	Complete	10/14/2003	None	None	None	None	None
B-3	TA-74-4 (Middle) (Little Otowi)	Pueblo	9/30/2003	3.40	Complete	11/14/2001	None	None	None	None	None
C-1	White Rock	Highway	TBD	15.41	Complete	5/7/2002	None	None	None	None	None
C-2	White Rock "Y"-1	Highway	TBD	104.10	Complete	6/11/2002	None	None	None	None	None
C-3	White Rock "Y"-3	Highway	TBD	53.60	Complete	10/9/2002	None	None	None	None	None
C-4	White Rock "Y"-4	Highway	TBD	20.10	Complete	4/22/2003	None	None	None	None	None
A-18	TA-74-2 (South)	County	9/30/2003	676.52	11/30/2002	1/31/2003	None	None	None	None	None
A-04	Airport-2 (North) (90 ac.)	County	9/30/2005	92.60	5/30/2005	7/30/2005	None	None	None	10/1/2004	9/1/2005
A-10	DP Road-3 (East)	County	9/30/2005	13.80	5/30/2005	7/30/2005	None	None	None	None	None
A-11 **(3)**	DP Road-4 (West) (Archives)	County	9/30/2006	3.09	5/30/2006	7/30/2006	None	None	None	5/1/2005	3/31/2006
A-13	LAAO-2 (West) (LAAO Bldg)	County	9/30/2005	8.82	5/30/2004	7/30/2004	None	None	None	11/1/2003	9/30/2004
A-14	Rendija	County	9/30/2007	918.30	5/30/2007	7/30/2007	5/1/2004	9/30/2004	9/30/2005	None	None
Currently Deferred											
A-05	Airport-3 (South) (deferred)	County	None	34.67	None	None	None	None	None	None	None
A-16	TA-21-2 (East) (deferred)	County	None	252.10	None	None	None	None	None	None	None
A-20	White Rock "Y"-2 (deferred)	County	None	323.40	None	None	None	None	None	None	None
Transferred											
A-01	Manhattan Monument (0 ac.)	County	10/31/2002	0.07	Complete	9/27/2001	None	None	None	None	None
A-02	Site 22 (0 c.)	County	10/31/2002	0.17	Complete	9/27/2001	None	None	None	None	None
A-03	Airport-1 (East) (8 ac.)	County	10/31/2002	9.44	Complete	5/14/2002	5/1/2002	9/30/2002	9/30/2003	None	None
A-06	Airport-4 (West)	County	10/31/2002	4.18	Complete	5/14/2002	None	None	None	None	None
A-09	DP Road-2 (North) (Tank Farm) (4 ac.)	County	10/31/2002	4.25	Complete	5/22/2002	None	None	None	None	None
A-12	LAAO-1 (East)	County	10/31/2002	4.51	Complete	2/21/2002	None	None	None	None	None
A-17	TA-74-1 (West) (3 ac.)	County	10/31/2002	5.52	Complete	6/26/2002	None	None	None	None	None
A-19	White Rock-1	County	10/31/2002	76.33	Complete	4/16/2002	5/1/2002	9/30/2002	9/30/2003	None	None
B-1	White Rock-2	Pueblo	10/31/2002	14.94	Complete	9/27/2001	None	None	None	None	None
B-2	TA-74-3 (North) (Includes B-4)	Pueblo	10/31/2002	2089.88	Complete	11/14/2001	None	None	None	None	None

Assumptions Critical To This Schedule

(1) Completion of the EBS is dependent upon two things. First, having the ACOE Maps prior to the anticipated start date. Second, having the ER CERCLA information provided two weeks prior to the end date. If either of these two conditions are not met, the EBS will be delayed.

(2) Start of cultural resource excavations is dependent on the Global Tasks being completed by April 2002 (NAGPRA, Transfer MOA, Data Recovery Plan, and TCP Consultations - see attached schedule for these tasks). If there are unexpected delays in completing these global tasks, the excavations planned to start in May 02 will be delayed.

(3) Both the EBS and the Historical Building Compliance work can be accomplished for DP Road-4 (West) (Archives); however, this property cannot be transferred unless the physical move of the archives into the basement of the new Administration building and the move of the JCI shops happens as planned. If for some reason, the anticipated moves are delayed or cancelled, then land transfer will have to either move the archives (expensive) and shops (expensive), or remove this property from transfer as still being required for mission support.

4.1.1.5 Santa Fe National Forest Land Use

The USFS should review and suggest any necessary changes to this section of the SWEIS. There are likely changes due to the Cerro Grande Fire, and the creation of the Valles Caldera Preserve.

4.1.1.6 Bandelier National Monument Land Use

The NPS should review and suggest any necessary changes to this section of the SWEIS. There are likely changes due to the Cerro Grande Fire, and the creation of the Valles Caldera Preserve. Visits have decreased annually since 1999 as reported in the Trails Management EA (DOE/EA-1431)–292,000 in 2002 compared to 344,000 annual average over the past decade.

4.1.1.7 American Indian Pueblo Land Use

San Ildefonso and Santa Clara Pueblos have both increased in acreage as a result of land transfers (DOE and USFS initiated). **The population figures can be updated per the 2000 Census included as Attachment D of this document. Should check with San Ildefonso about whether a formal land use plan has been adopted.**

4.1.2 Visual Environment (SWEIS Section 4.1.2)

(Contact: Peggy Powers, RRES-ECO, 665-5717, peggy.powers@lanl.gov)

Items not evaluated in SWEIS

The SWEIS identified taller structures as having adverse visual effects. More specifically, these include taller buildings at TA-3, water towers, and radio towers. Some taller buildings, like the existing Administration Building, will be demolished but will be replaced with an equally visible, but more aesthetically pleasing structure.

The SWEIS did not identify the white tension domes at TA-54 as an adverse visual effect. However, they contrast with the natural landscape and can be seen many miles away from areas in the Nambe/Espanola area and from areas in western and southern Santa Fe.

Regulatory changes

The *New Mexico Night Sky Protection Act* [74-12-1 to 74-12-10 NMSA 1978] was enacted in 1999. It provides guidance for new lighting at LANL and is part of the engineering standards in use. The Act establishes criteria for allowable new night lighting (11 pm to sunrise) in the state of New Mexico. Existing light fixtures, air safety lighting, advertising signs, and worker safety lighting at commercial facilities are exempted. Mercury vapor lamps are prohibited. Incandescent lights greater than 150 watts and other lights greater than 70 watts must be shielded so that the light projects toward the ground.

LANL's Habitat Management Plan (LANL 1998) identifies areas where night light is restricted for certain periods of time to protect sensitive species habitat. Restrictions only apply when a sensitive species occupies the area of concern.

Natural sources of visual resources impacts

The Cerro Grande Fire in 2000 destroyed approximately 7,650 acres of forest within LANL's primary viewsheds. Flanks of the mountainsides west of LANL that had thick stands of conifers were denuded. Both summer and winter vistas were severely affected by the Cerro Grande Fire. In addition, areas of LANL that were previously screened by vegetation are now more visible to passing traffic. Some of these areas are built environments characterized by older, industrial architecture.

A further source of visual resource degradation is resulting from the pine bark beetle infestation. The beetles have attacked large areas of pinyon-juniper woodland both at LANL and in surrounding areas. Within the infested woodlands, stands of brown, dead and dying, and bare needleless trees have replaced healthy tree stands. As these trees completely lose their remaining needles, LANL structures in their vicinity will become increasingly visible. In addition, the visual quality of common LANL access roads has become less visually interesting.

Human sources of visual resources impacts

As a result of the Cerro Grande Fire, LANL increased its program of wildfire threat reduction. Tree thinning was conducted over extensive areas. Areas that were previously surrounded by dense thickets of brush and stands of conifers are now open woodland areas that afford views of LANL's industrial buildings.

The LANL SWEIS identified the visually discordant and industrial construction in some areas of LANL such as TA-03 as an adverse visual effect. That condition has been partly altered by demolition of older buildings of industrial character, such as the Scyllac and Sherwood buildings and removal of temporary transportable buildings. In their place, new buildings with a more unified and modern style have been or are being constructed. This process is expected to continue. Examples of the new construction at TA-03 includes a strategic computing facility, a nonproliferation and international security center, an office building, and an industrial medicine facility. NNSA has also constructed an emergency operations center, a chemistry building, and various offices and laboratories in various technical areas. Other construction in the planning or construction stage includes a national security science building and D-Division office building and parking garages at TA-03 and new offices and laboratories at TA-16 and 22. Overall the effect of this demolition and construction has been to remove old eyesores and create a more unified architectural environment.

Recent construction has also been sensitive to the effects of taller, more visible structures on the visual environment. For example, the water tower at the new Emergency Operations Center has been painted to blend with the background. Although the new national security sciences building will be multi-story, it will be a landmark building that will unify the visual elements of the TA-03 area.

Radio towers have been installed, including one at the intersection of Pajarito Road and SR 4 and another at the new emergency operations center. The radio towers were judged not to have significant visual effects (DOE 2000; DOE 2001).

Following the events of September 11, 2001, LANL initiated a number of changes that limited or redirected access to LANL facilities. Some of these changes restrict access of members of the public to certain areas of LANL under low or moderate security conditions; others limit access during high security conditions. The result of the access changes is that members of the public have fewer interactions with LANL's built environment.

References

DOE 2000 *Environmental Assessment for Leasing Land for the Siting, Construction and Operation of a Commercial AM Radio Antenna at Los Alamos National Laboratory*. DOE/EA-1332. Los Alamos Area Office, Los Alamos, NM. February 16, 2000.

DOE 2001 *Environmental Assessment for the Proposed Construction and Operation of a New Interagency Emergency Operations Center at Los Alamos National Laboratory*. DOE/EA-1376. Los Alamos Area Office, Los Alamos, NM.

LANL 1998 *Threatened and Endangered Species Habitat Management Plan Overview*. LALP-98-112. Los Alamos National Laboratory, Los Alamos, NM. August 1998.

4.1.3 Noise, Air Blasts, and Vibration Environment

(Contact for Noise Limits: John Breiner, HSR-5, 665-8217, breiner@lanl.gov; Contact for Nake'muu monitoring: Brad Vierra, RRES-ECO, 665-8014, bvierra@lanl.gov)

Noise (considered to be unpleasant, loud, annoying or confusing sounds to humans), air blasts (also known as air pressure waves or over pressures) and ground vibrations are intermittent aspects of the LANL area environment. Although the receptor most often considered for these environmental conditions is human, sound and vibrations may also be perceived by animals and birds in the LANL vicinity. Little is known about how different wildlife species may process these sensations, or how certain species may react to them. The vigor and well being of area wildlife and sensitive, federally protected bird populations suggests that these environmental conditions are present at levels within an acceptable tolerance range for most wildlife species and sensitive nesting birds found along the Pajarito Plateau. (Biological resources are discussed in more detail in Section 4.5.)

"Public noise" is the noise present outside the LANL site boundaries. It is from the combined effect of the existing LANL traffic and site activities and the noise generated by activities around the Los Alamos and White Rock communities. "Worker noise" is the noise generated by LANL activities within LANL boundaries. Air blasts consist of a higher frequency portion of air pressure waves that are audible and that accompany an explosives detonation. This noise can be heard by both workers and the area public. The lower frequency portion of air pressure waves is not audible but may cause a secondary and audible noise within a testing structure that may be heard by workers. Air blasts and most LANL-generated ground vibrations result from testing activities involving above-ground explosives research.

The forested condition of much of LANL (especially where explosives testing areas are located), the prevailing area atmospheric conditions, and the regional topography that consists of widely varied elevations and rock formations all influence how noise and vibrations can be both attenuated (lessened) and channeled away from receptors. These regional features are jointly responsible for there being little environmental noise pollution or ground vibration concerns to the area resulting from LANL operations. Sudden loud "booming" noises associated with explosives testing are similar to the sound of thunder and may occasionally startle members of the public and LANL workers alike. The human startle response is usually related to the total amounts of explosives used in the test, the prevailing atmospheric conditions, and the receptor's relative location to the source location and to channeling valleys. Although these noises are sporadic or episodic in nature, they contribute to the perception of noise pollution in the area.

Concerns for damage that may be caused by ground vibrations as a result of explosives testing are primarily related to sensitive architectural receptors, such as the many archeological sites and historic building near the LANL firing ranges. The low masonry adobe or rock walls at prehistoric sites, and the nonrobust walls of what were expected to be temporary or short-term use buildings when originally constructed, may be speculated to suffer from subtle structural deterioration (fatigue damage) over time. However, field observations of eight prehistoric archeological sites in the vicinity of the firing ranges determined that none of the sites exhibited deterioration other than natural weathering.

Limited data currently exist on the levels of routine background ambient noise levels, air blasts, or ground vibrations produced by LANL operations that include explosives detonations. The following discussions of noise level limitations are provided to identify applicable regulatory limits or administrative controls regarding LANL's noise, air blast, and vibration environment; there are no regulatory, worker health protective, or maximum permissible level limitations for air blasts or ground vibrations. Available LANL noise and vibration information from specific activities is also summarized and presented.

4.1.3.1 Noise Level Regulatory Limits and LANL Administrative Requirements

Noise generated by LANL operations, together with the audible portions of explosives air blasts, is regulated by county ordinance and worker protection standards. The standard unit used to report sound pressure levels is the decibel (dB); the A-weighted frequency scale (db[A] or dBA) is an expression of adjusted pressure levels by frequency that accounts for human perception of loudness. Los Alamos County has promulgated a local noise ordinance that establishes noise level limits for residential land uses. Noise levels that affect residential receptors are limited to a maximum of 65 dBA during daytime hours and 53 dBA during nighttime hours between 9 p.m. and 7 a.m. Between 7 a.m. and 9 p.m., the permissible noise level can be increased to 75 dBA in residential areas, provided the noise is limited to 10 minutes in any 1 hour. Activities that do not meet the noise ordinance limits require a permit (LANL 1994a).

Noise standards related to protecting worker hearing are contained in LANL's Administrative Requirements, *Hearing Conservation*, which is part of the electronic Environmental, Safety, and Health Manual (LANL 1993c). LANL hearing conservation policy and noise level limits are based on:

- U.S. Air Force Regulation 161-35, *Hazardous Noise Exposure*
- DOE Order 5480.4, *Environmental Protection, Safety, and Health Protection Standards*
- 29 Code of Federal Regulations (CFR) 1910.95, *Occupational Noise Exposure*
- American Conference of Governmental Industrial Hygienists' (ACGIH) publication (ACGIH 1993) entitled, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices (1992–1993)*

The occupational exposure limit for steady-state noise, defined in terms of accumulated daily (8-hour) noise exposure dose that allows for both exposure level and duration, is ~~84~~ 82 dBA (29 CFR 1910.95). When a worker is exposed for a shorter duration, the permitted noise level is increased (Table 4.1.3.1–1). LANL Administrative Requirements also limit worker impulse/impact noise exposures that consist of a sharp rise in sound pressure level (high peak) followed by a rapid decay less than 1 second in duration and greater than 1 second apart~~. These limits are based on noise level and number of impacts allowed per day (Table 4.1.3.1–2).~~ No exposures of an unprotected ear in excess of a C-weighted peak of 140 dB is permitted.

Table 4.1.3.1–1. Limiting Values for Average Daily Noise Exposure

Duration of Total Daily Exposures Hours	Occupational Exposure Limits Noise Level dBA
16	80
8	82
4	85
2	88
1	91
0.5	94
0.25	97
0.125	100

a Exposure above 115 dBA is not permitted. *Source:* LANL 1993c

~~**SWEIS TABLE 4.1.3.1–2. *Occupational Exposure Limits for Impulse/Impact Noise***~~

SOUND LEVEL Dba	NUMBER OF IMPULSES OR IMPACTS PERMITTED DAILY

~~140~~	~~100~~
~~130~~	~~1,000~~
~~120~~	~~10,000~~

To meet the limits presented above, managers at LANL are required to minimize excessive worker noise exposure through measures such as worker hearing protection, control of noise using alternative operating conditions, and engineering designs or modifications to reduce operating noise levels.

There are no regulatory, worker health protective LANL administrative controls or other maximum permissible levels regarding property damage resulting from vibrations such as those generated through LANL operations.

Vibration criteria for ancient monuments have been recommended as low as 2 millimeters per second amplitude; a few European countries have established standards for ground vibrations levels allowed at their historic monuments of 2 millimeters per second. The vibration limit recommended at Mesa Verde and Chaco Canyon for one-of-a-kind, irreplaceable structures was not to exceed 2 millimeters per second in the 2 to 20 hertz frequency bandwidth. Given the lack of vibration damage attributable to vibrations from 50 years of explosives testing (as discussed in section 4.1.3.2), and given the environmental setting of the firing site areas (additional information regarding these sites is presented in section 4.8), it appears unnecessary to adopt such a limit for the types of resources present at LANL.

4.1.3.2 Existing LANL Noise Air Blast and Vibration Environment

Existing LANL-related publicly detectable noise levels are generated by a variety of sources, including truck and automobile movements to and from the LANL TAs, high explosives testing, and security guards' firearms practice activities. Noise levels within Los Alamos County unrelated to LANL are generated predominately by traffic movements and, to a much lesser degree, other residential-, commercial-, and industrial-related activities within the county communities and the surrounding areas.

Traffic noise from truck and automobile movements around the LANL TAs is excepted under Los Alamos County noise regulations, as is the traffic noise generated along public thoroughfares within the county. This type of noise contributes heavily to the background noise heard by humans over most of the county. Although some measurements of sound specifically targeting traffic-generated noise have been made at various county locations in recent studies, these sound levels are found to be highly dependent upon the exact measuring location, time of day, and meteorological conditions. There is, therefore, no single representative measurement of ambient traffic noise for the LANL site. Noise generated by traffic has been computer modeled to estimate the impact of incremental traffic for various studies, including recent NEPA analyses, without demonstrating meaningful change from current levels due to any new activities. While very few measurements of nonspecific background ambient noise in the LANL area have been made, two such measurements have been taken at a couple of locations near the LANL boundaries next to public roadways. Background noise levels were found to range from

31 to 35 dBA at the vicinity of the entrance to BNM and NM 4. At White Rock, background noise levels range from 38 to 51 dBA; this is slightly higher than was found near BNM, probably due to higher levels of traffic and the presence of a residential neighborhood (DOE 1995b) as well as the different physical setting.

The detonation of high explosives represents the peak noise levels generated by LANL operations. The results of these detonations are air blasts and ground vibrations. LANL has instituted stringent administrative controls to protect site workers from potential physical damages that could result from these detonations. These protective measures include the employment of TA perimeter fencing, badge exchange programs at manned access points, and gated personnel exclusion zones located at varying distances from the firing site detonation points determined by site safety requirements. Personal protective hearing devices are also made available for use by personnel as necessary as part of the standard operating procedures established for these sites. Exclusion zones are provided both for hearing protection and to keep workers from potentially being struck with high speed detonation debris or being adversely affected by air blasts. The perimeter fencing is also provided both for the protection of co-located workers and for members of the public. The primary source of these activities is the high explosives experiments conducted at the LANL Pulsed High-Energy Radiation Machine Emitting X-Rays (PHERMEX) Facility and surrounding TAs with active firing sites. Within the foreseeable future, the Dual Axis Radiographic Hydrodynamic Test (DARHT) Facility will begin operation (followed by a corresponding reduction of PHERMEX operations) and will become a source of high explosives testing. Explosives detonations were performed in March 1995 for the DARHT EIS analysis and measurements of air blasts and ground vibrations were obtained for representative PHERMEX explosives tests. The sound measurements recorded the following:

- *70 dBA* at a distance from the source of 4 miles (6 kilometers) using 150 pounds (68 kilograms) of TNT

- *71 dBA* at a distance from the source of 1 mile (2 kilometers) using 150 pounds (68 kilograms) of TNT (the closest public access point next to TA–49 at NM 4)

- *60 dBA to 63 dBA* at a distance from the source of 3 miles (5 kilometers) using 150 pounds (68 kilograms) of TNT (BNM entrance near NM 4) (DOE 1995b) Based on such findings, the Los Alamos County Community Development Department has determined that LANL does not need a special permit under the Los Alamos County Code because noise related to explosives testing is not prolonged, nor is it considered unusual to the Los Alamos community (Los Alamos County Code, August 8, 1996).

The DARHT EIS analysis performed to determine vibratory ground motion from detonation of high explosives indicated that the peak ground motion for the energy transmitted through the ground was less than the ground motion caused by the air wave pulse when it arrived at a measurement point. This is understandable because of the above ground placement of the explosives used in testing activities. Ground motion (particle velocity) amplitudes slightly above 2 millimeters per second were estimated by derivative calculations to occur within 1 mile (1.61 kilometers) of a 500-pound (227-kilogram) TNT explosives test (GRAM 1997). In general, structures within 2,000 feet (610 meters) are estimated to be exposed to ground vibration in excess of 5 millimeters per second. For explosive tests in the range of 10 pounds (4.5 kilograms) to 150 pounds (68 kilograms), ground vibrations in excess of 5 millimeters per second are not expected to be exceeded at locations of 1,000 feet (305 meters) or more from the firing site (GRAM 1997). For architectural sites near the firing site, but separated from them by an intervening canyon(s), the effects would be greatly lessened to absent from ground transmitted vibrations. Detonations of up to 500 pounds (227 kilograms) of TNT or its equivalent are not expected to generate vibrations sufficient to result in any damage to either sensitive historical or prehistoric structures at BNM or to residences in the White Rock or Los Alamos communities. Measurement of the air blast associated with a 150-pound (68-kilogram) detonation of TNT indicated that the maximum air blast over pressure was 5.05 millibar (0.073 pounds per square inch [psi] or 143 dB at 1,200 feet [366 meters]) to the blast site. The effect of a 500-pound (227-kilogram) detonation of TNT is estimated to be in excess of the 7 millibar (0.1 psi or 150 dB) that would be required to occur at that distance from the blast site before cracking of building windows and walls would be expected to occur. Given the distance of buildings from existing LANL blast site locations, it is unlikely that any cracks to building walls or windows would result due to air blasts from explosives testing. Field observations were made in 1997 to determine the existing condition of eight sensitive prehistoric resource sites within an 800-foot (244-meter) radius of 13 active explosives firing sites at LANL. The survey did not identify any significant structural deterioration to these sites that could conclusively be associated with ground vibrations. Rather, they appeared to be deteriorating due to natural weathering processes (LANL 1997e).

In July 1999, with the appropriate DOE authorization, the DARHT Project Office initiated DARHT facility operations on the DAHRT first axis. In late fall of 2000 the first major hydrotest using the DAHRT first axis was completed. Testing has continued; see the DAHRT Mitigation Action Plan Annual Reports for discussion (DOE 2003). As part of the DARHT Mitigation Action Plan (DOE 1996), LANL has undertaken a long term monitoring program at the ancestral pueblo of Nake'muu to assess the impact of these LANL mission activities on cultural resources. Nake'muu is the only pueblo at the Laboratory that still contains its original standing walls. It dates from circa A.D. 1200 to 1325 and contains 55 rooms with walls standing up to six feet high. Over the six-year monitoring program, the site has witnessed a 0.6 percent displacement rate of chinking stones and 0.2 percent displacement of masonry blocks. The annual loss rate ranges from 0.5 to 2.0 percent for the chinking stones and 0.05 to 1.3 percent for the masonry blocks. Statistical analyses indicate that these displacement rates are significantly correlated with annual snowfall, but not with annual rainfall or shots from the DARHT facility (LANL 2003b).

DOE 1996 *Dual-Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement Mitigation Action Plan,* DOE/EIS-0228, January 1996.

DOE 2003 *Dual-Axis Radiographic Hydrodynamic Test Facility Mitigation Action Plan Annual Report for 2002*, Los Alamos Site Office, National Nuclear Security Administration, Los Alamos, New Mexico. April 14, 2003.

LANL 2003a *Noise and Temperature Stresses*, Laboratory Implementation Requirements LIR 402-820-01.1, Issue Date: 12/21/99 (Revised 8/20/03). Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL 2003b *A Current Assessment of the Nake'muu Monitoring Program,* LA-UR-03-7364, Los Alamos National Laboratory, Los Alamos, New Mexico, September 25, 2003.

4.2 Geology and Soils

(Contacts: Jamie Gardner, EES-9, 667-1799, jgardner@lanl.gov;
Claudia Lewis, EES-9, 665-7728, clewis@lanl.gov)

SWEIS Page 4-22, Section 4.2.1, first paragraph, second line says: "…located on the Pajarito Plateau (Figure 4.2–1)." The Pajarito Plateau is not shown on this figure.

Page 4-22, Section 4.2.1, second paragraph, lines 3-5 say: "…trends northward across central New Mexico, and ends in central Colorado (Figure 4.2–1)." None of this is shown on the figure.

Page 4-23, Figure 4.2-1: caption at bottom of figure is incorrect. Figure does not show geology. Text in box at top of figure makes no sense with respect to the figure. See suggestions for replacement of Figure 4.2.2.2-1, below.

Page 4-24, Table 4.2.1-1, for the Formation Cerro Toledo "Interval": rock types should read "volcaniclastic sediments and tephras." Thickness in LANL Region should read "0 to 400 feet".

Page 4-26, Figure 4.2.1-1: caption should read "Generalized cross-section of the LANL area."

Page 4-27, second paragraph, lines 6-10 read: "The Jemez Mountains show an unusually low amount of seismic activity, which suggests that no magma migration is occurring. However, it is also possible that seismic signals are partially absorbed deep in the subsurface due to elevated temperatures and high heat flow." These statements are inaccurate. These lines should read: "The Jemez Mountains show an unusually low amount of seismic activity. It is possible that seismic signals of magma movement are partially absorbed deep in the subsurface due to elevated temperatures and high heat flow."

Page 4-28, Figure 4.2.2.2-1 is terribly obsolete and needs to be replaced with attached Figure 4-8. New caption should read: Mapped faults in the LANL area. PF=Pajarito fault zone, RCF=Rendija Canyon fault zone, GMF=Guaje Mountain fault, SCF=Sawyer

Canyon fault. Shaded area is covered by detailed geologic mapping or in-progress mapping. Note that the eastern two-thirds of the Laboratory has not been mapped. Thin grey lines are roads, thick grey lines are LANL technical area boundaries.

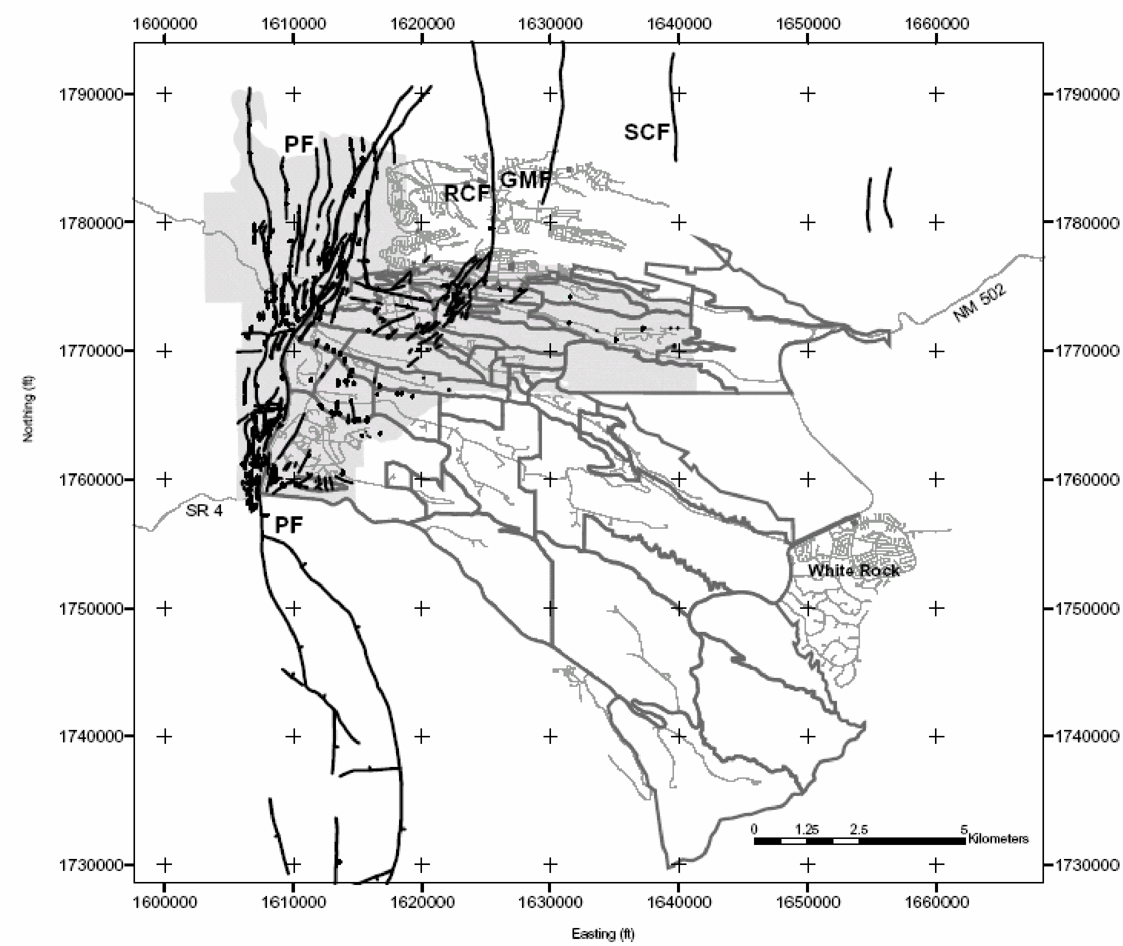

Figure 4-8. Mapped faults in the LANL area. PF=Pajarito fault zone, RCF=Rendija Canyon fault zone, GMF=Guaje Mountain fault, SCF=Sawyer Canyon fault.

Sources:

Gardner, J. N., Lavine, A., WoldeGabriel, G., Krier, D. J., Vaniman, D., Caporuscio, F., Lewis, C., Reneau, P., Kluk, E., and Snow, M. J., 1999, Structural geology of the northwestern portion of Los Alamos National Laboratory, Rio Grande rift, New Mexico: Implications for seismic surface rupture potential from TA-3 to TA-55; *Los Alamos National Laboratory Report*, LA-13589-MS, 112 p.

Gardner, J. N., Reneau, S. L., Krier, D. J., Lavine, A., Lewis, C., WoldeGabriel, G., and Guthrie, G., (2001), Geology of the Pajarito fault zone in the vicinity of S-site (TA-16), Rio Grande rift, New Mexico; *Los Alamos National Laboratory Report*, LA-13831-MS, 86 p. with 1:6000 scale geologic map.

Lewis, C. J., Lavine, A., Reneau, S. L., Gardner, J. N., Channell, R., and Criswell, C. W., 2002, Geology of the Western Part of Los Alamos National Laboratory (TA-3 to TA-16), Rio Grande Rift, New Mexico; *Los Alamos National Laboratory Report,* LA-13960-MS, 98 p. with 1:6000 scale geologic map.

Lavine, A., Lewis, C. J., Katcher, D. K., Gardner, J. N., and Wilson, J., 2003, Geology of the north-central to northeastern portion of Los Alamos National Laboratory, New Mexico; *Los Alamos National Laboratory Report*, LA-14043-MS, 44 p., with 1:4000 scale geologic map.

LANL Seismic Hazards Geology Team, unpublished.

Page 4-29, Table 4.2.2.2-1: in the Most Recent Movement column, for Pajarito fault should be approximately 1500 to 2000 years ago; for Rendija Canyon fault should be greater than 8000 years ago, and "to 9000 or 23000" should be deleted; for Guaje Mountain fault should be 4000 to 6500 years ago. Additional references would be

McCalpin, J. P., 1998, Late Quaternary faulting on the Pajarito fault, west of Los Alamos National Laboratory, north-central New Mexico: Results from the seven-trench transect excavated in summer of 1997; unpublished consulting report prepared for Los Alamos National Laboratory by GEO-HAZ Consulting Inc., Estes Park, CO.

LANL Seismic Hazards Geology Team, unpublished.

4.2.2.1 Volcanism

No change from 1999 SWEIS

4.2.2.2 Seismic Activity

While the Wong et al., (1995) and the Olig et al. (1998, and 2001) reports still provide the current guidance for probabilistic ground motion and surface rupture hazards, respectively, the probabilistic hazard is scheduled to be recalculated in 2005. Considerable advances have been made over the last 10 years in understanding the geometry of the Pajarito fault system and the seismic hazards posed by the three principal faults of the system in the vicinity of Los Alamos National Laboratory: the Pajarito fault, the Rendija Canyon fault, and the Guaje Mountain fault. In this section, we review new data on geometry and seismic event chronologies derived from trenches and boreholes, and summarize work done to date on seismic hazards in the vicinity of the Laboratory.

Pajarito fault

Geologic mapping, trench studies, and borehole studies along the Pajarito fault (PF) have demonstrated that the geometry of the fault varies appreciably along its north-south strike. Its surface expression varies from a simple normal fault to broad zones of small faults to faulted monoclines and largely unfaulted monoclines (e.g., McCalpin, 1998; Gardner et al., 1999; Schultz et al., 2003). These varied styles of deformation are all considered expressions of deep-seated normal faulting. Much of the main escarpment of the PF has been modified extensively by mass wasting (LANL Seismic Hazards Geology Team, unpublished mapping). Landslides in this area are cut by pronounced aerial photographic lineaments, but these and other linear features cannot be identified as faults with certainty.

Maximum stratigraphic separation on the PF occurs south-southwest of the LANL site, where the PF is expressed at the surface as two down-to-the-east (DTE) zones of normal faulting with ~180 m (590 ft) of stratigraphic separation on the Bandelier Tuff where it crosses Frijoles Canyon (Reneau, 2000). In the fault sector west of the LANL site, the PF is a faulted monocline with a prominent graben at the base of the escarpment. Geochemical correlations of individual Tshirege Member subunits across the main escarpment of the PF near Water Canyon indicate that DTE stratigraphic separation on the tuff is ~120 m (400 ft; Gardner et al., 2001; Schultz et al., 2003). Between Cañon de Valle and Pajarito Canyon, DTE stratigraphic separation is ~145 m (~475 ft; LANL Seismic Hazards Geology Team, unpublished data) accommodated on several DTE normal faults over a lateral width of about 1,000 m (~3,300 ft). Prior to recent detailed mapping of the escarpment between Water Canyon and Los Alamos Canyon, Gardner et al. (2001) estimated about 79 m (260 ft) of stratigraphic separation on the Tshirege Member at upper Pajarito Canyon, whereas Olig et al. (1996) estimated ~155 m (~510 ft) from a topographic profile on the surface of the Bandelier Tuff. South of Ski Hill Road (near the northwest corner of LANL), DTE stratigraphic separation of ~110 m (~360 ft) is accommodated by monoclinal folding and small-offset distributed normal faulting with ~35 m maximum displacement on any single mapped fault (LANL Seismic Hazards Geology Team, unpublished data).

In the vicinity of TA-16, deformation associated with the Pajarito fault extends at least 1,500 m (5,000 ft) to the east of the Pajarito fault escarpment (Gardner et al. 2001). Numerous north- and northeast-striking faults and monoclines with small amounts of dip slip, as well as monoclinal folding of originally east-dipping stratigraphy to horizontal or westward dips, represent a zone of distributed faulting and folding that is likely deformation of the hanging wall of the Pajarito fault.

McCalpin excavated seven trenches in a west to east transect along Ski Hill Road across strands of the PF to determine the age of the most recent faulting event (MRE) and previous faulting events (McCalpin, 1998). Trenches 97-3, -4, -7, and -7a displayed evidence of a mid- to late-Holocene MRE. According to McCalpin (1998), the MRE in trenches 97-7 and 97-7a falls in a narrow age range between ~1260-2290 cal yr BP (indicates ^{14}C date calibrated to correct for the effects of fluctuations in the $^{14}C/^{12}C$ ratio in the atmosphere). Trenches 97-3 and 97-4 indicated a probable Holocene event.

Of seven trenches excavated by McCalpin (1999) along the Pajarito fault between Pajarito and Water Canyons, three (98-4, -5, and -6) showed MREs in a broad age range from ca. 2-3 thousand of years before present (ka) to 10-12 ka. McCalpin (1999) concluded that this age range could indicate faulting contemporaneous with the MRE dated in the trenches of McCalpin (1998) and/or with the MRE on both the Guaje Mountain fault (ca. 4.2-6.5 cal ka; Gardner et al., 2003) or the Rendija Canyon fault (ca. 9 ka; Wong et al., 1995).

Stratigraphy and structure logged in boreholes at the Weapons Engineering Tritium Facility (WETF) at TA-16 indicated the presence of at least two normal faults and two fissures, which strike north-northeast (Gardner et al., 2001). Stratigraphic and structural evidence in borehole WETF-2C [located about 460 m (1,500 ft) from the base of the main escarpment of the Pajarito fault zone near the southwest corner of TA-16] indicate subsidiary faulting associated with ruptures in the Pajarito fault zone. At least three events are suggested by stratigraphic, structural, and geochronological relations as follows: > ca. 14.1 cal ka; ca. 10.9 to 9.0 cal ka; and ca. 7.3 to 1.3 cal ka, probably closer to ca. 1.3 cal ka.

Trenching at the site of the new LANL Emergency Operations Center characterized the stratigraphy and structure of the east side of a graben at the base of the Pajarito fault escarpment (Reneau et al., 2002). The main zone of faulting in the trench, with evidence for both normal and strike-slip displacement, displayed down-to-the-west (DTW) stratigraphic separation and forms the eastern edge of an approximately 160-m (525 ft) wide graben at the base of the east-facing Pajarito fault escarpment. The trench exposures provided evidence for a minimum of six surface rupture events in the last 1.22 million years, demonstrating the recurring nature of surface faulting at the site. The MRE occurred sometime within the last 10.5 cal ka. If a prominent stone line identified in the trench represents mass wasting during the MRE, the MRE occurred between 5.5 cal and 8.6 cal ka, most likely closer to 8.6 cal ka. It is also possible that the stone line was formed during another paleoseismic event in the Pajarito fault system or elsewhere and not during the MRE at this site.

Five small earthquakes (magnitudes of 2 or less) have been recorded in the Pajarito fault zone since 1991 (Gardner and House, 1999). These small events, which produced surprisingly strong felt effects, are thought to be associated with ongoing tectonic activity within the Pajarito fault zone.

The west-central area of the Laboratory, generally between TA-3 and TA-16, lies within a part of the Pajarito fault system that is characterized by subsidiary or distributed ruptures (Lewis et al., 2002). Faulting and fracturing between TA-3 and TA-16 is dominated by north-northeast to north-northwest-striking faults and associated folds with small amounts of DTE and DTW displacement. Similar to the TA-16 area (Gardner et al., 2001), deformation extends at least 1,500 m (5,000 ft) to the east of the Pajarito fault escarpment. This deformation appears to be associated with the Pajarito fault. As such, this is an area of generally higher potential for seismic surface rupture, relative to locations farther removed from the Pajarito fault zone. Chronological control on the timing of faulting in this area is sparse. The youngest known faulting in this area of the Laboratory occurred in Holocene time on the above-mentioned down-to-the-west fault trenched at the site of the new LANL Emergency Operations Center (Reneau et al., 2002).

Probabilistic analyses of surface rupture potential at TA-16 by Olig et al. (2001) indicate that, even in consideration of 1-in-10,000-year events, seismic surface rupture only becomes a significant hazard on the principal or main trace of the Pajarito fault. Re-analysis of the probabilistic seismic hazard for the Laboratory is planned for 2004. The analysis will take into account new data and models for event chronologies (see below) developed since previous hazard calculations by Wong et al. (1995) and Olig et al. (2001).

Rendija Canyon fault

The Rendija Canyon fault (RCF) is a dominantly DTW normal fault that, along with the DTE Pajarito fault, bounds the Diamond Drive graben (Figure 4.2.2.-1.; Gardner et al., 1999). The graben trends north and lies beneath the western part of the Los Alamos town site with its southern end in the TA-3 area. The 14-km long Rendija Canyon fault (RCF) is located ~3 km east of the PF (Gardner and House, 1987; Gardner et al., 1999). It exhibits as much as 40 m of post-Bandelier Tuff DTW displacement. South of the town of Los Alamos, the RCF splays southwest into a zone of deformation about 1,500 m wide with evidence for monoclinal folding and high-angle reverse faulting as well as normal faulting (Gardner et al., 1999). Net DTW displacement gradually decreases to the south as the zone of deformation broadens; the fault probably dies out just south of Twomile Canyon.

Trench exposures across the Rendija Canyon fault at Guaje Pines cemetery indicated that the most recent surface rupture occurred at either about 9 ka or 23 ka, indicating a late Pleistocene or Holocene event along the fault (Wong et al., 1995). Three radiometric analyses of charcoal by the ^{14}C method and two analyses of sediment by the thermoluminescence (TL) method provided conflicting results on the age of unfaulted scarp-derived colluvial deposits in the trench.

Geologic mapping by Gardner et al. (1998, 1999) showed that there is no faulting in the near-surface directly beneath TA-55. The closest fault is about ~460 m (1,500 ft) west of the Plutonium Facility. The RCF, therefore, does not continue from the Los Alamos townsite directly south to TA-55.

Some investigators have projected the trace of the RCF across Pajarito Mesa through the site of the proposed Mixed Waste Disposal Facility in TA-67. However, surficial geologic mapping, surveying, and trench mapping at Pajarito Mesa identified no faulting younger than the 50-60-kyr-old El Cajete pumice (Reneau et al., 1995). On the south side of Pajarito Mesa, Tshirege Member subunits are fractured but not displaced by faulting.

Gardner et al. (1999) showed that south of the Los Alamos town site, the RCF splays to the southwest into a broad zone of deformation (Gardner et al. 1999). The fault zone widens from about 610 m (2,000 ft) where it crosses Los Alamos Canyon and passes through the Los Alamos County landfill to about 1,500 m (5,000 ft) in Twomile Canyon. The fault zone appears to die out just south of Twomile Canyon. In TA-3, the RCF is a zone of distributed deformation consisting largely of northeast-striking normal faults with <3 m (10 ft) of dip slip, monoclines, and faulted monoclines with <15 m (50 ft) of vertical deformation on Bandelier Tuff. This zone of distributed deformation, including gentle northward tilts of structural blocks, forms part of the approximate southern boundary of the Diamond Drive graben. At Twomile Canyon, net down-to-the-west displacement is about 10 m (30 ft) on Bandelier Tuff.

Three borehole studies by Krier et al. (1998a, 1998b) and Krier (2001) provided further constraints on faulting within TA-3. Drilling at the site of the Strategic Computing Center (SCC) and the Nonproliferation International Security Center (NISC) showed no evidence of faulting in upper Tshirege Member units beneath the building sites (Krier et al, 1998a). Drilling at the site of the Chemistry and Metallurgy (CMR) Building identified two small, closely spaced, parallel reverse faults with a combined vertical separation of ~2.4 m (~8 ft; Krier et al., 1998b). Drilling at the site of the planned replacement of the TA-3 Administration Building identified a small, east-southeast striking normal fault with <1 m (3 ft) of displacement (Krier, 2001). The fault does not extend farther west than Pajarito Road; its eastern extent is unknown. These faults are located within the zone of distributed deformation that constitutes the southern end of the RCF and the Diamond Drive graben.

A probabilistic seismic hazards analysis of TA-3 was completed in 1998 (Olig et al., 1998). This study provided estimates of the probability of surface fault displacement considering a variety of seismic sources, rates of displacement, and location of faulting. The three different cases considered in the analysis correspond to three different possible scenarios for the southern end of the RCF. The orientation and location of the RCF in TA-3 was a significant variable in the analysis as, at the time, geological data were insufficient to confirm geologic conditions at the two sites of primary concern (CMR building and SCC/NISC buildings). The calculated probability of exceedance, even for performance category 4 facilities, was 0.1 or lower except for the case in which principal faulting occurred directly beneath one of the sites under consideration. The probabilistic displacement hazard for the worst-case scenario was determined to be <0.67 inches of displacement in 10,000 years. The low hazard results from the long recurrence interval (33,000 to 68,000 years), and therefore low slip rates, on the RCF.

Guaje Mountain fault

The Guaje Mountain fault (GMF) is subparallel to the Pajarito and Rendija Canyon faults and located ~2 km east of the RCF (Gardner and House, 1987; Gardner et al., 1999). It is somewhat shorter than the RCF and exhibits about 35 m of DTW displacement. The southern extent and amount of displacement of the GMF are not well characterized. The fault maintains topographic expression as far south as Bayo Canyon (Gardner et al., 2003).

Geologic surface mapping and trenching at Pajarito Mesa at the site of the proposed Mixed Waste Disposal Facility demonstrated the absence of faulting there for at least the last 50-60 ka (Reneau et al, 1995). Small displacement faults traverse the mesa but no through-going southward continuation of the Guaje Mountain fault was identified.

Trenches excavated by the LANL Seismic Hazards Geology Team along the GMF provide evidence for a surface rupturing paleoearthquake in the Holocene (Gardner et al., 2003). Gardner et al. (2003) concluded that the MRE for the GMF occurred in mid-Holocene time, around 4.2-6.5 cal ka. Combining available data, Gardner et al. (2003) recognized the following paleoseismic events on the GMF: 1) 4.2 to 6.5 cal ka with 1.5 to possibly > 2 m vertical displacement; 2) around 39 ka, probably dominantly a strike slip event with only small vertical displacement of about 50 cm; 3) perhaps about 40 ka with 1 m of vertical displacement at Chupaderos Canyon; and, 4) one or more events between 144 and 300 ka with 1.5-2.0 m of vertical displacement near the Sportsmen's Club.

Other areas of LANL

Surveying of Bandelier Tuff contacts at Mesita del Buey (TA-54) revealed 37 faults with vertical displacements of 5-65 cm (Reneau et al., 1998). These small faults are thought to record distributed secondary deformation associated with large earthquakes in the main Pajarito fault zone 8-11 km (2.4-3.4 miles) to the west, or perhaps earthquakes on other faults in the region.

Geologic mapping and related field and laboratory investigations in the north-central to northeastern portion of LANL (Technical Areas 53, 5, 21, 72, and 73) revealed only small faults that have little potential for seismic surface rupture (Lavine et al., 2003). The study identified six small-displacement (<1.5 m vertical displacement) faults or fault zones. These faults are considered subsidiary to the principal faults of the Pajarito fault system (PF, RCF, and GMF) and likely experienced small amounts of movement during earthquakes on the principal faults.

Pajarito fault system event chronology

Recent work (Gardner et al., 2001; Reneau et al., 2002; Lewis et al., 2002; Schultz et al., 2003; LANL Seismic Hazards Geology Team, unpublished data) has shown that the Pajarito fault system is a broad zone of distributed deformation, and that the master Pajarito fault itself probably breaks the surface only along part of its length in the vicinity of LANL. Most structures that have been the targets of paleoseismic studies are, in fact, subsidiary faults. As such, there is no reason to expect any one of these structures to record evidence of a complete record of paleoseismic events for the system.

A report by the Seismic Hazards Geology Team currently in preparation (Seismic Hazards Geology Team, in prep.) documents a comprehensive review and re-evaluation of geochronological constraints on paleoseismic activity in the Pajarito fault system in preparation for recalculation of the probabilistic seismic hazard at Los Alamos National

Laboratory (LANL). The reanalysis of the seismic hazard will update Wong et al. (1995, 1996) and later studies, and is planned for 2005. The potential seismic hazard at LANL is dominated by seismic ground motion associated with earthquakes on nearby faults, and also includes surface rupture along faults within the boundaries of LANL. New data obtained by the Seismic Hazards Program over the last five years (e.g., Gardner et al., 2001, 2003; Reneau et al., 2002; Seismic Hazards Geology Team, in prep.), combined with previous work, suggest that there may have been three Holocene surface-rupturing events within the Pajarito fault system. Although this scenario was considered in the probabilistic analyses of Wong et al. (1995), it was given a low weight.

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4.2.2.3 Slope Stability, Subsidence, and Soil Liquefaction

No change in this section except that the Omega West Facility was completely demolished in 2003 and is no longer located in the canyon bottom.

4.2.3 Soils

(Contact: Phil Fresquez, RRES-MAQ, 667-0815, fresquezp@lanl.gov)

Several distinct soils have developed in Los Alamos County as a result of interactions between the bedrock, topography, and local climate. Soils that formed on mesa tops of the Pajarito Plateau include the Carjo, Frijoles, Hackroy, Nyjack, Pogna, Prieta, Seaby, and Tocal soil series (Reneau 1994). All of the soils in the aforementioned soil series are welldrained and range from very shallow (0 to 10 inches [0 to 25 centimeters]) to moderately deep (20 to 40 inches [51 to 102 centimeters]), with the greatest depth to the underlying Bandelier Tuff being 40 inches (102 centimeters) (Nyhan et al. 1978). The geochemistry, geomorphology, and formation of soils in the LANL area have been characterized (Longmire et al. 1996).

4.2.3.1 Soil Monitoring

Soils on and surrounding LANL are sampled annually as a part of the Environmental Surveillance and Compliance Program to determine if they have been affected by LANL operations (LANL 1992b, LANL 1993b, LANL 1994b, LANL 1995f, LANL 1996e, LANL 1996i, and LANL 1997c, LANL 1998, LANL 1999, LANL 2000, LANL 2001, LANL 2002, LANL 2003, LANL 2004). Sediments, which occur along most segments of LANL canyons as narrow bands of canyon-bottom deposits that can be transported by surface water during runoff events or by LANL outfall effluent flows, are not part of the soil monitoring program and are discussed under section 4.3.1.4. A soil sampling and analysis program provides information on the inventory, concentration, distribution and changes over time of radionuclides in soils near LANL.

Basically, the soil monitoring program at LANL is comprised of an (1) institutional component that monitors soil contaminants within and around LANL, according to Department of Energy Orders 450.1 (DOE 2003) and 5400.5 (DOE 1993); and (2) a facility component that monitors soil contaminants within and around the Laboratory's principal low-level waste disposal area (Area G), according to DOE Orders 435.1 (DOE 1999a) and M 435.1-1 (DOE 1999b), and the Laboratory's principal explosive test facility (Dual Axis Radiographic Hydrodynamic Test [DARHT]), according to the Mitigation Action Plan (DOE 1996).

As part of the instituitional program, soil samples are collected from on-site, perimeter, and off-site (regional) locations shown in Figure 4.2.3.1–1. Background soil samples are collected from regional stations that are located at the same elevation as LANL in four areas surrounding LANL These areas are located near Borrego Mesa (near Santa Cruz dam) to the northeast, Rowe Mesa (near Pecos) to the southeast, Youngsville to the west, and Jemez to the southwest. (Figure 4.2.3.1–2). These background stations are located over 9 miles (15 kilometers) from LANL, which is considered beyond the range of potential influence from normal LANL operations (DOE 1991).
On-site areas sampled at LANL are not from potential release sites (PRSs) or wastewater outfalls. Instead, the majority of on-site sampling stations are located close to and downwind from major facilities and/or operations at LANL in an effort to assess radionuclide, radioactivity, heavy metals, and organics in soils that may have been contaminated as a result of air stack emissions and fugitive dust (e.g., the resuspension of dust from PRSs). A rough estimate, based on information from LANL's database, FIMAD, which has aerial estimates of the PRSs, indicates that the aerial extent of the PRS are less than 3 percent of LANL's approximately 43 square miles (111 square kilometers). The aerial extent of this 3 percent does not include the canyons because they are not classified under the FIMAD database as PRSs.

The soil radionuclide and radioactivity samples collected from 1974 through 2003 have been analyzed for tritium; cesium-137; plutonium-238, -239, and -240; americium-241; strontium-90; total uranium; gross alpha; gross beta; and gross gamma activities.

Sources of radionuclides in soil may include natural minerals, atmospheric fallout from nuclear weapons testing (Klement 1965), burn up of nuclear-powered satellites (Perkins and Thomas 1980), and planned or unplanned releases of radioactive gases, liquids, and/or solids by LANL. Naturally occurring uranium is present in relatively high concentrations in soil and rocks due to the regional geologic setting (Purtymun et al. 1987). Sources of plutonium include LANL operations and atmospheric fallout. Metals in soil may be naturally occurring or may result from LANL releases.

LANL on-site and perimeter soil samples (Figure 4.2.3.1–1) are collected and analyzed for radiological and nonradiological constituents, and compared to the regional (background) locations (Figure 4.2.3.1–2). In general, based on the most recent data (LANL 2004b), most radionuclide concentrations (activity) in soils collected from individual perimeter and on-site stations were nondetectable. A nondetectable value is one in which the result is lower than three times the counting uncertainty and is not significantly ($\alpha = 0.01$) different from zero (Keith 1991, Corely et al. 1981). Of the radionuclides that were detected, most were still within regional statistical reference levels (RSRLs). RSRLs are the upper-level background concentration (mean plus three standard deviations) from data collected from regional areas away from the influence of the Laboratory over the last five years and represent natural and fallout sources. Normally, radionuclides caused by fallout vary from one area to another, depending on wind patterns, elevation, and precipitation (Whicker and Schultz 1982); and fallout likely is more concentrated in the area of the Laboratory because it lies at a higher elevation and receives more precipitation than the regional areas (Fresquez et al., 1996, 1998).

The few radionuclides in soils from perimeter and onsite stations that were detected above RSRLs included mostly plutonium-239,240, albeit most values were just above the RSRL, and were probably a result of fallout because of higher precipitation events. However, two soil samples, one collected from an on-site location (TA-21 [DP-Site]) and one from a perimeter site (west airport) contained concentrations above regional fallout levels and were probably associated with Laboratory activities. The west airport site is located just north and slightly downwind of TA-21. TA-21 (DP-Site), the former plutonium processing facility, is currently undergoing decommissioning and decontamination work and show a great deal of variation in concentrations of plutonium-239,240 in soils over time. The large variability in plutonium-239,240 in soils collected from TA-21 (DP-Site) over the years may be a result of many factors. These factors may include: the release of larger size particles from unfiltered stacks in the very early years, the movement of surface plutonium-239,240 by wind and water processes, and/or the release of plutonium-239,240 from the many PRSs around TA-21 (DP-Site).

Although TA-21 (DP-Site) contained plutonium-239,240 concentrations above the RSRL, the values are still very low (pCi range) and far below screening action levels (SALs). LANL SALs, developed by the Environmental Restoration (ER) Project at LANL, are used to identify the presence of contaminants of concern and are derived from a risk assessment pathway using a 15 millirem per year dose limit. SALs are used by the ER Project at LANL to identify "hot spots" that will require additional sampling and may require remediation. Table 4.2.3.1–1 shows the RSRL and the LANL SAL values for several radionuclides. The SALs shown in Table 4.2.3.1–1 provide an indication of how far below RSRLs are to the 15 millirem per year standard.

Trend analyses show that most radionuclides and radioactivity, with the exception of plutonium-238 and gross alpha, in soils from on-site and perimeter areas have been decreasing over time (Fresquez et al. 1996a, Fresquez et al., 1998).These trends were especially apparent (i.e., significant at the 0.05 probability level [probability less than 0.05]) for tritium and uranium in soils from on-site areas. Their decrease may be due in part to reductions in LANL operations, air stack emissions, and to better engineering controls employed by LANL (LANL 1996i), but is more probably due to: (1) the cessation of aboveground nuclear weapon testing in the early 1960's, (2) weathering (wind, water erosion, and leaching), and (3) radioactive decay (half-life) (Whicker and Schultz 1982). Tritium, which has a half-life of about 12 years, exhibited the greatest decrease in activity over the 21 years in almost all of the soil sites studied, including regional locations. Plutonium-238 and gross alpha activity generally increased over time in most on-site, perimeter, and even regional background sites; all sites, however, were far from being statistically significant (probability less than 0.05). The source of most plutonium-238 detected in the environment is from nuclear weapons testing in the atmosphere (Klement 1965) and from the re-entry burn-up of satellites containing a plutonium-238 power source (Perkins and Thomas 1980). Only a few gross alpha readings and a few gross beta readings showed significantly increasing trends (probability less than 0.05) over time. In these cases, however, the measurement period was both early and very short (1978 to 1981).

The EPA studied radionuclides and radioactivity in soils at the Pueblo of San Ildefonso in 1994 (EPA 1995). Samples were collected from 16 locations east of the Rio Grande; 9 locations west of the Rio Grande in Los Alamos Canyon, Mortandad Canyon, and Cañada del Buey; and 5 regional background locations at Embudo Station, Santa Fe, Rio Chama above and below Abiquiu Reservoir, and Albuquerque. The EPA analyzed the soil samples for tritium; cesium-137; plutonium-238, -239, and -240; americium-241; strontium-90; uranium isotopes (uranium-234, -235, and -238); thorium isotopes (thorium-227, -228, -230, and -232); and gamma-emitting radionuclides. Analyses of the various isotopes of uranium and thorium were performed to evaluate whether these radionuclides were from natural sources or a result of human activities. The EPA concluded that, with the exception of cesium-137 and cobalt-56, the radionuclides detected were of natural origin and had concentrations typical of southwestern soils. The source of cesium-137 was interpreted to be from atmospheric fallout from nuclear weapons testing. Cobalt-56 is not normally detected in the environment due to its short half-life (79 days) and was found in only one sample. The EPA concluded that the origin of this radionuclide was unknown (EPA 1995).

Soils as part of the institutional program were also analyzed for trace and heavy metals . In general, very few individual sites from either perimeter or on-site areas had metals, particulary barium, beryllium, mercury, or lead concentrations above RSRLs, and do not appear to be increasing over time (LANL 2004b). In contrast, mercury concentrations in all soils, including regional soils, appear to be decreasing in time. This decrease is not entirely known but may be a reflection of improved air emissions from coal firing plants (Martinez 1999). The very few metals, mostly lead, that were above RSRLs were far below Environmental Protection Agency (EPA) screening levels (EPA 2000). EPA derived screening levels for nonradionuclides are based on potential health concerns; and therefore, there are no metal concentrations in soils collected from perimeter or onsite stations that are of a significant health concern.

Organic constituents have also been studied within and around LANL, particularly after the Cerro Grande fire that occurred in 2000 (Fresquez et al., 2000, Fresquez et al., 2001). . Volatile organic compounds (VOC), semivolatile organic compounds (SVOC), organochlorine pesticides (PEST), polychlorinated biphenyls (PCBs), high explosives (HE), and dioxin and dioxin-like compounds were assessed in soils from LANL, perimeter and background soil samples. Most organic compounds were not detected above reporting limits in any of the soils collected within or around LANL. However, of the other less toxic dioxin-like compounds analyzed, OCDD (1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin) and, to a lesser extent, HpCDD (1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin) were detected above reporting limits in most of the soil samples analyzed. These compounds, the least toxic of the six dioxin-like compounds analyzed, are by-products of natural (forest fires) and human-made (residential wood burning, municipal and industrial waste, etc.) sources. And the highest amounts detected in the soil collected near the airport (3.7 parts per trillion [ppt] of HpCDD, which is equal to 0 ppt toxicity equivalents [TEQ], plus 29.1 ppt of OCDD, which is equal to 0.029 ppt TEQ, equals 0.029 ppt total TEQ) were very far below the Agency for Toxic Substances and Disease Registry's soil screening level of 50 ppt TEQs (ATSDR, 1997). Since OCDD was detected upwind as well as downwind of the CG fire (and LANL) (concentrations ranged from 9.9 to 22.4 ppt), it was therefore probably not related to the fire. (Note: The average soil concentration of dioxins in North America is 8.0 ± 6.0 ppt TEQ, and uptake from water into food crops is insignificant because of the hydrophobic nature of these compounds)

As part of the facility monitoring program, soils are monitored around the perimeter of Area G and DARHT. Area G, approximately 63 acres in size, is located at TA-54 at the east end of the Laboratory. At this site, potential radionuclide (tritium, strontium-90, americium-241, cesium-137, plutonium isotopes and uranium isotopes) contamination is determined in soil and sediments (Fresquez et al., 2004a). Problem contaminants in soils at Area G include tritium and plutonium isotopes; both are significantly above RSRLs and tritium in soils in some locations is increasing over time. However, a special monitoring study of tritium in vegetation with distance from Area G showed that tritium decreased with distance, and at around 90 m were similar to RSRLs (Fresquez et al., 2004).

DARHT, approximately 20 acres in size, is located at TA-15 at the southwest end of the Laboratory. Soils and sediments are monitored for the same radionuclides as at Area G plus a host of heavy metals (Fresquez et al., 2004b). Results are compared with baseline statistical reference levels (BSRL) established over a four-year-long preoperational period prior to DARHT operations (Fresquez et al., 2001b). After four years of operation at DARHT, results show that most radionuclides and trace elements in soil, sediment, and biota are well within BSRLs.

4.2.3.2 Soil Erosion

Soil erosion can have serious consequences to the maintenance of biological communities and may also be a mechanism for moving contaminants across LANL and off site. Soil erosion rates vary considerably on the mesa tops at LANL, with the highest rates occurring in drainage channels and areas of steep slopes and the lowest rates occurring on gently sloping portions of the mesa tops away from the channels (LANL 1993a). A recent study performed in BNM suggests that erosion rates are high across widespread portions of local pinyon-juniper woodlands, which are found on the eastern portion of LANL (Wilcox et al. 1996a).

Another study found that light summer rainstorms in 1993 resulted in erosion of more than 12 tons per acre (26,900 kilograms per hectare) of soil (Wilcox et al. 1996b). It is estimated that the current annual rate of soil erosion in BNM is 36 tons per acre (80,700 kilograms per hectare).

Areas where runoff is concentrated by roads and other structures are especially prone to high erosion rates. High erosion rates appear to be relatively recent, most likely resulting from loss of vegetative cover, decreased precipitation, past logging practices, and past livestock grazing (Wilcox et al. 1996b).

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4.2.4 Mineral Resources

No change from 1999 SWEIS.

4.2.5 Paleontological Resources

No change from 1999 SWEIS.

4.3 WATER RESOURCES

(Contact: Bob Beers, RRES-WQH, 667-7969, bbeers@lanl.gov)

Only a small percentage of the world's total water supply is available to humans as freshwater, and more than 98 percent of the available fresh water is groundwater (Fetter 1988). Water is scarce in the semi-arid climate of northern New Mexico where precipitation is variable and stems primarily from summer thunderstorms and winter snowfall. During most of the year in the LANL region, surface water is present only in the Rio Grande and Rito de los Frijoles and in reservoirs. Naturally perennial surface water reaches also are located in Ancho, Pajarito, and Chaquehui Canyons[2]. The canyon-bottom streams within LANL boundaries are mostly dry and only portions of some streams contain water year-round. Flash floods can occur from the Sierra de Los Valles to the Rio Grande. Sediments moved by stormwater events from upstream, hillsides, or mesa tops occur along most of LANL canyons. Flash floods move the sediments from the canyon bottoms to downstream locations such as Cochiti Lake. Springs and the 87 National Pollutant Discharge Elimination System (NPDES)-permitted industrial and sanitary wastewater outfalls from LANL operations are additional sources of water to watersheds in the region. The 87 index NPDES flows were estimated using data provided by the surface water data team reports of August 1996 (Bradford 1996) and as modified in 1997 (Garvey 1997).

Update Comments (Beers):

1. Currently, the Laboratory has 20 NPDES permitted industrial outfalls and one (1) NPDES permitted sanitary outfall. LANL's NPDES permit expires on January 31, 2005. A permit re-application, scheduled for submittal in August 2004, will propose to the EPA a reduction to 16 industrial outfalls and one (1) sanitary outfall.

The geology of the region has set the stage for the locations of groundwater. Bodies of groundwater can occur near the surface of the earth in the canyon bottom alluvium, perched or trapped above the less-permeable rocks below, or at deeper levels, forming groundwater bodies referred to as intermediate perched groundwater (Purtymun 1995). Where these perched groundwater bodies occur or how large they are, is still under investigation and is not fully characterized.

The main aquifer is the only body of groundwater in the region that is sufficiently saturated and permeable to transmit economic quantities of water to wells for public use. All drinking water for LAC, LANL, and BNM comes from the main aquifer (Purtymun et al. 1995). Depth to water in the main aquifer from the ground surface varies from approximately 1,200 feet (366 meters) along the western boundary to approximately 600 feet (183 meters) along the eastern edge below the surface of the Pajarito Plateau. This groundwater body is relatively insulated from the alluvial and intermediate perched groundwater bodies by geologic formations. To better understand the hydrology of the Pajarito Plateau, LANL personnel have prepared a Hydrogeologic Workplan (LANL 1998b). The workplan proposes the installation of new wells that will further investigate the recharge and cross-connection mechanisms to the main aquifer (sections 4.3.2.1 and 4.3.2.3). The main aquifer exists regionally in the sedimentary and volcanic rock of the Española Basin, which extends from the Jemez Mountains in the west to the Sangre de Cristo Mountains in the east, and from the village of Abiquiu in the north to the village of La Bajada in the south. The main aquifer takes residence in interconnected geologic units of the Puye Formation and the Tesuque Formation. The latter unit is a member of the Santa Fe Group. Data on water levels and groundwater ages suggest that the main aquifer of the Española Basin is not strongly interconnected across its extent. There are

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[2] This does not include LANL effluent supported discharges.

significant differences in water chemistry at various locations in the Española Basin, further indicating that the regions are not connected. These observations may result from variations in permeability and from different directions of water movement in the aquifer (LANL 1998b). For information on the hydraulic parameters for the unsaturated zone, alluvium, and intermediate and main aquifer, see volume III, appendix A.

Water in the main aquifer is under artesian conditions under the eastern part of the Pajarito Plateau near the Rio Grande (Purtymun and Johansen 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. 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 (LANL 1996i).

A conceptual drawing of groundwater flow paths in the Española portion of the northern Rio Grande Basin is presented in Figure 4.3-1. The question marks indicate uncertainties in the groundwater flow.

A conceptual drawing of the surface and groundwater bodies as they occur beneath the Pajarito Plateau (the geohydrologic setting) is presented in Figure 4.3-2. A description of the types of water resources in the LANL region and where they occur is presented in Table 4.3–1. The surface and groundwater resources present in the LANL region are described further in this section. Information and data regarding surface water and groundwater quality, NPDES outfalls, sediments, and stormwater monitoring are presented by watershed. It should be noted that the grouping of groundwaters by watershed is applicable to alluvial groundwater, but may not reflect flow pathways to intermediate perched groundwater bodies. The main aquifer is present beneath all watersheds, but is generally considered to receive negligible recharge from surface water streams in the watersheds (Purtymun et al. 1995). The Hydrogeologic Workplan proposes the installation of new wells that will further investigate recharge to the main aquifer (section 4.3.2.3).

Monitoring data presented in this section are primarily from the LANL Environmental Surveillance and Compliance Program (previously called the Environmental Surveillance Program) for the period 1990 through 1996. This program is described in more detail in Section 4.5.1.7. Summary water quality data tables derived from the 1991 to 1996 LANL Environmental Surveillance and Compliance reports are presented in volume III, appendix C (Tables C-1 through C-7). Additional information regarding water use projections and the groundwater model are presented in appendix A.

Fenton Hill Site

The Fenton Hill site (TA-57) is located about 20 miles (32 kilometers) west of Los Alamos on the southwestern edge of the Valles Caldera in the Jemez Mountains and was the location of LANL's now decommissioned Hot Dry Rock Geothermal Project (Chapter 1, Figure 1-1). From the early 1970's until the 1990's, LANL carried out geothermal research at this facility. The main LANL site lies on the eastern side of the caldera, known as the Pajarito Plateau; whereas, the Fenton Hill site is on the western side, known as the Jemez Plateau. The drainage from the main LANL site is eastward toward the Rio Grande; whereas, the drainage from the Fenton Hill site is westward toward the Jemez River. Liquid waste discharges were governed by NPDES Permit No. NM0028576. During the time of operation there were no NPDES permit violations at the Fenton Hill site. No discharges have been made from the Fenton Hill site outfall since fiscal year 1990, and the NPDES permit was discontinued at the request of DOE and LANL on December 29, 1997. Additional information on this facility is available in the *Resource Conservation and Recovery Act* (RCRA) Facility Investigation (RFI) Work Plan for Operable Unit 1154 at the LANL (LANL 1994c).

Update Comments (Beers):

- In 1995, the Milagro Project (P-23) converted the existing 5-MG pond into an astrophysical observatory to record signals from high-energy cosmic emissions. Milagro uses over 700 photo-multipliers submerged in highly purified water to detect and record Cherenkov radiation. The pond was relined and a light-tight cover installed in 1995.

1. In 2000, the NIS Division installed an array of telescopes at Fenton Hill.
2. In 2003, the Laboratory completed the planned decommissioning of the Fenton Hill Hot Dry (HDR) Rock Geothermal Project site by plugging and abandoning all remaining HDR wells and closing out of the 1-MG service pond. In addition, most structures and equipment associated with the HDR Project were removed from the site.

4.3.1 Surface Water

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. Runoff from heavy thunderstorms or heavy snowmelt reaches the Rio Grande, the major river in north-central New Mexico, several times a year in some drainages. Effluents from sanitary sewage, industrial water treatment plants, and cooling-tower blowdown enter some canyons at rates sufficient to maintain surface flows for varying distances. Fifteen watersheds in the LANL region are shown in Figure 4.3.1-1 (watersheds A through O). Only 12 of these watersheds (watersheds B through M in Figure 4.3.1-1), with a total area of 82 square miles (212 square kilometers), pass through the boundary of LANL. All of these watersheds are tributaries to an 11-mile (18-kilometer) segment of the Rio Grande between Otowi Bridge and Frijoles Canyon. The Rio Grande passes through Cochiti Lake, approximately 11 miles

(18 kilometers) below Frijoles Canyon. The Los Alamos Reservoir, in upper Los Alamos Canyon, has a capacity of 41 acre-feet (51,000 cubic meters). The reservoir water is used for recreation, swimming, fishing, and landscape irrigation in the Los Alamos townsite (LANL 1996i).

The Pajarito Plateau canyons, which serve as collection points for the regional watersheds, originate either along the eastern rim of the Sierra de Los Valles or on the Pajarito Plateau. Within LANL boundaries, only Los Alamos, Pajarito, Water, Ancho, Sandia, Pueblo, and Chaquehui Canyons contain reaches or streams with sections that have continuous flow. Surface water within LANL boundaries is not a source of municipal, industrial, or irrigation water, but is used by wildlife that live within, or migrate through, the region.

To better understand LANL's influence to surface water in the Los Alamos area, the following surface water sections will first present information on surface water monitoring (section 4.3.1.1) and surface water quality standards (section 4.3.1.2). The text will then focus on the two primary potential sources of contamination to surface water quality: the NPDES-permitted outfalls at LANL (section 4.3.1.3.) and the sediments in the LANL area (section 4.3.1.4). Surface water quality is discussed in section 4.3.1.5, and floodplain information is discussed in section 4.3.1.6.

4.3.1.1 Surface Water Monitoring

Surface waters in the region are monitored by LANL and the New Mexico Environment Department (NMED) to survey the environmental effects of LANL operations. LANL's Environmental Surveillance and Compliance Program is one of the ways LANL determines whether its operations are adversely affecting the public health or the environment, and that LANL conforms with applicable regulatory requirements. This program is described in more detail on page 4-1. As a part of this program, surface water samples from offsite and on-site locations are collected (Figures 4.3.1.1-1 and 4.3.1.1-2, respectively) (LANL 1996i); the monitoring results are published annually in Environmental Surveillance and Compliance Reports. There are several locations at which surface water samples are taken; however, which locations are selected for sampling may vary from year to year. Figures 4.3.1.1-1 and 4.3.1.1-2 reflect the locations where surface water samples were collected in 1995 (LANL 1996i). Beginning 1996, some environmental surveillance runoff samples were collected using automated samplers. The samplers are activated when a significant precipitation event causes flow in a drainage crossing LANL's eastern or western boundaries. The 1996 analysis results for the surface water program were consistent with past findings (LANL 1997c). Surface water samples are not collected from Barrancas and Bayo Canyons due to the lack of surface water in these drainages. Surface water samples are analyzed annually for surface water chemistry, radionuclides, and metals. Samples from one third of the surface water sampling locations are analyzed annually for organics, with the samples from all of the surface water locations being analyzed for organics at least once every three years. Surface water at the Pueblo of San Ildefonso is also sampled in accordance with a Memorandum of Understanding (MOU) among the Pueblo, U.S. Bureau of Indian Affairs

(BIA), and DOE (BIA 1987). Pueblo of San Ildefonso or U.S. Bureau of Indian Affairs representatives may observe sampling and collect samples from the same surface water locations.

The NMED also collects surface water within the LANL region in accordance with the Agreement in Principle between DOE and the State of New Mexico (DOE 1995e). When LANL collects surface water samples, NMED will often (though not always) take split samples to verify the sampling data. NMED recently performed a comparison of LANL and NMED split-sampling data. The statistical analyses for general water chemistry parameters compared favorably, and for the majority of the samples there was no statistically significant difference between LANL and NMED analytical data (PC 1996f). Only LANL analytical data are presented in this SWEIS. Information is also collected from stream monitoring stations. Table 4.3.1.1-1 provides information (days with flow, volume of water, etc.) for various canyon reaches monitored in 1995. These canyon site locations (gaging stations) are further identified in Figure 4.3.1.1-2.

4.3.1.2 Surface Water Quality Standards

Streams within LANL property are nonclassified, and therefore, according to 20 NMAC 6.1, 1105.A, are protected for the uses of livestock watering and wildlife habitat. Most of LANL effluent is discharged into normally dry arroyos (Table 4.3-1), and LANL is required to meet effluent limitations under the NPDES permit program (as discussed in section 4.3.1.3). As discussed in section 4.3.1.1, surface waters from the regional and Pajarito Plateau stations are monitored to evaluate the environmental effects of LANL operations. A study is being performed at LANL to determine if uses in addition to livestock watering and wildlife habitat can be attained for selected reaches on streams present on LANL. The U.S. Fish and Wildlife Service (FWS) is performing the study and will present the results to a Use Selection Committee consisting of NMED, DOE, and University of California members. The results should be available by early 1999.

Concentrations of radionuclides in surface water samples may be compared to either the DOE-Derived Concentration Guide (DCG) for estimation of potential exposure to members of the public from ingested water[3] or the New Mexico Water Quality Control Commission (NMWQCC) stream standards, which reference the New Mexico Health and Environment Department Environmental Improvement Division's New Mexico Radiation Protection Regulations (part 4, appendix A). New Mexico radiation standards are in general two orders of magnitude greater than DOE's DCG for the public (i.e., DCGs are more restrictive than New Mexico standards). Accordingly, only the DCGs will be discussed here. The concentrations of nonradioactive constituents may be compared with NMWQCC Standards for Interstate and Intrastate Streams, Livestock Watering, and Wildlife Habitat Stream Provisions. NMWQCC groundwater standards can also be applied in cases where groundwater discharge may affect stream water quality.

[3] The DOE-DCG for water is the concentration that would deliver a 100-millirem dose to an adult who ingests 772 quarts (730 liters) of water in 1 year.

LANL conducts a variety of construction, maintenance, and environmental activities that result in excavation or fill within water courses, which are waters of the U.S. under Section 404 of the *Clean Water Act*. These activities are done pursuant to 404 permits issued by the Army Corps of Engineers and certified per Section 401 by NMED. Each permit is issued pursuant to one or more specific nationwide permits. These include relevant permit conditions to protect water quality and wildlife that must be complied with by LANL and its construction contractors. The NMED also adds conditions as a part of its 401 certification that require application of "best management practices" to ensure compliance with New Mexico stream standards. The following are some examples of currently active 404/401 permits at LANL:

- *LADP3 Culvert Removal Project*—Removal of access road culvert and channel restoration in Los Alamos Canyon
- *Sandia Wetland Restoration Project*—Erosion control, contaminated sediment trapping, and wetland restoration in Sandia Canyon
- *Otowi 1 Well Erosion Control Project*—Arroyo erosion control for well discharge tributary to Pueblo Canyon (PC 1998)

Update Comments (Beers):

1. During 2003, two new Section 404/401 permits were issued to the Laboratory for the Rendija Land Transfer Boulder Placement project. This bank stabilization and boulder placement activity was covered by Nationwide Permit No. 13 and Nationwide Permit No. 18, respectively. As a result of increased runoff from impacted areas caused by the Cerro Grande fire, the Laboratory conducted numerous dredge and fill activities to strengthen road crossings, clean roadside culverts to reduce road washouts and armor utility lines crossing Laboratory canyons in 2001-2002. In 2003, the Laboratory had 32 active individual 404 permits. Although many of the project activities have been completed, the permits remain active until the sites have been permanently stabilitized and the permit closed out by the Army Corps of Engineers (ACOE).

4.3.1.3 National Pollutant Discharge Elimination System Permitted Outfalls

Planned releases from industrial and sanitary wastewater facilities within LANL boundaries are controlled by NPDES permits. These permits require routine monitoring of point source discharges and reporting of results. In 1995, there were 10 NPDES permits: one for effluent discharges from LANL operations; one for effluent discharges at the Fenton Hill Hot Dry Rock Geothermal Facility (now decommissioned) located 20 miles (32 kilometers) west of Los Alamos; and eight for stormwater discharges (LANL 1996i).

Update Comments (Beers):

1. The NPDES permit for the Fenton Hill Hot Dry Rock Geothermal Facility was discontinued at the request of DOE and LANL on December 29, 1997.

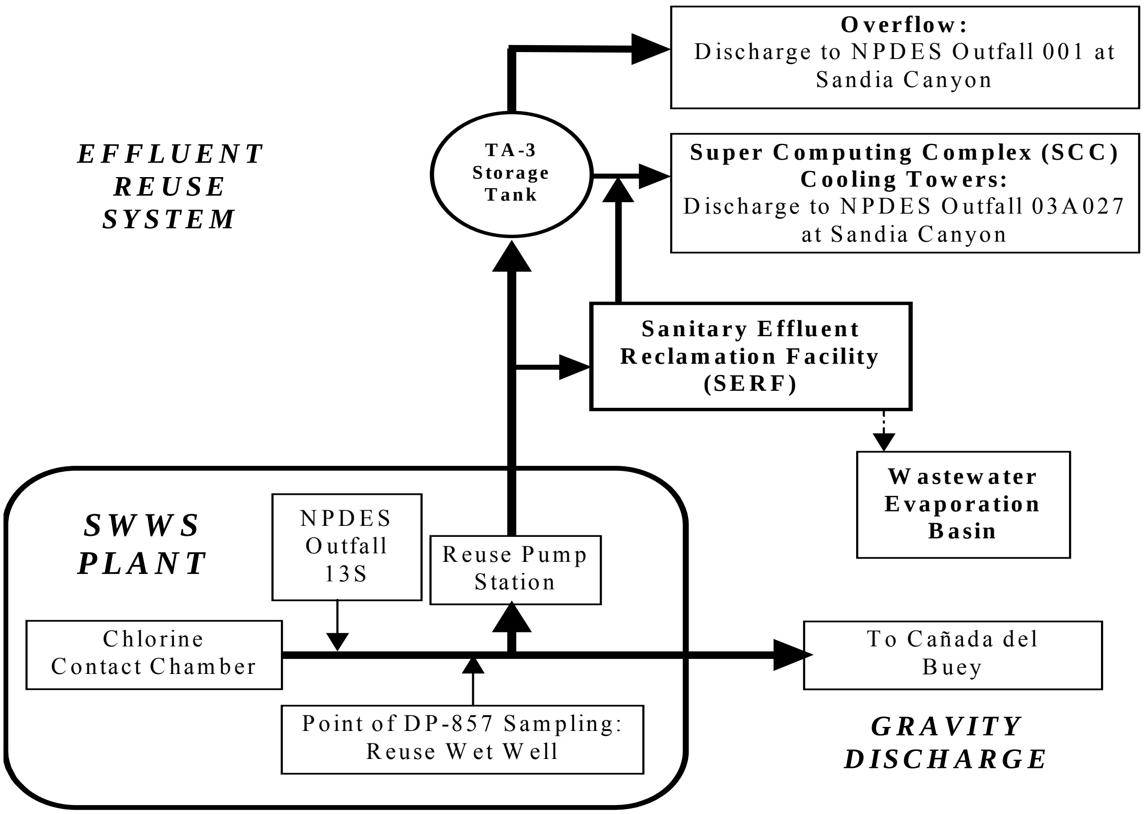
An analysis of data was completed for the 87 currently active NPDES industrial outfalls. Index NPDES flows were estimated using data provided by the surface water data team reports of August 1996 (Bradford 1996) and as modified in 1997 (Garvey 1997). Approximately 233 million gallons (882 million liters) per year of effluent are discharged from NPDES outfalls into 10 of the 15 watersheds in the LANL region. There are no LANL NPDES permitted effluents discharging directly into Barrancas, Bayo, Potrillo, Frijoles, or White Rock Canyon watersheds. The total number of gallons that were discharged into each canyon are presented in Table 4.3.1.3–1. Of the 233 million gallons (882 million liters) per year, the Key Facilities contributed about 103 million gallons (390 million liters) per year. The Non-Key Facilities contributed about 130 million gallons (492 million liters) per year. Figure 4.3.1.3–1 shows the locations of the NPDES outfalls identified by legend number as listed in Table 4.3.1.3–1 and identifies eliminated outfalls that are discussed in chapter 5. Figure 4.3.1.3–1 also shows areas in the canyons that support perennial flows, ephemeral and intermittent flows, and NPDES effluent-supported flow. The primary sources of outfall effluent and the approximate volume of effluents that are discharged are presented below.

- Treated sanitary wastewater accounts for approximately 13 percent of the discharge volume.
- Treated cooling water and noncontact cooling water account for 50 percent of the discharge volume.
- Photo waste and demineralizer and boiler discharges account for 11 percent of the discharge volume.
- Power plant outfall and high-explosives wastewater account for 26 percent of the discharge volume (Bradford 1996 and Garvey 1997).

The LAC Bayo Wastewater Treatment Plant Facility discharges treated sanitary effluent into Pueblo Canyon. In 1990, the plant increased its sanitary effluent discharge resulting in a nearly continual flow in the lower portions of Pueblo Canyon. This flow extended into the lower, offsite segments of Los Alamos Canyon and onto Pueblo of San Ildefonso land. These flows generally extend to a location between Totavi (just east of the LANL and Pueblo of San Ildefonso boundary) and the confluence of Guaje and Los Alamos Canyons. There is continual flow in this drainage except during the months of June and July (LANL 1995f). The Radioactive Liquid Waste Treatment Facility (RLWTF) discharges treated effluents into Mortandad Canyon at an average rate of 5.51 million gallons (21 million liters) per year. Surface water flow in Mortandad Canyon has not reached the LANL boundary since the RLWTF began operating in 1963 (LANL 1996e). The Los Alamos County Treatment Plant discharges into Cañada del Buey and provides nearly continual flow in the lower portions of Cañada de Buey. Table 4.3.1.3–1 does not include the Los Alamos County treatment plants that flow into Pueblo Canyon and Cañada de Buey because they are not owned and operated by LANL. Their locations, however, are shown on Figure 4.3.1.3–1. Cooling tower water from the power plant and treated effluents from the sanitary wastewater systems consolidation (SWSC) treatment plant in TA–46 are discharged into Sandia Canyon at outfall 01A-001. These effluents support a continuous flow in a short segment of upper Sandia Canyon. During summer thunderstorms, stream flow in this canyon reaches the LANL boundary at NM 4; and during periods of heavy thunderstorms or snowmelt, the surface water flow extends beyond LANL boundaries and reaches the Rio Grande (LANL 1996e).

Update Comments (Beers):

1. Los Alamos County is replacing the existing Bayo Wastewater Treatment Plant with a new advanced wastewater treatment plant to improve effluent water quality and meet more stringent reuse water quality criteria. The new plant will be located in Pueblo Canyon adjacent to the eastern Los Alamos County boundary. The project scope also includes the demolition of existing plant structures and restoration of the old Bayo site; and if funding is sufficient and approved, demolition of the old Pueblo Wastewater Treatment Plant. The new plant will be completed in the fall of 2005.
2. Discharges from the RLWTF averaged 16.6 million liters per year from 1995-2003. In 2002 and 2003 the RLWTF discharged 11.0 and 11.3 million liters, respectively.
3. In November 2003, the Laboratory completed construction of the Sanitary Effluent Reclamation Facility (SERF) at TA-3. The SERF is water treatment system designed to remove silica and total dissolved solids (TDS) from the SWWS Plant's effluent (reuse water) using microfiltration and reverse osmosis (RO). Lower silica concentrations in the reuse water will enable the Laboratory to operate cooling towers more efficiently, add more users to the effluent reuse system, and conserve ground water. Designed to process approximately 0.14 million gallons per day (MGD) of SWWS Plant effluent, the product water from the RO treatment unit is blended with SWWS Plant effluent at approximately a 2:1 ratio and sent to the cooling towers at the SCC Facility. The treatment of SWWS Plant effluent by SERF will allow the SCC cooling towers to operate at 4 cycles of concentration or greater. It is anticipated that the SCC Facility will begin using SERF treated reuse water in their cooling towers in early 2004. Secondary waste from the microfilter is retreated through the system. Solids are concentrated and filtered with a filter press. Reject water from the RO treatment unit, approximately 0.0084 MGD, is sent to a solar evaporation basin on Sigma Mesa (TA-60). The basin has two sections, each double-lined with leak detection. In November 2003, the Laboratory began inspecting the leak detection pipes monthly in accordance with the NMED's October 2002, Discharge Permit Modification (letter, Marcy Leavitt, NMED, to E. Dennis Martinez, DOE, October 1, 2002). Figure 4-9 below illustrates the SWWS Plant effluent reuse system.



4. SWSC Plant has been renamed: Sanitary Wastewater Systems (SWWS) Plant.

Figure 4-9. Effluent Reuse System Schematic

National Pollutant Discharge Elimination System Regulatory Compliance

The goal of the *Clean Water Act* is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The regulations specify water quality standards and effluent limitations. To comply with the *Clean Water Act*, LANL has two primary programs: the NPDES permit program and the Spill Prevention Control and Countermeasure Program. The University of California (UC) and DOE are co-operators on a site-wide NPDES permit covering the industrial and sanitary effluent discharges at Los Alamos. The permits are issued and enforced by EPA Region 6 in Dallas, Texas. However, NMED performs some compliance evaluation inspections and monitoring for EPA through a water quality grant issued under Section 106 of the act. The NPDES permits specify the parameters measured and the sampling frequency for the outfalls. The LANL NPDES industrial outfalls are identified by numbers and by types of industrial outfalls. Table 4.3.1.3-2 provides information on the industrial NPDES outfalls by number-type and NPDES permit limits. The NPDES numbers presented in Table 4.3.1.3-2 correspond to the first three numbers and/or characters identified for each outfall presented in Table 4.3.1.3-1. Concentrations limits are indicative of the overall quality of effluent discharges. Sampling frequency is dependent on the type of discharge and varies from once a week to annually. The chemical and biological constituents measured in outfall effluent samples and sampling results are presented in LANL's annual Environmental Surveillance and Compliance Reports. In 1995, effluent limits for the sanitary waste facilities were not exceeded. Analyses of 1,751 industrial outfall samples indicate that the NPDES permit limits for industrial outfalls were exceeded 21 times during 1995 (LANL 1996i). Table 4.3.1.3-3 presents information on the number of NPDES violations from 1991 through 1995. NPDES industrial discharge water quality data over the 24-month period of August 1994 (when the most recent NPDES permit and its new discharge limits became effective) through July 1996 is presented in summary NPDES water quality data tables in volume III, appendix C (Table C-1). Examples of types of exceedances are described later on in this section.

During the early 1990's, LANL was listed as a "Significant Non-Compliant Federal Facility" by EPA Region 6 for NPDES violations. DOE and LANL have had several Federal Facility Compliance Agreements and parallel administrative orders in effect to correct NPDES deficiencies. The current DOE compliance agreement (Docket No. VI-96- 1237, December 12, 1996) (EPA 1996c) and the current LANL administrative order (AO Docket No. VI-96-1236, December 10, 1996) (EPA 1996b) include schedules for coming into full compliance with the *Clean Water Act* by completing the High Explosives Wastewater Treatment Facility and Waste Stream Characterization projects. These corrective actions required by compliance agreement and administrative order are continuing.

Examples of the materials that have been involved in NPDES exceedances at outfalls include arsenic, chlorine, total suspended solids, acidity, chemical oxygen demand (COD), biochemical/biological oxygen demand (BOD), cyanide, vanadium, copper, iron, oil and grease, silver, phosphorus, and radium. In 1995, most of the industrial outfall exceedances were for chlorine and arsenic; the NPDES permit for chlorine was exceeded four times, with the largest exceedance of 9.2 milligrams per liter as compared to the permit limit of 0.5 milligrams per liter for the daily maximum. The permitted levels for arsenic were exceeded nine times with the largest exceedance of 0.211 milligrams per liter as compared to the permit limit of 0.04 milligrams per liter for the daily maximum. Actions to improve compliance with permit conditions are continually being taken including, elimination of outfalls, improvements and corrective actions at specific outfalls, and implementation of the Waste Stream Characterization Program and Corrections Project (see also Chapter 7, Section 7.5).

Radioactive liquid effluent discharges are regulated by DOE Order 5400.5. One NPDES permitted outfall at TA–50, the RLWTF, began operations in 1963. This outfall had continued to discharge residual radionuclides to Mortandad Canyon in liquid effluents to the present time. DOE Order 5400.5 specifies DCGs for liquid radioactive effluents, which provide a reference for determining dose to various exposure pathways. For liquid radioactive effluents, the "as low as reasonably achievable" (ALARA) and the "best available technology" (BAT) processes are adopted to determine the appropriate level of treatment. If discharges are below DCG reference values at the point of discharge to a surface waterway, generally no further treatment is required due to cost/benefit considerations. Historic discharges to Mortandad Canyon have resulted in above background residual radionuclide concentrations in alluvial groundwater and sediments. For calendar year 1996, two DCGs were exceeded in TA–50 effluents (for americium-241 and plutonium-238). The TA–50 discharge also contains nitrates that have caused the alluvial groundwater to exceed the state groundwater standard of 10 milligrams per liter. LANL is working to continue to upgrade the treatment process at TA–50 to correct these problems. A treatment system will be operational by early 1999 that will reduce concentrations of americium-241, cesium-137, plutonium-238, plutonium-239, and strontium-90 and will result in concentrations of these radionuclides in effluent that will meet the DOE-DCG for the public. A treatment system to comply with nitrate levels within the new groundwater discharge limits established by NMED will be operational by mid 1999. Tritium concentrations, which are well below the DOE-DCG, will not be reduced by the new treatment system. There is currently no practical treatment technology for tritium for the dilute concentrations present in the RLWTF effluent. Investigation and cleanup, if required, are conducted through the ER Project, and interim controls (sediment traps) have been implemented to control movement of contaminants off the site.

Update Comments (Beers):

1. Add DOE Order 450.1., Environmental Management Systems.
2. In August 1996, the Laboratory submitted a Ground Water Discharge Plan to the New Mexico Environment Department, Ground Water Quality Bureau, per their April 1996 request.
3. In September 1998, the NMED issued a letter of noncompliance because effluent from the RLWTF did not meet the NM Water Quality Control Commission (WQCC) Regulation 3103 ground water standards. The NMED gave the Laboratory 180 days to achieve compliance.
4. In March 1999, the Laboratory implemented a nitrate moratorium in order to lower the concentration of nitrates in its influent (and effluent) to less than 10 mg/L, the NM WQCC ground water standard.
5. In April 1999, Phase I of the RLWTF's treatment system upgrades, tubular ultrafiltration (TUF) and reverse osmosis (RO), became operational.
6. Since March 21, 1999, the RLWTF's effluent has met NM WQCC Regulation 3103 ground water standards for nitrate, fluoride, and TDS.
7. Since December 1999, the RLWTF's effluent has met DOE DCGs.
8. In December 1999, the Laboratory began operating the TA-53 Radioactive Liquid Waste Treatment Plant (RLWTP). The RLWTP treats radioactive liquid waste from accelerator research at the Los Alamos Neutron Science Center. The treatment process includes wastewater storage to allow for short-lived radioisotope decay and solar evaporation. In CY2003, the TA-53 RLWTP received 157,483 liters of wastewater from accelerator research and an additional 235,838 liters of wastewater were trucked to the RLWTP from other LANL facilities. During 2003, 325,013 liters of wastewater were pumped into the RLWTP basins for evaporation.
9. As a result of TA-53 RLWTP capabilities to evaporate highly tritiated wastewater, since October 2000 the tritium in the RLWTF's effluent has been below 20,000 pCi/L with the exception of one excursion in February 2001.

10. In January 2000, Phase II of the RLWTF's treatment system upgrades, electrodialysis reversal (EDR), became operational. The EDR is capable of achieving a 5-fold concentration of the RO reject stream.
11. In January 2000, Phase III of the RLWTF's treatment system upgrades, interim mechanical evaporator, became operational. The evaporator treats the EDR concentrate by reducing the volume 4:1. Distillate from the evaporator is discharged to the NPDES outfall and the evaporator bottoms are sent off site for solidification.
12. In March 2002, the RLWTF's treatment system for the removal of perchlorate, ion exchange (IX), became operational. Since that time all effluent discharged has contained perchlorate at concentrations <1ppb.
13. In April 2004, the Laboratory completed the Critical Decision (CD)-0 request for the RLWTF Upgrade Project. This project is necessary because the existing facility is 40 years old and has exceeded its design life.

Stormwater Effluents

In 1995, there were eight NPDES General Permits for LANL stormwater discharges (LANL 1996i): one permit is for LANL industrial activities; one permit is for the remediation of an environmental restoration site off of DOE property; and the other six permits are for construction activities disturbing more than 5 acres (2 hectares). As conditions of the General Permit, UC must develop and implement Stormwater Pollution Prevention Plans (SWPPs) and conduct monitoring activities (LANL 1996i). In 1993, 76 industrial facilities were identified that required SWPPs. There were 14 SWPPs developed and implemented in 1994 to cover these 76 facilities. In addition, several individual SWPPS were developed to address specific solid waste management units (SWMUs) and PRSs. LANL plans in 1999 to consolidate all the SWPPs into approximately 24 plans that will address all the 76 industrial facilities, as well as all the SWMUs.

UC monitors stormwater at TA–54, Areas G and J, and TA–50 as a requirement of the LANL NPDES general stormwater permit. Twenty-nine locations in 8 watersheds were sampled a total of 55 times between August 1991 and August 1995.

The largest amount of monitoring occurs in the Pajarito Canyon watershed where the stormwater from TA–54 drains. It is difficult to obtain stormwater samples repeatedly from the same location due to the inherently sporadic nature of stormwater. Therefore, it is difficult to identify trends in the stormwater quality or to perform confirmatory analyses. This problem should be corrected in the future by using U.S. Geological Survey (USGS) stream gage stations as consistent monitoring points and increasing the number of overall stormwater samples that are collected (PC 1997c). Also beginning 1996, environmental surveillance runoff samples were collected using automated samplers. The samplers are actuated when a significant precipitation event causes flow in a drainage crossing LANL boundaries.

4.3.1.4 Sediments

Sediments occur along most segments of LANL canyons as narrow bands of canyon-bottom deposits that can be transported by surface water during runoff events or by LANL outfall effluent flows. The 12 watersheds that cross LANL boundaries are watersheds B through M (Figure 4.3.1–1) and vary in their drainage area, peak flow volumes, and sediment-carrying capacity. Nearly every on-site LANL drainage has historically received LANL liquid industrial or sanitary effluents that contribute to the flow and water quality characteristics in the drainage area. As LANL effluents move downstream, some of the metals and radionuclides from LANL outfalls bind (or adsorb) to the sediments.

Sediment Monitoring

Samples of sediment are collected in the LANL region for DOE and NMED to monitor the environmental effects of LANL operations and activities on the environment. Sediment samples are analyzed for the presence of radionuclides, metals, and organics as a part of the LANL Environmental Surveillance and Compliance Program (described on page 4–1) (DOE Order 5400.1). Sediment samples are collected from off-site (regional and perimeter) and on-site locations (Figures 4.3.1.1–1 and 4.3.1.4–1). The locations at which sediment samples are collected may vary from year to year. Figure 4.3.1.4–1 shows locations where sediment samples were collected in 1995. Sediment samples are also collected at the Pueblo of San Ildefonso. Representatives of the Pueblo of San Ildefonso or U.S. Bureau of Indian Affairs may monitor or collect splits when LANL sediment samples are collected. NMED recently performed comparisons of LANL and NMED sediment and soil data. The statistical analysis of soils and sediments, which included radionuclides (i.e., plutonium, uranium, cesium, gross alpha) and metals (i.e., lead, beryllium, arsenic), compared favorably, and for the majority of samples there was no statistically significant difference (PC 1997g).

Sediment Quality

Sediments in the LANL region naturally contain minerals and metals, and may also contain radionuclides from worldwide fallout. Nuclear weapon atmospheric testing (Klement 1965) and the re-entry and burn-up of satellites (Perkins and Thomas 1980) containing plutonium power sources have resulted in worldwide fallout of strontium-90; cesium-137; and plutonium-238, -239, and -240. Therefore, these radionuclides can be found in sediments in very small but measurable concentrations.

There are no standards for radionuclides or metals in sediments; therefore, regional comparison levels were developed for the purposes of the SWEIS. These comparison levels were established by taking the average of 1990 to 1994 existing data for the following six stations: Chamita, Embudo, Otowi, Los Alamos Reservoir, Jemez, and Bernalillo (Figure 4.3.1.1–1). These locations were selected to provide a broad overall coverage for comparison purposes in the LANL region. These values may differ from background values used in various remedial action cleanups. Background values used for remedial action cleanup are based on the local geologic formation in the area being remediated. Because the SWEIS covers a very large area, these six locations were used instead and are within the accuracy necessary for providing relative useful information for the SWEIS.

Sediment samples from individual LANL locations are analyzed every 3 years for organic contaminants (PC 1996h). It should be noted that sediment samples were not collected from the Barrancas watershed from 1990 through 1994, and there are no sediment sampling data for organics for 1991 and 1992 (LANL 1993b and LANL 1994b). In 1993 LANL's Environmental Surveillance and Compliance Program started analyzing sediments for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs). Starting in 1995, selected sediment samples were also analyzed for high explosives (HE) residues. In 1996, sediment samples were analyzed for VOCs, SVOCs, PCBs, and HE residues from about one-sixth of the regional and local stations (approximately 75 stations). The analytical results showed that there were no VOC, SVOC, PCBs or HE residues detected in any of the sediment samples collected during 1996 (LANL 1997c). Details on contaminants in sediments can be found in the annual LANL Environmental Surveillance and Compliance Reports. Summary sediment data tables derived from the 1991 to 1996 LANL Environmental Surveillance and Compliance Reports are presented in volume III, appendix C (Tables C–4 and C–5). To provide a general understanding of the contaminants in sediments, additional information is presented below.

- Samples from all sediment sampling locations for the period 1990 to 1994 exceeded the regional comparison value for at least one metal. Most of the metals that were above the regional comparison value occur naturally in the environment as a constituent of the sediments. The exception may be a 1994 sediment sample from Los Alamos Canyon, which contained 68 milligrams per gram selenium. The regional comparison value for selenium is 0.2 micrograms per gram. The source of this contaminant is unknown (LANL 1996e).

- The regional comparison levels for at least one radionuclide were exceeded at nearly all sediment sampling locations in the sediment monitoring network for the period 1990 to 1994. Plutonium-239 and -240 (regional comparison level of 0.003 picocuries per gram) have been detected in sediments at 11.8 picocuries per gram in Acid Canyon, at 9.71 picocuries per gram in Pueblo Canyon, and at 0.329 picocuries per gram in Los Alamos Canyon). The source of this contamination is believed to be historic releases from LANL operations that occurred in Acid Canyon (a tributary to Pueblo Canyon) from 1945 to 1952. Natural stream processes have moved the contaminated materials out of Acid Canyon, down through Pueblo Canyon, and into lower Los Alamos Canyon to the Rio Grande (Graf 1995). This natural pathway crosses down-slope of San Ildefonso lands and meets the Rio Grande down-gradient from a nearby San Ildefonso well field.

Values of plutonium-239 and -240 at monitoring stations downstream at TA–50 and upstream of the sediment traps in Mortandad Canyon are above regional comparison levels. However, values of plutonium at monitoring stations downstream of the sediment traps and upstream of the Pueblo of San Ildefonso boundary are at or near atmospheric fallout levels. These results suggest that there has been little or no transport of plutonium from TA–50 below the sediment traps in Mortandad Canyon (LANL 1997c).

The distribution of plutonium-contaminated sediments is a result of several factors that control the ability of the stream to trap sediments. These factors include stream gradient, canyon width, the presence or lack of boulders, and vegetation. The locations, amounts, and likely sources of plutonium (in picocuries) that are found in the sediments of the Los Alamos region are illustrated in Figure 4.3.1.4–2.

Off-Site Sediment Sampling

A study that evaluated the deposition of plutonium in sediments in the northern portion of the Rio Grande estimated LANL contribution to the contamination (Graf 1993). The study found that, when averaged over several decades, 90 percent of the plutonium in the sediment moving into the northern Rio Grande system could be attributed to atmospheric fallout (Graf 1993). The remaining 10 percent of the plutonium in the sediments in the Rio Grande system can be attributed to releases from LANL operations. The sediment deposits along the Rio Grande between Otowi and Cochiti Lake are most likely to contain the plutonium that can be attributed to LANL operations (Graf 1993).

DOE continues to monitor and characterize the movement of sediments across LANL and into the Rio Grande. The LANL ER Project is currently evaluating the extent of the contamination (and the associated risks) in the canyon sediments. These sediment studies have found that off-site transport of sediments with elevated plutonium-239 and -240 levels has taken place. The study found the following:

- For sediments collected at Cochiti Lake during the period of 1982 through 1988, the mean plutonium-239 and -240 concentration was 0.189 picocuries per gram, compared to a mean plutonium-239 and -240 value of 0.0081 picocuries per gram that was found in sediments from a background monitoring station at Abiquiu Reservoir (Graf 1993).

- For sediments collected at Embudo Station during the period of 1974 to 1986, the mean plutonium-239 and -240 value was 0.0033 picocuries per gram, and at Cochiti Lake was 0.0092 picocuries per gram (Graf 1993).

Sediment samples have also been collected at the Pueblo of San Ildefonso and analyzed for radionuclides and trace metals. Tritium and plutonium-238, -239, and -240 were found at levels above regional comparison level at sampling locations. The plutonium-239 and plutonium-240 values were obtained at the boundary of Pueblo land with LANL. Strontium-90, cesium-137, total uranium, americium-241, gross alpha, gross beta, and gross gamma were not found to be elevated above the regional comparison levels for sediment sampling stations located in Mortandad Canyon or on Pueblo land. The levels of radionuclides found in sediment samples from Bayo and Sandia Canyons on San

Ildefonso Pueblo land were found to be at or below the regional comparison levels. Trace metals were all found to be within the range expected for natural background geologic materials (LANL 1996i).

4.3.1.5 Surface Water Quality

Analysis of LANL surface water sampling data indicates that LANL operations have affected the surface water within LANL boundaries. Data from the Environmental Surveillance and Compliance Program indicate that the greatest effects to surface water are attributable to historic LANL activities and radiological releases that occurred in Acid, Pueblo, Los Alamos, and Mortandad Canyons. Historical activities and releases that have contributed to the contamination in these canyons include:

- Nuclear materials research activities that occurred during the Manhattan Project
- An industrial liquid waste treatment plant, operated from 1952 to 1986, at TA–21
- Discharges from former TA–45 (operated from 1951 to 1964)
- Discharges from the Los Alamos Neutron Science Center (LANSCE) sanitary sewage lagoon system
- Discharges from the RLWTF
- NPDES-permitted effluent discharges (LANL 1996i)

Details on surface water quality can be found in the annual LANL Environmental Surveillance and Compliance Reports. Summary water quality data tables derived from the 1991 to 1996 LANL Environmental Surveillance and Compliance Reports are presented in volume III, appendix C (Tables C–2 and C–3). However, in order to provide a general understanding of the surface water quality at LANL, information from the 1996 Environmental Surveillance and Compliance Report is summarized in the following text. This information is, in most cases, consistent with past findings (LANL 1997c).

In 1996, the radiochemical analyses results for surface water samples were below DOE-DCGs for the public, and the majority of the results were near or below the detection limits of the analytical methods used and also were below DOE-DCGs for drinking water systems (except for samples from Mortandad Canyon). This was consistent with past findings. Long-term trends in the activity of tritium and total plutonium in surface water in Mortandad Canyon are depicted in Figure 4.3.1.5–1. These measurements were made from samples collected a short distance downstream of the TA–50 effluent discharge into Mortandad Canyon.

The measurements in waters from areas receiving effluents show the effects of these effluents; however, none of the results exceeded standards except for some pH measurements above 8.5. EPA drinking standards are only directly applicable to a public water supply. In particular, they would only apply to the supply wells in the main aquifer, which are the source of the Los Alamos water supply. EPA drinking water standards are useful for comparison purposes. Aluminum, iron, and manganese concentrations exceeded EPA secondary drinking water standards at most locations. The results reflect the presence of suspended solids in the water samples. Because the metals analyses are performed on unfiltered water samples, the results are influenced by naturally occurring metals (e.g., aluminum, iron, and manganese) that comprise the suspended solids. In 1996, barium and silver concentrations were within the NMWQCC groundwater limits. In 1996, mercury was not observed above the detection limit (0.2 microgram per liter) at any location, with the exception of a measurement of 0.3 microgram per liter for one of two measurements in DP Canyon. The other measurement found the concentration to be below the detection limit. Selenium values exceeded the New Mexico Wildlife Habit Stream Standard (2 micrograms per liter) at numerous locations around LANL. The highest selenium value (18 micrograms per liter) was reported below the Bayo Wastewater Treatment Plant Facility discharge. Low levels of HE were detected at Water Canyon, Beta, and Frijoles Canyons near the BNM headquarters.

4.3.1.6 Floodplains

(Contacts: Laura Marsh, RRES-ECO, 665-6092, lkmarsh@lanl.gov; Steve McLin, RRES-WQH, 665-1721, sgm@lanl.gov)

- All maps in this section need to be redone if they reflect vegetation or other changes associated with the CGF.

4.3.1.6 Floodplains *(Comments by Laura Marsh)*

- Update McLin reports: McLin, S.G., van Eeckhout, M. E., Earles, A. 2001. "Mapping 100-year floodplain boundaries following the Cerro Grande wildfire," Los Alamos National Laboratory Report, LA-UR-01-5218, Los Alamos, New Mexico.

Can leave in McLin 1992 but need to use as comparison

- Need to add information about all of the new flood retention structures, weirs and diversion dams created for the CGF (DOE/EA-1408. Proposed Future Disposition of Certain Cerro Grande Fire Flood and Sediment Retention Structures at Los Alamos National Laboratory, Los Alamos, N.M.).
- Omega West Reactor was DD-ed: (DOE/EA-1410. Environmental Assessment of the Proposed Disposition of the Omega West Facility at Los Alamos National Laboratory, Los Alamos, NM.).
- Biggest change is the delineation of the 100-year floodplain post CGF.

Pre- and post-Cerro Grande Fire floodplains (Figures 4-10 and 4-11) were compared using GIS 100-year floodplain coverages generated by modeling in 1992 (McLin, LA-12195-MS 1992) and in 2003 (Wright Water Engineers, 001-063.010, 2003). The post-

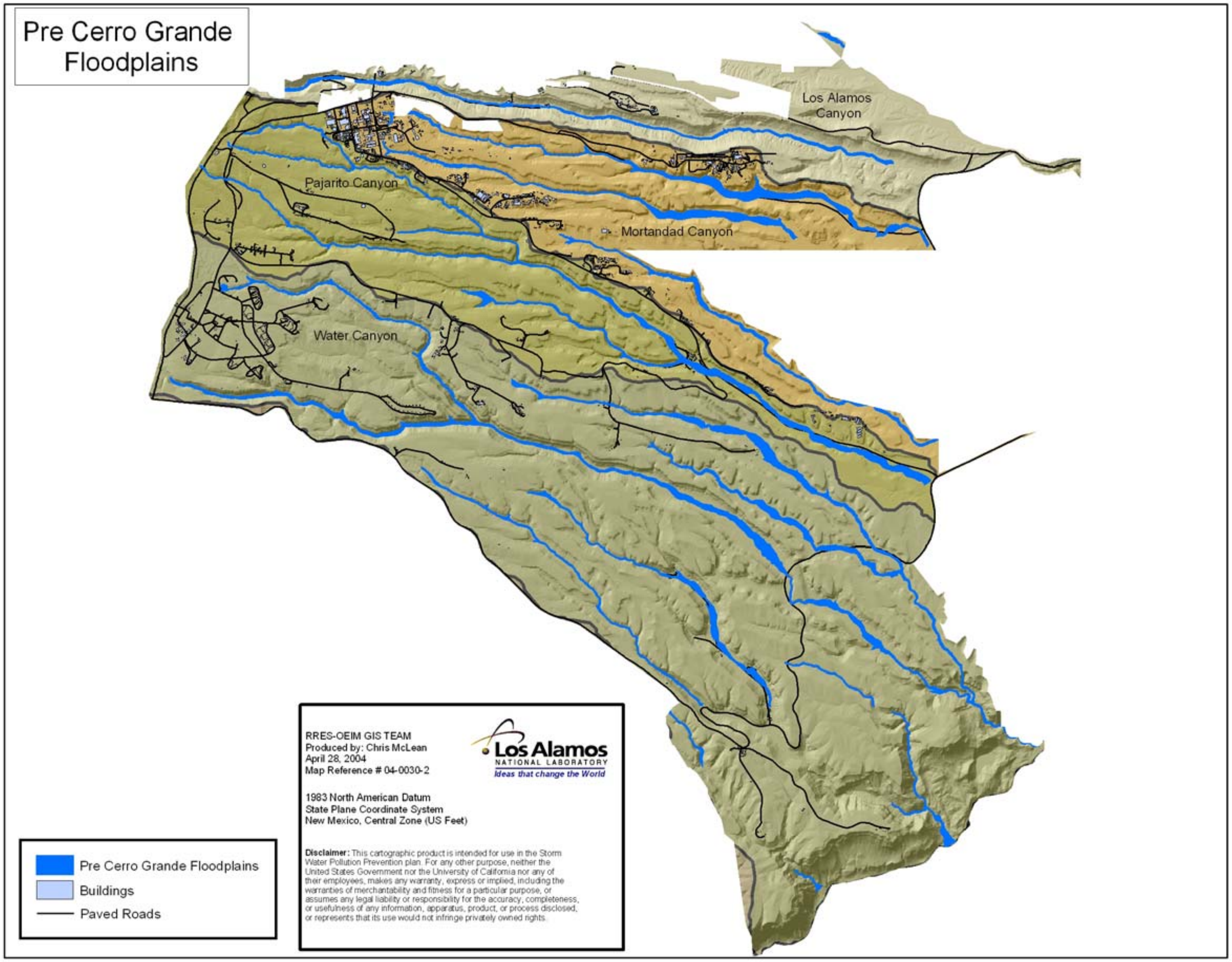


Figure 4-10. Pre-Cerro Grande floodplains.

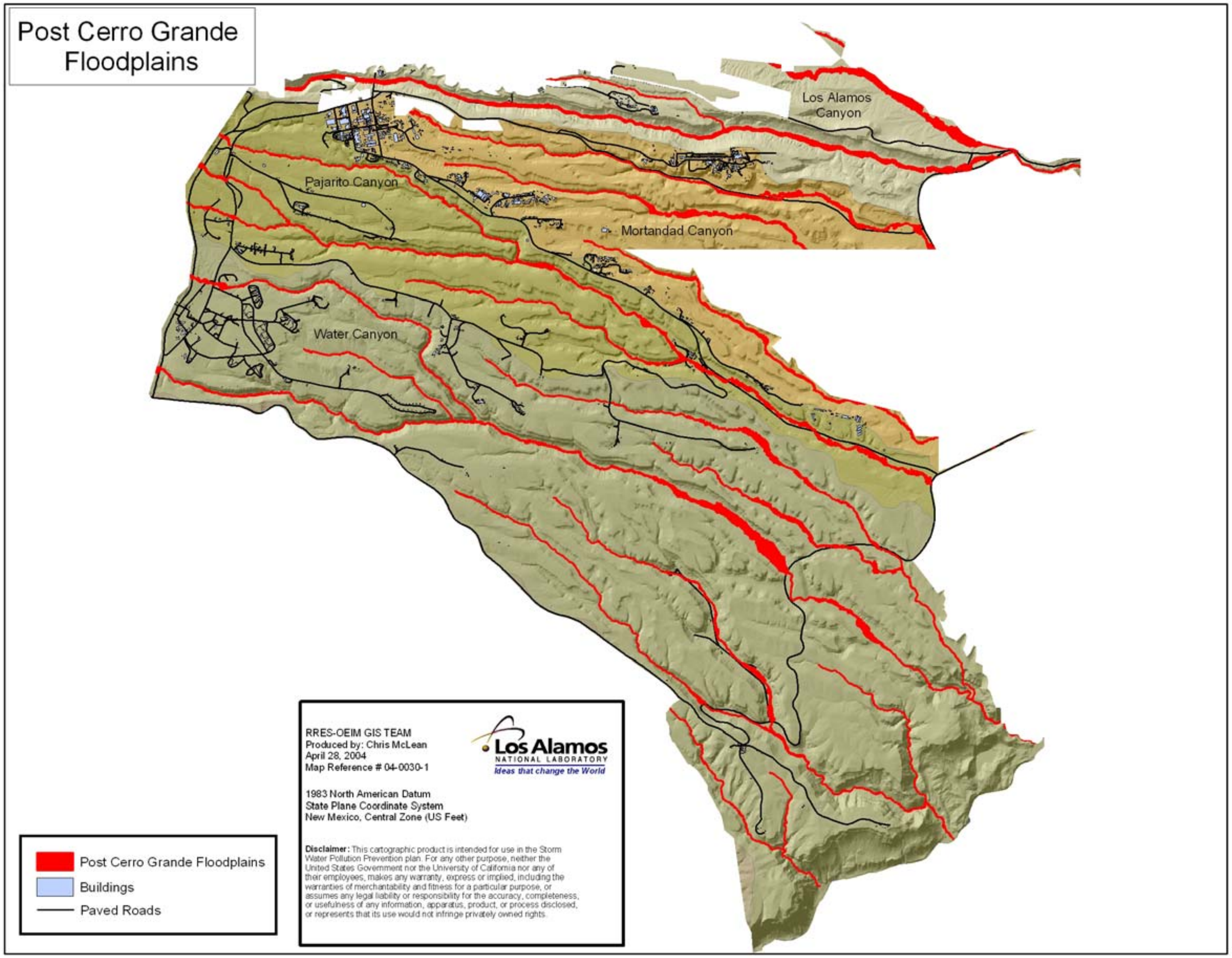


Figure 4-11. Post-Cerro Grande floodplains.

land transfer LANL boundary for the main area of the Laboratory was used to define the total area analyzed. Areas outside of the main LANL boundary, including Rendija Canyon and Fenton Hill, were not included in this analysis.

The original format of the 2003 Floodplain data was on a watershed basis. RRES Office of Environmental Information Management (OEIM) geographic information system (GIS) personnel merged single-canyon GIS shapefiles into one shapefile for analysis. In addition, the 2003 Floodplains contained islands of slightly higher ground within the floodplain boundaries. The pre-fire floodplains did not contain these islands, so they were removed from the 2003 floodplains for purposes of comparison.

The pre-Cerro Grande Fire 100-year floodplains are 10.86 percent larger in area then the post-fire 100-year floodplains inside the main LANL boundary. The post-Cerro Grande Fire floodplains were expected to be larger, due to the larger volume of flow in the canyons, but are actually smaller. One of the possible reasons for the smaller area of the floodplains in Pajarito Canyon is that the Pajarito Flood Retention Structure has attenuated the flow. The flow will be longer in duration but the peak volume of flow will be less. Therefore the floodplains associated with the smaller volume of flow will cover less area. The difference in the areas could also be due to the use of more accurate and precise data used to create the post-fire floodplains. The 2001 Light Detection and Ranging (LIDAR) data collected by LANL was used for the post-Cerro Grande Fire floodplain modeling. A Digital Elevation Model (DEM), on which two-foot contours were derived, was created from the LIDAR data. Also the post-fire floodplain modeling was performed using a newer version of the US Army Corps of Engineer tools HEC-RAS River Analysis System. This system links the modeling program to the GIS layer. The US Army Corps of Engineer tools HEC-2 was used for the pre-fire floodplain modeling, while the successor HEC-RAS River Analysis System was used in the post-fire floodplain modeling. Also the HEC-geoRAS model was used as a pre- and post-processing tool allowing more accurate and precise results to be obtained for the post-Cerro Grande Fire floodplain modeling for visualization Using GIS.

One of the noticeable differences between the pre- and post-fire floodplains is the floodplain in the lower reach of Pueblo Canyon. This floodplain does not exist in the pre-fire floodplains. This would lead to the conclusion that this portion of floodplain now in evidence in the post-fire floodplain should make the area of floodplains larger. However the calculations have shown that the post-fire floodplains are smaller even when this extra section of floodplain is included.

DOE has delineated all 100-year floodplain elevations within LANL boundaries in accordance with requirements presented in RCRA (40 CFR 270.14[b]) and Executive Order 11988—Floodplain Management (McLin et al 2001). There are a number of structures either completely (Table 4.3.1.6-1) or partially (Table 4.3.1.6-2) within the 100-year floodplain. Most may be characterized as small storage buildings, guard stations, well heads, water treatment stations, and some light laboratory buildings. There are no waste management facilities in the 100-year floodplain. Some facilities are characterized as moderate hazard due to the presence of sealed sources or x-ray equipment, but most are low hazard or with no hazard designation. The Solution High-Energy Burst Assembly (SHEBA) Building at TA-18 is within the 100-year floodplain, but the assembly is located there only during an experiment.

The 500-year flood plain has been designated only for Los Alamos Canyon. The Omega West reactor (inactive) is no longer located with this floodplain, as it was decommissioned and demolished in July 2003 (DOE/EA-1410). Overall, most laboratory development is on mesa tops, and development within canyons is light.

Table 4.3.1.6-1. List of buildings completely within the 100-year post-Cerro Grande Fire floodplains.

TA	Building	Building Type	Building Area (sq ft)	Status
02	90	PERM	102	Demolished 08/15/2003
02	89	PERM	152	Demolished 08/15/2003
39	167	TEMP	262	
39	143	PERM	590	
39	123	TEMP	320	
39	150	TEMP	80	
39	98	PERM	5295	
39	103	TEMP	1,661	
39	10	PERM	96	
39	107	TEMP	1789	
41	47	PERM	28	
41	07	PERM	163	
41	64	PERM	20	
72	40	PERM	806	
72	41	PERM	464	
72	52	TEMP	148	
72	39	PERM	2,100	

Table 4.3.1.6-2. List of buildings partially within the 100-year post-Cerro Grande Fire floodplains.

TA	Building	Building Type	Building Area (sq ft)	Status
02	01	PERM	16,700	Demolished 08/15/2003
02	90	PERM	102	Demolished 08/15/2003
02	89	PERM	152	Demolished 08/15/2003
02	63	PERM	507	Demolished 08/15/2003
18	184	TEMP	335	
36	136	PERM	74	
39	167	TEMP	262	
39	143	PERM	590	
39	123	TEMP	320	
39	125	TEMP	320	
39	150	TEMP	80	
39	98	PERM	5295	
39	182	TEMP	144	
39	09	PERM	59	

39	02	PERM	13,156	
39	103	TEMP	1,661	
39	10	PERM	96	
39	107	TEMP	1,789	
41	47	PERM	28	
41	07	PERM	163	
41	64	PERM	20	
41	04	PERM	14,726	Demolished 01/21/2003
72	11	PERM	2,504	
72	40	PERM	806	
72	10	TEMP	121	
72	41	PERM	464	
72	52	TEMP	148	
72	39	PERM	2100	
72	12	PERM	663	
72	08	PERM	175	

(Building list was generated utilizing current buildings coverage maintained by the Facility Waste Operations Group on the Institutional GIS Server [Publication Date: 20040106]. **Demolition data supplied to Susan Radzinski by Lorenzo Viramontes, FWO-FP, viramontes_l@lanl.gov, 7-1560, on 06/09/2004.)**

4.3.2 Groundwater Resources

(Contact: Bob Beers, RRES-WQH, 667-7969, bbeers@lanl.gov)

The nature and extent of groundwater bodies in this region have not been fully characterized. The LANL Hydrogeologic Workplan (LANL 1998b) proposes the installation of new wells that will provide further characterization (section 4.3.2.3). Current data indicate that groundwater bodies occur near the surface of the Earth in the canyon bottom alluvium, perched at deeper levels (intermediate perched groundwater), and at deeper levels in the main aquifer (Purtymun 1995). Data about the groundwater resources, including springs and groundwater quality, will be presented in this subsection.

Alluvial groundwater bodies within LANL boundaries have been primarily characterized by drilling wells in locations where impacts from LANL operations are most likely to occur. Generally, only wells in Mortandad, Los Alamos, Pueblo, and Pajarito Canyons and in Cañada del Buey indicate the continually saturated alluvial groundwater bodies (Purtymun 1995). More information on the canyon-bottom alluvium and groundwater bodies for Mortandad, Los Alamos, Pueblo, and Pajarito Canyons and for Cañada del Buey is presented in Table 4.3–1.

Intermediate perched groundwater bodies of limited extent occur beneath the alluvium in portions of Pueblo, Los Alamos, and Sandia Canyons; in volcanic rocks on the sides of the Jemez Mountains to the west of LANL; and on the western portion of the Pajarito Plateau (LANL 1996i, LANL 1993a, and Purtymun 1995). Undiscovered intermediate perched groundwater bodies may exist, as the drilling coverage for these groundwater bodies has been relatively limited. The depth to perched water from the surface ranges from approximately 90 feet (27 meters) in the middle of Pueblo Canyon to 450 feet (137 meters) in lower Sandia Canyon (LANL 1993a).

The main aquifer is separated from alluvial and intermediate perched zone groundwater bodies by 350 to 620 feet (107 to 189 meters) of unsaturated volcanic tuff and sediments (Purtymun 1995). Recharge of the main aquifer is not fully understood nor characterized. Recent investigations suggest that the majority of water pumped to date has been from storage, with minimal recharge of the main aquifer (Rogers et al. 1996). Groundwater in the main aquifer to the west of the Rio Grande generally flows from the northwest to the southeast toward the Rio Grande. Groundwater in the main aquifer to the east of the Rio Grande generally flows westward from the Sangre de Cristo Mountains toward the Rio Grande. Groundwater flowing from these opposite directions converges in the approximate vicinity of the Rio Grande, then flows southwest.

As a result, shallow groundwater in the main aquifer does not flow across the Rio Grande from either side (Frenzel 1995). Groundwater may flow beneath the Rio Grande deeper in the basin, but conditions at lower depths have not been characterized.

Springs in the LANL area flow from alluvial and intermediate perched groundwater bodies and the main aquifer (Figure 4.3.2–1). Springs can be found in Guaje, Pueblo, Los Alamos, Pajarito, Frijoles, and White Rock Canyon watersheds (LANL 1996i). Information regarding these springs is presented below.

- The Water Canyon Gallery was previously a source of potable water for LANL. Since 1989, Water Canyon Gallery has not been used as a potable water supply due to the high sediment content of its water (Purtymun et al. 1995).

- Contaminants that appear to be from LANL NPDES-permitted discharges at TA–16 have been detected in the recently discovered springs in Pajarito and Water Canyon watersheds, indicating a hydrogeological connection. However, the source of these springs has not been determined.

- Twenty-seven springs discharge from the main aquifer into White Rock Canyon. White Rock Canyon springs and main aquifer discharges contribute an estimated 6 to 7 cubic feet (0.17 to 0.20 cubic meters) per second to the Rio Grande (LANL 1993a).

4.3.2.1 Groundwater Monitoring

Groundwater monitoring is conducted within and near LANL. One of the objectives of LANL’s groundwater monitoring program is to provide indications of the potential for human and environmental exposure from contaminated groundwater sources. Groundwater may accumulate contaminants from discharges to surface water or from leakage of liquid effluent storage systems. Though hydrogeologic conditions around LANL greatly protect the main aquifer from near-surface activities, groundwater monitoring is conducted to detect any threats to the resource. Groundwater monitoring and protection requirements are included in DOE Order 5400.1, General Environmental Protection Program. The order requires LANL to prepare a Groundwater Protection Management Program Plan (GWPMPP) and to implement the program outlined by that plan. The plan also requires development of a groundwater monitoring plan. The groundwater monitoring plan identifies all DOE requirements and regulations applicable to groundwater protection and includes strategies for sampling, analysis, and data management. LANL's GWPMPP was approved by DOE on March 15, 1996 (LANL 1996f).

DOE Order 5400.1 requires that groundwater monitoring needs be determined by site-specific characteristics and, where appropriate, that groundwater monitoring programs be designated and implemented in accordance with RCRA regulations. The section also requires that monitoring for radionuclides be in accordance with DOE Order 5400.5, Radiation Protection of the Public and the Environment.

In addition to DOE Order 5400.1, Module VIII of the LANL RCRA permit requires LANL to collect information to supplement and verify existing information on the environmental setting at the facility and collect analytical data on groundwater contamination. Under Task III, LANL is required to conduct a program to evaluate hydrogeological conditions and is required to conduct a groundwater investigation to characterize any plumes of contamination at the facility.

In 1995, the NMED requested DOE develop a comprehensive groundwater monitoring program plan that addresses both site-specific and LANL-wide groundwater monitoring objectives. This was in part satisfied with submittal of the GWPMPP. In August 1995, NMED requested a Hydrogeologic Workplan. This workplan was submitted to NMED for review in December 1996. The Hydrogeologic Workplan was approved by NMED on March 25, 1998, and finalized on May 22, 1998 (LANL 1998b).

Through the LANL Environmental Surveillance and Compliance Program, samples are collected annually from alluvial groundwater, intermediate perched groundwater, main aquifer test and supply wells, and springs. Module VIII of LANL RCRA permit specifically requires monitoring of the canyon alluvial groundwater system in Pueblo, Los Alamos, Sandia, Mortandad, Potrillo, Fence (a tributary of Potrillo), and Water Canyons. Figures 4.3.2.1–1 and 4.3.2.1–2 show groundwater sampling locations for (1) alluvial and intermediate observation wells and (2) springs and deep wells, respectively. Groundwater samples are analyzed annually to evaluate compliance with applicable standards for radionuclides, water quality chemistry parameters, and metals. One-third of the groundwater samples collected from the well and spring locations are analyzed for organic compounds annually, with the samples from all locations analyzed for organics at least once every 3 years. The quality of water in the regional aquifer is tested at various locations. There are 8 deep test wells and 14 supply wells that belong to DOE. There also are several regional aquifer wells near the Rio Grande that do not belong to DOE. These wells are on San Ildefonso Pueblo land and are sampled under the Memorandum of Understanding (MOU) between the U.S. Bureau of Indian Affairs and DOE. In addition, there are many springs along the Rio Grande that are sampled. Since 1987, groundwater has been sampled annually from 13 wells and 4 springs on Pueblo of San Ildefonso land in accordance with the MOU (BIA 1987).

4.3.2.2 Groundwater Quality

Groundwater Quality Standards

There are numerous federal, state and DOE requirements related to groundwater protection and management. The State of New Mexico protects groundwater via NMWQCC regulations, which address liquid discharges onto or below ground surface. Under these regulations, a groundwater discharge plan must be submitted to and approved by the NMED for a discharging facility. Subsequent discharges must be consistent with the terms and conditions of the discharge plan. In 1996, LANL had three Groundwater Discharge Plans in effect. The NMWQCC regulations were significantly expanded in 1995 with the adoption of comprehensive abatement regulations. The purpose of these regulations is to abate surface and subsurface contamination for designated or future uses. Of particular importance to DOE is the contamination that may be present in the main aquifer.

Update Comments (Beers):

1. In April 1996, the NMED requested a ground water discharge plan for the TA-50 RLWTF. In August 1996, the Laboratory submitted a plan. As of April 2004, approval of the plan by the NMED is still pending.
2. In August 2003, the Laboratory's Ground Water Discharge Plan (GW-031) with the NM Oil Conservation Division (OCD) for the Fenton Hill Hot Dry Rock Geothermal Project was terminated at the Laboratory's request following the planned decommissioning of the project site.
3. In November 2003, the Laboratory Ground Water Discharge Plan (DP-1052) with the NMED for the land application of SWWS Plant sanitary sludge was terminated at the Laboratory's request. Since 1995, the Laboratory has disposed of SWWS Plant sewage sludge as a New Mexico Special Waste in accordance with the New Mexico Solid Waste Regulations (20 NMAC 9.1). The Laboratory has no near-term plans to return to land application.
4. Currently, the Laboratory has only one approved ground water discharge plan for the TA-46 SWWS Plant.

Concentrations of radionuclides in environmental water samples from the main aquifer, the alluvial perched water in the canyons, and the intermediate depth perched systems, whether collected within the LANL boundaries or off the site, may be evaluated by comparison with DCGs for ingested water calculated from DOE's public dose limits. Concentrations of radioactivity in samples of water supply wells completed in the Los Alamos main aquifer are also compared to the NMED, New Mexico Environmental Improvement Board (NMEIB), and EPA safe drinking water standards or to the DOE-DCGs applicable to radioactivity in DOE drinking water systems, which are more restrictive in a few cases. EPA has given NMED authority to administer and enforce federal drinking water regulations and standards in New Mexico.

EPA drinking water standards are only directly applicable to a public water supply. In particular they would only apply to the supply wells in the main aquifer that are the source of the Los Alamos public water supply. EPA drinking water standards may be useful for comparison purposes in some cases. For example, because LANL shallow alluvial groundwater is not a source of municipal or industrial water but may feed surface water springs and seeps used by livestock and wildlife, shallow alluvial groundwater must meet the Standards for Groundwater or Livestock and Wildlife Watering established by the NMWQCC. However, for many elements there are no established livestock and wildlife standards. When this is the case, although generally much more conservative than the livestock and wildlife standards, EPA drinking water standards are used herein for comparison purposes.

Alluvial and Perched Water Quality

Data derived from groundwater samples taken from test wells indicate that LANL operations and activities have influenced some of the alluvial and intermediate perched zone groundwater quality in the LANL region. Primary LANL sources of contamination include historic discharges of treated and untreated wastes, discharges from the RLWTF (Mortandad Canyon) and leaks from the Omega West Reactor (Los Alamos Canyon). Other sources of contamination are from past and present LAC sanitary treatment plant releases (Pueblo Canyon). Details on alluvial and perched water quality can be found in the annual LANL Environmental Surveillance and Compliance Reports. Summary alluvial and perched water quality data tables derived from the 1991 to 1996 LANL Environmental Surveillance and Compliance Reports are presented in volume III, appendix C (Tables C–6 and C–7). However, in order to provide a general understanding of the alluvial and perched water quality at LANL, information from the 1990 to 1994 Environmental Surveillance Reports are summarized in the following text.

- EPA *Safe Drinking Water Act* (SDWA) (40 CFR 141) standard for strontium-90 (8 picocuries per liter) was exceeded in at least 50 percent of the alluvial groundwater samples collected from Los Alamos and Mortandad Canyons from 1990 through 1994, and EPA SDWA standard for tritium (20 nanocuries per liter) was exceeded in 20 of 22 of the alluvial groundwater samples collected in Mortandad Canyon during this same period. The more applicable New Mexico livestock and wildlife standard for tritium is the same as the SDWA standard of 20 nanocuries per liter and there are no livestock and wildlife comparison values for strontium-90. Standards for americium-241, cesium-137, plutonium- 238 and plutonium-239, and nitrates also were exceeded during the period 1990 through 1994 in Mortandad Canyon.

Update Comments (Beers):

1. No SDWA drinking water standards exist for americium-241, cesium-137, plutonium- 238 and plutonium-239.

- Standards for some water quality parameters and metals were exceeded in samples from the alluvial groundwater in Pueblo and Pajarito Canyons and Cañada del Buey from 1990 through 1994. These water quality parameters and metals occur naturally in the groundwater system within the LANL region and are also released through some of LANL's NPDES-permitted discharges (LANL 1994b, LANL 1995f, and LANL 1996e).

- Tritium and nitrates were detected in samples collected from the intermediate perched groundwater in Pueblo and Los Alamos Canyons. The levels of tritium detected were below the EPA standard of 20 nanocuries per liter, but nitrate as nitrogen concentrations exceeded the EPA standard of 10 milligrams per liter in all samples taken in 1994 from the two wells in the Pueblo and Los Alamos Canyon watersheds and Basalt Spring. The nitrate concentrations in these wells ranged from less than 0.04 to 19.4 milligrams per liter (LANL 1994b, LANL 1995f, and LANL 1996e).

- HE, VOCs, and nitrates were found in samples collected from the recently discovered springs in Pajarito Canyon watershed. VOCs (tetrachloromethane) were detected at 15 micrograms per liter, which is above the EPA SDWA standard of 5 micrograms per liter. High explosives (Hexahydron-1,3,5-trinitron-1,3,5-triazine) were detected in samples at 100 micrograms per liter (EPA standard is 0.61 micrograms per liter) and nitrates (2-amino-[2,4]-6-dinitrotoluene) were detected at 3.31 micrograms per liter, which is above the EPA standard of 0.99 micrograms per liter (Yanicak 1996). The water quality in these springs may improve as a result of the new LANL industrial wastewater treatment plants coming on line in TA–16 in 1997 and a reduction of effluent volume from the NPDES-permitted outfalls (Purtymun 1995).

Update Comments (Beers):

1. In October 1997, as required by a Federal Facilities Compliance Agreement (AO Docket No. VI-94-1210), the Laboratory completed construction of the High Explosives Wastewater Treatment Facility (HEWTF) at TA-16. The new HEWTF is a centralized treatment plant that replaces the existing HEWTF and eliminates all but two of the previous 21 NPDES permitted HE outfalls. In addition, this new facility will reduce flows to the HEWTF from 12 million gallons per year to approximately 130,000 gallons per year.

Although groundwater data have been collected and will continue to be collected as a part of the Environmental Surveillance and Compliance Program, many questions remain regarding where groundwater occurs, groundwater quality, and potential contaminant migration (section 4.3.2.3).

Main Aquifer Water Quality

As a part of the Environmental Surveillance and Compliance Program, samples are collected from main aquifer test wells to ensure the quality of this groundwater body that provides the drinking water for LAC, LANL, and BNM. SDWA standards for all radionuclides were met in all samples taken from the main aquifer from 1990 through 1994. However, trace amounts of tritium, plutonium-239 and plutonium-240, americium-241, and strontium-90 have been detected in samples collected from the main aquifer. The presence of plutonium-239 and plutonium-240, americium-241, and strontium-90 has not been duplicated in previous or subsequent samples (section 4.3.2.3). Radioactive and hazardous waste has been generated and disposed at LANL since LANL's inception in 1943. LANL materials disposal areas and the PRSs identified by the ER Project (chapter 2, section 2.1.2.5) are potential sources of contamination. An additional possible source of groundwater contamination is the historic and current practice of discharging treated effluents in canyons near the northern boundary of LANL. While all canyons have received some industrial and sanitary discharges, Los Alamos, Sandia, Mortandad, and Pueblo Canyons are particular areas of concern because of the NPDES outfalls that discharge into these canyons. Tritium was first detected using a special sensitive method at Los Alamos in 1992. This analytical method was more sensitive than the EPA method for drinking water compliance monitoring in use. The levels measured were less than 2 percent of EPA SDWA (Dale and Yanicak 1996, LANL 1994b, LANL 1995f, and LANL 1996e) (also see section 4.3.2.3). Radioactivity, sodium, and metals all occur naturally in groundwater, and the detected concentrations are similar to those observed elsewhere in the Española Basin (LANL 1994b, LANL 1995f, LANL 1996e, and NMED 1995).

Organic compounds have been detected in samples taken from main aquifer test wells at TA–49 (DT–5A, DT–10, and DT–9; Figure 4.3.2.1–2). The largest detection was for pentachlorophenol from the TA–49 test well DT–9 (Figure 4.3.2–1) of 110 parts per billion. The EPA SDWA standard for pentachlorophenol is 1 part per billion. The sources of the contaminants detected in the TA–49 test wells are not known (LANL 1993b, LANL 1994b, LANL 1995f, LANL 1996e, and LANL 1996i). Test well DT–9 was retested in 1996, and no organic compounds were detected. However, the LANL Hydrogeologic Workplan (LANL 1998b) proposes the installation of borehole R-27 to further characterize the source of these contaminants. The TA-49 test wells are approximately 2 miles (3.2 kilometers) away and cross-gradient of the nearest public water supply well (PM 2) (Figure 4.3.2.1-2), and no public supply wells exist down-gradient of the TA–49 test wells. Therefore, the presence of organic compounds in these samples does not suggest a danger to the existing public water supply (Purtymun 1995).

The SDWA standard for nitrate (10 milligrams per liter) was exceeded in TW-1 in 1994 and 1995 (23.0 milligrams per liter and 12.9 milligrams per liter, respectively). This test well has shown nitrate levels in the range of about 5 to 25 milligrams per liter since early 1980. The source of the nitrate could be infiltration from sewage treatment effluent in Pueblo Canyon (LANL 1996i).

Details on main aquifer water quality can be found in the annual LANL Environmental Surveillance and Compliance Reports. Summary main aquifer water quality data tables derived from the 1991 to 1996 LANL Environmental Surveillance and Compliance Reports are presented in volume III, appendix C (Table C-6 and C-7).

4.3.2.3 Transport of Radionuclides and Chemicals

In the LANL region, uncertainties exist about the nature and extent of contaminant migration from alluvial groundwaters to deeper groundwaters (intermediate perched groundwaters or the main aquifer) and from intermediate perched groundwaters to the main aquifer (LANL 1993b, LANL 1994b, LANL 1995f, LANL 1996e, and LANL 1996i). The intermediate perched groundwater bodies beneath mid-Pueblo and lower Pueblo and Los Alamos Canyons are known to be hydraulically connected to surface water and alluvial groundwater in Pueblo Canyon. Therefore, groundwater movement from alluvial groundwater bodies to deeper intermediate perched groundwater bodies or the main aquifer may be a contaminant transport pathway in specific locations (LANL 1993a).

Of all hydrogeologic settings at LANL, contaminant transport from dry mesa top material disposal areas (e.g., Area G where contaminated wastes are treated, stored, and disposed) through the rock matrix to the main aquifer potentially takes the longest time. Evaluation of existing data and modeling results indicates potential transport of some radionuclides requires thousands of years to reach the main aquifer, and many other radionuclides will decay completely before arrival (Birdsell et al. 1995, DOE 1995b, Rosenberg et al. 1993, and Devaurs 1989).

The potential exists for contaminants to migrate more quickly from alluvial groundwater bodies through the rock matrix below to the main aquifer. Due to the hydrogeologic complexity of the LANL area, these pathways are not fully understood and may vary substantially from one hydrogeologic setting to another. Tritium in the main aquifer was first reported in the 1992 LANL Environmental Surveillance Report. This is when several advanced techniques not commonly applied to groundwater samples were first used. The levels measured were less than 2 percent of the EPA SDWA.

Although the exact recharge mechanism(s) is not known, some additional possible transport pathways from those discussed previously could be: (1) contaminants infiltrating along well shafts or boreholes, (2) contaminants moving through the unsaturated (vadose) zone, and (3) contamination infiltrating areas of high fault or fracture density. The tritium detected in TW–3 and TW–8 in Los Alamos Canyon and Mortandad Canyon, respectively, suggests a continual presence of a small recharge contribution from the surface in the main aquifer from an unknown source. As mentioned previously, one of the possible transport pathways is along the well bore of inadequately constructed or inappropriately designed older wells. Many of the wells at LANL were constructed as early as the 1940's. Tritium has been detected in samples taken from observation wells LA–1A and Test Wells TW–1, TW–1A, TW–2, TW–2A, TW–4, and TW–8. In all of these cases, it is possible that tritiated waters from the surface have seeped along the well bore due to an inadequate seal. These wells, as well as borings and coreholes that might present a pathway for contamination, may need to be plugged and abandoned in accordance with the NMED and New Mexico State Engineers Office requirements to ensure that contaminant transport pathways to intermediate depth perched groundwater and the main aquifer are properly closed off (LANL 1996f).

The primary solution to understanding the extent of the effects of LANL activities on the main aquifer is to obtain more site characterization information (i.e., construct more monitoring wells). This new site characterization information should provide data for researchers to gain a better understanding of how contaminants are transported from discharge sites. Because of the many questions concerning the hydrogeologic characterization of the Pajarito Plateau, such as the recharge mechanisms for the main aquifer and the lack of hydrologic detail, LANL personnel have prepared a Hydrogeologic Workplan that was approved by NMED in March 1998. The workplan proposes the installation of new wells to address these uncertainties. Well placement and other characterization activities as presented in the proposed plan will focus on providing more information on the hydrogeologic and stratigraphic settings (specifically, vertical hydraulic gradients, saturated hydraulic conductivities, vertical stratification, depth and direction of groundwater flow, recharge to the main aquifer, and water quality in the main aquifer). The workplan also proposes the placement of additional wells between known contaminated sources and water supply wells in order to provide detection of approaching contaminants (LANL 1998b).

4.3.2.4 Public Water Supply

DOE water supply system supplies potable water from the main aquifer to LANL, the Los Alamos townsite, the community of White Rock and BNM. Three well fields (Pajarito, Guaje, and Otowi) constitute the current DOE water supply system. Other than chlorine disinfection of the water supply, no other water treatment is required.

DOE's water rights allow the withdrawal of about 5,540 acre feet or 1.8 billion gallons (6.83 billion liters) per year from the main aquifer (DOE 1995a). In addition, DOE has a contractual agreement for Rights to Water for 1,200 acre feet or 0.39 billion gallons (1.48 billion liters) per year from the San Juan- Chama Transmountain Diversion Project of the U.S. Bureau of Reclamation (DOE 1995a). DOE obtained these Rights to Water in 1976 based on a concern that future use would exceed DOE's water rights for the main aquifer. No infrastructure exists for conveyance of water from the San Juan-Chama to LAC. DOE has not used and currently has no plans to use the San Juan-Chama Rights to Water (PC 1996c).

Update Comments (Beers):

1. On September 5, 2001, DOE completed the transfer of ownership of the Los Alamos Water Supply System to Los Alamos County. Since September 8, 1998, Los Alamos County had operated the water supply system under a lease agreement. Under the transfer agreement, the Laboratory retained responsibility for operating the distribution system within the Laboratory's boundaries, whereas the county assumed full responsibility for operating the water system, including ensuring compliance with the requirements of the federal Safe Drinking Water

Act (SDWA) (40 CFR 141) and the New Mexico Drinking Water Regulations (NMEIB 2002).

2. Under the agreement, 70 percent of DOE's 5541.3 acre feet per year (af/yr) of water rights were transferred to Los Alamos County (3,878.91 af/yr) and 30 percent of the rights (1662.39 af/yr) were retained by DOE, but leased to LA County (LA-UR-01-6376).
3. Also under the agreement, all of the San Juan-Chama contractual water rights of 1,200 af/yr were transferred to LA County on the September 8, 1998, lease date (LA-UR-01-6376). Currently, Los Alamos County is conducting a study on the feasibility of using this water.

For the period from 1947 through 1994, LAC's, BNM's, and LANL's combined water usage peaked at 96 percent of DOE water rights in 1976. From 1990 through 1994, total water rights usage ranged from 81 percent in 1993 to 91 percent in 1990. LANL's use has been approximately 500 million gallons (1.89 billion liters) per year since the late 1970's (PC 1996c). Additional information on drinking water supplies can be found in section 4.9, Socioeconomics.

Update Comments (Beers):

1. From 1994 through 2001, total water usage (LANL, LAC, BNM) averaged 77 percent of total water rights with a max usage in 2000 of 84 percent and min usage in 1997 of 71 percent (LA-13985-PR, March 2003). 2000 was the year of the Cerro Grande wildfire and severe drought conditions on the Pajarito Plateau.
2. Average LANL water consumption from 1998-2001 was approximately 422 million gallons with a max use in 2000 of 461 million gallons in 1998 to a min use in 2000 of 379 million gallons ((LA-13985-PR, March 2003).
3. Additional information on supply, usage, and demand forecasts can be found in Los Alamos National Laboratory's *Site-Wide Water Conservation Program Plan* (LA-UR-01-6376).

Historic water level measurements in main aquifer wells have indicated water level declines in the area due to pumping and natural discharges exceeding recharge and inflow. From 1947 through 1991, average water level declines in the four DOE supply well fields ranged from 24 to 76 feet (7 to 23 meters) (Purtymun 1995). Aquifer water level declines are shown pictorially, as in Figure 4.3.2.4–1; however, the water level declines are speculative. As expected, water level declines are most evident around water supply wells in the middle and northern part of Los Alamos County. Dashed contour lines on Figure 4.3.2.4–1 show declines on the order of 100 feet in the areas around the Guaje water supply well field diminishing in all directions away from it. Since the Los Alamos well field has been almost shut down (i.e., with the exception of LA–5, which supplies San Ildefonso - Totavi), water levels are returning to near-normal levels toward the east in the vicinity of the Rio Grande (Purtymun et al. 1995).

Update Comments (Beers):

1. Information on water production, water levels, and water use is available in *Water Supply at Los Alamos 1998-2001*: (LA-13985-PR, March 2003).

Water storage calculations which were made (based on the USGS regional model [Frenzel 1995]) for the total 5,600-foot (1,707-meter) thickness of the main aquifer indicate that approximately 21.8 trillion gallons (82,513 million cubic meters) of water are contained in the LANL region beneath the Pajarito Plateau (Frenzel 1995). If DOE used its full water rights at a rate of 1,805 million gallons (6.83 million cubic meters) per year, this storage volume represents a 12,109-year supply. However, because water quality will generally worsen with increasing depth, the volume of water suitable for drinking may be less. Available data are insufficient for modeling water quality degradation with depth, but water supply wells screened as deep as 1,830 feet (558 meters) into the main aquifer indicate that water at that level would meet SDWA standards. By comparison, storage calculations based on annual use at DOE water rights rate indicate a water supply for 2,839 years for the upper 1,275 feet (389 meters) of the main aquifer and 4,453 years for the upper 2,000 feet (610 meters) of the main aquifer.

A similar calculation for the water stored in the Española Basin (in which the main aquifer lies) indicates that 106 trillion gallons (401,210 billion liters) of water are stored in this aquifer. If the water rights of all major users (e.g., DOE, Santa Fe, and Española) were used at their capacity, the upper 1,275 feet (389 meters) of the Española Basin would be capable of supplying water for 2,982 years; and if the upper 2,000 feet (610 meters) of the water in the Española Basin were used, the basin would be capable of supplying water to current users for 4,637 years (PC 1996a). The calculations, assumptions, and data used for the Española Basin and main aquifer storage analyses are presented in volume III, appendix A.

Public Water Supply Quality

The DOE public water supply system is monitored to ensure compliance with the SDWA. Samples are collected from wellheads, the water distribution system, and residential taps. An evaluation of public water supply quality data indicates that all constituents analyzed were in compliance with applicable standards, with the exception of bacteria, which exceeded SDWA standards in August 1993. The bacteria were observed in samples taken from the distribution system for TA–33 and TA–39, which are both served by an infrequently used dead-end water main. The water was brought into compliance by flushing and disinfecting the water main. In response to this incident, LANL has increased minimum chlorination concentrations, sampling frequencies, and the frequency of flushing of dead-end water lines to prevent bacterial overgrowth (Dale and Yanicak 1995, LANL 1994b, LANL 1995f, LANL 1996e, LANL 1996i, and LANL 1993b).

Update Comments (Beers):

1. Since September 1998, SDWA compliance has been the responsibility of Los Alamos County.
2. No SDWA violations have occurred since 1993.

DOE also monitors the drinking water wells for a number of radionuclides in order to assess whether LANL operations impact the quality of water in the main aquifer. Sample results for the radionuclides, which do not have limits under SDWA are compared to DOE-DCGs. All sample results from 1990 through 1994 indicate that radionuclide concentrations are well below the DCGs.

Update Comments (Beers):

1. The SDWA has established standards for the following radionuclides:
   - Ra-226+Ra-228 (combined)=30 pCi/L(40 CFR 141.15)
   - Sr-90=8 pCi/L (40 CFR 141.16)
   - Tritium=20,000 pCi/L (40 CFR 141.16)

EPA has proposed standards for uranium (20 micrograms per liter) and radon (300 picocuries per liter) in groundwater (LANL 1995f). The movement of groundwater through uranium-rich rocks and sediments in the eastern portion of the Española Basin results in locally high concentrations of natural uranium and/or radon in the groundwater. During a study of residential wells in northern Santa Fe County, total uranium concentrations ranged from 0.1 to 930 micrograms per liter (PC 1997d). Analyses of water samples taken from the DOE water supply wells indicate that water from these wells exceed the proposed radon standard by 1.4 to 4.2 times (LANL 1995f). If the proposed EPA standard is adopted, treatment processes will need to be added to the DOE water supply system in order for the public water supply system for LAC to meet the radon standard. Uranium and radon in these wells is naturally occurring.

Update Comments (Beers):

1. EPA promulgated a uranium standard for drinking water of 30 ppb, effective 12/08/03.

2. EPA has proposed a two-tiered standard for radon:

   - *First Option*: States can choose to develop enhanced state programs to address the health risks from radon in indoor air -- known as Multimedia Mitigation (MMM) programs -- while individual water systems reduce radon levels in drinking water to 4,000 pCi/L or lower. New Mexico has committed to develop a MMM program.

   - *Second Option*: If a state chooses not to develop an MMM program, individual water systems in that state would be required to either reduce radon in their system's drinking water to 300 pCi/L or develop individual local MMM programs and reduce levels in drinking water to 4000 pCi/L.

3. Radon data from 1994-2000 from the Los Alamos Water Supply System shows a system-wide average of approximately 400 pCi/L with a max average of approximately 640 pCi/L at PM-2.

4.3.2.5 Regional Groundwater

In response to public and agency concerns about potential off-site groundwater contamination, data for the Buckman well fields and the Pueblos of San Ildefonso, Santa

Clara, Cochiti, and Jemez were evaluated. Evaluations of groundwater quality, flow directions, and supply indicate that the Pueblos of Santa Clara, Cochiti, and Jemez are located outside of the hydrogeologic influence of LANL. Therefore, a baseline characterization of groundwater quality for these Pueblos is not included in this evaluation.

Buckman Well Field

The Buckman well field supplies approximately 41 percent of the city of Santa Fe's municipal drinking water supply. The Buckman well field is located east of LANL and the Rio Grande. An evaluation of NMED's Safe Drinking Water electronic database indicated that all samples collected were in compliance with the SDWA requirements for all constituents measured. Additionally, a joint study conducted by UC and NMED in 1990 found radionuclides in samples taken from the Buckman wells, nearby springs, and the Rio Grande to be below regulatory standards (Gallegos 1990 and Gunderson 1993).

Update Comments (Beers):

1. The new SDWA uranium standard of 30 ppb was exceeded in one of the Buckman wells at 270 pCi/L, but system-wide compliance was achieved through blending (City of Santa Fe, Consumer Confidence Report, 2002).
2. LANL analyzed the Buckman well field capture zones in 2002 (LA-UR-02-2750). Initial analysis showed that the predicted portion of Buckman wellfield water coming from the western basin—western side of the Rio Grande and Pajarito Plateau—was 34 percent.

Pueblo of San Ildefonso Groundwater Quality

During the period of 1990 through 1994, uranium was found in groundwater samples collected from 6 of the 18 Pueblo of San Ildefonso wells at concentrations that exceed the proposed EPA SDWA standard (20 micrograms per liter), and ranged from less than 1.0 to 55 micrograms per liter. Three of the six wells are located east of the Rio Grande and three wells are located west of the Rio Grande.

In May 1994, EPA sampled groundwater at all 18 Pueblo of San Ildefonso wells to investigate possible groundwater contamination and analyzed the samples for radionuclides. No plutonium or tritium was found in the groundwater. Uranium concentrations above background were detected in two of the wells. Based on uranium isotopic ratios in the samples, EPA stated, "These data indicate that the source of excess uranium present in these samples is probably natural" (EPA 1995). Regarding possible contamination of groundwater from LANL releases through surface water or sediments pathways, EPA made the following statement that was based on the uranium isotope ratios in surface water and sediment samples. "These data suggest that the elevated uranium concentrations are not a result of releases from the LANL operations and activities, but rather from a natural source that is different from that of the background samples. It is most likely from a geologic formation containing much higher than normal levels of uranium" (EPA 1995).

In 1994, SDWA standard for nitrate was exceeded in three of the Pueblo of San Ildefonso supply wells (LANL 1996e). Potential sources of nitrates in Pueblo of San Ildefonso groundwater include agricultural fertilizers, septic tanks, and sewage treatment plant discharges. Existing data do not allow the source(s) of nitrates detected in a sample to be identified. Therefore, the source of the nitrates in Pueblo of San Ildefonso groundwater is unknown. Analyses performed as a part of the groundwater sampling program in 1994 and 1995 did not find nitrate concentrations that exceeded the SWDA standard in the five main aquifer wells sampled on Pueblo of San Ildefonso land (Dale and Yanicak 1995).

4.4 Air Quality and Climate

4.4.1 Climatology and Meteorology

(Contact: Darrell Holt, RRES-MAQ, 667-2661, darrellholt@lanl.gov)

Los Alamos has a semi-arid, temperate mountain climate which is characterized by seasonally variable rainfall with precipitation ranging from 10 to 20 inches (25 to 51 centimeters) per year. Los Alamos townsite is not as dry (arid) as the region near the Rio Grande, which is arid continental (Nyhan et al. 1978). Meteorological conditions within Los Alamos are influenced by the elevation and slope of the Pajarito Plateau. Climatological averages for atmospheric variables such as temperature, pressure, winds, and precipitation presented in this subsection are based on observations made at the official Los Alamos meteorological weather station from 1971 to 2000. The current official weather station, which has five sample heights (4, 37.5, 75, 150, and 300 feet [1.2, 11, 23, 46, and 92 meters]), is located at TA–6. Five other meteorological towers are also used by LANL. The locations of all six meteorological towers are shown on Figure 4.4.1–1.

Normal (30-year mean) minimum and maximum temperatures for the communities of Los Alamos and White Rock are presented in Figure 4.4.1–2. Temperatures in the region vary with elevation, averaging 5 degrees Fahrenheit (°F) (3 degrees Celsius [°C]) higher in and near the Rio Grande Valley, which is 6,500 feet (1,981 meters) above sea level, and 5°F to 10°F (3°C to 5.5°C) lower in the Jemez Mountains, which are 8,500 to 10,000 feet (2,600 to 3,050 meters) above sea level. Los Alamos townsite temperatures have dropped as low as -18°F (-28°C) and have reached as high as 95°F (35°C) (LANL 1992a).

Normal (30-year mean) precipitation for the communities of Los Alamos and White Rock is presented in Figure 4.4.1–3. The normal annual precipitation for Los Alamos from 1971 to 2000 was approximately 19 inches (48 centimeters). Annual precipitation rates within the region declines toward the Rio Grande Valley, with the normal precipitation for White Rock at approximately 14 inches (35 centimeters). The Jemez Mountains receive over 25 inches (64centimeters of precipitation) annually. The lowest recorded annual precipitation in Los Alamos townsite was 7 inches (18 centimeters) and the highest was 30 inches (76 cm) (LANL1992a).

Approximately 36 percent of the annual precipitation for Los Alamos County and LANL results from thundershowers that occur in July and August. Winter precipitation falls primarily as snow. Average annual snowfall is approximately 59 inches (150 centimeters), but can vary considerably from year to year. Annual snowfall ranges from a minimum of 9 inches (24 centimeters) to a maximum of 153 inches (389 centimeters). The single-storm snowfall record is 4 feet (122 centimeters) (LANL 1992a).

4.4.1.1 Wind Conditions

Wind speed, direction, and turbulence are pertinent to air quality analysis. Los Alamos County winds average 7 miles per hour (3 meters per second). Wind speeds vary seasonally, with the lowest wind speeds occurring in December and January. The highest winds occur in the spring (March through June) due to intense storms and cold fronts. The highest recorded wind in Los Alamos County was 77 miles per hour (34meters per second). Surface winds often vary dramatically with the time of day, location, and elevation due to the region's complex terrain. Average wind direction and wind speed for the four primary measurement stations are plotted in wind roses and presented in Figures 4.4.1-4, 4.4.1-5, and 4.4.1-6. Figure 4.4.1-7 presents the same wind information for LANL's measurement site on Pajarito Mountain and in Los Alamos Canyon at TA-41. For all stations except Pajarito Mountain, the data plotted is from 1996-2000. Pajarito Mountain's data spans 1998-2000. A wind rose is a vector representation of wind velocity and duration. It appears as a circle with lines extending from the center representing the direction from which the wind blows. The length of each spoke is proportional to the frequency at which the wind blows from the direction indicated. The frequency of calm winds (less than 1 mile per hour [0.5 meter per second]) is presented in the center of the wind rose.

In addition to seasonal changes in wind conditions, surface winds often vary with the time of day. An up-slope air flow can develop over the Pajarito Plateau in the morning hours. By noon, winds from the south usually prevail over the entire plateau. The prevalent nighttime flow ranges from the westsouthwest to northwest over the western portion of the plateau. These nighttime winds result from cold air drainage off the Jemez Mountains and the Pajarito Plateau.

Analyses of Los Alamos Canyon wind data indicate a difference between the air flow in the canyon and the air flow over the Pajarito Plateau. Cold air drainage flow is observed about 75 percent of the time during the night and continues for an hour or two after sunrise until an up-canyon flow forms. Nighttime canyon flows are predominantly weak drainage winds from the west. Because of the stability of these nighttime canyon flows and the relatively weak mesa winds, the development of rotors at night in the canyon is rare (LANL 1992a and LANL 1994b). But, a turbulent longitudinal whirl or “rotor” that fills the canyon can develop when the wind over the Pajarito Plateau has a strong cross-canyon component.

The irregular and complex terrain and rough forest surfaces in the region also affect atmospheric dispersion. The terrain and forests increase horizontal and vertical turbulence and dispersion. The dispersion generally decreases at lower elevations where the terrain becomes smoother and less vegetated. The region's canyons channel the air flow – which limits dispersion.

Light wind conditions under clear skies can create strong, shallow surface inversions that trap the air at lower elevations and severely restrict dispersion. These light wind conditions occur primarily during the autumn and winter months, with intense surface air inversions occasionally occurring. Inversions are most severe during the night and early morning. Overall dispersion is greater with strong winds in the spring. However, vertical dispersion is greatest during summer afternoons (LANL 1992a). Deep vertical mixing occurs in the summer afternoons, lowering concentrations near the surface.

4.4.1.2 Severe Weather

Thunderstorms are common in Los Alamos County, with an average of 60 thunderstorms occurring in a year. Lightning can be frequent and intense. The average number of lightning-caused fires, for the years 1990 through 1994, in the 2,727 acres (1,104 hectares) of Bandelier National Monument, is 12 per year (BNM 1995). Because lightning can cause occasional power outages, lightning protection is an important design factor for most facilities at LANL and the surrounding area.

Hailstorms occur in Los Alamos County that can produce measurable hail accumulations. Typically, hailstones have diameters of approximately 0.25 inch (0.63 centimeter) and do not cause heavy damage to property or plants. An extremely damaging hailstorm occurred in 1990 when golf ball- and baseball-sized hail pummeled the White Rock area (LANL 1992a).

Large-scale flooding is not common in New Mexico. There are no recorded instances of large-scale flooding in Los Alamos County. However, flash floods from heavy thunderstorms are possible in areas such as arroyos, canyons, and low-lying areas. For example, in 1991 a heavy downpour, combined with already saturated soil, caused flash flooding that washed out sewer lines in Pueblo Canyon, which is located between North Mesa and Los Alamos townsite. This incident caused extensive flooding of streets and basements in the Los Alamos townsite (LANL 1992a).

No tornadoes are known to have touched the ground in the Los Alamos area. However, funnel clouds have been observed in Santa Fe County (LANL 1992a).

Remnants of hurricanes and tropical storms originating in the Gulf of Mexico and the Pacific Ocean occasionally reach New Mexico during the summer and autumn. These storms are weak by the time they reach northern New Mexico and do not produce strong winds. However, these storms can produce widespread, strong thunderstorms and heavy rains (LANL 1992a).

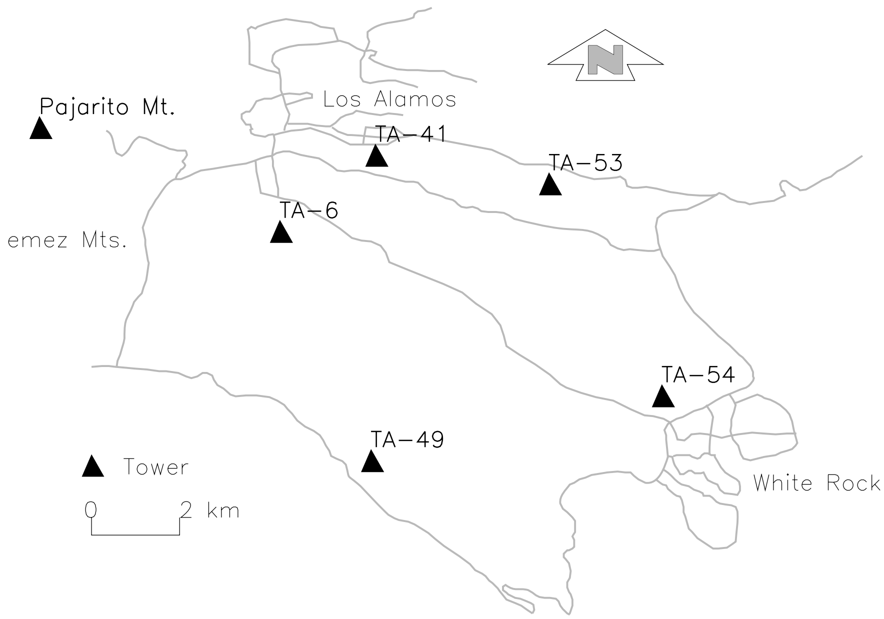


Figure 4.4.1–1. LANL Meteorological Stations.

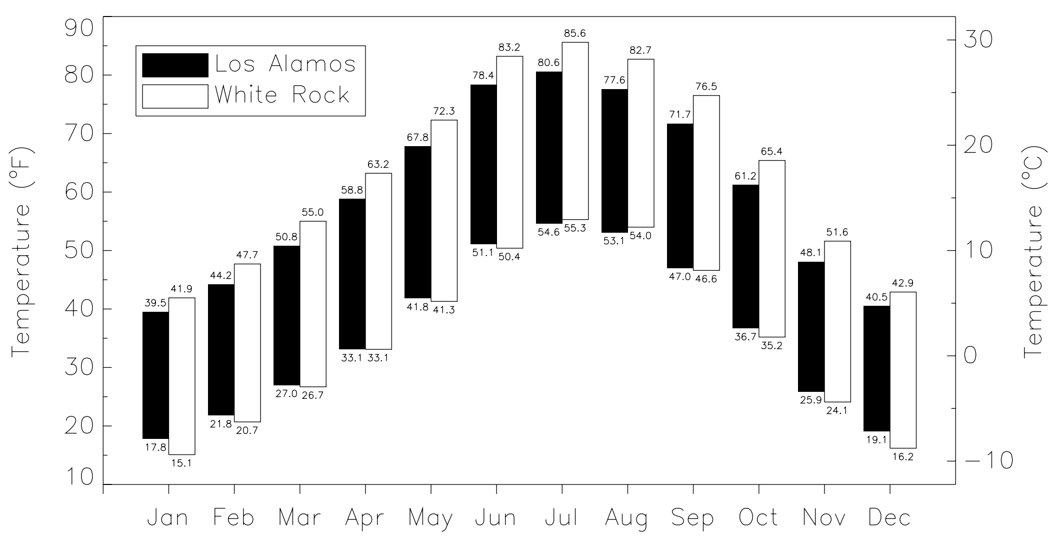


Figure 4.4.1–2. Mean High and Low Temperatures for Los Alamos (1971 to 2000) and White Rock (1971 to 2000).

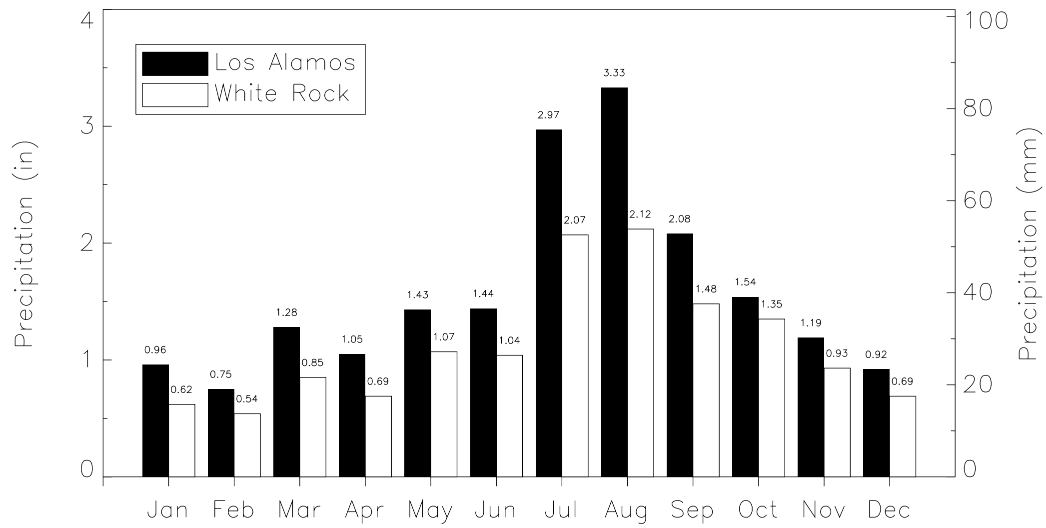


Figure 4.4.1–3. Mean Precipitation for Los Alamos (1971 to 2000) and White Rock (1971 to 2000).

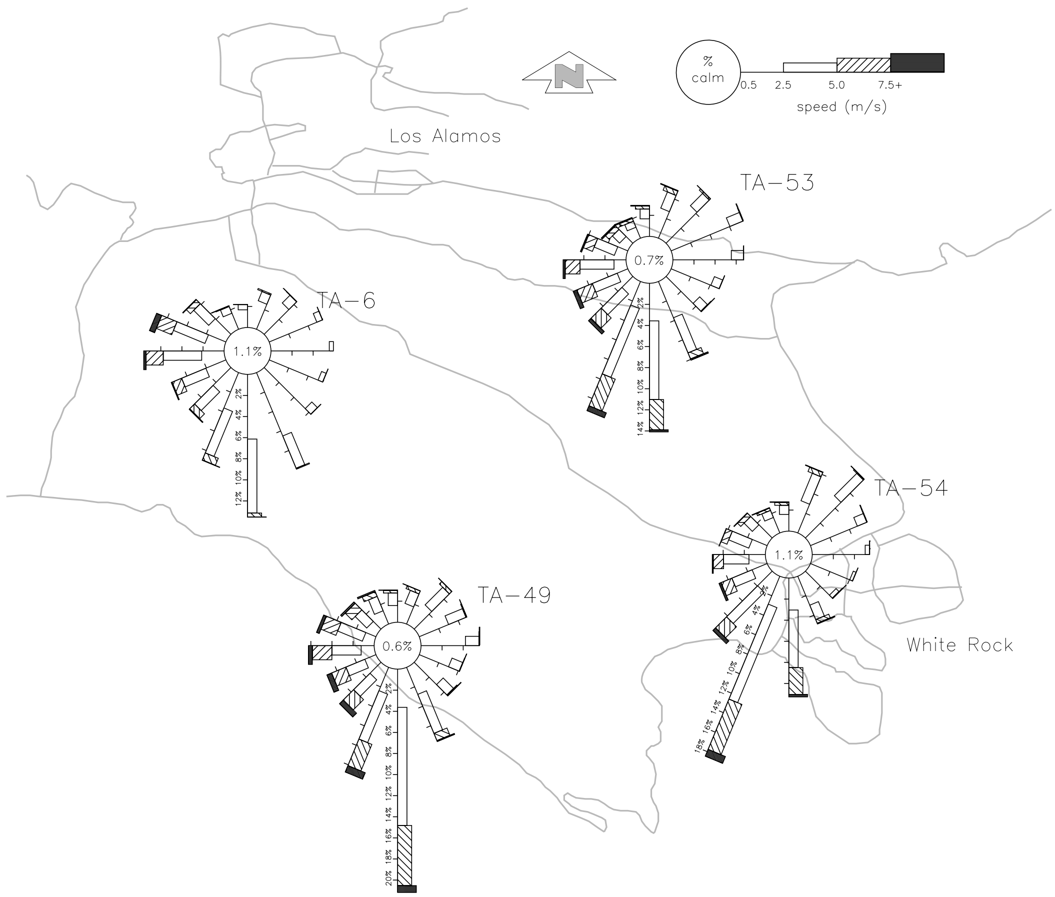


Figure 4.4.1-4. LANL Meteorological Stations with Daytime Wind Rose Data.

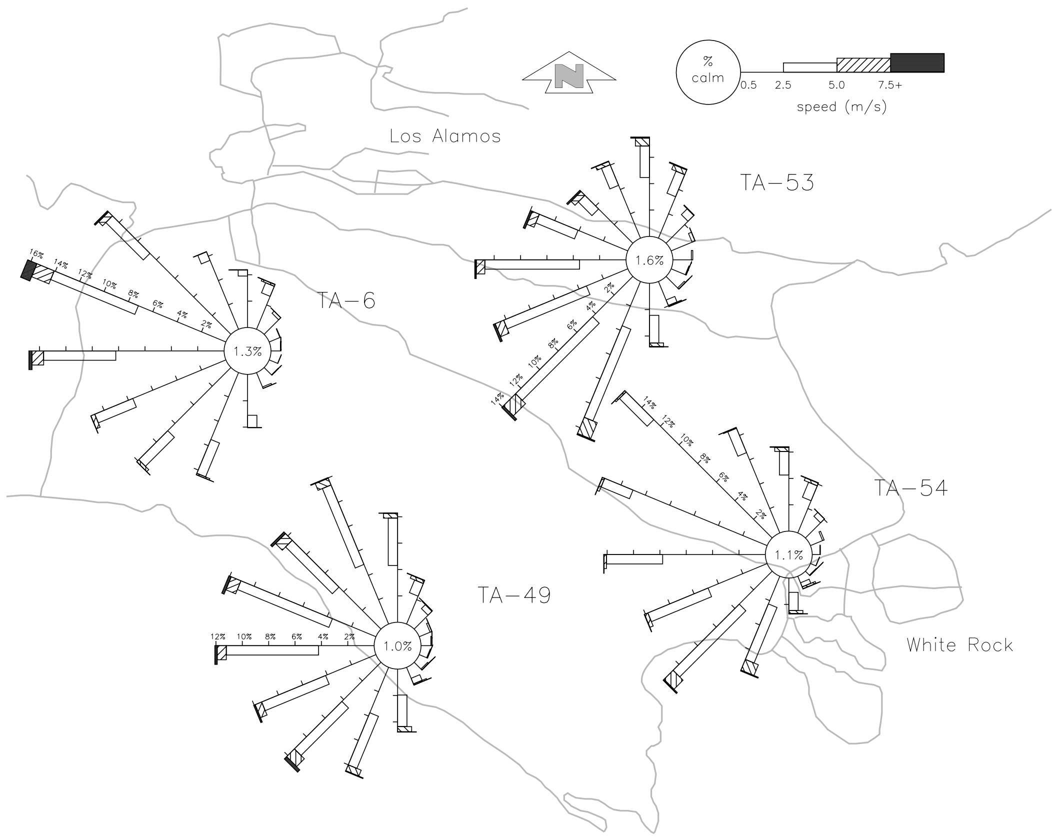


Figure 4.4.1-5. LANL Meteorological Stations with Nighttime Wind Rose Data.

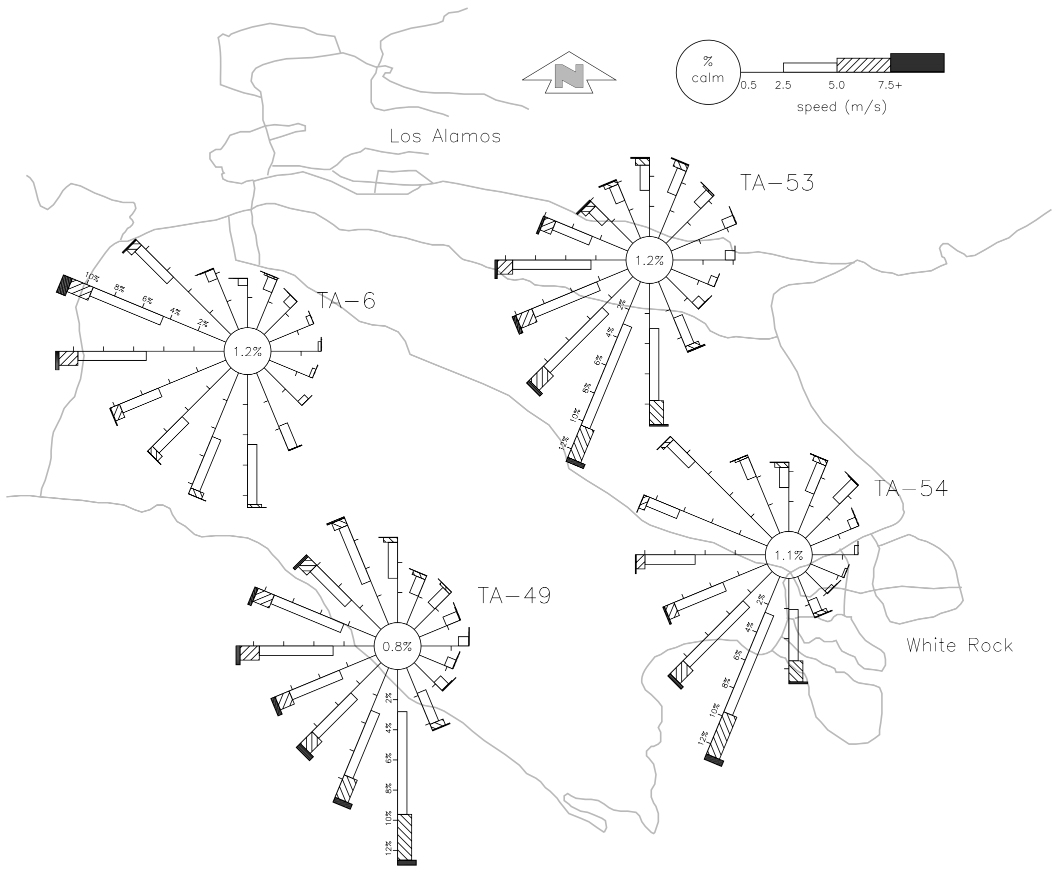


Figure 4.4.1-6. LANL Meteorological Stations with Total Wind Rose Data.

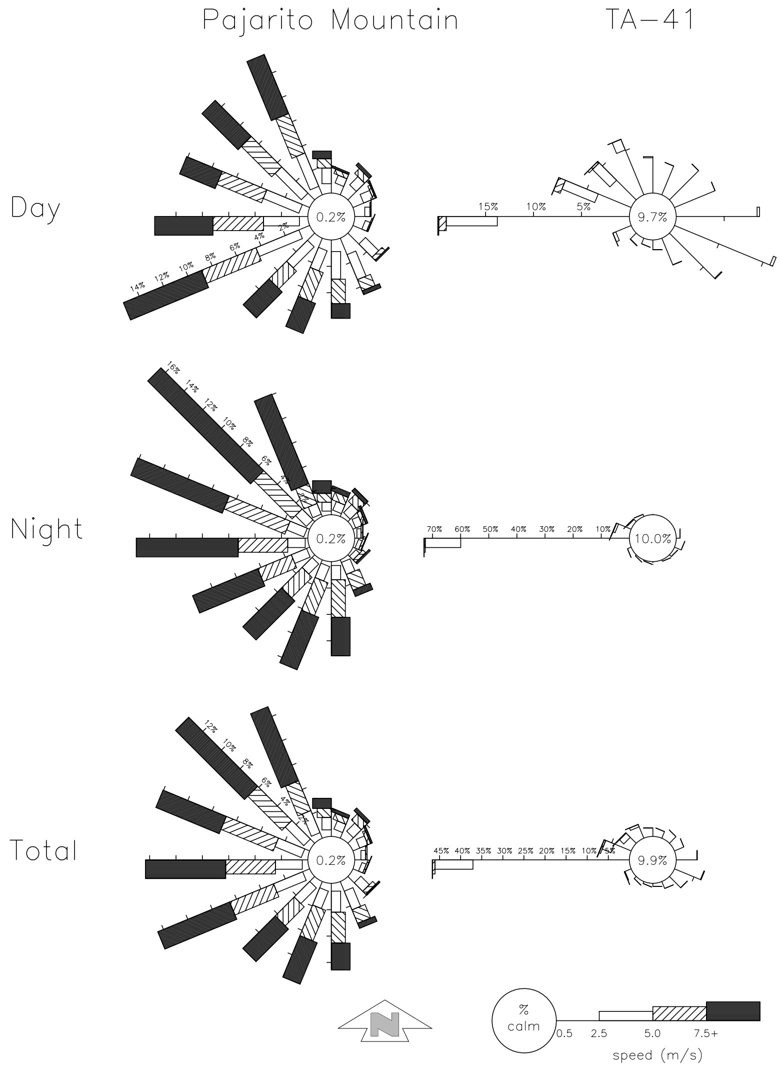


Figure 4.4.1-7. Pajarito Mountain and TA-41 Associated Wind Rose Data.

4.4.2 Nonradiological Air Quality - SWEIS 5-Year Update

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LANL operations can result in the release of nonradiological air pollutants that may affect the air quality of the surrounding area. Information regarding the applicable air quality standards and guidelines and existing nonradiological air quality will be presented in this section.

4.4.2.1 Applicable Requirements and Guidelines

The Clean Air Act (CAA) mandated that EPA establish National Ambient Air Quality Standards (NAAQS) for pollutants of nationwide concern. These pollutants, known as criteria pollutants, are carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, lead, and particulate matter. As of ~~September 16, 1997~~ **July 18, 1997**, in addition to the particulate matter (PM) equal to or less than 10 microns in aerodynamic diameter (PM_{10}) NAAQS, a new NAAQS became effective for particulate matter equal to or less than 2.5 microns (2.5 micrometers) in aerodynamic diameter ($PM_{2.5}$). **EPA plans to issue final $PM_{2.5}$ attainment designation status by December 2004. Areas designated as nonattainment will then have until December 2009 to implement controls to achieve compliance with this NAAQS.**

In 1997 EPA revised the NAAQS for ground-level ozone, setting it at 0.08 parts per million (ppm) averaged over an 8-hour time frame. Litigation delayed implementation of this standard for several years. However, in March 2002, the DC Circuit Court rejected all remaining challenges to the 8-hour ozone standard and EPA began implementing the requirements. The entire state of New Mexico, including Los Alamos County has been designated as attainment with the 8-hour ozone standard.

A primary NAAQS has been established for carbon monoxide and both primary and secondary standards have been established for the remaining criteria pollutants. National primary air quality standards define levels of air quality judged necessary, with an adequate margin of safety, to protect public health. National secondary ambient air quality standards define levels of air quality judged necessary to protect public welfare from any known or anticipated adverse effects of a pollutant. ~~There are only three nonattainment areas in New Mexico, and~~ **The area encompassing LANL and Los Alamos County is classified as an attainment area for all six criteria pollutants.**

The State of New Mexico has also established ambient air quality standards for carbon monoxide, sulfur dioxide, nitrogen dioxide, total suspended particulates (which is not PM10), hydrogen sulfide, and total reduced sulfur. Additionally, New Mexico established guidelines for toxic air pollutants. Toxic air pollutants are chemicals that are generally found in trace amounts in the atmosphere, but that can result in chronic health effects or increase the risk of cancer when they are present in amounts that exceed established occupational exposure limits. Because of the financial constraints and the unavailability of sufficient information on the effects of toxic air pollutants, New Mexico has not established ambient standards for toxic chemicals. To approach this issue, New Mexico has developed guidelines that are used by the NMED for determining if a new or modified source emitting a toxic air pollutant would be issued a permit under **20.2.72.402 New Mexico Administrative Code (NMAC).** ~~**Additionally, EPA has established exposure levels for toxic air pollutants, which are known or suspected human carcinogens.**~~

Almost all operations at LANL were in existence before August 31, 1972 **when the NMED air permit regulations were first applicable**. Therefore, air quality permits were not required. Air quality **construction** permits **are** obtained from the New Mexico Air Quality Bureau for ~~**beryllium**~~ operations that ~~**were**~~ **have been** modified or constructed after August 31, 1972. **A list of air quality permits, including construction permits and open burn permits, held by LANL is shown in Table 4.4.2.2.x.**

In accordance with Title V of the CAA, as amended, and 20.2.70 NMAC, UC and DOE submitted a CAA operating permit application to NMED in December 1995. The NMED issued a Notice of Completeness for this application, but for several years did not review the application or make any permitting decisions. In 2002 NMED requested that LANL submit a revised operating permit application. As requested, LANL submitted a revised operating permit application in November 2002. NMED issues a Notice of Completeness for this application also. A permit has yet to be issued.

The primary purpose of the operation permit program is to identify all state and federal air quality requirements applicable to LANL operations so that a single site-wide permit can be grated. Under this permit, UC would track pollutant emissions by reporting **semi-annual** emissions, based on chemical purchase data, **material and fuel usage**, knowledge of operations, and suitable emission factors.

~~The New Mexico ambient air pollutant guideline values **in 20.2.72.402** were used to evaluate **certain** toxic air pollutants in the SWEIS. Additional information pertaining to applicable federal and state air quality regulations is presented in chapter 7.~~

4.4.2.2 Sources of Nonradiological Emissions

Criteria pollutants released from LANL operations are emitted primarily from combustion sources such as boilers, **and** emergency generators. ~~**and motor vehicles**~~. **Although motor vehicle emissions have an impact on local air quality, no quantitative analysis of vehicle emissions was performed as part of the SWEIS. Instead, vehicle emissions were included in the assumed background concentrations for each of the criteria pollutants in the SWEIS analysis**. ~~Table 4.4.2.2-1 presents information regarding the major existing combustion sources that were analyzed for the SWEIS.~~ **Table 4.4.2.2.1 presents the sources of regulated air pollutants that are included in LANL's Title V operating permit application along with estimated**

emissions for 2000 and 2001. The sources that were included in the analysis for the original SWEIS are identified.

As part of the Title V operating permit application NMED requested that LANL provide a facility-wide air quality impacts analysis. The purpose of the analysis was to ensure that the emission limits requested in the Title V permit application would not cause exceedances of any NAAQS or New Mexico AAQS. The analysis was provided to NMED in July 2003 and demonstrated that simultaneous operation of all regulated air emission units described in the Title V permit application, being operated at their maximum requested permit limits will not result in exceedances of any ambient air quality standards. A copy of the report describing the details of this analysis is available through the LANL website (LA-UR-03-3983) [ref].

Toxic **and hazardous** air pollutant emissions (TAPs and HAPs) from LANL activities are released primarily from laboratory, maintenance, and waste management operations. Unlike a production facility with well-defined operational processes and schedules, LANL is a research and development facility with great fluctuations in both the types of chemicals emitted and their emission rates. DOE has a program to review ~~all~~ new operations for their potential to emit toxic **and hazardous** air pollutants. ~~Because past reviews demonstrate that LANL's toxic air pollutant emissions are below the state's permitting threshold limits, DOE is not required to monitor LANL's toxic air pollutant emissions.~~ **LANL has not been required to obtain any permits specifically for TAP emissions, and therefore there is no requirement to monitor for TAPs. Additionally, in the Title V operating permit application, LANL requested voluntary facility-wide limits on hazardous air pollutants to keep LANL below the major source threshold for HAPs. Past actual emissions of HAPs have been well below the threshold.**

In the original SWEIS a list of 382 chemicals of interest were selected for evaluation. A comparison of a calculated maximum emission rate derived from health-based standards to the potential emission rate from key LANL facilities was made. In this analysis, a screening level emission value (SLEV) was developed for each chemical and for each TA where that chemical was used. A SLEV is a theoretical maximum emission rate that, if emitted at that TA over a short-term (8-hour) or long-term (1-year) period, would not exceed a health-based guideline value (GV). This SLEV was compared to the emission rate that would result if all the chemicals purchased for use in the facilities at that TA over the course of 1 year were available to become airborne.

~~However, air toxic estimates~~ **Estimates for selected toxic and hazardous air pollutant emissions from key LANL facilities** were made **in the original SWEIS** based on chemical use at LANL and assumed stack and building parameters as discussed in chapter 5, section 5.1.4.1 **(DOE 1999)**. **Chemical purchasing records for these key facilities have been reviewed each year and estimated emissions reported in the annual SWEIS yearbooks (LANL 1999; LANL 2000; LANL 2001; LANL 2002). Although the amount of individual chemicals purchased varies from year to year,**

the total amount of the chemicals of interest have stayed relatively constant since the original SWEIS analysis. (+- x percent).

4.4.2.3 Existing Ambient Air Conditions

Only a limited amount of monitoring of the ambient air has been performed for nonradiological air pollutants within the LANL region. NMED operated a DOE-owned ambient air quality monitoring stations adjacent to BNM between 1990 and 1994 to record sulfur dioxide, nitrogen dioxide, ozone, and PM_{10} levels (Table 4.4.2.3-1). LANL and NMED discontinued operation of this station in fiscal year 1995 because recorded values were well below applicable standards.

New Mexico state **had** ambient air quality control standards for beryllium, which were repealed in 1995. To ensure that LANL's beryllium emissions did not exceed those standards, ambient air monitoring of beryllium was performed at LANL from ~~1989~~ **1988** to December 1995. This monitoring was performed at four on-site stations, four perimeter stations, and one regional station. The recorded beryllium levels were low, and as a result, beryllium monitoring was discontinued after December 1995. **Beryllium monitoring resumed in 1998 through December 2003 at over 20 sites located near potential beryllium sources at LANL or in nearby communities. Air concentrations remain very similar to those measured previously. For comparison purposes, the results were compared to the ambient standard from the National Emission Standard for Hazardous Air Pollutants (NESHAP) standard for beryllium of 10 nanograms per meter cubed (ng/m3) (40 CFR Part 61, Subpart C). LANL is not required to monitor to this standard because all beryllium permitted sources meet the emission standards, but it is used in this case for comparative purposes. All monitored beryllium values were 2 percent or less than the NESHAP standard.**

After the Cerro Grande fire in the spring of 2000, there was concern that LANL did not have an adequate baseline of nonradiological ambient air sampling. Therefore, in 2001 LANL designed and implemented a new air monitoring program, entitled NonRadNET, to provide nonradiological background ambient data under normal conditions. Funding for the NonRadNET program ended in late December 2002 with five full quarters of data collected. The NonRadNET program included real-time ambient sampling for total suspended solids (TSP), PM_{10}, and $PM_{2.5}$. Additionally, air samples were collected and analyzed for up to 20 inorganic elements and up to 160 volatile organic compounds (VOCs). The results for PM_{10} and $PM_{2.5}$ are included in Table 4.4.2.3-2. Results for the inorganic elements and the VOCs were all very low, well below any published ambient or occupational exposure limits. More information about this ambient monitoring program can be found in the report entitled "Nonradioactive Ambient Air Monitoring at Los Alamos National Laboratory 2001-2002" (LANL 2004 LA-UR-XX-XXXX).

Table 4.4.2.2-x. Air Quality Permits Held by LANL

Source	Permit	Date issued	Expiration date
Rock Crusher	Construction Permit #2195	**June 16, 1999**	None

Be Machining at TA-3-102	Construction Permit # 636	March 19, 1986	Withdrawn on 2/20/2004
Be Machining at TA-3-141	Construction Permit # 634-M2	October 30, 1998	None
Be Machining at TA-35-213	Construction Permit # 632	December 26, 1985	None
Be Machining at TA-55-4	Construction Permit # 1081-M1-R3	July 1, 1994. Revised March 11, 1998	None
Operational Burning at TA-16	Open Burning: TA-16-OB-2003	December 27, 2002	December 31, 2007
Operational Burning at TA-11	Open Burning: TA-11-OB-2003	December 27, 2002	December 31, 2007
Operational Burning at TA-14	Open Burning: TA-14-OB-2003	December 27, 2002	December 31, 2007
Operational Burning at TA-36	Open Burning: TA-36-OB-2003	December 27, 2002	December 31, 2007
Air Curtain Destructors	Open Burn Permit	June 20, 2001	September 30, 2003
FGR Installation at the Power Plant	Construction Permit #2195-B-R1	September 27, 2000	None
TA-33 Generator	Construction Permit 2195-F	October 10, 2002	None
Asphalt Plant	Construction Permit GCP-3-2195G	October 29, 2002	None
Data Disintegrator	Construction Permit 2195-H	October 22, 2003	None

Table 4.4.2.2-1. Emissions Sources and Projected Maximum Emissions as Included in LANL's Operating Permit Application (tons/year)

Source Category	NO_x	SO_x	CO	VOC	PM	PM_{10}	HAP
Air Curtain Destructors[a]	38.2	2.0	23.7	61.3	32.4	24.4	5.6
Asphalt Production*	0.2	0.0	2.6	0.1	0.5	0.5	0.1
Beryllium Machining[b]	—	—	—	—	1.09E-05	1.09E-05	7.60E-06
Small Boilers/Heaters*	37.2	0.3	31.9	2.4	3.3	3.3	0.8
Carpenter Shops	—	—	—	—	5.9	5.9	—
Chemical Use [c]*	—	—	—	30	—	—	13
Degreasers[c]	—	—	—	0.1	—	—	0.1
Internal Combustion*	49.1	5.2	22.0	2.0	2.2	2.2	0.04
Paper Shredder	—	—	—	—	13.0	13.0	—
Power Plant (TA-3)*	99.6	36.9	81.3	11.1	15.7	15.7	3.8
Remediation[d]	—	—	—	—	—	—	0.5
Rock Crusher	6.4	0.4	1.4	0.5	1.0	0.7	0.01
Steam Plant (TA-21)*	3.1	0.3	2.5	0.2	0.2	0.2	0.1
Storage Tanks[e]	—	—	—	0.8	—	—	0.4
Total	**234**	**45**	**165**	**108**	**74**	**66**	**24**
Total (without air curtain destructors)	**196**	**43**	**142**	**47**	**42**	**41**	**19**

* Included in original SWEIS analysis
(a) The air curtain destructors began operating at LANL in September 2001 as part of fire recovery efforts. They were removed in October 2003.
(b) Emissions from permitted activities. PM and PM_{10} include aluminum.
(c) "Projected" emissions estimated to be approximately double the actual emissions from most recent years.
(d) Only HAP emissions have been projected for future projects.
(e) Worst case emissions were calculated for one tank, and projected for all tanks subject to Clean Air Act requirements

Table 4.4.2.3-2. 2002 Ambient Air Monitoring for Particulate Matter

Station Location	Constituent	Annual Mean Monitored Value (g/m3)	NAAQS Primary Annual Standard (g/m3)

Diamond Drive	PM^{10}	Not Sampled	
	PM^{25}	8.5	15
Los Alamos Medical Center	PM^{10}	19.0	50
	PM^{25}	8.7	15
White Rock Fire Station	PM^{10}	19.0	50
	PM^{25}	8.2	15

4.4.3 Radiological Air Quality

(Contact: Dave Fuehne, RRES-MAQ, 665-3850, davef@lanl.gov)

Individuals are continuously exposed to airborne radioactive materials. These materials come primarily from natural sources such as radium and its daughters, including radon. However, airborne radioactive materials can also be emitted by manmade operations. For example, in 2003 the average Los Alamos resident received a radiation dose of 200 millirems from exposure to naturally occurring radon gas and a radiation dose of 0.06 millirems from LANL nuclear operations. Descriptions of the radiation doses received by individuals within Los Alamos County from recent routine LANL operations are presented in this subsection.

Some LANL operations may result in the release of radioactive materials to the air from point sources such as stacks or vents or from nonpoint (or area) sources such as the radioactive materials in contaminated soils. The concentration of radionuclides in point-source releases is continuously sampled or estimated based on knowledge of the materials used and the activities performed. Nonpoint-source emissions are directly monitored or sampled or estimated from airborne concentrations outdoors. Radionuclide emissions from LANL point and nonpoint sources include several radioisotopes such as tritium, uranium, strontium-90, and plutonium.

4.4.3.1 Radiological Emissions and Monitoring

Manmade sources of airborne radiological emissions include radioactive materials or radiation-producing equipment. At LANL, radiation sources are used in operations, primarily to support nuclear weapons research and development. Many LANL organizations or work groups use radioactive materials. These work groups are located in TAs throughout LANL.

The number of stacks that are continuously monitored for radiological air emissions varies, and is dependent on DOE operational and EPA radiological air emission monitoring requirements. As of July 2004, 28 stacks were continuously monitored to measure the air emissions for radioactive materials. DOE also operates an ambient air monitoring program (AIRNET) at LANL to measure the level of radionuclides in the air. In 2004, there were 15 on-site monitoring stations, 24 site perimeter monitoring stations, and 3 off-site monitoring stations at the Pueblos of San Ildefonso, Taos, and Jemez. Four background monitoring stations are also operated in Española, El Rancho, and Santa Fe. As activities with potential for increased releases change, on-site, site perimeter, and off-site monitoring stations will be added to the ambient air monitoring program (AIRNET) consistent with the requirements of the operational changes.

Currently, the largest contributors to LANL radiological point-source emissions are LANSCE and the tritium operations. LANL nonpoint sources of radiological emissions include fugitive emissions from the LANSCE facility, the PHERMEX facility at TA–15, the dynamic testing facility at TA–36, and low-level radioactive waste (LLW) disposal at Material Disposal Area (MDA) G. A list of radionuclides emitted from LANL operations during the period of 1990 through 1995 [THIS SHOULD BE UPDATED FOR 1998-2003] is presented in volume III, appendix B.

4.4.3.2 Radiological Emission Standards

Radiological air emission requirements are specified in 40 CFR 61, Subpart H, "National Emissions Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities." During 1991 and 1992, EPA cited DOE for exceeding the dose standard in 1990 and for LANL operations not being in full compliance with these requirements. Although there was a program for measuring emissions of radioactive materials, the program did not meet all of the provisions of Subpart H, including sample probe design criteria, placement, and quality assurance requirements. Upon enactment of Subpart H, LANL began assessing its existing air monitoring program in light of these new regulations (enacted in December 1989), and investigating the means to achieve compliance with those regulations. In June 1996, DOE and EPA signed a Federal Facility Compliance Agreement that specifies how UC will meet the requirements of 40 CFR 61, Subpart H (EPA 1996a). Since June 1996, DOE and UC have asserted that LANL operations are in full compliance.

A lawsuit by the Concerned Citizens for Nuclear Safety (CCNS) over these EPA citations was settled through a Consent Decree between CCNS and the DOE. One point under the Decree was a series of external audits of the LANL's compliance program. These audits looked at LANL operations for calendar years 1996, 1999, and 2001. The outcome of these audits was that while LANL did not meet all compliance points in 1996, the program was fully compliant in 1999 and 2001, and could be a "model program" for the DOE Complex. Following the completion of the final audit of 2001 operations and other criteria established in the Decree, this lawsuit was formally closed by the court in late 2003.

4.4.3.3 Radiation Doses from LANL Airborne Emissions

EPA regulations for radionuclide air emissions (40 CFR 61, Subpart H) require that doses be modeled in order to demonstrate compliance with the standard. Doses are also directly monitored as part of routine environmental monitoring but do not include some of the modeled pathways. The measured and modeled radiological doses for the maximally exposed individual (MEI) are presented in Table 4.4.3.3–1 for the period of 1990 through 1995. The location of the LANL MEI is assumed to be 2,625 feet (800 meters) north-northeast from the LANSCE ES–3 stack, where the maximum dose from the air pathway is received. The CAA Assessment Package for 1988 (CAP–88), an EPA-approved model, was used to calculate the dose to MEI. Different assumptions are used to estimate the measured and modeled doses. The CAP–88 model assumes that the MEI is stationary throughout the year and does not account for shielding from clothing or buildings. This model also assumes that the MEI ingests some food, milk, vegetables, and fruits grown at that location; inhales radioactive materials; and receives external exposure to radiation. This model also uses conservative dose conversion factors. Therefore, the modeled dose is generally higher than the actual measured dose.

Table 4.4.3.3–1. Dose to the MEI from Exposure to LANL Airborne Radionuclide Emissions (1990 Through 1995)[THIS SHOULD BE UPDATED FOR RECENT YEARS]

Year	Measured Dose[a]		Modeled Dose[b]	
	DOSE (millirem/year)	PERCENT OF EPA STANDARD	DOSE (millirem/year)	PERCENT OF EPA STANDARD
1990	3.1	31	15.3[c]	153
1991	Not Above Background[d]	-	6.5	65
1992	Not Above Background[d]	-	7.9	79
1993	3.1	31	5.6	56
1994	3.5	35	7.6	76
1995	2.3	23	5.1	51

a *Sources*: LANL 1994b, LANL 1995f, LANL 1996e, LANL 1996i, LANL 1993b, and LANL 1992b
b No shielding and an occupancy factor of 1.0 were used for calculating the modeled dose.
c This modeled dose is based on an MEI location that is 800 meters north/northeast of the LANSCE ES–3 stack. In 1990, no one resided at this location.
d In 1991 and 1992, the monitoring devices at the MEI location did not show doses above the background levels. This was because the monitoring devices were not sensitive enough to pick up small doses.

Measured doses are based on actual monitoring data taken from the monitoring station at the MEI location. This includes thermoluminescent dosimeters (TLDs) and air sampling stations. The measured doses do not take into account the inhalation or ingestion (breathing in or eating) of radioactive materials that are accounted for in the modeled dose.

EPA requires that emissions of radioactive materials to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 millirem. DOE received a notice of noncompliance from EPA for its emissions during 1990. This notice was issued because DOE applied a shielding factor (a factor that reduces the calculated dose to take credit for materials, such as clothing or walls of a residence, that can shield the MEI from the effects of radioactive emissions) in calculating the MEI dose without prior EPA approval; the MEI dose without use of the shielding factor exceeded the 10 millirem limit for 1990.

Comments on emissions levels:

Most estimates of emissions rates, etc., are adequate and have not significantly changed. These include TA-55, CMR, TA-48, etc. These emissions estimates were based on historical emissions levels, which won’t change too much year-to-year.

A comparison could be done for the tritium facilities at TA-21 & TA-16. Some of the "real" emissions levels have exceeded the SWEIS ROD values. From an off-site dose perspective, these changes are not significant, though.

The LANSCE emissions calculations are the biggest discrepancy. Some significant projects at TA-53 never took place (e.g., the Long-Pulse Spallation Source), while some other low-emission buildings have had elevated levels of emissions above the SWEIS projections. A re-evaluation of the LANSCE emissions might be a good idea. However, the SWEIS off-site projections are likely conservative (e.g., too high) so we are still operating within the "boundary" established by the SWEIS ROD.

Other comments:

There might be a couple monitored new stacks coming on line soon.

TA-54-412 will be monitored for the duration of a specific job (six months or so). This is part of the Solid Waste Processing key facility work at TA-54.

TA-16-202 might become monitored. This will be part of the Tritium Key Facility.

4.4.4 Visibility

(Contact: Dianne Wilburn, RRES-MAQ, 667-6952, dwwilburn@lanl.gov)

In accordance with CAA, as amended, and New Mexico regulations, the BNM and Wilderness Area have been designated as a Class I area (i.e., wilderness areas that exceed 10,000 acres (4,047 hectares) where visibility is considered to be an important value (40 CFR 81 and 20 NMAC 2.74) and requires protection. Visibility is measured according to a standard visual range, how far an image is transmitted through the atmosphere to an observer some distance away. Visibility has been officially monitored by the NPS at the BNM since 1988 (Table 4.4.4-1 reflects average visibility from 1993 through 2002) from approximately 79 to 113 miles (127 to 182 kilometers).

Table 4.4.4-1. Average Visibility Measurements at Bandelier National Monument (1993 to 2002)

Season	1993		1994		1995		1996		1997		1998		1999		2000		2001		2002	
	mi	km	mi	km	mi	km	mi	km	mi	km	mi	km	mi	km	mi	km	mi	km	mi	km
Winter	94	151	99	159	104	168	113	181	108	173	102	164	106	171	113	182	105	169	111	179
Spring	96	154	95	153	110	177	84	135	100	161	91	147	96	154	82	132	102	164	91	146
Summer	87	140	87	140	86	138	92	148	84	135	79	127	93	150	86	139	100	161	88	142
Fall	93	150	103	166	101	163	106	170	105	168	87	140	91	147	104	168	104	167	104	168

4.5 Ecological Resources and Biodiversity

An editorial point for the entire SWEIS document: no need to have author information after every plant or animal species name. This is only needed in monographs or when a species is in question—never used for common species.

Wetlands Working Group (WWG)

(Contacts: Laura Marsh, RRES-ECO, 665-6092, lkmarsh@lanl.gov)

The WWG was created with the general goal of better managing, studying, and mitigating wetlands for the institution. It consists of experts on wetlands and floodplains from Ecology, Water Quality and Hydrology, Earth and Environmental Sciences, and Environmental Restoration Project.

The WWG identified three main institutional wetlands goals: 1) compliance, 2) revise and develop new best management practices for working in and around wetlands, and 3) long-term management of wetlands for the Laboratory. We identified goals of the WWG as 1) the ability to field institution-wide questions regarding wetlands, particularly in terms of projects and compliance, 2) provide assistance in institution- and project-level decision making, 3) provide data resources, and 4) generate projects as necessary to support institutional needs. The group as a whole listed several capabilities, including ecorisk analysis, research on many topics, delineation, best possible science practices, recommendations on compliance, decision analysis, adverse impacts assessments, compliance document writing, monitoring, mitigation, management, hydrology and geochemistry, wildlife and floristic studies, subsurface hydroenvironment analysis, and an overall knowledge of many levels of issues facing wetlands.

We developed a detailed outline for the Floodplains and Wetlands Management Plan, a document for DOE that is not completed due to lack of funding.

4.5.1 Ecological Resources

(Contact: Leslie Hansen, RRES-ECO, 665-9873, hansenl@lanl.gov)

LANL is located in a region of diverse landform, elevation, and climate—features that have contributed to producing in New Mexico one of the world's most diversified plant and animal communities. The combination of these features, including past and present human use, has given rise to correspondingly diverse, and often unique, biological communities and ecological relationships in Los Alamos County and the region as a whole. Plant communities range from urban and suburban areas to grasslands, wetlands, shrublands, woodlands, and mountain forest, and provide habitat for a wealth of animal life. This richness of animal life includes herds of elk and deer, bear, mountain lions, coyotes, rodents, bats, reptiles, amphibians, invertebrates, and a myriad of resident, seasonal, and migratory bird life. In addition, numerous threatened, endangered, species of concern, and other sensitive species utilize LANL resources. Because of restricted access to LANL lands and management of contiguous BNM for natural biological systems, much of the region provides a refuge for wildlife.

The interfingering of deep, steep-sided canyons with narrow mesas that descend the east slopes of the Jemez Mountains and an inversion of the normal altitudinal distribution of vegetation communities along the canyon floors result in many transitional overlaps of plant and animal communities and increased biological diversity. It is this dominant feature of the Pajarito Plateau, in combination with an elevational descent of almost a mile from mountain ridges to the Rio Grande, that has made a major contribution to the species richness and diverse ecological relationships that characterize the Pajarito Plateau.

> *Since the turn of the century, logging has been an important industry on the Pajarito Plateau. Sawmills were small and easily portable, dragged from place to place to follow the loggers. The output, mostly poles and railroad ties, was hauled by wagon to lumber yards along the Denver and Rio Grande Western Railroad. One small mill site lies at the head of Alamitos mesa. This was McCurdy's mill, one of a number of logging camps that itinerant lumberman H.T. McCurdy established on the Pajarito Plateau in the 1920's. Now little remains to mark the location but a round clearing and some mill debris. Elk bed in the tall grass and western tanagers sing from the tree tops. Source: Los Alamos Outdoors (Hoard nd)*

4.5.1.1 A Regional Approach

(Contact: Laura Marsh, RRES-ECO, 665-6092, lkmarsh@lanl.gov)

Administrative boundaries do not often coincide with ecological boundaries, which are frequently boundaries that vary in space and time and at multiple scales. LANL facilities, infrastructure, operations, and impacts (positive, negative, and undetermined) are immersed in the patterns and processes of a complex and fragile regional landscape. Weather, geomorphic and elevational variation, soils, plant, and animal communities, and major canyon systems are continuous across the jurisdictional boundaries of LANL, the NPS, the USFS, the regional Pueblos, and other regional land stewards. Seasonal migration routes for thousands of elk and deer in the region and foraging or hunting ranges of black bears and mountain lions ignore map boundaries such as fences that define these boundaries on the landscape. North American migratory birds who winter-over in Central and South America return to the region to breed during the spring and summer. Because of this ecological continuity and "interconnectedness" of patterns of vegetation and wildlife populations, along with the ecological processes that shape and sustain them, the "site" to be analyzed in this SWEIS is the larger regional ecosystem.

Two landscape-based organizational themes are used to present the data in this section from a regional ecosystem perspective: watershed units and major vegetation zones. The general area included for analysis is shown in Figure 4.5.1.1–1, LANL Technical Areas and Watersheds. Descriptions of specific vegetation ecosystem components such as air, soils and sediments, and surface and groundwater can be found in other subsections of this report and associated technical reports.

Watershed Unit

- Need to look up anything more current than EPA 1994. Newer info: EPA 2001. Protecting and Restoring America's Watersheds Protecting and Restoring America's Watersheds: Status, Trends, and Initiatives in Watershed Management. EPA-840-R-00-001.

Traditionally, environmental impact assessments have considered air quality, water resources, wildlife, and human communities as separate entities for analysis. Recognition of the interconnectedness of land, water, and human resources has encouraged many federal and state agencies to undertake ecosystem or watershed approaches to environmental protection (CEQ 1997). For example, EPA is promoting multi-organizational, multiobjective, watershed management projects across the nation. This shift toward comprehensive watershed management has helped lead EPA toward a "place-based approach" to environmental problem solving (EPA 1994).

Watersheds are natural boundaries that provide a common template for integrating multiple tasks, including ecological resource description, analysis, and management, thereby enhancing efficiency and economy. The complex canyon/ mesa topography and pronounced elevational gradients of LANL region are particularly well suited to this approach because regional watersheds:

- Are relatively discrete landscape units with a hierarchical structure.

- Are relatively closed systems in terms of many ecological components and processes such as hydrologic regime, nutrient cycling, contaminant transport, erosion, and sedimentation.

- Provide an ecologically consistent template for organizing information on ecosystem components, such as landscape-wide vegetation zones as well as resident and migratory wildlife populations (including threatened and endangered species, and wetlands).

The regional LANL ecosystem has been more precisely delineated by incorporating watershed boundaries as shown in Figure 4.5.1.1–1. As mapped, this area includes 14 regional watersheds bounded by Guaje Canyon on the north, Frijoles Canyon on the south, the crest of the Jemez Mountains on the west, and the Rio Grande on the east. Because of their downstream hydrologic connection to LANL and the function boundary of Cochiti Dam, the White Rock Canyon stretch of the Rio Grande and Cochiti Lake were also included in this analysis. Summary information is presented in Table 4.5.1.1–1.

Major Vegetation Zones

- Vegetation zones have been redefined in the new Land Cover Map: McKown, Koch, and Balice 2003. Land cover classification map for the eastern Jemez Mountains. LA-14029.

- There have also been landscape-wide changes in vegetation from the CGF and drought/bark beetle infestation. See section being written by Sam on drought/bark beetle. There are no pubs at present, but Balice and Breshers can be cited as “pers. com.”

While watersheds traverse all or part of the elevational gradient, major vegetation zones are organized into elevation- and aspect-defined bands across this gradient. Increasing temperature and decreasing moisture along the approximately 12-mile (19-kilometer) wide, 5,000-foot (1,500-meter) elevational gradient from the peaks of the Jemez Mountains to the Rio Grande are primarily responsible for the formation of five broad bands, containing six major vegetation zones. These vegetation zones are defined by the dominant vegetation species. Plant and animal communities similar to those found throughout the southern Rocky Mountain region live within these vegetation zones (Bailey 1980).

From the western crest of the Pajarito Plateau to the Rio Grande, the six vegetation zones that characterize the LANL region consist of montane grasslands, spruce-fir forest, mixedconifer forest (with aspen forest), ponderosa pine forest, pinyon-juniper woodland, and juniper savannah. These vegetation zones are depicted on Figure 4.5.1.1-2. The major plant communities of each watershed and areal coverage are depicted in Table 4.5.1.1-2. The montane grassland, spruce-fir, and mixed conifer vegetation zones are located primarily west of LANL with little representation on the laboratory proper. The vegetation zones and associated ecotones provide habitat, including breeding and foraging territory, and migration routes for a diversity of permanent and seasonal wildlife species. This diversity is illustrated by the presence of over 900 species of vascular plants; 57 species of mammals; 200 species of birds, including 112 species known to breed in Los Alamos County; 28 species of reptiles; 9 species of amphibians; over 1,200 species of arthropods; and 12 species of fish (primarily found in the Rio Grande, Cochiti Lake and the Rito de los Frijoles). No fish species have been found within LANL boundaries.

Characteristics of each zone are presented in Table 4.5.1.1-3. The Fenton Hill site (TA-57) is on the southwestern side of the Valles Caldera, on a mesa top location (Lake Fork Mesa) on the Jemez Plateau. This site is at an elevation of 8,660 feet (2,640 meters), and its vegetation characteristics at this elevation are those described in Table 4.5.1.1-3. Table 4.5.1.1-4 is a summary of conditions for each vegetation zone that existed about 1850, human and natural disturbances that have altered these historic conditions, and current conditions resulting from these ecological perturbations.

4.5.1.2 Wetlands

(Contact: Laura Marsh, RRES-ECO, 665-6092, lkmarsh@lanl.gov)

Wetlands are transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of the National Wetlands Inventory, conducted by the FWS, which included an inventory of wetlands in the LANL region, wetlands must have one or more of the following attributes:

- At least periodically, the land supports predominantly hydrophytes (plants adapted to abundant water such as cattails and willows).
- The substrate is predominantly undrained hydric soil (e.g., marshes, wet meadows).
- The substrate is nonsoil (e.g., gravel, stones) and is saturated with water or covered by shallow water at some time during the growing season of each year.

A 1990 survey (based on interpretation of aerial photographs) identified a total of 39 acres (16 hectares) of wetlands within LANL boundaries (FWS 1990). A 1996 field survey by LANL personnel identified an estimated 50 acres (20 hectares) of wetlands within LANL boundaries, based on the presence of wetland vegetation (hydrophytes). The LANL survey determined that more than 95 percent of the identified wetlands are located in the Sandia, Mortandad, Pajarito, and Water Canyon watersheds (Bennett 1996). Wetland locations in the general area of LANL are shown on Figure 4.5.1.2–1.

Wetlands in the general LANL region provide habitat for reptiles, amphibians, and invertebrates (e.g., insects), and potentially contribute to the overall habitat requirements of the peregrine falcon, Mexican spotted owl, southwestern willow flycatcher, and spotted bat, all of which are federal- or state-listed species, or both. 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 or seeps. Cochiti Lake and the area near the LANL Fenton Hill site (TA–57) support lake-associated wetlands. There are also some springs within White Rock Canyon.

Currently, about 13 acres (5 hectares) of wetlands within LANL boundaries are caused or enhanced by process effluent wastewater from 38 NPDES-permitted outfalls. These artificially created wetlands are afforded the same legal protection as wetlands that stem from natural sources. In 1996, the effluent from NPDES outfalls, both storm water and process water, contributed 108 million gallons (407 million liters) to wetlands within LANL boundaries (Garvey 1997). Nearly half of the NPDES outfalls at LANL are probable sources of drinking water for large mammals (Foxx and Edeskuty 1995). Data regarding the wetlands that occur within the LANL region are presented by watershed in Table 4.5.1.2-1. Information pertaining to wetlands in the general LANL area and their previous condition, current condition, and the human disturbances that have influenced and shaped them are presented in Table 4.5.1.2-2.

The definition of wetlands used by DOE is not the one in the SWEIS. DOE uses the US Army Corps of Engineers definition, which defines an (arid) wetland as having all three of the following characteristics: a) at least periodically, the land supports predominantly hydrophytes, b) the substrate is predominantly undrained or saturated hydric soils or those which produce anaerobic, reducing conditions during the time of water presence, c) The area in question shows signs of water availability by being saturated with water or covered in shallow water, or if dry by showing a clear hydrology via culverts, water channels or other means of drainage into the wetland.

- The National Wetlands Inventory is obsolete and needs to be ground-truthed. There are few wetlands we can keep on a map for LANL with confidence as most of them have not been redelineated in over 10 years (or definitely more than 5 years). The last field survey of wetlands at LANL was in 1996.

- There need to be new maps for wetlands across LANL, but we have no funding to do this or the field survey to correct the current system. Thus there is minimal updated data in the current wetland database.

- There needs to be a sentence in there about wetlands acting as good sinks for contaminants, and without them we are unsure what the contaminant movement may be.

- There is a Wetlands Working Group established for LANL in 2000 by L. Marsh (chair). There are 16 members who meet whenever there are lab-wide questions regarding projects that may impact them.

- The Cerro Grande Fire changed some of the wetlands and drainage patterns around LANL, as did retention and weir structures affiliated with the CGF.

- There are new outfalls and old ones that have been shut off. We need new info on this. There will need to be new compilation of Table 4.5.2-1 as a result of new wetland surveys and outfall data.

- Table 4.5.1.2-2 Need to add all retention structures added after CGF under Human Disturbances. This simply means adding the words “retention structures” to the tables.

- An editorial point: no need to have author information after every plant or animal species name. Only needed in monographs or when a species is in question—never used for common species.

4.5.1.3 Canyons

(Contact: Sam Loftin, RRES-ECO, 665-8011, sloftin@lanl.gov)

The complex interactions of geology, water, climate, vegetation, and other living organisms are still carving the deep, vein-like canyon systems into the relatively soft Bandelier Tuff of the Pajarito Plateau. From their narrow, thickly forested beginnings on the flanks of the Jemez Mountains, to their confluence with the Rio Grande, major canyons are associated with the six major vegetation zones present in the LANL region. The plateau canyons range in depth from about 200 to 600 feet (60 to 180 meters). The steeply sloping, north-facing canyon walls and canyon bottoms are shadier and cooler and have higher levels of humidity and soil moisture than the often nearly vertical, south-facing canyon walls, which are sunnier, hotter, and more arid. These differences in slope, aspect, sunlight, temperature, and moisture cause a dramatic shift in major vegetation zones on canyon walls and in canyon bottoms beyond their typical range of elevation. This "canyoneffect" is responsible for the fingers of coniferous forest extending down regional canyons.

Canyons in this region reflect the effects of natural and human-caused disturbances on the surrounding environment. Data on the interactions of the disturbances within the region and some effects of these interactions on canyon ecosystems is presented in Table 4.5.1.3-1. The greatest impact to canyon ecosystems in the past five years has been the loss of mature forest to the Cerro Grande Fire of 2000 and bark beetle-induced mortality in 2002-2004 (see Section XX).

While the Rito de los Frijoles in BNM and the Rio Grande are the only truly perennial streams in the region, many canyon floors contain reaches of perennial surface water, such as the perennial streams draining LANL property from lower Pajarito and Ancho Canyons to the Rio Grande (Cross et al. 1996). Wetlands are common features of these isolated stretches of perennial water in the canyons where springs and seeps return groundwater to the surface throughout the year. As stated, many wetlands are caused or enhanced by process effluent water from **38 NPDES-permitted outfalls** (check number). Surface water flow occurs in canyon bottoms seasonally, or intermittently, as a result of spring snowmelt and summer rain. A few, short sections of riparian vegetation of cottonwood and willow and other water-loving plants are present in scattered locations on LANL as well as along the Rio Grande in White Rock Canyon. The relatively abundant moisture concentrated between the temperature moderating canyon walls allows a diverse array of plant and animal species to exist in these canyons at elevations that exceed the normal upper and lower elevational limits for these species.

Wildlife is abundant and diverse in the canyons. The canyons contain a more complex mix of habitats than the adjacent mesa tops and provide nest and den sites, food, water, and travel corridors. Mammals and birds are especially evident in these environments. Large mammals, such as black bears (*Ursus americanus*), mountain lions (*Felis concolor*), bobcats (*Lynx rufus*), coyotes (*Canis latrans*), raccoons (*Procyon lotor*), elk (*Cervus elaphus nelsoni*), and mule deer (*Odocoileus hemionus*) are known to use some portion of nearly all regional canyons.

Regional canyon systems also are essential to a variety of state-protected and federally protected species. The north-facing slopes of these canyons provide habitat for isolated populations of rare species, like the stateendangered yellow lady slipper orchid (*Cypripedium calceolus L.* var. *pubescens (Willd.) Correll)* as well as the Jemez Mountains salamander (*Plethodon neomexicanus*), a federal species of concern and state-threatened species (section 4.5.2). Mexican spotted owls (*Strix occidentalis lucida*) and

American peregrine falcons (*Falco pereginus anatum*) are known to nest in the canyons of the region, and bald eagles (*Haliaeetus leucocephalus*) roost in canyon mouths along the Rio Grande during the winter. The southwestern willow flycatcher (*Empidonax traillii extimus*) is a likely migrant. Numerous bat species, including nine federal species of concern, use canyons in this region for roosting, breeding, and foraging.

4.5.1.4 Rio Grande

(Contact: Sam Loftin, RRES-ECO, 665-8011, sloftin@lanl.gov)

The watersheds draining the Jemez Mountains and the Pajarito Plateau are tributary to the Rio Grande, the fifth largest watershed in North America (Durkin et al. 1995). Approximately 11 miles (18 kilometers) of LANL's eastern boundary border on the rim of White Rock Canyon or descend to the Rio Grande. The riverine, lake, and canyon environment of the Rio Grande as it flows through White Rock Canyon makes a major contribution to the biological resources and significantly influences ecological processes of the LANL region.

The Rio Grande, like most rivers in North America, has been significantly altered throughout much of its length. The collective actions of humans, particularly since about 1850, have significantly altered, and continue to alter, its hydrogeologic regime and plant and animal communities as a consequence of water storage and flood control facilities, irrigated agriculture, watershed degradation, drainage, floodplain development, fragmentation, and the introduction of nonnative plants and animals. These consequences are particularly evident south of LANL in the middle Rio Grande Valley. The relatively recent construction of Cochiti Dam at the mouth of White Rock Canyon for flood and sediment control, recreation, and fish and wildlife purposes, has contributed to these changes and has significantly changed the features of White Rock Canyon and introduced new ecological components and processes. Water storage, particularly high floodwater storage during 1979 and 1985 to 1987, inundated riparian vegetation dominated by one-seeded juniper (*Juniperus monosperma* Engelm. *Sarg.*) and isolated individuals and small stands of cottonwood, (*Populus deltoides* Bartr. Ex Marsh. Ssp. *Wislizeni* (S. Wats.) Eckenwalder) willow (*Salix* spp.), boxelder (*Acer negundo* L.), and ponderosa pine (*Pinus ponderosa* Laws. var. *Scopulorum* Engelm.), and associated understory vegetation. Some of the denser concentrations of riparian vegetation were located at the mouths of tributary canyons. Sediment deposited along the banks of the river has been colonized by nonnative plants such as salt cedar (*Tamarix pentandra* Pall.), Russian olive (*Eleagnus angustifolia* L.), mullein (*Verbascum thapsus* L.), and perennial pepperweed (*Lepidium latifolium* L.)

Water storage in Cochiti Lake has greatly expanded aquatic communities and has fostered the development of two large wetlands, one on the Santa Fe River arm of the lake and the other at the expanding delta at the head of Cochiti Lake. The presence of these aquatic features has benefited a wide diversity of wildlife, including waterfowl, shorebirds, and threatened and endangered species such as the bald eagle and the peregrine falcon.

Summary information pertaining to the past and present conditions of the Rio Grande is presented in Table 4.5.1.4–1. This table generally focuses on the Rio Grande above Cochiti Dam.

New References:

Allen, C.D. and D.D. Breshears. 1998. Drought-Induced Shift of a Forest-Woodland Ecotone: Rapid Landscape Response to Climate Variation. Vol. 95, pp. 14839-14842. Proceedings of the National Academy of Sciences USA.

Los Alamos National Laboratory (LANL). 1998. Threatened and Endangered Species Habitat Management Plan. LA-CP-98-96. Los Alamos National Laboratory, Los Alamos, NM.

4.5.1.5 Protected and Sensitive Species

(Contact: Leslie Hansen, RRES-ECO, 665-9873, hansenl@lanl.gov)

The presence and use of LANL by protected and sensitive species is influenced not only by the actual presence and operation of the facility, but by management of contiguous lands and resources, and, importantly, by 150 years of human use.

A number of regionally protected and sensitive (rare or declining) species have been documented in the LANL region. These consist of 3 federally endangered species, 2 federally threatened species, and 18 species of concern (species that may be of concern to FWS but do not receive recognition under the *Endangered Species Act*, and that FWS encourages agencies to include in NEPA studies). Species listed as endangered, threatened, or rare or sensitive by the State of New Mexico are also included in this listing. The New Mexico "sensitive" taxa are those taxa that, in the opinion of a qualified New Mexico Department of Game and Fish (NMDGF) biologist, deserve special consideration in management and planning, and are not listed as threatened or endangered by the State of New Mexico. A summary of the available habitat and pertinent siting information for these species is presented in Table 4.5.1.5–1. DOE and LANL coordinate with the NMDGF and FWS to locate and conserve these species (LANL 1998c).

Table 4.5.1.5-1. Protected and Sensitive Species

Species	USFWS Status	State of NM Status
Rio Grande Chub		Sensitive (informal)
Jemez Mountain Salamander	Species of concern	Threatened
American Peregrine Falcon	Species of concern	Threatened
Arctic Peregrine Falcon	Species of concern	
Southwestern Willow Flycatcher	Endangered	Endangered
Bald Eagle	Threatened	Threatened

Mexican Spotted Owl	Threatened	Sensitive (informal)
Northern Harrier	Bird of Conservation Concern	
Northern Goshawk	Species of concern	Sensitive (informal)
Ferruginous Hawk	Bird of Conservation Concern	
Golden Eagle	Bird of Conservation Concern	
Prairie Falcon	Bird of Conservation Concern	
Yellow-billed Cuckoo	Candidate	Sensitive (informal)
Flammulated Owl	Bird of Conservation Concern	
Lewis's Woodpecker	Bird of Conservation Concern	
Williamson's Sapsucker	Bird of Conservation Concern	
Gray Vireo	Bird of Conservation Concern	Threatened
Pinyon Jay	Bird of Conservation Concern	
Bendire's Thrasher	Bird of Conservation Concern	
Crissal Thrasher	Bird of Conservation Concern	
Virginia's Warbler	Bird of Conservation Concern	
Black-throated Gray Warbler	Bird of Conservation Concern	
Grace's Warbler	Bird of Conservation Concern	
Sage Sparrow	Bird of Conservation Concern	
Broad-billed Hummingbird		Threatened
Loggerhead Shrike		Sensitive (informal)
Western small-footed myotis		Sensitive (informal)
Long-eared myotis		Sensitive (informal)
Long-legged myotis		Sensitive (informal)
Fringed myotis		Sensitive (informal)
Yuma myotis		Sensitive (informal)
Spotted bat		Threatened
Townsend's big-eared bat	Species of concern	Sensitive (informal)
Big free-tailed bat		Sensitive (informal)
Black-footed ferret	Endangered	
Goat Peak pika	Species of concern	Sensitive (informal)
New Mexico Meadow Jumping Mouse	Species of concern	Threatened
Ringtail		Sensitive (informal)
New Mexico silverspot butterfly	Species of concern	
Wood Lily		Endangered
Yellow Lady's Slipper Orchid		Endangered
Sapello Canyon Larkspur		Species of concern
Springer's blazing star		Species of concern
Species	USFWS Status	State of NM Status
Rio Grande Chub		Sensitive (informal)

Jemez Mountain Salamander	Species of concern	Threatened
American Peregrine Falcon	Species of concern	Threatened
Arctic Peregrine Falcon	Species of concern	
Southwestern Willow Flycatcher	Endangered	Endangered
Bald Eagle	Threatened	Threatened
Mexican Spotted Owl	Threatened	Sensitive (informal)
Northern Harrier	Bird of Conservation Concern	
Northern Goshawk	Species of concern	Sensitive (informal)
Ferruginous Hawk	Bird of Conservation Concern	
Golden Eagle	Bird of Conservation Concern	
Prairie Falcon	Bird of Conservation Concern	
Yellow-billed Cuckoo	Candidate	Sensitive (informal)
Flammulated Owl	Bird of Conservation Concern	
Lewis's Woodpecker	Bird of Conservation Concern	
Williamson's Sapsucker	Bird of Conservation Concern	
Gray Vireo	Bird of Conservation Concern	Threatened
Pinyon Jay	Bird of Conservation Concern	
Bendire's Thrasher	Bird of Conservation Concern	
Crissal Thrasher	Bird of Conservation Concern	
Virginia's Warbler	Bird of Conservation Concern	
Black-throated Gray Warbler	Bird of Conservation Concern	
Grace's Warbler	Bird of Conservation Concern	
Sage Sparrow	Bird of Conservation Concern	
Broad-billed Hummingbird		Threatened
Loggerhead Shrike		Sensitive (informal)
Western small-footed myotis		Sensitive (informal)
Long-eared myotis		Sensitive (informal)
Long-legged myotis		Sensitive (informal)
Fringed myotis		Sensitive (informal)
Yuma myotis		Sensitive (informal)
Spotted bat		Threatened
Townsend's big-eared bat	Species of concern	Sensitive (informal)
Big free-tailed bat		Sensitive (informal)
Black-footed ferret	Endangered	
Goat Peak pika	Species of concern	Sensitive (informal)
New Mexico Meadow Jumping Mouse	Species of concern	Threatened
Ringtail		Sensitive (informal)
New Mexico silverspot butterfly	Species of concern	
Wood Lily		Endangered
Yellow Lady's Slipper Orchid		Endangered
Sapello Canyon Larkspur		Species of concern

Springer's blazing star		Species of concern

For the consultation procedures of the *Endangered Species Act of 1973* (42 U.S.C. §1531) and section 7(c) of the 1978 amendments, DOE has compiled information on five threatened and endangered species that are present, or potentially present, on LANL to assess possible effects that the proposed action, including the two project-specific proposals, would have on these species. None of these species have been found on or in the vicinity of Fenton Hill site (LANL 1995g). A biological assessment has been formally submitted to the FWS. The FWS provided comments on this biological assessment as part of its response to the draft SWEIS. These comments are being addressed and an amended biological assessment will be submitted to the FWS in continuation of the Section 7 consultation process.

Species Listed as Endangered or Threatened Under the *Endangered Species Act*

The species listed below utilize LANL as seasonal residents or during migration.

Endangered Species. American Peregrine Falcon (*Falco peregrinus anatum*). The peregrine falcon (state-listed as threatened) is a summer resident and migrant on the Pajarito Plateau. Peregrines do not nest within LANL boundaries but do nest on surrounding lands in the Jemez Mountains. Both adult and immature birds have been observed foraging on LANL, with the entire site providing suitable foraging habitat (LANL 1998c). The preferred prey of peregrine falcons includes doves, pigeons, and waterfowl, all captured in flight. Peregrine falcons also use the Rio Grande corridor during migration.

The southwestern willow flycatcher (*Empidonax traillii extimus*) (state-listed as endangered) occurs in riparian habitats along rivers, streams, or other wetlands, where dense growths of willows (*Salix* and *Baccharis* sp.), arrowweed (*Pluchea* sp.), tamarisk (*Tamarix* sp.), or other plants are present, often with a scattered overstory of cottonwood (*Populus* sp.). A possible migrant southwestern willow flycatcher was located on LANL during May 1997. Potential suitable nesting habitat is present on LANL but, in general, is limited. Southwestern willow flycatchers have been observed at higher elevations in the Jemez Mountains west of LANL and at lower elevations along the Rio Grande in the vicinity of Española.

Whooping cranes (*Grus americana*) in New Mexico (state-listed as endangered) are part of an experimental "cross-fostering" population that was established at Grays Lake National Wildlife Refuge, Idaho, in 1975. These birds migrate southward to winter in New Mexico in the autumn, and most winter in the middle Rio Grande Valley. Here, whooping cranes occupy the same habitats as their foster-parent sandhill cranes. Foraging areas are generally agricultural fields and valley pastures, particularly where there is waste grain or sprouting crops. Both species of cranes roost together, typically on sand bars in the Rio Grande. The cross-fostering program was terminated in 1989 because the birds were not pairing and the mortality rate was too high to establish a self-sustaining population. Only three whooping cranes remain.

Three whooping cranes were led from Idaho to Bosque del Apache National Wildlife Refuge in New Mexico in 1997 as part of a research project to determine if captive-reared cranes can be taught to follow an ultralight aircraft along a migration route and, when released on a wintering area, will migrate north in spring to their natal area without human assistance. Survivors will be left in the wild.

The association of whooping cranes with LANL has been limited to overflights and possible occasional roosting (the latter on sandbars in White Rock Canyon). Limited night roosting at the Santa Fe River arm of Cochiti Lake has been observed during migration.

A proposal to designate the Rocky Mountain whooping cranes as "experimental nonessential" was published in the *Federal Register* (FR) in February 1996. A final ruling was published on July 21, 1997. For purposes of the Section 7(a)(2) consultation procedures under the *Endangered Species Act*, this designation will result in the treatment of the Rocky Mountain whooping cranes as a species proposed to be listed under Section 4 of the *Endangered Species Act*.

Threatened Species. Bald Eagle (*Haliaeetus leucocephalus*). In the general LANL area the bald eagle (state-listed as threatened) is a common late fall and late winter migrant and winter resident (November through March). The wintering bald eagle population in the general area has significantly increased since 1975 as a consequence of both the creation of nearby Cochiti Lake and a general increase in bald eagle populations. The Rio Grande in White Rock Canyon and connecting Cochiti Lake are focal use areas and are used by wintering bald eagles to forage for fish and waterfowl. Trees and rock cliffs that border the Rio Grande in White Rock Canyon are used as hunting and loafing perches, and canyons that dissect the Pajarito Plateau are used as night roosts. Bald eagles have been observed soaring over LANL, and some limited foraging for small mammals and carrion probably occurs over much of LANL. There is no evidence of historical or present nesting in the general region.

Critical Habitat

The specific areas within the geographic area occupied by a species on which are found those physical and biological features: (1) essential to the conservation of the species, (2) that may require special management considerations or protection, and (3) include specific areas outside the geographical area occupied by a species at the time it is listed, but are areas which are essential for the conservation of the species.

Mexican Spotted Owl (*Strix occidentalis lucida*). The Mexican spotted owl is a strictly nocturnal bird that prefers tall, old-growth forests in narrow, steep canyons where little light penetrates and cool temperatures and moist areas are present. Small mammals, especially wood rats, make up the bulk of the owl's diet. The Jemez Mountains, including areas within LANL and contiguous lands administered by the NPS, USFS, and the BLM provide habitat for the Mexican spotted owl. Nesting occurs on LANL as well as adjacent areas. Critical habitat has been designated on Santa Fe National Forest lands that are contiguous with LANL's western boundary.

4.5.1.6 Management Plans

There are two plans in progress or in the planning stage that are being developed for management of ecological resources and biodiversity at LANL. These plans consist of a Threatened and Endangered Species Habitat Management Plan and a Natural Resources Management Plan. Descriptions of these plans follow.

Threatened and Endangered Species Habitat Management Plan

The Record of Decision (ROD) for the *Dual Axis Radiographic Hydrodynamic Test Facility Final Environmental Impact Statement* (60 FR 53588) commits DOE to prepare a habitat management plan for federally listed endangered and threatened species within LANL boundaries. This plan has been completed and, in addition to federally listed species, also addresses species of concern and species listed by the State of New Mexico as threatened, endangered, and sensitive. Stated goals of the management plan are to: (1) develop a comprehensive management plan that protects undeveloped portions of LANL that are suitable, or potentially suitable habitat for threatened and endangered species, while allowing current operations to continue and future development to occur with a minimum of project or operational delays, or additional costs related to protecting species or their habitats; (2) facilitate DOE compliance with the *Endangered Species Act* and related federal regulations by protecting and aiding in the recovery of threatened and endangered species; and (3) promote good environmental stewardship by monitoring and managing threatened and endangered species and their habitats using sound scientific principles (LANL 1998c). This management plan is currently being reviewed by the FWS as part of the *Endangered Species Act*'s Section 7 consultation procedures.

Changes since 1999

The LANL Threatened and Endangered Species Habitat Management Plan (HMP) received concurrence from the USFWS in 1999. The HMP has been implemented as LANL's primary tool for Endangered Species Act compliance. The effort to develop an independent Natural Resources Management Plan has been halted. Natural resource management issues will be considered as part of LANL's Environmental Management System, currently under development.

Natural Resource Management Plan

A team has been established and is currently formulating a plan for development of a Natural Resource Management Plan. The purpose of natural resource management at LANL will be to determine conditions and to recommend management measures that will restore, sustain, and enhance the biological quality and ecosystem integrity at LANL within the context of a dynamic Pajarito Plateau ecosystem. The guiding principle of natural resource management will be to integrate the principles of ecosystem management into the critical missions of LANL to protect ecosystem processes and biodiversity. A Natural Resource Management Plan will provide policies, methods, and recommendations for long-term management of LANL facilities, infrastructure, and natural resources to ensure responsible stewardship of LANL resources that have been entrusted to DOE. Integral to natural resource management will be continuing guidance to operations managers with which to make management decisions based on a scientific understanding of the Pajarito Plateau ecosystem. The Threatened and Endangered Species Habitat Management Plan will be integrated into the Natural Resource Management Plan.

Planned Activities

LANL has initiated a multi-year effort to develop a Floodplains and Wetlands Management Plan and a Migratory Bird Management Plan. The goals of these plans are to provide guidelines and criteria for best management practices and compliance activities for these regulated resources. LANL also plans to update the wetlands inventory in our GIS database, which is currently 5 -10 years old, and to develop new boundaries for Mexican spotted owl habitat at LANL based on habitat changes caused by drought and Cerro Grande Fire.

There are two plans in progress or in the planning stage that are being developed for management of ecological resources and biodiversity at LANL. These plans consist of a Threatened and Endangered Species Habitat Management Plan and a Natural Resources Management Plan. Descriptions of these plans follow.

4.5.1.7 Environmental Surveillance

DOE requires monitoring of LANL and the surrounding region for radiation, radioactive materials, and hazardous chemicals. The LANL Environmental Surveillance and Compliance Program (in previous years, this program was referred to as the Environmental Surveillance Program) is intended to meet this requirement, as well as to determine compliance with appropriate standards and to identify undesirable trends. Data collected and analyzed under this program include: external penetrating radiation; airborne radioactive materials; the radioactive and hazardous chemical content of soils, sediments, and water; and radioactive and hazardous chemicals in foodstuffs and biological resources. As part of this program, biological studies are conducted at LANL on all major trophic levels. Contamination data analyzed under this program are also used for ecological risk assessments to evaluate the likelihood that adverse effects are occurring or may occur as a result of exposure to radioactive and nonradioactive materials.

This program provides more than 11,000 environmental samples each year from more than 450 sampling stations in and around LANL. These samples are subjected to more than 200,000 analyses to identify the chemical constituents in the samples collected. The sampling and analysis results are made publicly available annually, once analyses are complete (e.g., *Environmental Surveillance at Los Alamos during 2002* [LANL 2004] was published in January 2004). A qualitative discussion of ecological risk is presented in section 4.5.3 in this chapter.

Ref.
Los Alamos National Laboratory, *Environmental Surveillance at Los Alamos during 2002*, LA-14085-ENV, Los Alamos, NM. January 2004.

4.5.2 Biodiversity Considerations

(Contact: Sam Loftin, RRES-ECO, 665-8011, sloftin@lanl.gov)

Biodiversity is a new and more explicit expression of one of the fundamental concepts of ecology, popularly stated as "everything is connected to everything else" (CEQ 1993). Simply defined as "the variety of life and its processes," components of diversity consist of regional ecosystem diversity, local ecosystem or community diversity, and species diversity. The importance of biodiversity on local, regional, and global scales has been recognized in the U.S. by the Council on Environmental Quality (CEQ), resource management agencies, and the public. The heightened interest in biodiversity presents an opportunity to address environmental problems holistically, rather than the traditional and fragmentary species-by-species, stress-by-stress fashion (Noss 1990). "The biological world is not a series of unconnected elements, and the richness of the mix of elements and their connections are what maintains the system as a whole" (CEQ 1993).

Because knowledge of biodiversity as described above can be applied to improve decision making in the areas of land use and resource management (Keystone 1991) and because it complements and informs the ecosystem approach, biodiversity considerations are an integral part of this impact analysis. For the purposes of this document, biodiversity considerations are intended to be synonymous with a healthy, functioning ecosystem.

The major human-caused disturbance factors identified by the CEQ (CEQ 1993) as responsible for the decline in biodiversity at multiple scales, including global, regional, and site-specific scales, are the following:

- Physical alteration of the landscape
- Over harvesting
- Disruption of natural processes, such as flooding and fires
- Introduction of nonnative (exotic) species
- Pollution
- Global climate change (which is considered outside the scope of this analysis) (CEQ 1993)

These human-caused disturbance factors provide a convenient framework for categorizing the causes of biodiversity loss, but these categories often overlap and are inevitably connected to each other in chains of ecological consequences.

The LANL regional area has also been affected by these major human-caused disturbance factors. Human occupation of the Jemez Mountains and the Pajarito Plateau (particularly since about the mid 19th Century) and accompanying disturbance actions, have worked in concert with one another and with natural disturbances to mold and continue to mold the environment in which LANL operates. These factors induce and perpetuate systemwide changes in the composition, structure, and function of plant and animal communities in all of the major vegetation zones.

As a consequence of historic and recent disturbances, several major issues affecting ecosystem sustainability and biodiversity currently confront DOE, LANL, and neighboring land administrators and owners such as the NPS, BNM, USFS, U.S. Army Corps of Engineers, and Native American Pueblos. The following discussions provide a summary of some issues of regional import and serve to describe ecosystem dynamics on a landscape scale and to illustrate the necessity of incorporating knowledge of these dynamics into the management and planning process.

4.5.2.1 Physical Alteration of the LandscapeAccelerated Soil Erosion

Historical overgrazing has been cited as the primary disturbance causing the continuing decline of local soils (Allen 1989 and Rothman 1992). Extensive grazing by cattle and sheep in the pinyon-juniper woodland and juniper savanna vegetation zones has resulted in a decline in the fragile surface soils, which continues today (Allen 1989 and Potter 1977). Because of long-term restricted grazing on LANL, soil erosion is less of a concern than surrounding areas where continuing erosion represents an impediment to long-term stability and productivity.

The combined impacts of drought, the Cerro Grande Fire, and bark beetle-induced tree mortality may have broad scale detrimental impacts to soil erosion. A substantial increase in soil erosion was observed in most of the higher elevation areas with high burn severity. The forest dieback resulting from the 1950s drought is thought to have initiated much of the current soil erosion on the Pajarito Plateau (Allen and Breshears 1998). The current drought could have the similar effects, depending on precipitation patterns, land management activities, and vegetation recovery.

Habitat Fragmentation

Fragmentation is the division of natural habitat areas into smaller segments or the destruction of animal access corridors between natural areas. It may reduce or enhance landscape productivity. Consideration of fragmentation is important in land use planning, because larger blocks of natural habitat are generally better for conserving biodiversity, and connected blocks of natural habitat are better than isolated ones. The edge to interior ratio of habitat patches is also an important consideration.

Developed areas, roads, and fenced areas either directly eliminate habitat, inhibit habitat use, or alter the dispersal and distribution patterns of wildlife, depending on the species being considered. Allen (1989) contrasts roadway development in the LANL regional area in 1935 with that present in 1989, demonstrating an appreciable increase in road expansion and accompanying habitat fragmentation. A comparison of disturbed (buffered to take into account the impact of features on their immediate surroundings) and undisturbed areas within the 14 watersheds in which LANL is located demonstrated that of a total of 95,200 acres (38,080 hectares), 6,672 acres (2,669 hectares) have been disturbed. This represented about 7 percent of the land area analyzed Most development is in pinyon-juniper woodland and ponderosa pine forest. Generally, many of the developed areas are concentrated on mesa tops, which has tended to limit fragmentation. However, there is some development in canyon areas, which has resulted in habitat loss and disturbance in areas with high biodiversity. These study results are outdated and additional fragmentation has undoubtedly occurred in the past 15 years. However, development in some areas (endangered species habitat) is tracked and restricted (LANL 1998).

4.5.2.2 Disruption of Natural Processes

Natural processes can be disrupted even when many components of the ecosystem appear intact. Resource management activities may alter ecosystem dynamics through fire suppression, modification of surface water or groundwater flow, and alteration of predator/prey relationships (CEQ 1993). Natural fires helped to shape, structure, and sustain ecosystems throughout the Southwest (Allen et al. 1995). The tree-ring record for the Jemez Mountains reflects a virtual cessation of natural fire in about 1890. At higher elevations (i.e., the conifer forests, including ponderosa pine, mixed conifer, and spruce-fir forests), vigorous suppression of wildfire has had serious environmental consequences. In the absence of natural fires, surface fuel loads and tree densities have increased to high levels, favoring large scale, high-intensity crown fires such as the 1954, 1977, 1996, 1998, and 2000 fires that occurred on or near LANL. Wildfire remains a significant threat to the area.

In response to the Dome Fire of 1996, the Interagency Wildfire Management Team was formed with representatives from the DOE Los Alamos Area Office, Santa Fe National Forest, Los Alamos Fire Department, NMED, BNM, and LANL (PC 1996p). This team, drawing on regional expertise in fire management, coordinates activities to reduce regional vulnerability to catastrophic wildfires.

4.5.2.3 Overharvesting

In addition to habitat loss and modification, physical alteration is linked to the disruption of natural wildlife patterns and processes and ensuing loss of biodiversity throughout the region. One increasingly troublesome result is the imbalance in the regional elk population. The current “elk problem” is due to excess numbers, which seems to suggest under harvesting. Although this is another example of an ecological cascade involving multiple disturbance regimes and intertwined ecological processes, the origins of the problem are grounded in the over harvest of multiple species.

The native population of Rocky Mountain elk was eliminated from the entire State of New Mexico by 1909. The current elk herds developed from 86 elk reintroduced into the Jemez Mountains in 1948 and 1964 through 1965. Since the 1970's, local elk populations have exhibited high growth rates (USFS 1996). In 1994, estimates of herd size were over 10,000 elk in the Jemez Mountains and the Pajarito Plateau (Allen 1994). A lack of predators such as the gray wolf (*Canis lupus*) and mountain lions has contributed to the abundance of the reintroduced herds. Hunting is not allowed within LANL nor in BNM, allowing them to be elk refuges.

The 1977 La Mesa Fire created about 15,000 acres (6,000 hectares) of grassy winter habitat adjacent to and extending into LANL property. Elk are expanding their range into lower elevation foraging areas and are using these areas throughout the year rather than migrating to summer pasture at higher elevations (USFS 1996). Existing information is inadequate to predict how elk numbers and distribution will respond to landscape changes resulting from recent wildfires. An interagency work group, Seeking Common Ground, consisting of representatives from the Jemez and Española Ranger Districts of the Santa Fe National Forest, BNM, LAC, and the NMDGF has been formed for the exploration of the problems and potential solutions related to elk overpopulation.

4.5.2.4 Introduction of Nonnative (Exotic) Species

Nonnative species of plants and animals are emerging worldwide as one of the leading threats to native species, ecosystem processes, and biodiversity. The introduction of nonnative species can result in the elimination of native species thorough predation, competition, genetic modification, and disease transmission (CEQ 1993). The botanical inventory of BNM, which is a reasonable representation of LANL flora, lists 150 plants as nonnative. These exotics comprise about 17 percent of the approximately 900 species inventoried (PC 1996r). LANL has compiled a database, derived from the report *Status of the Flora of the Los Alamos National Environmental Research Park, Checklist of Vascular Plants of the Pajarito Plateau and Jemez Mountains* (Foxx and Tierney 1985) for exotic species and their distribution. Some of the exotic plant species of concern to local resource managers and LANL biologists are salt cedar (*Pall.*), tree of heaven (*Ailanthus altissima (Mill.) Swingle*), cheatgrass (*Bromus tectorum L.*), and Russian olive (*Eleagnus angustifolia* L.). Salt cedar may be of most concern for the future. Salt cedar, as well as Russian olive, possess certain phenological and reproductive characteristics that differ from those of the common native riparian species that gives them advantages in colonization of certain types of disturbed sites or during certain times of the year. In addition, salt cedar consumes prodigious amounts of groundwater, exudes salt from leaf glands that inhibits the growth of other plants, and has lower species density and diversity (e.g., birds) than native cottonwood or willow forests. It is present on LANL and BNM and in the mouths of canyons in White Rock Canyon.

4.5.2.5 Pollution

Pollution impacts on ecosystems include direct lethal, sub-lethal, and reproductive effects (including those resulting from bioaccumulation) and degradation of habitat (CEQ 1993). Sub-lethal effects of environmental contamination may indirectly cause mortality at widely varying temporal scales and on widely varying levels of ecological organization. Possible mechanisms include immunological effects enhancing susceptibility to disease, alteration of nutrient cycles through effects on bioavailability or uptake mechanisms, metabolic effects, and behavior modification affecting ability to feed, hunt, avoid predation, or breed (Hodgson and Leve 1987). The contribution of pollutants to environmental media by LANL operations is due primarily to past practices. Long-term monitoring of soils, sediment, water, and air and biomonitoring have not demonstrated levels of contaminants that would pose a health risk, nor have there been obvious toxic effects observed. Potential for ecological risk is discussed in greater detail in the following section. There is no evidence of any contaminants originating at LANL that would pose a risk to recreational fishing in the Rio Grande and downstream of Cochiti Lake. LANL publishes an annual Environmental Surveillance Report (http://www.airquality.lanl.gov/AirReports.htm#ES) that presents monitoring data for a variety of environmental media.

4.5.3 Ecological Risk Considerations

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4.5.3 Ecological Risk Considerations

Ecological risk assessment is the qualitative or quantitative appraisal of actual or potential impacts or effects of one or more stressor(s) (contaminants) on non-human biota. Since 1999 when the SWEIS was issued, substantial progress has been made on ecological risk assessment methodology at LANL and numerous applications have been made. Substantial changes have occurred in the parameters that are used in ecological risk assessments, methods have improved, and numerous risk screening exercises, field studies, laboratory toxicological studies, and modeling efforts have been completed.

Risk to ecosystems, biological communities, populations, individual plants and animals and associated ecological processes have been assessed at LANL using environmental surveillance dataon the distribution and concentration of contaminants in numerous media, biomonitoring data, existing ecological risk assessments, toxicology studies, and general and species-specific knowledge of the presence, biology, and behavioral characteristics of biotic resources. Generally no adverse effects to plants and animals have been observed (recognizing the absence of intensive, long-term research regarding such potential effects) from chemical and radioactive materials and populations appear healthy and thriving.

4.5.3.1 Background on Contamination at LANL

A rough estimate, based on information from LANL's Environmental Restoration Project (now "Remediation Services (RS)" Project) Database, which has information on their "potential release sites (PRSs)," demonstrated that less than 3 percent of LANL's approximately 43 square miles (111 square kilometers) is of potential concern. The areal extent of this 3 percent does not include canyons . However, PRS investigations and cleanup activities at the PRSs over the past several years hasreduced the spacial area requiring cleanup. The exact areal extent of PRSs has yet to be determined. As discussed in chapter 2, section 2.1.2.5, the RS Project was instituted to assess and remediate potentially contaminated sites resulting from historical treatment, storage, and disposal practices. RS activities include identification of potentially contaminated sites, characterization of sites, risk assessment, and restoration actions, where appropriate.

Biomonitoring

Biomonitoring to measure the amounts of contaminants in plants and animals and their effects on biological systems and processes is being accomplished under LANLs Integrated Resource Management Plan (IRMP) and as a component of the Environmental Surveillance and Monitoring Program. Biomonitoring data has been collectedfor produce, bees, fish, honey, milk, elk, mule deer, pinyon pine, shrubs, grasses, forbs, small mammals, and birds. Volume III, Appendix D presents many of these "foodstuffs," analytes detected, and their concentrations. These biomonitoring data indicate no immediate environmental concerns.

Empirical and Laboratory Studies

Over the years special field studies have been conducted on peregrine falcon prey, the Western bluebird, the many-lined skink, which is a lizard, and other animals. Laboratory toxicological studies relating to LANL environmental contaminants have been conducted on amphibians, fish and other aquatic organisms, earthworms, and other organisms. These studies are being summarized in an updated site-wide biological assessment currently in development.

4.5.3.2 Ecological Risk Assessments

As mentioned previously a number of risk screening exercises, field studies, laboratory toxicological studies, and modeling efforts have been completed since the SWEIS was issued in 1999.

Ecological Risk Screening

Since the issuance of the SWEIS in 1999, the RRES-RS Project (formerly Environmental Restoration) has led the completion of numerous screening-level ecological risk assessments. These assessments have been completed on a systematic basis across the entire Laboratory, usually on a PRS by PRS basis, in accordance with guidance by the U.

S. Environmental Protection Agency (EPA) on ecological risk assessment guidance for Superfund (ERAGS) (EPA 1997) and New Mexico Environment Department (NMED) guidance (NMED XXXX). The methods for the screening assessments are documented in an internal report (LANL 1999). The RS Project originally identified 2,124 PRSs, many of which were subjected to ecological screening assessments that factored into decisions on the disposition of the PRSs (LANL 2004). By the end of 2003, only 833 discrete PRSs remain. Approximately 707 units have been approved for no further action and 139 units have been removed from the Laboratory's Hazardous Waste Facility Permit. Of the 139 total PRSs removed from the permit, no sites were removed in 2003. Following the ERAGS eight-step process, some sites, such as Cañon de Valle and the Los Alamos and Pueblo canyons watershed, were escalated to a level of more robust risk assessment as described below.

In 2000 LANL began implementing DOE's technical standard on evaluating radiation dose to aquatic and terrestrial biota. The results are reported in annual LANL environmental surveillance reports (LANL 2004, 2002, 2001). Consistently calculated doses to biota using worst-case (maximum concentration) data have been at or below the DOE's radiological dose rate limit.

Cañon de Valle Ecological Risk Assessment. Cañon de Valle was the first area elevated to a baseline, or Tier-3, level of ecological risk assessment because there were contaminants in the canyon that exceeded ecological screening levels (ESLs) by orders of magnitude and there were contaminants in the canyon for which some screening values were unavailable. Also the canyon is a nesting area for the Mexican spotted owl, a federally-protected threatened species and threatened and endangered species require assessments of effects for individuals. Thus, RRES-RS designed a pilot ecological risk assessment process for Cañon de Valle that was comprised of baseline risk assessment problem formulation, field sampling, field verification, site investigation, baseline risk characterization, and risk management (LANL XXXX). Both aquatic and terrestrial components of the ecosystem were investigated. The terrestrial lines of evidence compared small mammal populations and contaminant body burdens between Cañon de Valle and a reference site (upper Pajarito canyon). The aquatic lines of evidence were comparison of benthic macro-invertebrate communities between Cañon de Valle and three reference canyons, comparison of Cañon de Valle benthic macro-invertebrate data from 1997 and 2001, and comparison of sediment toxicity testing using *Chironomus tentans* sampled in Cañon de Valle and a reference location ("Starmer's Gulch"). The ecological risk assessment for the terrestrial system in Cañon de Valle found some elevated metals concentrations in the small mammals, but no values that were likely to pose adverse effects for the Mexican spotted owl. The numbers of species, population densities, and reproductive classes for those species indicated that the Cañon de Valle small mammal community is not being adversely affected by contaminants. The aquatic system assessment showed some differences between benthic macro-invertebrates in Cañon de Valle and reference canyons. These differences were attributed to relative sizes of the streams, reduced flows caused by the ongoing drought, and the elimination of effluent discharges to the canyon. One of the two rounds of toxicity testing for sediment and water in the canyon identified reduced survival for a site near the 260 outfall and a site below Burning Ground Spring. These results were not replicated in a subsequent toxicity test. The presence of a viable benthic macro-invertebrate community in the canyon indicated that the reduced survival in 2001 toxicity test for the site near the 260 outfall is not a spatially extensive condition. The lack of difference between that same site and the reference site in 2002 toxicity testing further indicated that large-scale pervasive impacts to the aquatic system were not occurring. The benthic macro-invertebrate community was considered a more meaningful measure of the condition of the aquatic system in the canyon than the toxicity testing results. It was concluded that while toxicity testing identifies potential problems based upon the sampling locations and can be used to associate contaminant concentrations with measured effects for the samples, the endemic community condition gives a much larger scale indication of contaminant impacts that are integrated over long periods.

Los Alamos and Pueblo Canyons Investigation Report

A wide variety of field studies, model calculations, and laboratory toxicity tests were completed on the Los Alamos and Pueblo watershed as lines of evidence to evaluate the potential for adverse ecological effects from contaminants in sediment and persistent surface water (LANL 2004). Assessment activities included soil characterization, small mammal whole-body contaminant analysis, a cavity-nesting birds study, breeding bird survey, earthworm toxicity test, seedling germination tests, plant survey, aquatic insect toxicity tests, rapid bioassessment characterization, and spatial computer modeling. Biological investigation plans were developed based on the application of the eight-step ERAGS process to contaminants of potential ecological concern (COPECs) in sediment and persistent surface water. ERAGS was applied to affected canyons media. Concentrations of COPECs in sediment and water were compared with ESLs as part of the problem formulation (Katzman 2002). The ESLs were used to evaluate combined sediment and water exposures to wildlife. Screening of affected media in the watershed identified many COPECs (metals, SVOCs, PAHs, PCBs, pesticides, americium-241, and isotopic plutonium), which led to developing a plan to more thoroughly and comprehensively characterize ecological risk based on the ERAGS process. The spatial modeling consisted of estimating risk to three receptors (*Peromyscus maniculatus* (deer mouse), *Strix occidentalis* (Mexican spotted owl), and *Sialia mexicana* (western bluebird)) using the FORTRAN model “ECORSK.7” (Gonzales et al. 2004a) in order to assess the entire watershed and supplement the screening and field study results. The weight of evidence demonstrated by the various lines of evidence gathered in this effects assessment indicated no adverse effects of COPECs on terrestrial and aquatic receptors. The field studies, model calculations, and laboratory toxicity tests all provided a complementary set of results that supported this interpretation and indicated that the assessment endpoints are not adversely affected. Thus, no COPECs were retained for further assessment or mitigation and the lack of effects for various measures used in the baseline ecological risk assessment confirmed the protective nature of ESLs (i.e., the overestimation of potential effects using ESLs).

Mortandad Canyon is the next area identified for advanced assessment of ecological risk by RRES-RS.

Threatened and Endangered (T&E) Species

In the late 1990's preliminary assessments were conducted of the potential risk from legacy waste to the Mexican spotted owl (Gallegos et al. 1997a), the American peregrine falcon (Gallegos et al. 1997b), and the bald eagle (Gonzales et al. 1998a) using ECORSK.5, a FORTRAN model. Updates to these preliminary assessments are reflected in the Second Annual Review Update Preliminary Risk Assessment of Federally Listed Species at the Los Alamos National Laboratory (Gonzales et al. 1997). These assessments were summarized in the 1999 SWEIS. These assessments concluded that, on the average, there was a small potential for impact to the peregrine falcon from contaminants at LANL, but no appreciable impact was expected to the spotted owl nor the bald eagle. The peregrine is no longer a federally-listed T&E species.

Site-Wide Assessments

ECORSK.6 and .7. ECORSK.6. With substantial changes in environmental contaminant data and other risk assessment parameters since the late 1990's assessments, ECORSK.6 was used in 2000 to assess Lab-wide risk to the Rocky Mountain elk, the American robin, and the deer mouse (Gonzales et al. 2002). ECORSK.6 was the model version in which the natural distribution of animals was interacted with the spatial contaminant distribution to increase the reality of the exposure calculations. Results indicated no appreciable potential impact to elk or robin and a small potential for impact to the deer mouse, however natural and regional background sources of contamination contributed the dominant portion of total risk indicating that the safe limits used may have been overly conservative (too low).

Independent Risk Assessment. In February 2003, Colorado State University (CSU) undertook an independent risk assessment for public health and the environment for chemicals and radionuclides associated with LANL operations. The primary objectives of this project are to develop a process for stakeholder involvement in the risk assessment and decision-making processes for LANL; develop a method to estimate current ecological impacts (and human health risks) from LANL using available data on chemicals and radionuclides measured in environmental media; develop a method to implement a risk-informed decision analysis framework; and to develop a consistent approach for efficiently compiling, using, and updating data to support the risk assessment and decision-making processes. The plan and general methods for this assessment are described in various documents (RAC 2003a, RAC 2003b). Emphasis appears to be on human risk.

Site-Wide Assessment of Ecological Risk. Application of ECORSK.7 site-wide is currently in progress. A contaminant database compiled by the Risk Assessment Corporation (RAC) has been reduced from over 2.5 million records covering all media to ~305,000 records of soil/sediment contaminant data that are pertinent to ecological risk and appropriate for use in ECORSK.7. The data consist of measured and interpolated values. The resulting data set contains approximately three times more data than the amount available the last time (1999) that site-wide applications of the model were made. Site-wide applications are also on-going for the *risk-based end state* (RBES) project at LANL (LANL 2003, Gonzales et al. 2004b). Comparisons will be made of current (baseline) site-wide risk and end-state (year 2015) risk in which soil and sediment contaminant levels are reduced to levels that would result from postulated clean-up through 2015. The RAC database was filtered by units of measure, lab sample type, lab qualifer, field matrix, bottom depth, excavation flag, field quality control type, sample location, lab analytical method, analyte suite, analytical results, and TRV. This reduced raw data set (305,000 records) consists of measured contaminant values in canyon and non-canyon areas across the Laboratory. Effects of the Cerro Grande Fire of 2000 on contaminant release and transport are somewhat reflected in data used in ECORSK.7 as the canyons data are reflective of some post-fire sampling. The raw data set is further reduced by averaging contaminant values within each 100 × 100 ft (30 × 30 m) grid cell. The measured canyons values are then used to interpolate (predict) from points at which they were measured through sampling to points along a canyon reach at which they were not measured but known to exist based on logic. So the resultant data set consists of measured non-canyons data, measured canyons data, and interpolated canyons data.

Assessment methods using ECORSK.7 and operations of ECORSK.7 are described in detail in previous reports (Gonzales et al. 2004a, 2002). ECORSK.7 provides a measure of effect using the hazard quotient (HQ) methodology for wildlife receptors (EPA 1997). ECORSK.7 integrates biological, ecological, and toxicological information using Geographic Information System (GIS) interfaces so that all model input and output are spatially explicit (Gonzales et al. 2004). Effects are characterized by evaluating impacts on individual animals using a measure of population effects as the proportion of the population with an hazard index (HI) greater than 1 (Katzman 2002). Exposure pathways considered in ECORSK.7 are incidental soil ingestion and food ingestion. The model assigns nest sites or focal locations (the center of the animals home range) within GIS land cover types that incorporate measurements on the distribution of these animals. An animal then can forage across its home range weighted on the basis of their natural distribution, in a uniform manner, or forage based on the central-place foraging theory with greater amounts of food and greater COPEC exposure near the nest or focal point. Relative usage of vegetation classes or habitat type can be intersected with the proportion of LANL occupied by a given vegetation class or habitat type. The model calculates unadjusted, adjusted, and background HI values for each nest site or focal point. The unadjusted HI is equivalent to the total exposure from COPECs, including background sources. The adjusted HI removed the contribution of background sediment concentrations. The adjusted HI provides information on the COPECs that may originate from Laboratory releases and does not reflect background risks.

ECORSK.7 assesses potential adverse effects of COPECs to terrestrial animals over large spatial areas on the basis of the U.S. Environmental Protection Agency Quotient Method. Estimates of animal exposure over a gridded area are compared with assumed health effects levels (toxicity reference levels—TRVs) to generate HIs using the equations:

$$HQ_{ij} = \frac{exposure_{ij}}{effect_{ij}(orTRV)} \qquad (1)$$

$$HI_i = \sum_{j=1}^{n} HQ_{ij}, \qquad (2)$$

where HQ_{ij} = hazard quotient for receptor i to COPEC j (unitless), $exposure_{ij}$ = exposure to COPEC j for receptor i (units are mg of COPEC per kg body weight per day or mg/kg/day), $effect_{ij}$ = effect level or safe limit (represented by a toxicity reference value [TRV]) for exposure to COPEC j for receptor i (mg/kg/day), and HI_i = hazard index for receptor i to n COPECs (unitless). ECORSK.7 repeats equation #1 for each COPEC within each grid cell that is within the home range of a given animal and for the number of nest sites or focal points (up to 1000) chosen by the operator. The mean total HI represented by equation #2 is the arithmetic average of HIs for a specified total number of nest sites established for a receptor. The receptors chosen for application of ECORSK.7 often include the deer mouse (*Peromyscus maniculatus*) and the Mexican spotted owl (*Strix occidentalis lucida*) but previous versions of the model have been applied to several other species. The deer mouse and owl represent different social/cultural and ecological attributes and, because of large disparities in the home ranges of the species that they exhibit during foraging, reflect differently on the location of COPEC sources. With their small home range, HQs for the deer mouse reflect directly on the grid cell in which a nest site was hypothetically placed.

Preliminary results of the recent site-wide application of ECORSK.7 indicate no adverse effect is expected to the Mexican spotted owl from environmental contaminants. The HI average for 1000 nest sites was less than 1.0. Verification of results for the owl and the deer mouse and application of the model to the southwestern willow flycatcher (*Empidonax traillii extimus*) are currently in progress. Additional information and results summaries for the owl and deer mouse are forthcoming.

Conclusions

The various studies, assessments, and modeling efforts generally indicate that there is little risk to nonhuman biota from legacy contamination. Organic chemicals and metals tend to dominate risk indices, followed distantly by radionuclides. Radionuclides present little risk to biota. Recent operations have little potential for contributing to ecological risk because environmental laws and regulations are rigorous and recent programs, actions, and plans to clean up legacy waste as well as institution of management measures to protect and manage natural resources reduce the overall potential for risk over time.

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4.6 Human Health: Worker and Public Health in the Region Affected by LANL Operations4.6.1 Public Health in the LANL Vicinity

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This section is based on environmental surveillance data from 2003, with consideration also given to data from recent years. The source for the background dose is based on NCRP 1987 and the LANL Environmental Surveillance Reports ("Environmental Surveillance at Los Alamos during xxxx".

(Question: if we move criticality operations out of TA-18 in the next couple of years, will this affect the maximum on-site dose? Do we know if there is another site that would become the source of maximum dose? We are supposed to look at impacts through 2009. Reply from Mike: if so, we will stop calculating separate "On-site" and "Off-site" public doses; candidates for the maximally exposed individual, MEI, will continue to be East

Gate (caused by LANSCE) and the boundary north of Area G. If LANSCE is closed and the Area G waste is sent to WIPP, then the largest dose would be about 0.1 mrem/year from tritium from the LANL stacks.)

4.6.1 Public Health in the LANL Vicinity

4.6.1.1 Radiation in the Environment Around LANL

Major sources of background radiation exposure to individuals in the vicinity of LANL are shown in Figure 4.6.1.1–1. Background doses will be accrued regardless of LANL operations. The total effective dose equivalent (TEDE) to residents is about 360 millirem/year in the vicinity of Los Alamos from all natural sources. The individual components of the background dose for Los Alamos and White Rock are typically: about 200 mrem/year from radon (NCRP 1987); 40 mrem/year from radionuclides occurring naturally within the body, such as potassium-40 (NCRP 1987); and 100 to 200 mrem/year total external radiation from cosmic and terrestrial sources [references: Environmental Surveillance at Los Alamos during 2001, LA-13979-ENV, Chapter 4 Section C.1; M. McNaughton, "Environmental Radioactivity, LA-UR-00-502, Sections 3 and 4, http://www.lanl.gov/orgs/res/maq/CommunityMonitoring/pdf/Envir-Rad-expanded.pdf]. In addition, the average effective dose equivalent (EDE) is 53 millirem per year to members of the U.S. population from medical and dental uses of radiation (NCRP 1987).

Radiation and radionuclides from LANL operations provide other sources of radiation exposure to individuals in the vicinity of LANL. There are 3 technical areas (TAs) that cause measurable radiation in publicly accessible areas: gamma radiation from the short-lived radioactive air emissions from TA-53 (LANSCE) can be detected at East Gate; neutron radiation from TA-54 Area G can be measured at the boundary with the adjacent San Ildefonso Pueblo land; and neutron radiation from the critical assemblies at TA-18 can be measured on Pajarito Road.

The neutron radiation is measured directly using LANL-standard dosimeters mounted on slabs of hydrogenous plastic such as Lucite [reference: Environmental Surveillance at Los Alamos, Chapter 4, Section C]. However, the gamma radiation from LANSCE is too small to measure reliably so the doses are calculated using an EPA-approved air transport model, CAP–88 [reference: Environmental Surveillance at Los Alamos, Chapter 2 Section B and Chapter 4, Section B]. The doses from inhalation of radioactive materials are calculated using CAP-88 and also measured directly [reference: Environmental Surveillance at Los Alamos, Chapter 4, Section A]. Doses from other pathways are less than 0.1 mrem/year, which is too small to measure or calculate reliably [reference: Environmental Surveillance at Los Alamos, Chapter 3, Section C].

Maximum Individual Dose—Off-Site Locations (2003)

The maximum dose (EDE) was calculated at various locations to assess the maximum radiological impact from LANL to areas acessible by the public. This maximum dose is the total dose from all potential routes of radiation exposure and is based on data gathered by both the Environmental Surveillance and Compliance Program and radiological effluent monitoring. These assessments are described in annual reports entitled "Environmental Surveillance at Los Alamos during xxxx" where xxxx is the year.

In 2003 the maximum dose was 0.6 mrem at East Gate north-north-west of LANSCE, and also approximately the same amount at the boundary of San Ildefonso Pueblo land north of TA-54 Area G. At East Gate, the dose consisted of 0.3 mrem from short-lived airborne radionuclides (mostly carbon-11) from LANSCE, 0.2 mrem from other LANL stacks, and 0.1 mrem from the radionuclides (mostly tritium) measured at the AIRNET station. At the boundary north of Area G, the dose was almost entirely from neutron emissions from radioactive waste awaiting shipment to WIPP; other pathways contributed less than 0.1 mrem.

The annual dose at East Gate depends on the duration and power of the operations at LANSCE. For the past 8 years the annual dose has been less than 4 mrem and we expect similar doses during the next 5 years. We expect the neutron dose at the boundary north of Area G to decrease when the waste is shipped to WIPP.

Maximum Individual Dose—On-Site Locations (2003)

The maximum potential dose that an individual who is not a LANL worker could have received while within the LANL boundary was calculated as 2.5 millirem, which is typical of the doses for the past 5 years. The location of the maximum potential exposure is a section of Pajarito Road near TA–18. The amount of time a member of the public may spend traveling this section of Pajarito Road, as well as the operational cycles of the TA–18 facility, were factored into the above dose calculations, which also used readings of external penetrating radiation measurements taken at TA–18 during the operation of criticality experiments.

There are entry stations at each end of Pajarito Road, but at the time of writing, cyclists are unrestricted and the occupants of a vehicle are unrestricted provided there is a badge holder in the vehicle. Therefore, we continue to report the potential dose on Pajarito Road as a potential public dose. Within the next few years, we anticipate the transfer of neutron-producing operations from TA-18 to the Nevada Test Site. If so, public doses on Pajarito Road will become much less than 1 mrem/year and will be too small to measure.

Average External Radiation

The average external penetrating radiation dose to a typical Los Alamos and White Rock resident due to LANL operations in the years 1997-2003 is too small to measure and is estimated to be much less than 0.1 mrem/year. We expect it to remain much less than 0.1 mrem/year in the foreseeable future.

Average Inhalation

The committed effective dose equivalent (CEDE) resulting from inhalation of airborne emissions as measured by the LANL air monitoring network for the town sites of Los Alamos and White Rock averages about 0.1 mrem/year, and is expected to remain so for the foreseeable future. At some locations, airborne concentrations of plutonium-239 are on the order of 0.02 fCi/m^3; and at other locations, tritium concentrations are on the order of 15 pCi/m^3; these concentrations are about 1 percent of the EPA standard, and therefore they indicate a dose that is approximately 1 percent of the 10 mrem/year EPA standard for airborne emissions (40 CFR 61.92).

Ingestion

Because of the prevalence in the environment of radionuclides from global fallout, it is difficult to distinguish potential doses caused by LANL from those caused by atmospheric nuclear-weapons testing. Global fallout is a function of average rainfall and snowfall, so background measurements from the relatively arid Rio Grande valley are not directly applicable to the wetter Pajarito Plateau and the slopes of the Jemez Mountains. The report published in 2000 by the United Nations Scientific Committee on the Effects of Atomic Radiation, UNSCEAR-2000, estimates the average ingestion dose from fallout to be about 0.2 mrem/year from carbon-14, 0.05 mrem/year from strontium-90, and 0.03 mrem/year from cesium-137, each as a result of soil concentrations on the order of 1 pCi/g. Measurements of radionuclides in the soil and biota near LANL are reported and discussed in the annual reports "Environmental Surveillance at Los Alamos", and the results are consistent with these estimates of global fallout (corrected for rain and snowfall). Considering that carbon-14 is not prevalent at LANL, these results indicate that possible contributions from LANL are smaller than those from global fallout, i.e., smaller than 0.1 mrem/year.

Also, because of the prevalence of natural uranium in the soil and water of northern New Mexico, it is difficult to distinguish potential doses caused by LANL from those caused by natural terrestrial radionuclides. The dose from uranium in drinking water is about 0.1 mrem/year in Los Alamos County and about 1 mrem/year in the Rio Grande Valley. However, isotopic measurements [reference: David H. Kraig and Ernest S. Gladney, "Tap Water Sampling and Analysis during Calendar Year 2001 for Calculation of Radiological Dose to the Public", LA-UR-01-6643] show this uranium is not likely from LANL.

Measurable amounts of radioactive contamination exist both on-site and off-site at several locations in the environment near LANL. For example, plutonium, tritium, cesium-137, and/or strontium-90 are present in concentrations significantly above background in the water, soil, sediment, and biota of Acid Canyon, Pueblo Canyon, Bayo Canyon, Los Alamos Canyon, and Mortandad Canyon. Various scenarios have been reported in "Environmental Surveillance at Los Alamos", some of which might lead to a potential dose of several millirem per year in exceptional cases. However, there is no realistic pathway that results in a dose of more than 0.1 mrem/year to a typical resident.

In summary, the ingestion doses from LANL to nearby residents are estimated to be less than 0.1 mrem/year, and are too small to measure.

Summary of Total Dose to the Public

In exceptional circumstances, the maximally exposed individual may receive a potential dose of several mrem/year at some locations within 1 km from LANL. However, a typical member of the public receives an average dose from LANL of less than 0.1 mrem/year.

4.6.2 LANL Worker Health

This section summarizes operational health risk experience including workers' exposures to radioactive and hazardous materials and physical injuries from workplace hazards during the period of 1997 through 2003. Overall, no new and significant operational health risks were identified that had not been considered in the SWEIS ROD. Proposed changes to LANL operations in the next 5 years should not exceed the operational health risk bases stated in the ROD. There were changes to LANL's worker safety programs during the last several years that appear to have contributed to reduction of accident rates from physical injuries. The major safety program changes are presented in this report. The Ten-Year Comprehensive Site Plan FY04-FY13 (LA-CP-03-0653) was used to assess the possible changes to Site conditions that could impact operational health risks from 2004-2009.

4.6.1.2 Chemicals

No change from 1999 SWEIS.

4.6.1.3 Cancer Incidence and Mortality

No change from 1999 SWEIS.

4.6.1.4 Environmental Surveillance and Compliance (previously discussed in Section 4.5.1.7)

4.6.2.1. Summary of Radiological And Chemical Exposure and Physical Hazard Incidents Affecting Worker Health 1997 to 2003

The working conditions at LANL have remained essentially the same during the 90's and continuing through 2003. Possible scenarios that could impact worker health risk are expanded operations in existing facilities, reduced operations in existing facilities, construction and operation of new facilities, and facility decommissioning. There continue to be 15 key facilities (ref. Table S.2.4-1 SWEIS99) that contribute the highest health risk to workers from radioactive materials. Approximately one-tenth of the general workforce continues to be engaged in production, services, maintenance and research and development within moderate hazard facilities that comprise the 15 key facilities. Both nuclear and non-nuclear facilities are categorized as high, moderate or low hazard facilities based on quantities of nuclear material or the presence of chemical/toxicological materials, biological hazards or high explosives. A complete description of hazard categories for each facility is available in LA-CP-02-75 (ref). The Beryllium Technology Facility is the only high hazard facility at LANL. The current moderate hazard non-nuclear facilities are LANSCE (ER-1&2), SIGMA (TA-3-66), Compressed Gas Processing (TA-3-170) and DARHT (TA-15-312). Operations of the Pulsed High-Energy Radiographic Machine Emitting X-rays (PHERMEX) have been closed down; the last experiment was in March 2004 and the facility is in a "surveillance and maintenance" mode (Source of PHERMEX information: Franco Sisneros, DX-4, 665-6978, franco@lanl.gov and Gary McMath, RRES-WD, 665-4969, gmcmath@lanl.gov).

Reports of personnel monitoring show the impact of routine operations and expanded operations in existing facilities and new facilities that used radioactive and hazardous material from 1997-2003. Data is provided for the major accidents and significant radiological exposures, chemical exposures, and physical injuries. Annual reports of total recordable and lost workday cases rates per 100 workers (also represents the case rates per 200,000 hours worked) represent the frequency of occupational injuries and illnesses. Collective radiation dose, the number of radiation workers with measurable dose and the average collective dose per year are used to assess radiological exposures.

Review of OSHA 300 logs and the LANL Occurrence Reporting and Processing System (ORPS) indicates that there were no significant changes to sources of non-ionizing radiation, which includes electromagnetic radiation, LASER and microwaves, and no reported incidents due to non-ionizing radiation from 1997-2003.

There were two major (fatal, serious injury, or near miss) accidents affecting worker safety from 1997 to 2003 compared to five major accidents occurring between 1993-1996. The two major accidents were categorized as near misses:

September 29, 2001 TA3-29 Room 4135/4136 A sheet metal worker cut into a conduit and struck an energized 110 VAC conductor while decommissioning a radiological hood. The worker was not injured and did not receive an electrical shock.

November 4, 2003 TA-63 During excavation activities at a construction site, a backhoe operator punctured a two-inch gas line. The gas line was pressurized at approximately 80 pounds per square inch (psi). This excavation work that resulted in the event had not been authorized.

In addition there were two non-work related fatalities from vehicular accidents involving private vehicles on DOE property.

A summary of accidental radiological and chemical exposures and physical injuries to workers is provided in Tables 4.6.2.1-1 and 4.6.2.1-2. DOE Order 232.1 requires occurrence reports of radiological contamination events and other accidental events impacting worker safety. There were 225 radiological contamination events logged from 1997-2003. Most of these contamination events were for skin or clothing contamination. Four facilities accounted for 94 percent of the radiological occurrence reports: TA-55 (42 percent), CMR (35 percent), LANCE (4 percent) and TA-48 (13 percent). There were 82 intakes exceeding 100 mrem from 1997-2003. All intakes greater than 100 mrem resulted from actinide intakes at CMR or TA-55. From 1993-1996 there were 5 intakes from exceeding 100 mrem. The detailed descriptions of radiological incidents are available in ORPS.

Table 4.6.2.1-1. Representative Radiological Exposures Affecting Workers at LANL 1997-2003

Date	Location	Description of Incident/Exposure
EXTERNAL RADIATION EXPOSURE		
1997 to 2003	Site wide	None to individual workers exceeding 5 rem/year
RADIOLOGICAL INTAKE EXCEEDING 100 MREM		
1997		19 workers
1998		11 workers
1999		10 workers
2000		18 workers
2001		8 workers
2002		8 workers
2003		8 workers

Table 4.6.2.1-2. Representative Examples of Recorded Chemical Exposures and Physical Accidents Affecting Workers at LANL 1997 through 2003

Chemical Exposures		
Date	**Location**	**Description**
December 1, 1997	TA-3 Bldg 22	Subcontractor employee potentially exposed to asbestos while performing boiler maintenance.
December 17, 1997	TA-3 Bldg 105	Employee experienced headache and nausea while working in a mobile unit when she was exposed to gases emitted from holding tanks due to freezing of liquid in the tanks.
July 28, 1998	TA-3 Bldg 0029	While sorting chemicals in poorly ventilated room an employee was exposed to off gassing of an epoxy hardener that leaked onto paper.
December 17, 1998	TA-55 Bldg 4	A bottle of nitric acid broke. 12 employees in area of spill were evaluated for possible exposure. One PTLA employee was admitted to LAMC for overnight observation.
June 2, 1999	TA-55 Bldg 3	A 1-liter bottle of methyl acrylate fell and broke on the floor resulting in potential impact on employee health.
August 19, 1999	TA-18 Lead Shed	Two employees exposed to airborne lead in excess of the OSHA PEL
September 14, 1999	TA-43 Bldg 1	Breathing zone samples from 2 ironworkers indicated presence of cadmium in excess of the OSHA PEL.
July 22, 2001	TA-50 Bldg 1	An employee responded to a spill of Alphaex scintillator, a toluene-based compound. The employee was exposed to toluene below the OSHA PEL.

July 25, 2001	TA-3 Bldg 31	Air sample results indicated an employee had exceeded the ACGIH TLV for refractory ceramic fibers.
January 8, 2002	TA-54, Bldg.1009	A chemist was working when a chlorine dioxide reactor blew and was exposed to chlorine dioxide
April 1, 2002	TA 48, Bldg.107	Two chemists were exposed to nitrogen dioxide for a few seconds when a cylinder valve was opened.
February 19, 2003	TA-46 Bldg 46	An employee was performing a chemical synthesis experiment when the contents of a flask containing a hexane mixture flashed and caused minor burns to employee's face.
February 23, 2003	TA-3, Bldg 1	Three of four demolition workers experienced symptoms of dizziness and nausea and were treated for exposure to carbon monoxide above the ACGIH TLV levels.
April 4, 2003	TA 9, Bldg. 21	An employee received flash burns on his face and hands when the compound he was removing from a petrie dish ignited.
July 2,2003	TA-48, Bldg. 208	A research associate opened a chemical reaction vessel and its contents sprayed onto his face.
July 30, 2003	TA 48, RC 1	The research associate was reconditioning resin in a column when he accidentally sprayed acid in his eyes.
June 18, 1997	TA-15 Bldg. 312	A construction craft foreman was injured during concrete placement operations when struck by a concrete pumping hose. He suffered a head contusion, facial laceration, and dislocated shoulder and was admitted for overnight observation.

Physical Injuries (requiring minimum one night hospitalization, resulting in fatality or affecting 3 or more workers)		
Date	**Location**	**Description**
January 29 2001	TA- 60 Bldg 1	A heavy equipment employee was injured, while installing a snowplow blade on a grader. The safety chain attachment point failed, the blade swung into the employee and broke his leg just above the ankle. The employee was kept overnight at the hospital.
October 16, 2001	TA-3 Bldg 32-Room 102A	A Facility Manager was walking down some equipment that was located above a false ceiling. He fell through the false ceiling and sustained serious fractures of both ankles.
April 16, 2003	TA-16 Bldg. 300 subbasement	A piece of pipe striking an 8-foot stepladder caused a worker to fall and sustain a multiple compound fracture to his right tibia/fibula. As the worker fell, he became entangled in the stepladder and landed with his head close to the stairs. The accident resulted in an injury to the worker—a multiple compound fracture of the right tibia/fibula—that necessitated surgery and several days of hospitalization.
September 27, 2003	TA-55 Bldg. PF-4. Room 319	Five workers were exposed to toxic chemical decomposition products resulting from heating fluorocarbon coolant vapors in a poorly ventilated, anti-contamination tent. All of the workers were hospitalized for observation.

There are many factors that impact worker exposures and accident rates. The number of workers engaged in medium and high-risk work is probably the single most significant factor followed by the quantity of radioactive and hazardous material. Expansion of nuclear operations in plutonium facilities and decommissioning of nuclear facilities are likely to cause an increase in radiation exposures. The manufacturing of the Radioactive Thermal Generators in TA-55, which use Pu-238, is a good example of expanded nuclear operations that could increase future worker exposure during the next five years. Construction and operation of DARHT and Atlas were considered in the SWEIS, and shown through separate NEPA documentation to have small impacts. The planned increase in pit production rates that were considered in the SWEIS, have not been achieved, resulting in a collective radiation dose to the workforce which is considerably less than the collective projected for the ROD. Continued improvements in the Integrated Safety Management (ISM) Program, particularly identification of the hazards and hazards controls, is expected to reduce the worker accident rates, mitigate hazards, and improve productivity.

There are several major construction activities that are being implemented as result of aging facilities and consolidation of facilities that use radioactive and hazardous materials. Three construction projects were identified that could impact worker health risk; however, none of these facilities is expected to operate until after 2009 and their operations were determined to be outside the scope of this review:

- Chemical and Metallurgical Research Replacement Facility, which includes a Radiological Laboratory Office Building (FY04-FY11);
- TA-55 Reinvestment: enhanced manufacturing, surveillance, disassembly, research and development, plutonium recovery and production, waste processing and vault storage (FY07-FY15); and
- Radioactive Liquid Waste Treatment Facility (FY06-FY10)

The following projects or proposed facility modifications have radiological or chemical hazards. Each operation was considered to have a small impact on operational health risk: new radiography facilities and modifications to existing glovebox lines in TA-55, Project 2010 (TRU waste disposal), additional sealed radioactive sources, LANSCE consolidation, DARHT modifications, TA-18 relocation, decommissioning of PHERMEX, transfer of ATLAS to NTS, transfer of tritium operations from TA-21 to WETF, and expanded tritium operations in WETF.

Facility decommissioning will both reduce longtime exposure from sources of radioactive and hazardous material, and increase worker health risk during the decommissioning process. Decommissioning activities at four nuclear facilities were noteworthy 1997-2003: RAMROD, Omega West, TA-33 Bldg. 86 and TA-21. RAMROD and TA-21, DP-West were partially decontaminated. Tritium operations in TA-21 were relocated to WETF. The RAMROD facility is being converted to office space, actinide research and development and training. The Omega West Reactor and TA-33, Bldg. 86 were complete environmental restoration projects. TA-33, Bldg. 86 was a tritium receiving, storage and processing facility. An occupation radiation dose of 31.854 person-rem was required to complete the Omega West D&D and contributed about 14 percent of LANL's external radiation dose received by radiation workers in CY2003. Future nuclear facility decommissioning has potential to result in a one-time increase in worker health risk. None of the major 15 Key Facilities, including CMR, is scheduled for decommissioning before 2009.

The number and severity of physical injuries and chemical exposure from 1997-2003 were compared to events occurring between 1993-1996. A noticeable reduction in the frequency of physical injuries occurred from 1997-2003 (1993-1996 there were 4.5 events/year versus 0.7 events/year from 1997-2003). The frequency and severity of chemical exposures and severity of physical injuries were relatively consistent from 1993-2003.

The SWEIS provided two reference levels, referred to as the Baseline level and the Expanded Operations level. The Baseline level, as reported in Table 2, provides a benchmark to the collective dose during 1993-1995. The Expanded Operations level provides the collective dose considered to be an upper boundary for additional worker health assessments in the ROD. The Expanded Operations reference level of 704 person-rem and was based on 3,548 workers with measurable dose. The operations since 1997 are well below the Expanded Operations reference level. Additionally, there is no indication that increased operations in nuclear facilities or decommissioning in the next five years will result in collective dose approaching a condition that would require additional worker health assessments.

Measurable doses from intakes of radioactive material are provided (Table 4.6.2.1-3) to evaluate the contribution of internal doses to the total collective dose from external plus internal doses. With the exception of year 2000, most of the collective dose is from external radiation doses. The internal dose is primarily attributed to accidental intakes of Plutonium. The column labeled “Plutonium + all others” includes a minor contribution from intakes of Uranium. The number of workers with measurable Tritium intakes increased from 46 in 1996 to 155 in 2003. The average worker CEDE from Tritium is consistently 0.006-0.009 rem per year which is indicative of chronic exposures. Significant intakes of Plutonium have occurred and are attributed to incidents in the workplace. For example, a small intake of Plutonium, particularly Pu-238, can result in a very high CEDE as was the case in 2000 when a worker received a CEDE over 100 rem. Workers with uptakes routinely submit bioassay samples and their CEDE is re-evaluated based on radio-chemical and bio-kinetic data. This annual re-assessment of each workers CEDE often results in minor changes in their reported CEDE, the Site’s total person-rem and average person-rem.

Table 4.6.2.1-3. Collective Total Doses to LANL Workers 1993-2003

Year	Collective Dose (person-rem) TEDE[2]	Numbers of Workers with Measureable Dose[3]	Average Measureable Dose (rem)
1993 to 1995[1]	208	2,141	0.097
1996	199	2,027	0.098
1997	200	2,290	0.087
1998	170	1,935	0.088
1999	133	1,506	0.088

2000	212	1,399	0.152
2001	120	1,350	0.089
2002	163	1,700	0.096
2003	240	1,999	0.120

[1] Baseline Radiological Exposure to LANL Workers, Table 4.6.2.2-1 DOE 1999.
[2] Bates 2004, CY 2003 Performance Indicators for Radiation Protection.
[3] Bates personal communication; LANL EDBS query.

Table 4.6.2-4 is a summary of the total recordable and lost work day (more than one-half day lost due to injury and treatment) cases rates per year at LANL (1997 through 2003). Recordable incidents are any occupational injuries or illnesses that result in: (1) fatalities, regardless of the time between the injury and death or the length of the illness; (2) lost work day cases, other than fatalities, that result in lost work days; or (3) nonfatal cases without lost work days that result in transfer to another job, termination of employment, require medical treatment (other than first aid), or involve loss of consciousness or restriction of work or motion. This category also includes any diagnosed occupational illnesses that are reported to the employer but are not classified as fatalities or lost workday cases (29 CFR 1904.12). Lost workdays are a subset of recordable incidents. These comparisons were based on the Occupational Safety and Health Administration (OSHA) 300 logs maintained by LANL's HSR-5, Industrial Hygiene Group. The data is standardized by the U.S. Department of Labor, Bureau of Labor Statistics allowing comparisons between LANL and other DOE facilities performing similar activities.

Table 4.6.2-4. Measurable Doses from Intakes of Radioactive Materials LANL 1997-2003 (Bates, 2004)

Year	Metric	Tritium	Plutonium + all others	Total CEDE	Average CEDE
1997	Number of Workers with Measurable Dose	74	23	17.771	0.183
	Collective Dose (CEDE)	0.481	17.290		
	Average CEDE	0.007	0.752		
1998	Number of Workers with Measurable Dose	77	17	11.870	0.126
	Collective Dose (CEDE)	0.590	11.280		
	Average CEDE	0.008	0.664		
1999	Number of Workers with Measurable Dose	61	12	4.056	0.056
	Collective Dose (CEDE)	0.489	3.567		
	Average CEDE	0.008	0.297		
2000	Number of Workers with Measurable Dose	84	20	124.306	1.195
	Collective Dose (CEDE)	0.762	123.544		
	Average CEDE	0.009	6.177		
2001	Number of Workers with Measurable Dose	99	11	5.798	0.053
	Collective Dose (CEDE)	0.838	4.960		
	Average CEDE	0.008	0.451		
2002	Number of Workers with Measurable Dose	94	17	3.200	0.029

	Collective Dose (CEDE)	0.755	2.445		
	Average CEDE	0.008	0.144		
2003	Number of Workers with Measurable Dose	155	19	20.131	0.116
	Collective Dose (CEDE)	0.915	19.216		
	Average CEDE	0.006	1.011		

The total reportable case rates were compared to eight other DOE facilities (Table 4.6.2-5). LANL has recordable and lost work day cases at a rate that is within the operational experience of DOE facilities and shows a general decreasing tread which is indicative of improvements in worker health and safety during the last several years.

Table 4.6.2-5. Total Recordable and Lost Workday Case Rates at LANL and other DOE Facilities (1997-2003)

Year	ANL	BNL	HS	INEEL	LLNL	LANL	ORR	RFS	SNL
TOTAL RECORDABLE CASE RATE									
1996	1.4	4.1			3.8	6.6	3.4		3.6
1997	2.1	4.3	3	3.8	7.2	5.6	3.9	4.2	3.8
1998	3.5	4.2	2.5	4.1	5.6	3.5	4.7	2.6	3.9
1999	2.9	2.4	2.2	4	5.2	2.6	4.6	2.3	3
2000	2.6	2.2	1.9	2.9	4.8	1.9	3.9	1.9	3.5
2001	2.8	2.5	2.2	2.3	4.2	1.8	4.2	1.8	3.7
2002	2.2	2.5	1.6	1.6	2.8	2	3.2	2.3	4
2003	1.5	1.8	1.4	1.2	3.3	1.9	2.3	1	3.2
LOST WORKDAY CASE RATE									
1996	0.6	2.9			1	2.3	1.1		1.5
1997	0.8	2.5	1.2	1.6	2.7	3.5	1.7	2.1	1.4
1998	1.6	2.8	1.1	1.6	2	1.8	2.1	1.1	1.3
1999	1.3	1.5	0.9	1.4	1.7	1.3	2.2	1	1.1
2000	1.2	1.2	0.8	1.1	1.8	0.8	1.6	1	1.3
2001	1.4	1.3	0.8	1.2	1.3	0.8	1.9	0.9	1.3
2002	1.3	1.3	0.8	0.6	0.9	1.1	1	0.6	1.6
2003	0.7	1	0.8	0.5	1.2	1	0.9	0.1	1.1

ANL = Argonne National Lab, BNL = Brookhaven National Laboratory, HS = Hanford Site, INEEL = Idaho National Engineering and Environmental Laboratory, LLNL = Lawrence Livermore National Laboratory, LANL =Los Alamos National Laboratory, ORR = Oak Ridge National Laboratory, RFS = Rocky Flats Closure Site, SNL = Sandia National Laboratory

Sources:

DOE Summary Report 2003, Table 3 - Injury and Illness Data by Major Site
DOE Summary Report 2002, Table 3 - Injury and Illness Data by Major Site
DOE Summary Report 2001, Table 3 - Injury and Illness Data by Major Site
DOE Summary Report 2000, Table 3 - Injury and Illness Data by Major Site
DOE Summary Report 1999, Table 3 - Injury and Illness Data by Major Site
DOE Summary Report 1998, Table 3 - Injury and Illness Data by Major Site
DOE Summary Report 1997, Table 3 - Injury and Illness Data by Major Site
DOE Summary Report 1996, Table S3 - Injury and Illness Ranking of Research contractors

4.6.2.2 Ionizing Radiation Exposure to Workers

Table 4.6.2.2-1 summarizes the highest individual dose data for CYs 1998-2003.

Table 4.6.2.2-1. Highest Individual Doses from External Radiation to LANL Workers (rem) [a]

CY 1998	CY 1999	CY 2000	CY 2001 [B]	CY 2002	CY 2003
1.846	1.910	1.048	1.284	2.214	10.197
1.804	1.866	1.013	1.225	1.897	8.097
1.581	1.783	0.905	1.123	1.813	1.710
1.536	1.755	0.828	1.002	1.644	1.569
1.523	1.749	0.815	0.934	1.619	1.214

[a] Data on highest doses have only been presented in the Yearbooks since CY 2000.
[b] During CY 2001, five individual doses were greater than 1 rem but less than 2 rem. Only the highest dose was identified.

4.6.2.3 Monitoring Radiation Exposure

No change from 1999 SWEIS.

4.6.2.4 Summary of Worker Health Studies at LANL

No change from 1999 SWEIS.

4.6.2.5 Worker Health Programs

This section provides a summary of significant changes to the Radiation, Chemical Hygiene, and Occupational Safety. The overarching program impacting worker safety is LANL's Integrated Safety Management (ISM) Program. ISM ensures that safety is integrated into management and work practices at all levels so that mission activities are accomplished while protecting all employees, the public, the environment, and property. The term safety comprises environment, safety, and health including pollution prevention and waste minimization. ISM is a continual improvement process with a goal of an injury-free and accident-free workplace. The LANL Performance Requirement for ISM was issued May 1998. A new process called the Integrated Work Document (IWD) was developed and became effective in November 2003. The IWD was designed to improve safety performance through a more formal assessment of hazards and controls, increased participation from workers and responsible leadership. LANL continues to implement ISM through the IWD process.

Radiation Protection

There were four significant changes to the Radiation Safety Program that impacted worker safety: improved neutron dosimetry, enhanced air monitoring in PF-4, incorporation of new analytical methods actinide bioassay, and additional accountability for sealed radioactive sources. The improved neutron dosimetry reduced the conservativeness built into the analysis of personnel monitoring devices. The enhanced air monitoring in PF-4 provides higher sensitivity and alarm functions for rapid response to high airborne levels. TIMS (Thermal Ionization Mass Spectroscopy) analysis of plutonium in urine resulted in a signification improvement in detection sensitivity.

Lastly, revisions to 10CFR835, brought accountability of sealed radioactive sources under the Radiation Protection Program.

In the next five year period the planned conversion from ICRP 26 and 30 (circa 1979) to the newer ICRP 60/66 (circa 1994) methodologies of calculating CEDE will improve bio-kinetic modeling of radionuclide intake, distribution, retention, and excretion in the human body. Subject to DOE approval, plutonium-239, plutonium-238, and americium-241 doses will be recalculated using the new models. This will result not only in a reduction for the previous years' CEDE and CDE doses, but also for the cumulative total effective dose equivalent (CTEDE) if doses from these radionuclides comprise part of the CTEDE.

Chemical Hygiene Program and Chronic Beryllium Prevention Program

The major improvement to the Chemical Hygiene program was associated with the Beryllium Program. Department of Energy rule 10 CFR 850, Chronic Beryllium Prevention Program, went into effect January 7, 2000. In response to this rule, LANL revised its established beryllium program and developed the Los Alamos National Laboratory Chronic Beryllium Disease Prevention Program (CBDPP). The requirements of the CBDPP are specified in Laboratory Implementation Requirements LIR 402-560, Beryllium Use, which went into effect on February 7, 2001.

LANL has had a long-standing beryllium medical surveillance program. This program was updated to meet the increased requirements of 10 CFR 850. Part of this update was to offer the beryllium Lymphocyte Proliferation Test (LPT) to all beryllium-associated workers. This test can identify workers whose immune systems are responding to beryllium (beryllium sensitized) and are at risk for developing Chronic Beryllium Disease (CBD).

Since 1997, 1350 LANL beryllium-associated workers have chosen to complete the LPT. (Under 10 CFR 850 participation in beryllium medical surveillance is voluntary on the part of the worker.) Seventeen LANL workers (UC and sub-contractor) have been identified as being beryllium sensitized by having repeat abnormal LPT results. Workers with repeat abnormal LPTs are provided follow-up medical evaluations by respiratory specialists. Three of the individuals completing medical follow-up have been diagnosed with CBD.

The John Hopkins University Bloomberg School of Public Health conducts a medical surveillance program for former LANL workers. As of March 2004, 2008 former LANL workers have completed the LPT under this program. Of those completing the LPT, 26 have been identified as beryllium sensitized. Of those identified as sensitized, two have been diagnosed as having CBD.

Significant upgrades and improvements have been made to LANL facilities to minimize the potential for worker exposure to beryllium. Beryllium machining operations in the old beryllium shop in TA-3-39 has been transferred to the state-of-the-art Beryllium

Technology Facility (BTF) in TA-3-141. The old beryllium shop awaits final clean up and decontamination and decommissioning. The Dual Axis Radiographic HydroTest (DARHT) firing point has undergone modifications to reduce beryllium contamination spread and enable more effective clean up after dynamic experiments containing beryllium. Other operations have been evaluated and improved to assure compliance with 10 CFR 850, the CBDPP and the LIR.

As part of exposure reduction and minimization efforts, intensive workplace sampling is conducted to monitor exposure levels and aid in identifying processes and procedures that need further improvement. Worker breathing zone samples, area air samples, and surface contamination samples are routinely collected. The American Industrial Hygiene Association-accredited analytical laboratory operated on-site by C-ACS processes approximately 700 air and surface beryllium samples per month.

Bates, (2004) Personal Communication

4.6.3 Emergency Response and Preparedness Program

DOE maintains equipment and procedures to respond to situations where human health or the environment are threatened. These include specialized training and equipment for the local fire department, local hospitals, state public safety organizations, and other government entities that may participate in response actions, as well as specialized response teams such as the Radiological Assistance Teams (DOE Order 151.1, *Comprehensive Emergency Management System*). These programs also provide for notification of local governments whose constituencies may be threatened. A broad range of exercises is run to ensure the systems are working properly, from facility-specific exercises (e.g., fire drills) to regional responses (major exercises involving several government organizations). Additionally, the emergency response procedures are periodically utilized in response to actual events, **such as the Cerro Grande Fire in the spring of 2000**.

4.6.3.1 Emergency Management and Response

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LANL has an institutional emergency planning, preparedness, and response program as required by federal regulations. Emergency Management and Response (EM&R) personnel are responsible for the emergency planning, preparedness, and response necessary to minimize adverse operational impacts. They are available on a 24-hour basis for emergencies, and they provide a 24-hour notification service capable of contacting all LANL employees, even those on travel, should this assistance be needed.

The EM&R Program also equips and trains both a Crisis Negotiations Team and a Hazardous Devices Team. It maintains an Emergency Operations Center (EOC) 24 hours per day to coordinate emergency responses, and maintains an alternate emergency operations center as required by DOE. To effectively operate during an emergency, memoranda of understanding have been established among DOE, Los Alamos County, and the State of New Mexico to provide mutual assistance during emergencies and to provide open access to medical facilities. In addition, the EM&R Program supports development and deployment of a DOE-directed complex-wide data handling and display system.

To assist emergency responders, the EM&R Program maintains a database with facility-specific information such as building managers, phone numbers, building locations, chemicals of concern, etc. In addition, the EM&R Program has an Emergency Management Plan and Emergency Management Plan Implementing Procedures that contain procedures for operating the EOC and mitigating emergencies including collecting response data. During an emergency, protective actions required for the safety of LANL personnel are determined by and ordered by the Incident Commander. Immediate protective actions that can be ordered are "shelter-in-place" and evacuation. Shelter-in-place would be used for incidents that have a short duration.

The Cerro Grande Fire demonstrated several inadequacies within the original EOC and Multi-Channel Communications capabilities. The fire indicated that the original EOC had outlived its useful life and further evaluation showed that upgrading it would be neither economical nor practical. As a result, the decision was made to pursue the construction of a new EOC. In 2001, an environmental assessment was prepared to address construction and operation of both a new EOC and Multi-Communications capabilities (DOE 2001). The new EOC was completed and began operations in December 2003.

4.6.3.2 Emergency Response for Explosions

LANL has procedures to be followed in case of an explosion. The procedures require a 911 call and a response by fire and medical personnel. EM&R personnel will respond to ensure that the situation is mediated prior to re-entry of the facility.

4.6.3.3 Fire Protection

The Laboratory Director has the responsibility to mitigate dangers to the public, Laboratory workers, and property resulting from fire and other safety concerns. In order to meet this responsibility, management has established a fire protection program that:

- Provides and maintains the necessary staff and resources to develop, maintain, and implement a fire protection program that provides technical expertise to achieve DOE's fire protection goals and requirements
- Minimizes the potential for the occurrence of a fire or other related perils
- Ensures fire does not cause an unacceptable onsite or offsite release of hazardous material that could threaten the public health, safety, or the environment

- Establishes and defines the requirements that provide an acceptable degree of life safety to employees and the public from fire in Laboratory facilities
- Ensures that DOE programs do not suffer unacceptable delays as a result of fire or related perils
- Ensures that property damage from fire and related perils does not exceed levels established by DOE
- Provides fire protection technical assistance to DOE as requested

To this end, the Laboratory Director has established a core fire protection group to consolidate the Laboratory's fire protection technical expertise; Laboratory operations oversight; and provide guidance for facility related inspection, testing, and maintenance of Laboratory fire protection systems. The Fire Protection Program operates under a Laboratory Implementation Requirement document (LIR 402-910.01) that is part of the Laboratory's Integrated Safety Management System.

The Laboratory is also pursuing the development and implementation of an institutional Wildland Fire Management Plan as required by DOE Order 450.1–Environmental Protection Program, and the DOE Wildland Fire Management Policy. This plan is designed to integrate with the existing Fire Protection Program by enhancing institutional wildland fire risk assessment and management capabilities through proactive forest maintenance and wildfire risk reduction.

DOE 2001 *Environmental Assessment for the Proposed Construction and Operation of a New Interagency Emergency Operations Center at Los Alamos National Laboratory*. DOE/EA-1376. Los Alamos Site Office. July 26, 2001.

4.7 Environmental Justice

(Contact: Dan Pava, RRES-ECO, 667-7360, dpava@lanl.gov)

In the first paragraph, explain that the terms used in E.O. 12898 "disproportionately high and adverse human health and environmental impacts" translates simply into "fair treatment", and that "public participation" translates simply into "meaningful involvement" Explain that LANL applies guidance from DOE and CEQ to accomplish both. The introduction and/or Chapter 5 should also mention the efforts LANL uses to engage minority and low-income communities such as but limited to the East Jemez Resource Council, the Trails Assessment Working Group, the Foodstuffs and Biota Monitoring Program, outreach done by the CER and RRES Division. In the second paragraph we should note that minority figures from the 1990 Census aren't directly comparable to the figures supplied by the 2000 Census. There is a good explanation in Appendix D on D-1 of the CMRR EIS. In paragraph three, the poverty threshold for 2000 Census will be different

than the figures used in the SWEIS for 1990 (based on 1989 income of $12,674 for a family of four). Another figure to reconcile is that DOE's guidance for preparing EA's uses a$15,000 year per household income figure for "low income".

4.7.1 Region and Population Considered

The approach used in this section remains valid but the **figures would change as a result of the 2000 Census figures (see Attachment D) for minority and low-income populations within the 50-mile radius.** Figure 4.7.1-2 and Table 4.7.1-1 would change and not be directly comparable to the 1999 data. The SWEIS included minority populations in each of 80 sectors that exceeded 25 percent of that sector's population. Since the majority of the sectors exceed the 25 percent factor there is a question about whether this is a meaningfully greater figure. The CMRR EIS for example in Appendix D states that minority populations should be identified where it exceeds 50 percent or is meaningfully greater than the minority population percentage in the general population; while the NRC uses a similar criterion and suggests that 20 percent is meaningful. Applying this stricter and perhaps more meaningful screen would change the appearance of Figure 4.7.1-2 by increasing the number of unmarked sectors from 17 to 26.

Daniel Sherman (Reference Materials on Environmental Justice: A Document History, July 19, 1999) suggested that it might be useful to prepare community profiles to enrich the data presented. One such profile was prepared for Los Alamos but it is not known if others have been prepared for other nearby settlements such as the pueblos. Sherman also noted that the Army's Economic Impact Forecast System (EIFS) used to assess impacts to communities resulting from the Base Realignment and Closure Act could be adapted to fit LANL needs for further analysis.

4.7.2 Minority Population.

In 1999, the minority population (as then defined by the USCB) was about 115,000 within 50-miles of LANL (SWEIS says nearly 54 percent of 212,771 people) whereas the more recent analysis in the CMRR EIS using 2000 Census figures (calculated differently because people can claim to be more than one minority) states that there are 160,000 minority individuals within this radius. Given population growth the actual percentage may also have changed along with the absolute numbers.

4.7.3 Low-Income Population

These figures would need to be updated with 2000 Census information (see Attachment B) for median household income ($34,133) and the percentage of New Mexicans living

Traditional cultural values are often central to the way a community or group defines itself, and maintaining such values is often vital to maintaining the group's sense of identity and self respect. Properties to which traditional cultural value is ascribed often take on this kind of vital significance, so that any damage to or infringement upon them is perceived to be deeply offensive to, and even destructive of, the group that values them. As a result, it is extremely important that traditional cultural properties be considered carefully in planning; hence it is important that such properties, when they are eligible for inclusion in the NRHP, be nominated to the NRHP, or otherwise identified in inventories for planning purposes.

Source: NPS 1990

below poverty level (14.5 percent vs. 21 percent in 1990). In Los Alamos County, the figures would change from 2.4 percent of all individuals in 1990 to 1.9 percent of all families in 2000. Figures from the 2000 Census could be added for each of the four Accord Pueblos for comparison, and other communities as well.

Section 5.3.7 Expanded Operations Alternative. The bottom line should still be that LANL operations would not have environmental justice impacts but the analysis should cite recent studies done since 1999, particularly with regard to surface and groundwater.

4.8 CULTURAL RESOURCES

(Contacts: Bruce Masse, RRES-ECO, 665-9149, wbmasse@lanl.gov; Kari Garcia, RRES-ECO, 665-6093, manzk@lanl.gov)

Cultural resources are any prehistoric or historic sites, buildings, structures, districts, or other places or objects (including biota of importance) considered to be important to a culture, subculture, or community for scientific, traditional, or religious purposes, or for any other reason. They combine to form the human legacy for a particular place. The cultural resources present within the LANL region are complex because of the great diversity in the culture of the inhabitants of this region. As the structure and physical environment of the Jemez Mountains and Pajarito Plateau changed over time, cultures changed in response, as reflected in the settlement patterns and technology that evolved over time.

The early hunter-gatherers maintained a mobile society that pursued the large game of the Pleistocene era and also used the vegetation present in the region. Archaic hunter-gatherers responded to a warmer and drier climate by increasing their gathering activities and hunting smaller game. The advent of agriculture permitted leisure time for the inhabitants within the region and also allowed the specialization of labor. Along the Rio Grande and the adjacent Pajarito Plateau, American Indian Pueblo cultures developed and moved through a succession of changes in where they settled, from the mesa tops and cliff faces to finally resting on the Rio Grande floodplain (SWEIS Figure 4.8-1). After the Spanish conquest, the area remained agricultural until the Pajarito Plateau became home to a science and technology center, LANL.

While not all cultural resource elements need to be preserved, those with significance require identification and preservation so that future generations may be informed and enriched by the past. The standards and criteria used for evaluating impacts to cultural resources for the SWEIS are based on the system developed for the National Register of Historic Places (NRHP), which was established by the *National Historic Preservation Act*. The NRHP is a list of architectural, historical, archaeological, and cultural sites of local, state, or national importance.

The cultural resources present within the LANL boundaries and the region have been classified into three categories: prehistoric, historic, and traditional cultural properties

(TCPs). Information pertaining to cultural resources that occur within the LANL site boundaries or the region is presented in this section.

Cultural resource data evaluated for the SWEIS are limited to information that is known about prehistoric resources present on the LANL site, historic evidence of cultures on the LANL site, and the TCPs of both American Indian and Hispanic communities on the LANL site and the surrounding areas that may be affected by LANL operations. Information pertaining to how ongoing cultural practices within the region are related to LANL and other land that could be affected by LANL operations is presented in subsection 4.8.3, Traditional Cultural Properties.

Sources used to assess the cultural resources present in the LANL region include systematic archeological surveys of cultural resources present on the LANL site that were conducted by or for DOE and recorded in the LANL cultural resource database, consultations with 23 American Indian tribal sovereign governments, consultations with Hispanic communities, and literature reviews of American Indian and Hispanic traditional cultural properties. In volume III, appendix E of the original 1999 SWEIS report contains expanded discussions of previous studies of cultural resources in the LANL region, a cultural background of the LANL region, applicable regulations, methodologies used for acquiring cultural resource data and assessing impacts to cultural resources, and cultural resources management and resources within LANL boundaries.

4.8.1 Prehistoric Period

Prehistoric cultural resources refer to any material remains and items used or modified by people before the establishment of a European presence in the upper Rio Grande Valley in the early seventeenth century. Socio-historical time lines have been developed based on changes in how people lived and what they ate as reflected by the cultural material remains. Table 4.8.1-1 contains a typical classification scheme for sites in northern New Mexico.

As of October 2003, archeological surveys have been conducted of approximately 86 percent of the land within LANL boundaries to identify the cultural resources present. The majority of these surveys emphasized prehistoric American Indian cultural resources. Information on prehistoric cultural resources was obtained from the LANL cultural resources database, which is a listing of the cultural resources identified through surveys and excavations and recorded over the last decade. The database is organized primarily by site type and records 1,797 prehistoric sites (Table 4.8.1-2). Of the 1,797 prehistoric sites in the LANL database, 1, 722 have been assessed for potential nomination to NRHP. Of these, 1,165 sites are eligible, 425 sites are potentially eligible, and 130 sites are ineligible. The remaining 75 sites, which have not been assessed for nomination to NRHP, are assumed to be potentially eligible until further assessment.

Table 4.8.1-2. Prehistoric Site Types and Number of Sites Recorded in the LANL Cultural Resources Database

Site Type	Number of Sites

Simple Pueblos	796
Complex Pueblos	73
Rock Shelters, Cavate (small cave) Pueblos	323
Rock Art	75
Water Control Features, Game Traps	56
Trails, Steps	54
Highly Eroded Pueblos, Rubble	79
Artifact Scatter, Lithic (made of stone) Scatter, Rock Rings	3,160
Pit Structures	2
Rock/Wood Enclosures, Fences	7
Other Prehistoric Use Areas	15
TOTAL	1,796

Sources: Cordell 1979, Cordell 1984, Stuart and Gauthier 1981, Wolfman 1994, and Wendorf 1954

Yes, Water Control Features, Game Traps stays the same number (56).

4.8.2 Historic Period

Historic cultural resources include all material remains and any other physical alteration of the landscape that has occurred since the arrival of Europeans in the region. The historic resources present within LANL boundaries and on the Pajarito Plateau can be attributed to three phases: Spanish Colonial, Early U.S. Territorial/Statehood, and the Nuclear Energy Period. Because of the very well-defined changes in the function of LANL, the Nuclear Energy Period is further broken into three periods: World War II/Early Nuclear Weapon Development, Early Cold War, and Late Cold War. No systematic survey has been conducted of the Historic Period resources present within LANL boundaries.

Through LANL site surveys, 404 historical resources have been recorded out of the 757 potential resources. The remaining 353 resources were identified by reviewing the construction dates presented in the following LANL facility listings:

- Capital Asset Management Process Report for fiscal year 1997
- The Facility for Information Management, Analysis, and Display database
- As-built structure location maps
- The LANL ER Project decommissioning summary
- The LANL cultural resources database

The SWEIS ROD lists 2,319 historic (A.D. 1600 to the present) cultural resource sites, including sites dating from the Historic Pueblo, US Territorial, Statehood, Homestead, Manhattan Project, and Cold War Periods (Table 3.9-2). To date LANL has identified no sites associated with the Spanish Colonial or Mexican Periods. Many of the 2,319 potential historic cultural resources are temporary and modular properties, sheds, and utility features associated with the Manhattan Project and Cold War Periods. Since the

SWEIS ROD was issued, these types of properties have been removed from the count of historic properties because they are exempt from review under the terms of the Programmatic Agreement (MOU DE-GM32-00AL77152) between the DOE Los Alamos Area Office, the New Mexico State Historic Preservation Office, and the Advisory Council on Historic Preservation. Additionally, the Heritage Resources and Environmental Policy Compliance Team (HR&EPCT) has evaluated many Manhattan Project and Early Cold War properties (A.D. 1942–1963) and those properties built after 1963 that potentially have historical significance, reducing the total number of potential historic cultural resource sites to 757. Most buildings built after 1963 are being evaluated on a case-by-case basis as projects arise that have the potential to impact the properties. Therefore, additional buildings may be added to the list of historic properties in the future.

The temporal phases of these historic periods, characteristic cultural evidence, number of known artifacts or sites, and eligibility for the NRHP are presented in Table 4.8.2–1, Historic Site Types and Number of Sites Recorded in the Los Alamos National Laboratory Cultural Resources Database.
LANL is currently documenting Nuclear Energy period resources as part of a DOE-wide historic preservation program focusing on World War II and Cold War properties. This study was not completed in time for inclusion in the SWEIS.

Table 4.8.2-1. Historic Site Types and Number of Sites Recorded in the LANL Cultural Resources Database

Historic Period	Dates	Characteristic Cultural Evidence	Number of Known Artifacts or Sites	National Register of Historic Places Eligibility
Spanish Colonial	A.D. 1600 to 1849	• Wagons • Iron hardware • Horse equipment • Pueblo V artifacts	0	
Early U.S. Territorial/ Statehood	A.D. 1850 to 1942	• European and Hispanic homesteads • Commercial ranching concerns/guest ranches: Pond Cabin, Anchor Ranch, and the Los Alamos Ranch School	124	30 sites are eligible for the NRHP. One site is also listed on the State Register of Cultural Properties.[a]
Nuclear Energy	A.D. 1943 to present			

a. World War II/Early Nuclear Weapon Development Period	A.D. 1943 to 1948	• Original Los Alamos townsite • World War II Manhattan Project facilities where the design and manufacture of the “Trinity Site” bomb; Hiroshima bomb, “Little Boy,” and Nagasaki bomb, “Fat Man” occurred • LANL sites where all U.S. Nuclear Weapons were made from 1946 to 1950 • Common remains consist of buildings, security fences and stations, barricades, roads, and reinforced protective structures.	320	95 sites are eligible for the NRHP (1943–1956). One is also listed on the State Register of Cultural Properties.[a]
b. Early Cold War Period	A.D. 1949 to 1956	Pronounced expansion of facilities		
c. Late Cold War period	A.D. 1957 through 1989	Continued expansion of facilities	136	10 sites are eligible for the NRHP (1957-1989).
Total number of sites:			**757**	

Sources: LANL 1995a, LANL 1996h, LANL 1995c, McGehee 1995, and NMHPD 1995
a The Ashley Pond Cabin is listed twice because its occupation and use spans two historic periods.

4.8.3 Traditional Cultural Properties

A TCP is a significant place or object associated with historical and cultural practices or beliefs of a living community that is rooted in that community’s history and is important in maintaining the continuing cultural identity of the community (LAHS nd). TCPs are essential in preserving cultural identity through social, spiritual, political, and economic uses. Federal guidelines established by the NPS identify TCPs to include:

- Natural resources
- Prehistoric and historic archaeological sites
- Traditional-use areas in the cultural landscape that do not reveal evidence of human use
- A rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents
- An urban neighborhood that is the traditional home of a particular cultural group and that reflects its beliefs and practices
- A location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historical identity (NPS 1990)

An area may have TCP significance depending upon a variety of factors such as if the site is remembered in prayers or tribal stories, if the traditional ritual knowledge of the place is passed on to other members of the community, or if traditional customs continue to be practiced by members of a community. TCPs that are considered culturally important by traditional communities include shrines, trails, springs, rivers, acequias, plant and mineral gathering areas (also referred to as ethnobotanical sites), traditional hunting areas, ancestral villages and grave sites, and petroglyphs (Harrington 1916 and Henderson and Harrington 1914). However, TCPs are not limited to ethnic minority groups. Americans of every ethnic origin have properties to which they ascribe traditional cultural value.

Within LANL's limited access boundaries, there are ancestral villages, shrines, petroglyphs, sacred springs, trails, and traditional use areas that could be identified by Pueblo and Athabascan communities as TCPs. DOE, together with the LANL HR&EPCT, has a program in place to manage on-site cultural resources for compliance with the *Native American Graves Protection and Repatriation Act* and *American Indian Religious Freedom Act*. When an undertaking is proposed, DOE and LANL arrange site visits by tribal representatives with San Ildefonso, Santa Clara, Jemez, and Cochiti Pueblos to solicit their concerns and to comply with applicable requirements and agreements. Provisions for coordination among these four Pueblos and DOE is contained in formal agreements called Accords that were entered into in 1992 for the purpose of improving communication and cooperation among federal and tribal governments. According to the DOE compliance procedure, American Indian tribes may request permission for visits to sacred sites within LANL boundaries for ceremonies (PC 1997f).

American Indian TCPs located on lands outside LANL boundaries such as tribal lands, state lands, federally managed lands, and private lands, could potentially be affected by LANL operations. Other federal agencies that administer lands in the LANL vicinity that may have TCPs include the following:

- U.S. Forest Service—Santa Fe and Carson National Forests
- National Park Service—Bandelier National Monument
- Bureau of Land Management—Taos Resource Area

During surveys conducted in 1992 and 1993 in Rendija Canyon as part of the then proposed Bason Land Exchange, seven properties were identified as TCPs by the Pueblo of San Ildefonso. These properties are currently included as part of the ongoing Congressionally-mandated Land Conveyance and Transfer of excess DOE lands to Los Alamos County and the Pueblo of San Ildefonso, with the transfer anticipate in FY 2007.

As part of the original SWEIS process, a TCP study was conducted during the period of 1996 to 1997. This study involved consultations with 19 American Indian tribes and two Hispanic communities to identify cultural properties important to them in the LANL region. Contacts were made with 23 American Indian tribes; however, four chose not to participate in the consultations. All of the consulting groups stated that they had at least some TCPs present on or near LANL. Categories of TCPs identified and number of consultations identifying the presences of TCPs are summarized in Table 4.8.3–1. These resources are present throughout LANL and adjacent lands identified above. No specific features or locations were identified.

In 2000, DOE prepared a document entitled *A Comprehensive Plan for the Consideration of Traditional Cultural Properties and Sacred Sites at Los Alamos National Laboratory, New Mexico*, which was sent to a total of 24 tribes in New Mexico and Arizona. Based on this plan, and on subsequent discussions with a number of the tribes, meetings were held with the four Accord Pueblos and the Hopi Tribe. In addition, various communications ensued with the Pueblo of Acoma, the Mescalero Apache Tribe, and the Jicarilla Apache Nation. The Pueblo of San Ildefonso is actively involved with the identification of TCPs in addition to those documented in 1993. Discussions are also in progress with the Pueblos of Santa Clara and Cochiti.

Spiritual Concerns

In addition to physical cultural entities, concern has been expressed that “spiritual,” “unseen,” “undocumentable” or “beingness” aspects can be present at LANL that are an important part of Native American culture and may be adversely impacted by LANL’s presence and operation.

4.8.4 Cultural Resource Management at LANL

Cultural resources management at LANL is handled by DOE and the LANL HR&EPCT of the Ecology Group of the Risk Reduction and Environmental Stewardship Division . The HR&EPCT follows the LANL compliance procedure outlined in the *LANL Cultural Resource Overview and Data Inventory 1995*, and modified in April 2000 by the previously mentioned Programmatic Agreement (MOU DE-GM32-00AL77152) for the management of historic properties at LANL, signed by DOE, the New Mexico State Historic Preservation Officer, and the Advisory Council on Historic Preservation. These procedures are designed to ensure DOE compliance with the *National Historic Preservation Act of 1966*; the *Archaeological Resources Protection Act of 1979*; the *American Indian Religious Freedom Act of 1978; Native American Graves Protection and Repatriation Act of 1990;* Executive Order 13007, Section 2(b)*; National Environmental Policy Act of 1969*; DOE’s *American Indian Tribal Government Policy* (DOE Order 1230.2), revised in 2000; DOE Policy 141.1, *Department of Energy Management of Cultural Resources*, issued in 2001, and other pertinent laws, Executive orders, regulations, and policies. A preliminary draft cultural resource management plan (CRMP) for LANL was completed in June 2004, with the final plan anticipated for implementation during FY 2005. Once signed and implemented, the CRMP will guide all subsequent cultural resources management activities at LANL.

Coordination of cultural resource issues with the four Accord tribes of San Ildefonso, Santa Clara, Jemez, and Cochiti is an integral part of this cultural resource compliance, and have been discussions with other tribes. In addition to the compliance procedure, measures are taken to provide American Indian tribes with access to information and input to the process of cultural resource management.

The DOE and LANL are active participants in the East Jemez Resource Council recently formed to foster conservation and preservation of the natural and cultural resources of the east Jemez Mountains.

During the period of 1999 to 2004, two events have had a profound and continuing impact on cultural resources management activities at LANL. These are the May 2000 Cerro Grande fire and the start of archaeological excavations in FY 2002 in support of the Land Conveyance and Transfer of excess properties at LANL as directed by Section 632 of Public-Law 105-119.

The May 2000 Cerro Grande Fire consumed approximately 19, 495 ha (47,650 ac) of land along the eastern flanks of the Jemez Mountains, including 3295 ha (8,120 ac) of lands owned and managed by DOE. The fire caused substantive damage to historic Manhattan Project buildings and structures. This included consuming most of the wooden structures at the "V-site," a historic property that just the year before had been designated and funded for the national "Save America's Treasures" program. The V-site is the location of a trial assembly of the components for the 1945 Trinity test immediately prior to the test detonation of the World's first atomic weapon at the Trinity site in southern New Mexico. Because of the extensive damage to the V-site by the Cerro Grande Fire, the managers of the Save America's Treasures Program graciously agreed to partially shift funding and preservation efforts to the equally significant "Gun Site" at LANL, where tests were conducted of the uranium gun device used for the "Little Boy" bomb.

An archaeological assessment was conducted by the HR&EPCT of 470 of the 480 archaeological sites known or suspected to be within the area encompassed by the Cerro Grande Fire and fire suppression activities at LANL. Of these 470 assessed sites, 340 (72 percent) exhibited varying degrees of damage. This damage included soot staining, spalling, and cracking of stone masonry walls of Ancestral Pueblo fieldhouses and roomblocks, the creation of snags and burned out stump holes within many sites, the massive destruction of wooden elements associated with historic homesteads, increased potential for erosion at many sites, and other related problems.

Disaster can sometimes produce unanticipated opportunities, and such was the case for the Cerro Grande Fire. Through the efforts of the LANL Cerro Grande Rehabilitation Project (CGRP) and other groups at LANL, including the HR&EPCT, a collaborative project was set up under contract with the Accord Pueblos to assist with forest management and erosion control rehabilitation at LANL. This included rehabilitation of selected Ancestral Pueblo archaeological sites. The HR&EPCT recommended 118 archaeological sites to be assessed for cultural sensitivities and rehabilitation measures by a team of cultural specialists and tribal elders from the Pueblos of San Ildefonso and Santa Clara.

The pueblo assessment team, facilitated by archaeologists, foresters, and erosion control specialists from the CGRP and from HR&EPCT, conducted its work in FY 2002. During FY 2003, a trained cultural site mitigation team from the Pueblo of San Ildefonso conducted rehabilitation work at 107 of these 118 sites. They also placed protective fences (3-strand smooth wire) around 87 sites along fire break roads and other locations potentially vulnerable to fire suppression activities. Single sites, as well as clusters of sites were fenced. During FY 2004, the Pueblo of San Ildefonso team conducted the hand thinning of 146 ha (360 ac) of juniper and piñon pine forest around particularly high densities of archaeological sites on LANL land. This effort is for the purpose of reducing the threat of wildfire to key LANL facilities and to the archaeological sites themselves.

The other major cultural resources management activity during the 1999 to 2004 period is that of the Land Conveyance and Transfer archaeological excavations. The fieldwork for the project began in FY 2002 and is anticipated to be completed in FY 2005, with analyses and report preparation continuing until FY 2007. The excavations are being conducted by the HR&EPCT with the assistance of students and contractors.

Three excess parcels slated to be transferred to Los Alamos County are included in the excavations. These are the White Rock tract near the community of White Rock, the Airport tract immediately adjacent to the Los Alamos airport, and the Rendija Canyon tract. As of April 2004, a total of 16 archaeological sites had been excavated in the three tracts. These include three Ancestral Pueblo habitation roomblocks, three Archaic Period lithic scatters, two late historic probable Jicarilla Apache tepee ring sites, four Ancestral Pueblo fieldhouses, two Ancestral Pueblo artifact scatter, and a two Ancestral Pueblo garden plots. The FY 2004 and FY 2005 field seasons will include the excavation of a total of 23 archaeological sites, nearly all of which are Ancestral Pueblo field houses, but which also include garden features, other unidentified rock features, and a historic Hispanic homestead.

A notable aspect of the excavations is the use of tribal monitors, set up through an intentional excavation comprehensive agreement as part of the Native American Graves Protection and Repatriation Act (NAGPRA). During the FY 2002 and FY 2003 field seasons, two fulltime monitors were hired from the Pueblo of San Ildefonso, including the then First Lt. Governor. Not only did these individuals ably serve in their capacity of monitoring fieldwork activities in compliance with NAGPRA, but also provided valuable assistance in other aspects of fieldwork, analysis, and report preparation. These two individuals from the Pueblo of San Ildefonso are joined during the FY 2004 and FY 2005 field seasons in Rendija Canyon by a monitor from the Pueblo of Santa Clara.

One other notable cultural resources management outcome of the Land Conveyance and Transfer project is that of the establishment of archaeological protection easements in that portion of Pueblo Canyon (Technical Area 74) being transferred to Los Alamos County. These easements cover approximately 32 ha (79.5 ac), and encompass 31 archaeological sites, including 16 Ancestral Pueblo habitation roomblocks and 5 Ancestral Pueblo complex plaza village ruins, the later which includes Little Otowi Ruin, ancestral to the Pueblo of San Ildefonso and which is still remembered in their traditional history. These easements are being set up with a private conservation trust to provide protection in perpetuity for the archaeological sites.

4.9 Socioeconomics, Infrastructure, and Waste Management

4.9.1 Socioeconomics

(Contact: Dan Pava, RRES-ECO, 667-7360, dpava@lanl.gov)

4.9.1.1 Demographics.

SWEIS Table 4.9.1.1-1 has been updated using 2000 Census data.

Table 4.9.1.1-1. 2000 Population by Race and Ethnicity for the Tri-County Region

All Persons, Race/Ethnicity	Los Alamos County		Rio Arriba County		Santa Fe County	
	No	%	No	%	No	%
All Persons	18,343		41,190		129,292.0	
White	16,563.73	90.3	23,313.54	56.6	95,029.62	73.5
Black or African-American	73.372	0.4	123.57	0.3	775.752	0.6
Amer. Indian and Alaska Native	110.058	0.6	5,725.41	13.9	4,008.052	3.1
Asian	697.034	3.8	41.19	0.1	1,163.628	0.9
Native Hawaiian/Other Pacific Islander	0	0	41.19	0.1	129.292	0.1
Some other race	495.261	2.7	10,544.64	25.6	22,884.68	17.7
Two or more races	421.889	2.3	1,359.27	3.3	5,300.972	4.1
Hispanic or Latino (any race)	2,146.131	11.7	30,027.51	72.9	63,353.08	49
White, not Hispanic or Latino	15,059.6	82.1	5,601.84	13.6	58,827.86	45.5

Source: 2000 Census Data, Department of Commerce

SWEIS Table 4.9.1.1-2 has been updated using 2000 Census data and a straight line projection to 2010 has been performed.

Table 4.9.1.1-2. Tri-county population projections through the year 2010

County	1990	2000	2010	Percent change per year
Los Alamos	18,115	18,343	18,573.87	0.126655
Rio Arriba	34,365	41,190	49,370.47	2.183249
Santa Fe	98,928	129,292	168,975.6	3.540334
Region	151,408	188,825	235,488.7	2.776628

Source: 2000 Census Data and SWEIS Table

4.9.1.2 Regional Incomes

SWEIS Table 4.9.1.2-1 has been updated using 2000 Census data.

Table 4.9.1.2-1. Income data for the LANL region (1999)

Area	Median Family Income 1999	Per Capita Income 1999
Los Alamos	90,032	34,646
Rio Arriba	32,901	14,263
Santa Fe	50,000	23,594

Source: 2000 Census Data

4.9.1.3 Regional Labor Force and Educational Attainment

SWEIS Table 4.9.1.3-1 has been updated using New Mexico Department of Labor data.

Table 4.9.1.3-1. Regional civilian labor force, employment, unemployment, and unemployment rates (2003)

County	Labor Force	Employed	Unemployed	Unemployment Rate
Los Alamos	10,412	10,235	177	1.7
Rio Arriba	22,537	20,795	1,742	7.7
Santa Fe	71,175	68,511	2,664	3.7
Tri-county Region	104,124	99,541	4,583	4.4
State of New Mexico	896,867	839,667	57,200	6.4

Source: New Mexico Department of Labor, Economic Research and Analysis Bureau (LASER website)

Table 4.9.1.3 has been updated using 2000 Census data.

Table 4.9.1.3 Educational Attainment (2000)

County	% adults > 25 with at least one degree	% adults > 25 without high school diploma/equivalency
Los Alamos	60.5	3.6
Rio Arriba	15.4	27
Santa Fe	36.8	15.5
Nation	24.4	19.6

Source: 2000 Census Data

4.9.1.4 Regional Economy

Locate more current information about regional economy. Possible sources include http://www.tradenm.org/directory/3d.html which includes further links at the Tri-Area Economic Development site.

Table 4.9.1.4-1. Earnings for Tri-County Region (Thousands of Dollars)

Earnings by Industry	2002 Dollars
Farm Earnings	4,238
Private Earnings	2,695,784
Government Earnings	1,794,964
Federal Civilian	134,425
Military	9,211
State and Local	1,651,328
Dividends, Interest & Rent	1,478,864
Transfer Payments	716,522
Total Personal Income	6,104,993

Source: US Department of Commerce Bureau of Economic Analysis
Regional Economic Accounts (website)
*Can get other years' data if needed

4.9.1.5 LANL Affiliated Workforce

SWEIS Tables 4.9.1.5-1, 2, 3, and 4 have been updated.

Table 4.9.1.5-1. Employees of the LANL-Affiliated Work Force by County of Residence

County of Residence	Number of Persons Employed By				Total	Percent of Work Force
	UC	SE Contractor	KSL*	PTLA		
Los Alamos	5,022	521	155	102	5,800	43
Rio Arriba	1,797	332	540	229	2,898	22
Santa Fe	2,194	255	269	158	2,876	21
Other NM	737	285	267	112	1,401	10
Total NM	9,750	1,393	1231	601	12,975	96
Outside NM	450	34	15	0	499	4
Total	10,200	1,427	1,246	601	13,474	100
Percent of Total	76.00	11.00	9.00	4.00	100.00	

Data as of 12/31/2003
Generated by HR-WDA on 4/26/04
* KSL data is as of 4/26/2004

Table 4.9.1.5-2. LANL-Affiliated Work Force by Race and Ethnicity

	UC Employees*	UC Student	Tech. Contractor**	KSL***	PTLA***
All Persons	8,461	1,693	1,405	1,363	668
White	5,105	856	662	390	190
Black or African-American	57	16	8	8	10
Amer. Indian and Alaska Native	154	19	15	51	22
Asian/Native Hawaiian/Other Pacific Islander	249	157	17	3	5
Did Not Specify	369	218	180	0	0
Hispanic or Latino (any race)	2,527	427	523	911	441

* UC Regular + UC Limited Term Employees
** Includes employees of Comforce Technicial Services, Weirich and Associates, Inc., The Plus Group, Inc., Butler Services, or others
*** There are 1,482 companies, individuals, or universities with contracts from LANL that employ 11,574 employees (including KSL and PTLA). Most (1,452) of these companies, universities, or individuals have fewer than 50 employees engaged on LANL contracts. LANL does not maintain race and ethnicity statistics on most of these contractor employees. Generated by HR-WDA on 6/2/04. Data generated by company (KSL or PTLA) as of 6/30/04.

Table 4.9.1.5-3. Percentage of University of California Employees by Race/Ethnicity

Category	Unclassified		White		Hispanic		Black		Asian/Pacific Islander		American Indian		Total
	#	%	#	%	#	%	#	%	#	%	#	%	
TSM	397	8	3,846	75	460	9	37	1	343	7	58	1	5,141
TGS	61	13	199	43	188	41	0	0	6	1	8	2	462

TEC	160	6	1,180	46	1,100	43	19	1	45	2	65	3	2,569
SSM	44	3	895	51	744	43	14	1	26	1	25	1	1,748
OS	53	11	122	24	307	61	3	1	6	1	12	2	503
GS	4	2	45	19	172	74	1	0	2	1	8	3	232
ASM	45	16	161	56	75	26	5	2	2	1	2	1	290
AS	50	7	217	31	425	60	3	0	1	0	13	2	709
Total	814	7	6,665	57	3,471	30	82	1	431	4	191	2	11,654

Generated by HR-WDA on 6/8/04

Table 4.9.1.5-4. Salary and Work Force Shares of University of California Employees by Race/Ethnicity

Race/Ethnicity	Percent of UC Work Force	Percent of UC Salaries
Unclassified	6	6
Caucasian	59	67
Hispanic of Any Race	29	21
African-American	1	1
Asian/Pacific Islander	4	4
American Indian	2	2
Total	100	100

Data as of 12/31/2004
Generated by HR-WDA on 4/26/2004

4.9.1.6 UC Procurement.

SWEIS Table 4.9.1.6-1 has been updated to reflect FY 2003 data. SWEIS Figure 4.9.1.6-1 needs to be revised. Suggested sources include SUP Division and Public Affairs.

Table 4.9.1.6-1. University of California Procurement for Fiscal Years 1995 and 2003 (Millions of dollars)

Source	1995		2003	
	Dollar Amt	Percent	Dollar amt	Percent
New Mexico Orders				
Big Business	218.2	61	305.2	57.26079
Small Business*	132.8	37	209	39.21201
Other**	9.5	3	18.7	3.508443
Total	360.5	100	533	100
Outside New Mexico Orders				
Big Business	125	54	178.7	40.82705
Small Business*	89.2	39	161.7	36.94311
Other**	17.5	8	97.3	22.22984
Total	231.6	100	437.7	100
Total FY Procurement	592.1		970.6	

*Small Businesses meet any applicable criteria concerning number of employees or annual receipts established by the Small Business Administration, and are independently owned and operated.
**Other includes agreements with DOE management & operating contractors, universities, the federal government, utilities, foreign entities, educational institutions, and purchase cards.
Source: SWEIS table and Los Alamos National Laboratory Small Business Program Summary LALP-04-019

Table 4.9.1.6-1. University of California Procurement in New Mexico Counties, FY03 (Millions of Dollars)

Los Alamos	329.7
Rio Arriba	15.4
Santa Fe	37.5
Other	150.4

Source: Los Alamos National Laboratory Small Business Program Summary LALP-04-019

4.9.1.7 Role of LANL in Regional Economy

No change from 1999 SWEIS.

4.9.1.8 Community Resources and Social Services

SWEIS Tables 4.9.1.8-1, 2, 3, and 4 have been updated using the most current version of County and Municipal Governments Financial and Property Tax Data annual report from the Department of Finance and Administration.

Table 4.9.1.8-1. Municipal and County General Funds Revenues in the Tri-County Region (Fiscal Year 2001)

Source	LA County		Rio Arriba County		Espanola		Santa Fe County		City of Santa Fe	
	$	%	$	%	$	%	$	%	$	%
Property Tax	4,298,335	3.043444	3,825,225	16.74902	352,951	1.7808	25,331,255	36.0238	1,451,370	0.80785
Gross Receipts Tax	16,541,971	11.71257	2,094,991	9.173067	7,214,398	36.39996	9,271,503	13.18509	57,710,711	32.12248
Lodgers Tax	260,952	0.184768	NA		96,922	0.489016	NA		5792,597	3.224229
Others	167,284	0.118446	364,856	1.597548	259,876	1.311194	1,282,287	1.823551	2,352,033	1.30917
Fees, etc.	63,719,827	45.11694	614,051	2.688666	4,821,426	24.32631	598,601	0.851276	63,112,502	35.12918
Oil and Gas Taxes	NA		7,256,598	31.77353	NA		0	0	NA	
Misc. Income	56,244,216	39.82382	3,536,397	15.48436	7,074,225	35.69272	16,905,470	24.04142	49,239,138	27.4071
Restricted Funds	NA		5,146,384	22.53381	NA		16,928,997	24.07487	NA	
Total Revenues	1.41E+08	100	22,838,502	100	19,819,798	100	70,318,113	100	1.8E+08	100

Source: Financial and Property Tax Data by County and Municipality Fiscal Year 2003 (NM DFA)

Table 4.9.1.8-2. Municipal Revenues in Tri-County Region (Fiscal Year 2003)*

Source	LA County		Espanola		City of Santa Fe	
	Actual	%	Actual	%	Actual	%
Property Tax	4,298,335	3.043444	352,951	1.7808	1,451,370	0.80785
Cigarette Tax	8,243	0.005836	16,413	0.082811	134,673	0.074961
Franchise Tax	0	0	0	0	1,918,212	1.0677
Gas Tax	159,041	0.112609	158,005	0.797208	0	0
Gross Receipts Tax	16,541,971	11.71257	7,214,398	36.39996	57,710,711	32.12248
Lodgers Tax	260,952	0.184768	96,922	0.489016	5,792,597	3.224229
Motor Vehicle Tax	0	0	85,458	0.431175	299,148	0.166509
Fees and Charges	63,719,827	45.11694	4,821,426	24.32631	63,112,502	35.12918
Fines and Forfeits	0	0	0	0	0	0
Licenses and Permits	483,346	0.342234	130,833	0.660113	1,593,704	0.887075
Other	55,760,870	39.48159	6,943,392	35.03261	47645434	26.52002

Total Revenue	1.41E+08	100	19,819,798	100	1.8E+08	100

Includes all sources of funds, including bond revenues, state grants, etc.
Source: Financial and Property Tax Data by County and Municipality Fiscal Year 2003 (NM DFA)

Table 4.9.1.8-3 Rio Arriba and Santa Fe Counties Revenues (Fiscal Year 2003)

Source	Rio Arriba County		Santa Fe County	
	$	%	$	%
Property Taxes	3,825,225	16.74902	25,331,255	36.0238
Oil, Gas and Mineral Taxes	7,256,598	31.77353	0	0
Gross Receipt Taxes	2,094,991	9.173067	9,271,503	13.18509
Motor Vehicle Taxes	313,477	1.372581	871,387	1.239207
Other Taxes, Penalties and Interest	51,379	0.224967	410,900	0.584344
Licenses, Permits, Fees and Service Charges	614,051	2.688666	598,601	0.851276
Misc. Income	3,536,397	15.48436	16,905,470	24.04142
Restricted Funds	5,146,384	22.53381	16,928,997	24.07487
Total Receipts	22,838,502	100	70,318,113	100

Source: Financial and Property Tax Data by County and Municipality Fiscal Year 2003 (NM DFA)

Table 4.9.1.8-4 DOE payments to Los Alamos County (FY03)

Recipient	DOE Dollars	Total Budget Dollars	DOE Percent of Total
County Fire Dept.	12,297,882	12,718,305	96.69435
County General Fund*	0	28,272,843	0
School District	8,675,896	30,772,621	28.19356

Sources: FY2003 Comprehensive Annual Financial Report for County of Los Alamos and the New Mexico Public Education Department 2002-2003 Stat Book
* Annual financial assistance payments from DOE were discontinued in 1997 when the County received a lump sum buyout payment.

Public Schools

Los Alamos **Public Schools** Funding information used to update this section may be found at http://laps.losalamos.k12.nm.us/LAPS%20Report%20to%20Congress.pdf.

New Mexico is divided into 89 school districts, 4 of which are predominantly within the Tri-County area. The State Equalization Guarantee Distribution accounts for over 90 percent of operational revenue received by New Mexico's public schools (NMDE 1995a). Information regarding school district operations for the school districts within the Tri-County region is presented in Table 4.9.1.8-5.

Table 4.9.1.8-5 Public school statistics in the LANL region (2002 - 2003 School Year)

District	Student Enrollment	Teachers	Teacher/Student Ratio	Per Student Operational Expenditures
Los Alamos	3,452	267.09	12.92448	8,529
Santa Fe	13115.36	781.68	16.77843	5,320
Espanola	4897.18	284.75	17.19817	6,010
Pojoaque	1,893	120.02	15.77237	6,174
State Average			15.5	5,675

Source: the New Mexico Public Education Department 2002-2003 Stat Book

The Los Alamos School District receives 30 percent of its funding from the federal government, over 63 percent from the State Equalization Guarantee Distribution, and 7 percent from local sources such as the property tax levy and surplus school space rental (Personal Communication 2004 with Superintendent Jim Anderson by phone on July 15, 2004). The district receives direct funding from DOE in lieu of property taxes on nontaxable federal property in the district. The district also receives Public Law (PL) 874 funding in lieu of property taxes for children residing on federal land or having parents employed on federal property (PL 874). The total operational school budget for school year 2004-2005 is projected to be $32.5 million.

The school district is not eligible for many of the federal programs that assist schools and students, because the majority of its student body is not low income. The school district is at the legal limit in its ability to raise local taxes for operational funds.

In the Los Alamos School District, enrollment was stable during the period of 1990 through 2004. The district owns four surplus school facilities: one it leases to DOE and the University of New Mexico at Los Alamos, and three it leases to LANL and LANL contractors. These four facilities could potentially accommodate approximately 1,275 students. Capacities differ at each school now in use, but as a whole, schools currently in use could accommodate approximately 750 more students in the coming years (Personal Communication 2004 with Superintendent Jim Anderson by phone on July 15, 2004).

Housing

SWEIS Table 4.9.1.8-6 has been updated using 2000 Census data. American Fact Finder is a convenient source.at http://factfinder.census.gov/home/saff/main.html?_lang=en

Table 4.9.1.8-6 Regional housing summary for the tri-county region (2000)

	Los Alamos		Rio Arriba		Santa Fe	
	Number	%	Number	%	Number	%
Total Housing Units	7,937		18,016		57,701	
Occupied	7,497		15,044		52,482	
Owner-occupied	5,895		12,296		35,977	
Renter occupied	1,602		2,748		16,505	
Vacant	440		2,972		5,219	
For sale only	68		127		548	
For rent	201		194		908	
Other	171		2,651		3,763	
Median home value	228,300		107,500		189,400	
Median contract rent	615		312		626	

Source: 2000 Census Data

Health Services

Health Services text could be updated with a review of the Los Alamos Medical Center (LAMC) current information. Wendy Hoffman is the Director of Community Relations at 505.662.4201. Wendy_M_Hoffman/Los_Alamos/phccorp@prhc.net. Attachment E contains current information on the LAMC.

Police Protection

Police and Fire Protection text will need to be updated by referring to current Los Alamos County information and the budget at http://www.lac-nm.us/index.asp?Type=B_BASIC&SEC={4C4DCA41-D6B2-467D-8C53-83480EADA8BD} and http://www.lac-nm.us/index.asp?Type=SEC&SEC={73334B41-B5E8-48C0-A345-1165BEE5653C}&DE={9AEC976D-6CAF-45CF-A559-7E7A99B21E5C}. Attachment F contains information on the Los Alamos Police and Fire Departments. For further information on the Los Alamos Fire Department, contact Deputy Chief Doug Tucker at 505-662-8301.

4.9.2 LANL Infrastructure and Central Services

4.9.2.1 Utilities

(Contact: Susan Radzinski, RRES-ECO, 667-1838, sradz@lanl.gov)

Utility services at LANL include electrical power, natural gas, steam, water, sanitary wastewater treatment, and waste management and disposal. Ownership and distribution of utility services for LANL are currently split between NNSA[4] and Los Alamos County. NNSA owns and distributes most utility services to LANL facilities, and the County provides these services to Los Alamos, White Rock, and in some cases, to nearby Bandelier National Monument located to the south of LANL.

The existing sanitary sewer collection system, serving all technical areas located throughout LANL, was expanded to a central wastewater treatment facility better known as SWSC (Sanitary Wastewater Systems Consolidation). The extended aeration, nitrification/denitrification activated sludge treatment facility is designed to collect and treat 0.60 million gallons of domestic sewage per day.

Electrical

In 1985, DOE and Los Alamos County formally agreed to pool their electrical generating and transmission resources and share bulk power costs based on usage. LANL is now supplied with electrical power through the Electric Coordination Agreement, a cooperative arrangement with the County of Los Alamos and the NNSA, known as the Los Alamos Power Pool (Power Pool). The Power Pool purchases most of the electric power necessary to meet the use requirements of LANL and Los Alamos County customers from offsite generators. Electric power purchases have been at increased cost

[4] The NNSA is a separately organized agency within DOE established by Congress in 2000 under Title 50 United States Code (USC) Chapter 41, Subchapter I, Section 2401.

recently, and future availability of electric power for purchase is uncertain. Excess power is sold by the Pool to other area power utilities.

The peak electrical demand under the Expanded Operations Alternative projected in the SWEIS is 113 megawatts. Recent changes (as of August 1, 2002) in transmission agreements with Public Service Company of New Mexico have resulted in the removal of contractual restraints on Power Pool resources import capability. Import capacity is now limited only by the physical capability (thermal rating) of the transmission lines that is approximately 110-120 megawatts from a number of hydroelectric, coal, and natural gas power generators throughout the western United States.

Electric power is supplied to the Power Pool through two existing regional 115-kilovolt (kV) electric power transmission lines, one from the Santa Fe area Norton Substation (the Norton Line) that is owned by NNSA and one from the Albuquerque area Bernalillo-Algodones Substation (the Reeves Line), that is owned and operated by Public Service Company of New Mexico (PNM). Electrical service includes NNSA ownership of a 115-kV power transmission line from the Norton Substation west into

LANL and a Co-generation Complex (combination steam heating and electrical power generation plant) at TA-03 that is operated on an as-needed basis. Secondary power system components include about 34 miles (mi) (45 kilometers [km]) of 13.2-kV distribution lines connecting to the input line side of secondary transformers at LANL facilities. Figure 4-12 shows the Los Alamos are electrical power distribution system. Onsite electric generating capability for the Power Pool is limited by the existing TA-03

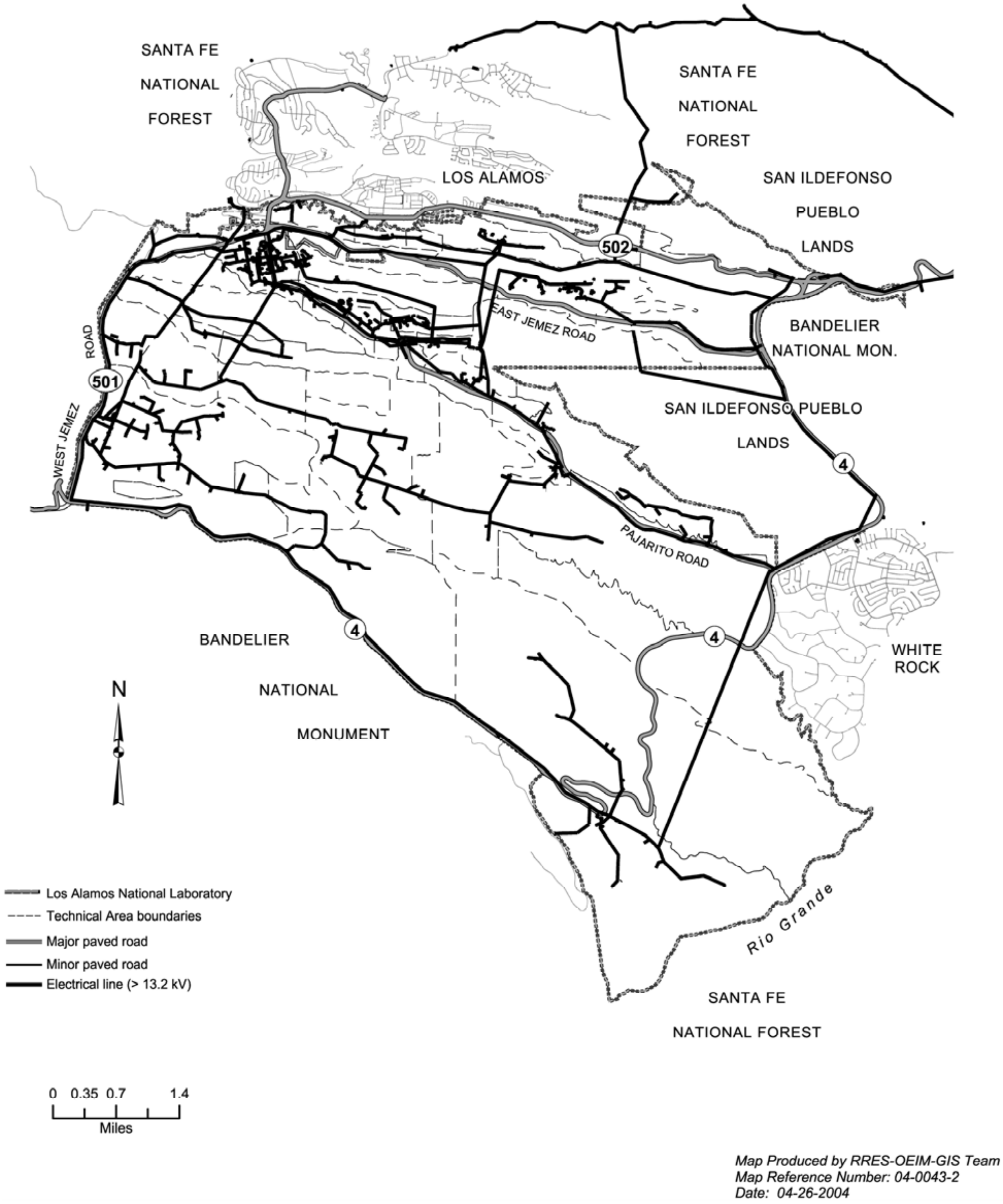

Figure 4-12. Los Alamos Area Electrical Power Distribution System.

Co-generation Complex, which is capable of producing up to 20 megawatts of electric power that is shared by the Pool under contractual arrangement.

The reliability of the Norton and the Reeves electric power transmission lines that serve the Power Pool is compromised because they cross at one location within LANL. In doing so, they do not provide physically separate avenues for the delivery of power from independent power supply sources. The crossing of power lines results in a situation where a single outage event, such as a conductor or structural failure, could potentially cause a major power loss to the Power Pool. Loss of power from the regional electric system results in system isolation where the TA-03 Co-generation Complex is the only source of sufficient capacity to prevent a total blackout. If such an event occurred when the TA-03 Co-generation Complex was not operating or was being serviced or repaired, there would be no power available to the Power Pool. A single outage event could have serious and disruptive consequences to LANL and to the citizens of Los Alamos County. This vulnerability was noted by the Defense Nuclear Facilities Safety Board.

Historically, offsite power system failures have disrupted operations in LANL facilities. For example, a near total electrical blackout in New Mexico in 2000 was caused by a grass fire near Farmington, New Mexico. Interruption of the electrical power supply, which has happened several times in the past two to three years, has both direct and indirect consequences to LANL. Therefore, all facilities that require safe shutdown capability for power outages are equipped with emergency generators to assure these needs are met. This includes nuclear facilities such as TA-55 and CMR that require uninterrupted power for critical ventilation, control systems, and lighting. A one-day shutdown of LANL would have a direct cost (salaries only) of $3M to $5M per day and incalculable indirect costs to research and development, national security programs, and future funding.

Curtailment due to reductions in network capability of the regional electric transmission system would result in reduction of system capacity and the TA-03 Co-generation Complex would become the major source of electric power to maintain existing LANL electrical demand. Fire damage to transmission systems from the Cerro Grande Fire in 2000 resulted in the shutdown of both 115-kV transmission lines that supply power to LANL and Los Alamos County. The steam turbines at the TA-03 Co-generation Complex were operated and the critical electric power requirement of approximately 15 MW was maintained until the transmission lines could be repaired and power delivery through them resumed.

Additionally, the TA-03 Co-generation Complex provides the additional electric power needed to meet peak load demands when demand exceeds the allowable supply, delivered by two 115-kV transmission lines. The TA-03 electric power generators are used primarily during peak demand periods of LANL operations and during system outages. When electric power generation is required, steam generation is increased (additional gas is burned), and the extra steam is routed to three steam turbines for power generation. Typically, this occurs only a few months out of the year when the Los Alamos Neutron Science Center (LANSCE) is fully operational. LANSCE is LANL's major accelerator and development complex and home of the linear accelerator that requires large amounts of power. In FY 2003, LANSCE was responsible for approximately 23 percent of the entire electric consumption at LANL.

The TA-03 Co-generation Complex is now over 50 years old and various upgrades of the steam turbine generators, battery banks, circuit breakers, metering, and power generation controls are needed. The majority of LANL's 120-mile (200-kilometer) 115/13.8-kilovolt overhead electrical distribution system is past or nearing the end of their design life. Backup and replacement transformers and their ancillary equipment are needed to increase system reliability because of the increasing likelihood of component failure and the fact that many components are no longer readily available. Most of LANL's 480/277-volt and 208/120-volt systems would fall below industry reliability standards if used to supply additional power. In addition, the TA-03 substation requires an additional thyristor switched capacitor to maintain system stability during lightening storms. Finally, about 18.6 miles (30 km) of 50-year old underground cables and 13.8-kilovolt switchgear will require replacement within the next 5 years.

In recent years, the population growth in northern New Mexico, together with expanded industrial and commercial usage, has greatly increased power demands on the northern New Mexico regional power system. Several proposals for bringing additional power into the region have been considered. Power line corridor locations remain under consideration, but it is uncertain when any new regional power lines would be constructed and become serviceable. Additionally, NNSA has also been considering ways to retain the reliability of its electric power service to LANL (for example, NNSA has proposed the construction and operation of a third, redundant electric power line into LANL [DOE 2000a]), and has also been considering ways to increase the amount of electric power service transmission to LANL for the increased demands projected by the SWEIS.

In 3rd Quarter CY 2002, LANL completed construction of the new Western Technical Area (WTA) 115/13.8-kV substation at TA-6. The main power transformer for WTA, rated at up to 56 megavolt amperes, was delivered in 2001. WTA will provide LANL and the Los Alamos town site with redundancy in bulk power transformation facilities to guard against losses of either the Eastern Technical Area Substation or the TA-03 Substation.

In CY 2002, an environmental assessment (DOE 2002x), "Environmental Assessment for Installation and Operation of Combustion Turbine Generators at Los Alamos National Laboratory, Los Alamos, New Mexico" (DOE/EA-1430) was written to analyze the effects of increasing the TA-03 steam and electric power plant generating capability by an additional 40 megawatts of power in the near future. Based on this environmental assessment, DOE issued a Finding of No Significant Impact in December 2002. Installation of the first combustion turbine generator at the TA-03 power plant is scheduled to occur during the FY04-FY05 timeframe.

The environmental assessment analyzed the environmental consequences of installing and operating two new simple-cycle gas-fired combustion turbine generators (CTGs), each with an approximate output of 20 megawatts of electricity (rated at 7,400 feet [ft] or 2,220 meters [m] elevation) as stand-alone structures within the Building-22 Co-generation Complex at TA-3. Installation of the CTGs would occur consecutively over a period of years and would also include installation of two new compressors to provide the gas pressure required for operation of the CTGs. The environmental assessment analyzed two options: (Option A) installation of two CTGs (CTG 1 and CTG 2) that would be used long-term as simple-cycle gas-fired turbine generators without co-generation capabilities or (Option B) installation and subsequent conversion of one or both of the installed CTGs from simple-cycle operation to combined-cycle co-generation at some future date. In addition to these two options for installing and operating the proposed CTGs, the existing steam turbines in the TA-3 Co-generation Complex would be maintained and refurbished and would continue to be operated long-term with the CTGs.

When refurbishment of the existing steam turbines is complete, total electric output including the two CTGs, would be approximately 60 MW. Each CTG would have the potential to generate approximately 20 MW of electricity and the existing steam turbines would generate an additional 20 MW at peak winter heating steam demand. Annual LANL hourly electric demand varies between 40 MW and 83 MW. All electric power generated by LANL could be consumed onsite. However, the Power Pool would have the option and possibly the requirement to sell available power from offsite resources to the grid if the need arises.

Table 4.9.2.1-1 shows peak demand and Table 4.9.2.1-2 show annual use of electricity for FY 1991 through FY 2003. LANL’s electrical energy use remains below projections in the SWEIS ROD. Most of the fluctuation was the result of power consumption by LANSCE. The ROD projected peak demand to be 113,000 kilowatts (with 63,000 kilowatts being used by LANSCE and about 50,000 kilowatts being used by the rest of LANL. In addition, the ROD projected annual use to be 782,000 megawatt hours with 437,000 megawatt hours being used by LANSCE and about 345,000 megawatt hours being used by the rest of LANL. Actual use has fallen below these values, and the projected periods of brownouts have not occurred. However, on a regional basis, failures in the Public Service Company of New Mexico system have caused blackouts in northern New Mexico and elsewhere. Tables 4.9.2.1-3 and 4.9.2.1-4 show projected peak demand and consumption for FY 2004–2008.

Table 4.9.2.1-1. Electric Peak Coincident Demand/Fiscal Years 1991–2003

Category	LANL Base	LANSCE	LANL Total	County Total	Pool Total
SWEIS ROD	50,000[a]	63,000	113,000	Not projected	Not projected
FY 1991	43,452	32,325	75,777	11,471	84,248
FY 1992	39,637	33,707	73,344	12,426	85,770
FY1993	40,845	26,689	67,534	12,836	80,370
FY 1994	38,354	27,617	65,971	11,381	77,352
FY 1995	41,736	24,066	65,802	14,122	79,924
FY 1996	41,799	20,799	62,598	13,160	75,758
FY 1997	37,807	28,846	62,653	13,661	76,314

FY 1998	39,064	24,773	63,837	13,268	77,105
FY 1999	43,976	43,976	68,486	14,399	82,885
FY 2000	45,104	45,104	65,447	15,176	80,623
FY 2001	50,146	50,146	70,878	14,583	85,461
FY 2002	45,809	20,938	66,747	16,653	83,400
FY 2003	50,008	20,859	70,687	16,910	87,597

[a] All figures in kilowatts.

Table 4.9.2.1-2. Electric Consumption/Fiscal Years 1991–2003

Category	LANL Base	LANSCE	LANL Total	County	Pool Total
SWEIS ROD	345,000[a]	437,000	782,000	Not projected	Not projected
FY 1991	282,994	89,219	372,213	86,873	459,086
FY 1992	279,208	102,579	381,787	87,709	469,496
FY 1993	277,005	89,889	366,894	89,826	456,720
FY 1994	272,518	79,950	352,468	92,065	444,533
FY 1995	276,292	95,853	372,145	93,546	465,691
FY 1996	277,829	90,956	368,785	93,985	462,770
FY 1997	258,841	138,844	397,715	96,271	493,986
FY 1998	262,570	64,735	327,305	97,600	424,905
FY 1999	255,562	113,759	369,321	106,547	475,868
FY 2000	263,970	117,183	381,153	112,216	493,369
FY 2001	294,169	80,974	375,143	116,043	491,186
FY 2002	299,422	94,966	394,398	121,013	515,401
FY 2003	294,993	87,856	382,849	109,822	492,671

[a] All figures in megawatt-hours

Table 4.9.2.1-3. Projected Peak Coincident Demand/Fiscal Years 2004–2008

FY	LANL Base	LANSCE	LANL Total	County Total	Pool Total
2004	46000	22000	68000	18000	86000
2005	47840	22000	69840	18000	87840
2006	49754	22000	71754	18500	90254
2007	51744	22000	73744	18500	92244
2008	53813	22000	75813	19000	94813

Table 4.9.2.1-4. Projected Electrical Consumption/Fiscal Years 2004–2008

FY	LANL Base	LANSCE	LANL Total	County Total	Pool Total
2004	331793	95000	426793	125197	551990
2005	377564	95000	472564	126699	599264
2006	392667	95000	487667	127966	615633
2007	408374	95000	503374	129246	632620
2008	424709	95000	519709	130539	650247

Electrical Infrastructure/Safety Upgrades Project (EISU)

The EISU Project seeks to upgrade the electrical infrastructure in buildings throughout LANL to improve electrical safety. Typically, the project seeks to correct NEC violations, replace aging, unsafe equipment, and improve equipment and facility grounding.

The CDR for the EISU Project was completed in 1998. Thirty-one buildings were identified for upgrades and were prioritized based on the safety hazards they presented. Since then, the EISU Project has been coordinated with the LANL Ten-Year Comprehensive Site Plan (TYCSP) and subprojects have been removed from the list as the buildings have been identified for decommissioning and demolition. To date, five subprojects have been removed from the list for a new total of 26 GPPs. An evaluation of the LANL electrical safety maintenance backlog may increase the number of subprojects under the EISU Project. As of February 2004, four EISU projects have been completed (TA-3-43, TA-16-200, TA-40-1, TA-3-40), five projects are in construction (TA-3-40 S&W, TA-3-261, TA-43-1, TA-46-31, TA-8-21), and three projects are scheduled for design (TA-46-1, TA-53-2, TA-48-1) in FY2004.

Initially, the EISU Project was a U.S. Department of Energy FY 2000 line item project whose primary objective was to improve the electrical power distribution systems at selected facilities at LANL. The facilities listed were selected due to their impact on mission requirements, and their relative ranking based on safety, age, difficulty of maintenance and other criteria. The proposed facilities support the Stockpile Stewardship Program or are landlord responsibilities that are funded through the National Nuclear Security Administration (NNSA), formerly the office of Research and Development (DP-10) within DOE Defense Programs. Beginning in FY1999, a subset of selected facilities was chosen in yearly lots for design and construction. The facilities were prioritized by LANL based on the relative scoring of Risk Assessment Code assigned to each building as described in Part I Section F of the approved Conceptual Design Report dated January 7, 1998 and amended April 5, 1998.

Water

The Utilities Water Distribution System consists of 100 miles of water lines ranging in size from 3/4" to 24" from Los Alamos Canyon to TA-39. There are 16 storage tanks that have a total storage capacity of 3,746,500 gallons. The distribution system used to supply water to LANL facilities now consists of a series of reservoir storage tanks, pipelines, and fire pumps. The LANL distribution system is gravity fed with pumps for high-demand fire situations at limited locations. Figure 4-13 shows the Los Alamos area water distribution system.

The LANL water system includes pumping stations, storage tanks, and distribution systems. Sanitary wastewater systems include septic tanks and a new centralized sanitary wastewater collection system and treatment plant.

Water demand for LANL is projected to be 759 million gallons (2,900 million liters) per year for the Expanded Operations Alternative. DOE and Los Alamos County rights to water from the main aquifer are adequate to meet this demand and other demands that draw from this right to water.

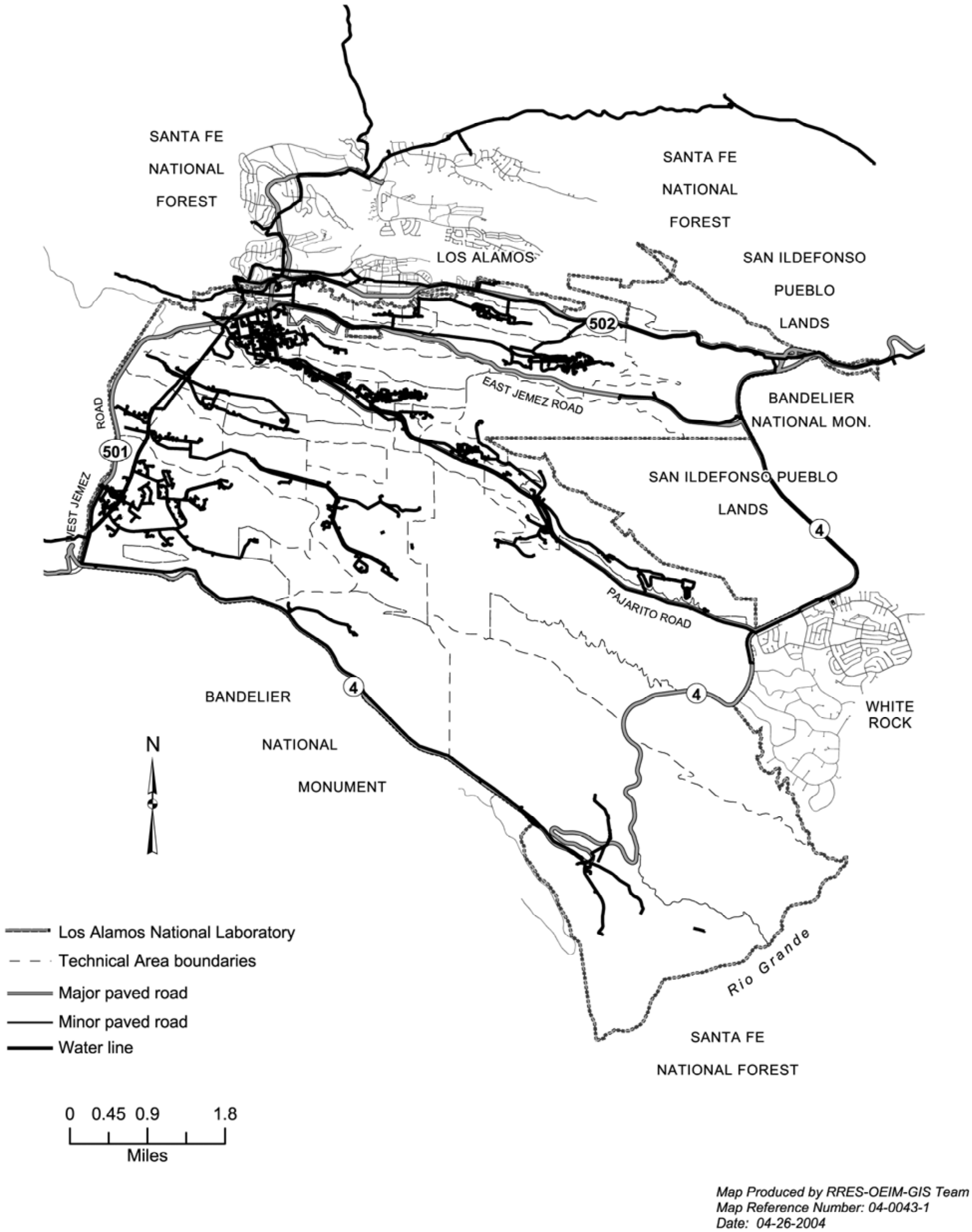

Figure 4-13. Los Alamos Area Water Distribution System.

Before September 8, 1998, DOE supplied all potable water for LANL, Bandelier National Monument, and Los Alamos County, including the towns of Los Alamos and White Rock. This water was obtained from DOE's groundwater right to withdraw 5,541.3 acre-feet per year or about 1,806 million gallons of water per year from the main aquifer. On September 8, 1998, DOE leased these water rights to Los Alamos County. This lease also included DOE's contractual annual right obtained in 1976 to 1,200 acre-feet per year of San Juan-Chama Transmountain Diversion Project water. The lease agreement was effective for three years until September 8, 2001. In September 2001, DOE officially turned over the water production system and transferred 70 percent of the water rights to Los Alamos County. Los Alamos County has continued to lease the remaining 30 percent of the water rights from DOE. LANL is now considered a customer of Los Alamos County. Los Alamos County is continuing to pursue the use of San Juan-Chama water as a means of maintaining those water rights. Los Alamos County has completed a preliminary engineering study and is currently negotiating a convert contract, which will provide more stability, prior to further investment.

Potable water is obtained from deep wells located in three well fields (Guaje, Otowi, and Pajarito). This water is pumped into production lines, and booster pump stations lift this water to reservoir tanks for distribution. Figure 4-13 shows the existing water distribution system in the LANL area. Prior to distribution, the entire water supply is disinfected using the MIOX Corporation process. This process, which replaces the formerly used chlorine disinfectant process, uses an advanced disinfection technology and is a US EPA compliance technology for water disinfection. The Los Alamos County potable water production system consists of 14 deep wells, main distribution lines, pump stations, and storage tanks. In September 2001, DOE officially turned over the water production system to Los Alamos County. LANL is now considered a customer of Los Alamos County. The County now bills LANL for water, and all future water use records maintained by LANL will be based on those billings.

Portions of the LANL water system have been in place for about 55 years, including pressure reducing valves, block valves, hydrants, and 8,400 feet (2,600 meters) of transite asbestos fiber piping. In addition, another 30 miles of distribution piping is near the end of its useful life and needs replacement.

LANL is in the process of installing additional water meters and Supervisory Control and Data Acquisition/Equipment Surveillance System (SCADA/ESS) on the distribution system to keep track of water usage and to determine the specific water use for various applications. Data is being accumulated to establish a basis for conserving water. LANL continues to maintain the distribution system by replacing portions of the over 50 year old-system as problems arise. In remote areas, LANL is trying to automate the monitoring of the system to be more responsive during emergencies such as the Cerro Grande Fire.

Table 4.9.2.1-5 shows water consumption in thousands of gallons for CYs 1992 through 2003. Under the Expanded Operations Alternative, water use for LANL was projected to be 759 million gallons per year. Actual use by LANL in 2003 was about 381 million gallons less than the projected consumption of 759 million gallons per year. A 10-year agreement with Los Alamos County, which started in 1998, has an escalating estimated LANL water consumption. Actual use by LANL in CY 2003 was about 155 million gallons less than the estimated CY 2003 consumption of 533 million gallons. The calculated NPDES discharge of 209.8 million gallons in CY 2003 was about 56 percent of the total LANL usage of 378 million gallons.

Table 4.9.2.1-5. Water Consumption (thousands of gallons) for Calendar Years 1992–2003

Category	LANL	Los Alamos County	Total
SWEIS ROD	759,000	Not Projected	Not Applicable
CY 1992	547,535	982,132	1,529,667
CY 1993	467,880	999,863	1,467,743
CY 1994	524,791	913,430	1,438,221
CY 1995	337,188	1,022,126	1,359,314
CY 1996	340,481	1,035,244	1,375,725
CY 1997	488,252	800,019	1,288,271
CY 1998	461,350	Not Available [a]	Not Available [a]
CY 1999	453,094	Not Available [a]	Not Applicable
CY 2000	441,000	Not Available [a]	Not Available [a]
CY 2001	393,123	Not Available [a]	Not Applicable
CY 2002	324,514	Not Available [a]	Not Available [a]
CY 2003	377,768	Not Available [a]	Not Available [a]

[a] In September 2001, Los Alamos County acquired the water supply system and LANL no longer collects this information.

Gas

Natural gas service for LANL and the surrounding residential and commercial neighborhoods is purchased from the Meridian Oil Company (Los Alamos County) and the Defense Energy Support Center (LANL) in the San Juan Basin of northwestern New Mexico. PNM owns the main gas transmission supply pipeline feeding into LANL, Los Alamos townsite, and beyond into the city of Española. Figure 4-14 shows the Los Alamos areas natural gas distribution system. LANL uses most of the natural gas supply provided by PNM to the Los Alamos area. About 90 percent of the natural gas consumed by LANL is used for heating (both steam and hot air) with the remainder being used for steam-generated electrical power.

There was a change in ownership to the DOE Natural Gas Transmission Line in August 1999. DOE sold 130 miles of gas pipeline and metering stations to the Public Service Company of New Mexico (PNM). This gas pipeline transverses the area from Kutz Canyon Processing Plant south of Bloomfield, New Mexico, to Los Alamos.

Approximately 4 miles of the gas pipeline are within LANL. Table 4.9.2.1-6 presents gas usage by LANL for FYs 1991 through 2003. Approximately 97 percent of the gas used by LANL in FY 03 was used for heating (both steam and hot air). The remainder was used for electrical production. LANL electrical generation is used to fill the difference between peak loads and the electric import capability. The maximum annual natural gas

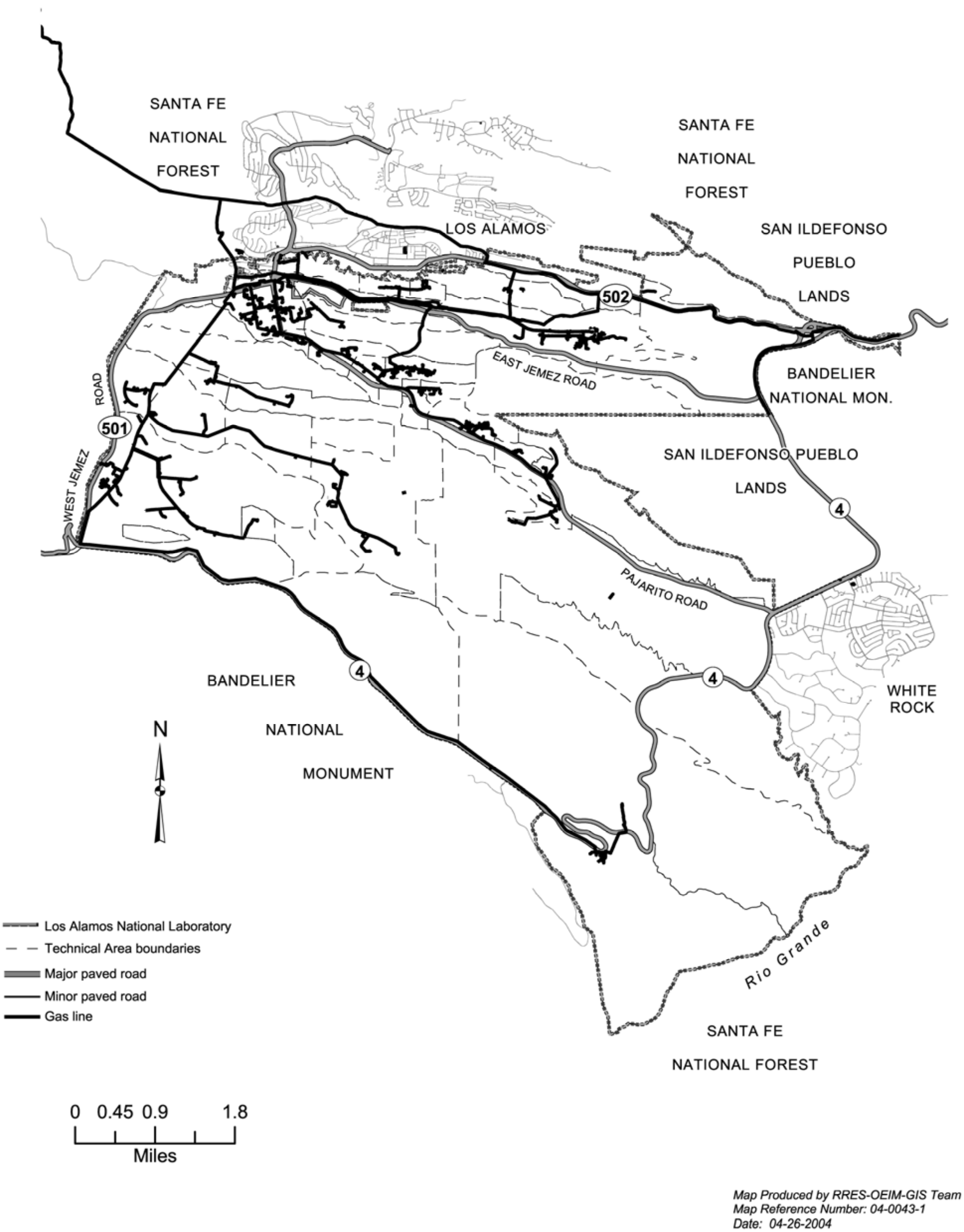

Figure 4-14. Los Alamos Area Natural Gas Distribution System.

demand under the SWEIS Expanded Operations Alternative was projected to be 1,840,000 decatherms, well within the existing supply capacity. Table 4.9.2.1-7 illustrates steam production from FY 1991 through FY 2003.

Table 4.9.2.1-6. Gas Consumption (decatherms[a]) at LANL/Fiscal Years 1991–2003

Fiscal Year	SWEIS ROD	Total LANL Consumption	Total Used for Electric Production	Total Used for Heat Production	Total Steam Production
1991	1,840,000	1,480,789	64,891	1,415,898	803,168
1992	1,840,000	1,833,318	447,427	1,385,891	744,300
1993	1,840,000	1,843,936	411,822	1,432,113	1,192,803
1994	1,840,000	1,682,180	242,792	1,439,388	1,094,812
1995	1,840,000	1,520,358	111,908	1,408,450	967,587
1996	1,840,000	1,358,505	11,405	1,347,100	701,792
1997	1,840,000	1,444,385	96,091	1,348,294	464,066
1998	1,840,000	1,362,070	128,480	1,233,590	415,242
1999	1,840,000	1,428,568	241,490	1,187,078	606,016
2000	1,840,000	1,427,914	352,126	1,075,788	662,598
2001	1,840,000	1,492,635	273,312	1,219,323	560,958
2002	1,840,000	1,325,639	212,976	1,112,663	504,213
2003	1,840,000	1,220,137	41,632	1,178,505	378,052

[a] A decatherm is equivalent to 1,000 to 1,100 cubic feet of natural gas.

Table 4.9.2.1-7. Steam Production at LANL/Fiscal Years 1996–2003

Fiscal Year	TA-3 Steam Production (KLB [A])	TA-21 Steam Production (KLB)	Total Steam Production (KLB)
1996	451,363	54,033	701,792
1997	413,684	50,382	464,066
1998	377,883	37,359	415,242
1999	576,548 [b]	29,468	606,016
2000	634,758 [b]	27,840	662,598
2001	531,763 [b]	29,195	560,958
2002	478,007 [b]	26,206	504,213
2003	351,905 [b]	26,147	378,052

[a] klb: Thousands of pounds
[b] TA-03 steam production has two components: that used for electric production (29,373 klb in FY 2003) and that used for heat (322,532 klb in FY 2003).

U.S. Department of Energy, *Environmental Assessment for Electrical Power Systems Upgrades at Los Alamos National Laboratory*, DOE/EA-1247, Los Alamos, NM. March 2000.

Department of Energy, 2002. "Environmental Assessment for Installation and Operation of Combustion Turbine Generators at Los Alamos National Laboratory, Los Alamos, New Mexico," DOE/EA-1430, and Finding of No Significant Impact. Los Alamos, NM.

4.9.3 Waste Management

4.9.3.1 Effluent Reduction

An overview of LANL's NPDES Outfalls History can be found in the SWEIS Yearbook 2002 Section 3.2.

4.9.3.2 Solid Waste

Operational Waste
(Contact: Jim Scott, RRES-PP, 667-9155, jhs@lanl.gov).

Attachment G presents the 10-year forecast of LANL hazardous and radioactive waste volumes. The waste volume forecast was prepared to support strategic planning for waste management operations and facilities and to target activities for waste minimization opportunities. Projections were made based on historical data combined with both near- and long-term program plans. It should be noted that the 10-year forecast is based on many assumptions. The near-term forecasts rely on relatively good information from managers directing currently funded programs/projects. The long-term forecasts were based on program and project manager expectations of long-range potential future funding.

The approach used in this study was to identify the organizations, programs, and projects that are responsible for the majority (>80 percent) of the waste by type. These activities were selected for detailed inquiry and modeling. The remaining 20 percent were simply extended based on historical trends. Projections for the RS Project (formerly called the ER Project) and decommissioning and demolition (D&D) wastes have been included where appropriate. However, the majority of the proposed D&D activities are analyzed in the following section, Waste Generated by D&D Activities. The data were collected by division but are reported by waste type. The waste types of interest include transuranic (TRU) waste, radioactive liquid waste (RLW), low-level waste (LLW), mixed low-level waste (MLLW), and chemical/hazardous waste. The data for each division are reported by key program or project. Additional data are supplied to document the program or project forecasts (delta factors). The notes and assumptions also have been included in the report details.

Waste Generated by D&D Activities
(Contact: Susan Radzinski, RRES-ECO, 667-1838, sradz@lanl.gov).

In addition to LANL hazardous and radioactive waste volumes, an appreciable amount of uncontaminated debris, high explosives (HE) contaminated debris, and LLW is expected to be generated as a result of proposed LANL D&D activities. Projected waste volumes from proposed D&D activities through calendar year 2011 are shown in Table 4.9.3.2-1. The methodology used to estimate the volumes is presented in the following text. The actual D&D spreadsheet can be found in Attachment H.

The following assumptions were made to estimate the volume of debris form D&D activities for the next five years:

1. According to the Facility Information Management System (FIMS), there are approximately nine specific types of construction at LANL. These are concrete shear walls, concrete moment frame, concrete frame with infill shear walls, steel moment frame, un-reinforced masonry bearing walls, wood (commercial or industrial), wood (light frame), steel braced frame, and steel light frame. For this volume estimation, the construction types were classified as "heavy" or "light" construction that, for our purposes, refers only to the thickness of the walls. A "heavy" construction building with thick walls would generate a greater waste volume than a "light" construction building with thinner walls. It was assumed that only concrete construction would be considered "heavy" construction. Other construction typed would be considered "light" construction. It was further assumed that 85 percent of the estimated structure volume for "heavy" construction would be waste and that 33 percent of the estimated structure volume for "light" construction would be waste.

2. All trailers were considered uncontaminated debris.

3. Demolition debris from structures within the High Explosives (HE) Processing areas (TA-08, TA-09, TA-11, TA-16, TA-22, TA-28, TA-37) and the HE Testing areas (TA-14, TA-15, TA-36, TA-39, TA-40) was considered to be HE-contaminated.

4. Demolition debris from structures within radiological areas was considered to be rad-contaminated (LLW).

Table 4.9.3.2-1. Projected Waste Volumes Generated by Proposed D&D Activities.

Fiscal Year	Estimated Waste Volume Uncontaminated		Estimated Waste Volume HE-contaminated		Estimated Waste Volume LLW		Total	
	yd^3	m^3	yd^3	m^3	yd^3	m^3	yd^3	m^3
2004	7,804	5,966	35,807	27,375	1,126	861	44,737	34,202
2005	13,565	10,370	11,896	9,094	544	416	26,005	19,880
2006	699,038	534,414	13,005	9,942	0	0	712,043	544,356
2007	16,907	12,925	43,463	33,227	0	0	60,370	46,152
2008	0	0	6,201	4,741	0	0	6,201	4,741
2009	59	45	25,184	19,254	17,442	13,335	42,685	32,634
2010	0	0	0	0	144,091	110,158	144,091	110,158
2011	38	29	0	0	0	0	38	29
TBD (2004–2013)	110,285	84,313	4,962	3,794	138,720	106,051	253,967	194,158
Grand Total	847,695	648,063	140,518	107,426	301,923	230,820	1,290,136	986,309

Waste Generated by RS Project (formerly ER Project) Activities
(Contact: Joe English, RRES-ECR, 667-9641, cenglish@lanl.gov)

Table 4.9.3.2-2 is a summary of projected RS Project waste volumes, by waste type, for FY04-FY08. This information was extracted from the ER Baseline.

Table 4.9.3.2-2. Projected Waste Volumes Generated by RS Project (formerly ER Project) Activities.

Waste Type	FY04	FY05	FY06	FY07	FY08	FY09	Total
Industrial Liquid Waste, gal			5				5
Liquid Hazardous Waste with Organics, gal	4	15	6	104	70	604	803
Liquid Hazardous Waste with Metals, gal					5	51	56
Liquid Low-Level Radioactive Waste (55-gal drums), gal	573	2,472	1,875	2,657	4,049	1,059	12,685
Liquid "Solid" Waste, gal			500	400		1,050	1,950
Liquid RCRA Mixed Waste (55-gal drums), gal	781	950	898				2,629
Liquid Low-Level Radioactive Waste (tanker), gal					5		5
Liquid Waste <500 ppm PCB, gal						121	121
Subtotal Liquid Waste, gal	1,358	3,437	3,284	3,161	4,129	2,885	18,254
Solid Hazardous Waste w/ Organics (55-gal drums), y^3	1	12				18	31
Low-Level Radioactive Waste (55-gal drums), y^3	1	11	143	34	4	35	228
Mixed Low-Level Radioactive Waste, y^3	4	7	1	128	10	9	159
Solid Industrial Waste, y^3	270	3,757	13,669	1,454	2,691	2,421	24,262
Solid Sanitary Waste, y^3	5		10	12	6	434	467
Solid RCRA Mixed Waste (55-gal drums), y^3				169	131		300
Solid RCRA Mixed Waste (bulk), y^3						87	87
Solid TSCA Hazardous Waste (<500 ppm PCB, bulk), y^3	250					121	371
Solid TSCA Hazardous Waste (>500 ppm PCB, bulk), y^3						65	65
Low-Level Radioactive Waste (bulk), cy	409	3,231	1,088	12,793	10,292	285	28,098
Solid Hazardous Waste with Organics (bulk), y^3	33	69					102
Solid Hazardous Waste with Metals (bulk), y^3	15	470	5,002	1,486	501	116	7,590
Subtotal Solid Waste, y^3	988	7,557	19,913	16,076	13,635	3,591	61,760

4.9.3.3 Radioactive and Hazardous Waste

Discussed in the previous Section 4.9.3.2

4.9.4 Contaminated Space within LANL Facilities

(Contact: James Bland, HSR-12, 667-8085, jrbland@lanl.gov)

The information in this section is intended to provide a qualitative understanding on the liability associated with decontamination and decommissioning (D&D) of nuclear facilities. The D&D liability, which could be represented by health risks and the costs, depends on the type of radioactive material, contamination levels, physical and chemical forms of the radioactive material, and other hazardous or toxic materials that could be present. There are no requirements or databases used to identify the radiological conditions for structures, systems or components or possible health risks to workers or members of the public during facility D&D. The Health, Safety, and Radiation Protection (HSR) 1 organization provides radiological surveillance of occupied areas, and the amount of contaminated areas (10 CFR 835 definition) in facilities is maintained as low as reasonably achievable. However, there is no correlation of contaminated space in SWEIS 99 to radiological contaminated areas as defined by 10 CFR 835. Because there is no routine surveillance for the radioactive material content of systems or components the relative magnitude and extent of contamination can only be estimated. The process of assembling this information and the time and cost to re-assess each facility would be significant. Therefore the approach taken was to simply compare the Barr 96 data to current data to determine if there were any new and significant conditions that should be reported. Table 1 shows these results of this comparison.

The reported data for contaminated space in SWEIS 99 (Table 4.9.4-1, "Estimated Existing Contaminated Space in LANL Facilities") was based on interviews and walk downs of the facilities (Barr 96). The Barr 96 report did not provide a consistent basis for reporting data between facilities and the basis for the facility specific data was for some facilities not available. The reported information in Barr 96 is inconsistent and in some cases not reproducible. For example, radioactive contaminated shielding and waste volumes were reported for some facilities and no data on contaminated shielding or waste volumes were reported for other facilities. As stated in SWEIS 99, "In most cases, a room containing glovebox systems was not counted as contaminated space unless there was no better way of including the process area. In general, the contaminated space within plutonium facilities, hot cells, process gloveboxes and general laboratory areas was estimated on a footprint basis." These statements appear to indicate that process areas square footage were used to report contaminated space for gloveboxes in some plutonium facilities while the contaminated space for other gloveboxes in plutonium facilities were reporting using the glovebox footprint. Because of these and other consistencies in the Barr 96 report, the value of these data to assess D&D liability is questionable.

Unpublished supporting documents for Barr 96 were obtained for TA-55 (PF-4), CMR and the radiochemistry labs. A comprehensive review of these data to existing conditions

Comparison of Table 1a Contaminated Space at Several LANL Facilities

Facility	Contaminated Space (Barr96)	Contaminated Space (2003)
TA-55 Conveyor, gloveboxes, hoods, etc. Contaminated ducts Laboratory floor space	 11,400 ft^2 (10,600 m^2) 1,100 ft^3 (30 m^3) 59,600 ft^2 (5,550 m^2)	No new significant changes
CMR Facility, TA-3 Conveyor, gloveboxes, hoods, etc. Contaminated ducts Hot cell floor space Laboratory floor space	 3,100 ft^2 (290 m^2) 760 ft^3 (20 cubic meters) 580 ft^2 (50 m^2) 40,320 ft^2 (3,750 m^2)	No new significant changes
Radiochemistry Laboratory, TA-48 Conveyor, gloveboxes, hoods, etc. Hot cell floor space Laboratory floor space	 1,800 ft^2 (170 m^2) 17,060 ft^2 (1,590 m^2) 39,300 ft^2 (3,650 m^2)	No new significant changes
Tritium Facilities Weapons Engineering Tritium Facility (WETF) Process Room 114 WETF Process Room 116 WETF Process Room 120 TA-33 (High Pressure Tritium Laboratory in Building 86) TA-21 Tritium System Test Assembly TA-21 Tritium Science and Fabrication Facility	 1,460 ft^2 (140 m^2) 760 ft^2 (70 m^2) 1,300 ft^2 (120 m^2) 7,500 ft^3 (210 m^3) of rubble (mostly cement)[a] 8,000 ft^2 (740 m^2) 750 ft^2 (70 m^2)	WETF Room114: minor changes in glovebox size WETF Room 116: no new and significant changes WETF Room 120: no new and significant changes WETF TA-33, Bldg. 86: decommissioned and rubble removed as waste. TA-21 TSTA: building footprint the same, gloveboxes were removed and disposed at TA-54. The uranium test bed remains posted as a contaminated area (30 ft^2). TA-21 TSTA: in the process of decontaminated. Hoods in Bldg. 152 were removed. The process area is about 3,000 ft^2. TA-41-4: 800 ft^2 of contaminated hoods.
TA-18, Pajarito Site	<500 ft^2 (47 m^2)	No new significant changes
TA-50, RLWTF	37,000 ft^2 (3,440 m^2)[b]	TA-50-1 RLWTF: Process area floor space 22,200 ft^2. TA-50-69 WCCRF: Process area floor space 3,000 ft^2. TA-54-1009: 1,900 ft^2.
TA-53 Area A A-East Beam Stop Target Areas 5 and 6 Lines B and C Lead Shielding Weapons Neutron Research and Proton Storage Ring	 178,000 ft^3 (4,980 m^3) 27,600 ft^3 (770 m^3) 9,000 ft^3 (250 m^3) 100 ft^3 (3 m^3) 350 tons of lead shielding Unknown	Basis for Barr96 not known. Appears to be a projection of waste volumes from target areas. May have been underreported in Barr96.

a This facility was decommissioned.

b This facility processes liquid radioactive waste and includes large process areas, tanks, and a glovebox. Even though the entire facility is not contaminated, no method of estimated space for this facility was devised; the facility footprint is represented here.

was not performed. The data provided in Barr 96 was sufficient to provide an update for the tritium facilities, TA-50 and TA-18. There was no supporting data available for TA-53 and any comparison of current conditions to the SWEIS 99 data would not be possible for this facility. It appears that the data from TA-53 were based on the volume of waste generated rather than a surface area. Based on discussions with TA-53 personnel there were other sources of activated shielding (e.g. uranium shielding) and some process areas that were unreported in Barr 96.

In general an assessment of D&D liability would depend on the type and quantity of radioactive materials, square foot of potentially contaminated building structures, the level of environmental restoration for soils and underground sources of radioactive material and the projected volume and classification of wastes. Nuclear or radiological facility decommissioning typically involves removal and packaging of all potentially contaminated systems and components as radioactive waste. Waste packaging, shipping and disposal costs depend on the type of waste that may include hazardous waste, low level radioactive waste, transuranic waste or mixed (radioactive and hazardous) wastes. The remaining building structures, depending on contamination levels and likelihood of containing residual radioactivity, are decontaminated. A final radiological survey is conducted on all building structures or equipment prior to equipment release, building reuse or building demolition. Overall it appears that process system piping, tanks, other radioactive contaminated equipment in process areas, soils, facility stacks, support facilities, and impoundments which are known to be contaminated with radioactive materials were not included as contaminated space in Barr 96. In accordance with the Multi-Agency Radiation Survey and Site Investigation Manual, which provides information on planning and conducting radiological surveys and sampling for demonstrating compliance with risk bases standards, a though evaluation of all potentially contaminated areas is required. Costs for sampling and surveys to prove the areas are "clean" can be significant and are usually evaluated against other alternatives in the D&D plan.

In conclusion, there were no significant changes to the contaminated spaces reported in SWEIS99. If D&D liability is considered to be an important EIS criteria, this section of the report should be re-written so there is a consistent, reproducible and technically defensible approach to assess risks and costs.

4.10 Transportation

(Contact: Dan Pava, RRES-ECO, 667-7360, dpava@lanl.gov)

4.10.1 Regional and Site Transportation Routes

This section needs to de-emphasize the LA Bus system which gets very little ridership and describe the Park and Ride now being offered to LANL workers commuting from off the hill. The taxi service should be mentioned. The airport discussion is still relevant but mention could be made of the Santa Fe airport service several times daily to Denver. (See Attachment I). The section could describe how automobiles are the preferred mode and cite figures for modal choice available from HR employee surveys. The discussion in the fourth paragraph should describe the major improvements being made to US84/285. The truck inspection station on East Jemez Road should be mentioned. Also to be noted is the DOE renegotiated agreement with San Ildefonso Pueblo for the easement for NM4 between East Jemez Road and White Rock and the closure of Pajarito Road as part of the LANL access controls project. The text needs to explain that more LANL workers now commute than live in Los Alamos County. The final paragraph of this section needs revising since NM599 has been open for traffic for several years and serves both LANL needs and the general public desiring to bypass Santa Fe. Parking should be included in the discussion of transportation issues yet it is only mentioned once in the SWEIS. **Table 4.10.1-1 needs modifying because the Average Daily Traffic figures are from 1994, and the last three rows should be replaced with a description of NM 599 rather than the US84/285 segments in use during the writing of the SWEIS) (eg Camino la Tierra to Cerrillos Road to St. Michael's Drive toI-25).** Supplemental information on Average Daily Traffic and traffic accidents is also provided in Attachment J. Figure 4.10.1-1 should be revised to show NM599 as completed and the quality of the map improved so that it is actually legible.

Human Resources (HR) may have info on employee use of Park and Ride or Charles Trask (7-7756 and cwtrask3@lanl.gov) the LANL traffic engineer may have some info and Charles may also know if there is any recent traffic count and level of service information for major LANL roads.

4.11 Accident Analyses

(Contact: Gil Gonzales, RRES-ECO, 665-6630, gonzales_g@lanl.gov)

4.11.1 An Assessment of Changes in Major Parameters of the 1999 SWEIS Accident Analyses

Introduction

In order to provide the decision maker, the DOE, and stakeholders with an estimate of human health impacts that could result from accidents at LANL, the 1999 SWEIS presented the results of analyses of unexpected events (accidents) that could lead to the release of hazardous materials or radiation within a facility and/or into the environment and that could cause exposures to workers or the public to those materials. The analyses began with the establishment of the baseline risk from current operations, plus planned activities, which together constituted the No Action Alternative. The baseline was established by a process of safety documentation review, interviews with facility management, physical inspections (walkdowns) of facilities, and further discussions with facility management. Changes in the baseline risk were estimated for an Expanded Operations Alternative, a Reduced Operations Alternative, and the Greener Alternative.

Every five years, DOE performs a formal analysis of the adequacy of the SWEIS to continue to characterize the environmental envelope for operations at LANL. This report documents the results of assessing changes in major parameters of the 1999 accident analyses that may have occurred since 1999. This information is intended to serve as a basis for the DOE to make decisions on whether to re-analyze any of the accidents or to perform new analyses. The changes referred to above may have occurred as a result of operational changes or the addition of new operations. As the Expanded Operations Alternative was ultimately chosen as the preferred alternative under which the Laboratory currently operates, it became the new baseline to which we compare potential accident parameters associated with current conditions.

A total of 26 risk-dominant accidents were fully quantified (quantitatively analyzed) for the 1999 SWEIS. Sixteen were radiological accidents, six were chemical accidents, and four were site-wide accidents in which many facilities contributed to potential human health impacts. We primarily evaluated changes in the material at risk (MAR) and estimated likelihood or frequencies of the 26 accidents. Our evaluations were based on information supplied by the pertinent facility personnel. We also considered the need to perform new accident analyses, analyses of potential accidents that resulted from new operations, operations that can give rise to accident types or impacts that are not addressed by other analyses.

We also considered how changes in DOE-LANL boundaries and/or conveyance of properties to new owners might affect the location at which members of the public might be exposed to hazardous or radiological materials resulting from accidents.

Results

Table 1 has a list of the reviewed accidents, comparisons of 1999 major parameters (estimated frequency and MAR) to the current status, and population consequence and impact information. Considerations or salient points concerning each accident are discussed below. Most of the MARs for the radiological accidents have remained the same or have been reduced since 1999. For those the SWEIS analyses can continue to represent that type of accident and continue as the NEPA baseline to which any new analyses in the next five years are compared.

RAD-01
The current MAR at the Radioassay and Nondestructive Testing (RANT) Facility at TA-54 is XXXX PE-Ci (30,000 PE-g).

RAD-02
The Chemistry and Metallurgy Research (CMR) Facility is still operating under the 1998 Basis for Interim Operations that is referenced in the SWEIS, therefore, the SWEIS analysis accurately represents the current operations at the CMR Facility.

RAD-03
The MAR at the TA-18 Godiva-IV Facility has been reduced from ~66,000 g of highly enriched uranium (HEU) to ~700 g HEU approved in their 2002 Basis for Interim Operations. Given that the MAR is substantially reduced the analysis in the 1999 SWEIS bounds current conditions and the RAD-03 analysis in the SWEIS can continue to represent any new operations of similar types.

RAD-04
The MAR at the TA-16 DARHT Facility is the same as used in the analyses reported in the 1999 SWEIS, therefore the 1999 SWEIS analysis represents current conditions at the DARHT and the analysis in the SWEIS can continue to represent operations of similar types at the DARHT.

RAD-05
RAD-05 was a postulated accident in which a release of tritium oxide occurred resulting from an airplane crash at the TA-21 Tritium Systems Test Assembly (TSTA) Facility (Bldg. 155) or Tritium Science and Fabrication Facility (TSFF) (Bldg. 209). The assumed tritium oxide MAR of 200g in the SWEIS is currently 100 g and the current MAR for TSFF is 27 g of tritium oxide. TSTA was downgraded from a Nuclear Facility to a Radiological Facility (DOE/LANL 2004). Given that the MAR is substantially reduced the analysis in the 1999 SWEIS bounds current conditions and the RAD-05 analysis in the SWEIS can continue to represent any new operations of similar types. Radiological Facilities, by definition, can have no offsite impacts from accidents.

RAD-06
In January of 2003 the RAMROD facility was downgraded from a Nuclear Facility to a Radiological Facility (DOE/LANL 2004). Given that the MAR is substantially reduced the analysis in the 1999 SWEIS bounds current conditions and the RAD-06 analysis in the SWEIS can continue to represent any new operations of similar types. Radiological Facilities, by definition, can have no offsite impacts from accidents.

RAD-07
The MAR for this accident had gone down from approximately 1,605 PE-Ci to 1,000 PE-Ci. The current source of information is the May 28, 2003 Basis for Interim Operation (BIO) for the WCRRF. The current scenario is a vehicle accident spill of waste containers with the ignition of a fire (Section 3.4.2.1). Given that the MAR is currently reduced from what was used for the analysis in 1999, the SWEIS accident analysis still bounds the current conditions and the analysis can continue to represent operations at this facility.

RAD-08
Activities at the Transuranic Waste Inspectable Storage Project (TWISP) are now minimal and are being replaced by the Decontamination and Volume Reduction System (DVRS). The total inventory for the TWISP (which will transfer to the DVRS) has increased substantially since 1999, but the per-dome arithmetic average, which makes up the MAR used in some accident analyses, has remained about the same.

RAD-09
Same as RAD-08.

RAD-10
TA-55 Plutonium Operations Facility is still operating under the 1996 Facility Safety Analysis Report (FSAR) that was consulted for the 1999 SWEIS. Given that the MAR is the same the analysis in the 1999 SWEIS is still representative of current conditions and the analysis can continue to represent operations at this facility.

RAD-11
As stated under RAD-04, the MAR at the TA-16 DARHT Facility is the same as used in the analyses reported in the 1999 SWEIS, therefore the 1999 SWEIS analysis represents current conditions at the DARHT and the analysis in the SWEIS can continue to represent operations of similar types at the DARHT.

RAD-12
Operations at TA-16-411 have changed. Currently weapons assembly is not being conducted at the facility. The new operations and results of the accident analysis, considering the changed operations, are described below. The estimated frequency of the accident has declined from Extremely Unlikely to Incredible. Radiological inventories at TA-16-411 have been reduced substantially reduced, the facility has been downgraded from a Nuclear Facility to a Radiological Facility, and the consequences to the public of an accident involving the new operations at Building 411 are expected to be significantly below DOE evaluation guidelines. A new assembly chamber is being designed, after which radiological inventories will return to those used in the 1999 SWEIS.

General Scenario Description

The accident scenario discussed here is an explosively driven release of plutonium from the assembly chamber. The explosive dispersal would be initiated by the collapse of appropriate parts of the assembly chamber during an earthquake, during one of the short periods when an explosive assembly including plutonium would reside in the facility. In this scenario, the seismic event is postulated to cause the high explosives to detonate and to aerosolize a portion of the plutonium as respirable particles. The design and the construction of the assembly facility and its safety systems will prevent plutonium aerosolized by the explosion from escaping into the environment above regulatory guidelines.

The scenario is considered incredible, with the design controls in place, based on recent preliminary safety analysis development activities involved in the design of the assembly chamber and the associated safety equipment. The assembly chamber and associated support systems will be required to withstand a Performance Category 3 (PC-3) seismic event, the Design Basis Earthquake, eliminating the event initiator.

No Action Alternative Frequency Calculation

Because this accident scenario is a seismically initiated event, the capacity of the building to withstand an earthquake is a key factor in determining the frequency of the accident. The assembly chamber and it’s associated safety systems (including overhead attachments, and stands) will be designed to PC-3 facility standards and as such can withstand the once in 2,500-year earthquake, for Los Alamos this is a 0.31 g earthquake. This magnitude earthquake would correspond to an initiating frequency of 4×10^{-4} failures per year.

The overall initiating frequency is lower than the estimated earthquake occurrence frequency because further conditional probabilities of an earthquake occurring when high explosives and nuclear materials are present and vulnerable in the assembly chamber must be considered.

The design and construction of the assembly chamber preclude the release of aerosolized plutonium should an explosion occur due to other initiators. The assembly chamber will be constructed of inner steel liner and an outer steel shell with concrete in between the liner and the shell. The inner steel liner and concrete infill will be designed in accordance with TM5-1300, Protection Category 1 requirements to:

- Contain all fragments associated with a HEVR within the inner liner and concrete infill; and
- Respond to the shock loads with a ductility ratio of the inner liner less than 5.

The outer steel shell will be designed, constructed, and inspected in accordance with American Society of Mechanical Engineers (ASME) Section VIII, Division I, Boiler and Pressure Vessel Code to:

- Contain the residual gas pressure loads and limit the stresses in the outer shell to less than the yield strength of the steel; and
- Confine the released radioactive and hazardous material associated with an explosion within the outer shell.

The assembly chamber structure will be designed as (PC-3) structure to confine radioactive and hazardous material and contain all fragments as the result the worst explosion possible in the facility.

The overall frequency of a seismic induced event (PC-3 or less) based on preliminary analysis is incredible since the facility and associated systems have been specified and designed to withstand a design basis seismic event.

Expanded Operations, Reduced Operations, and Greener Alternatives

Because the Assembly Chamber will be used under all alternatives, the frequency values would remain the same.

No Action Source Term Calculation

Some details associated with the source term for this accident scenario are classified. Credit is taken for entrapment of radiological material inside the assembly chamber and its safety systems through the use of blast valves, blast doors, seismically stable stands and fixtures, and a HEPA filtration system.

Consequences for Facility Workers

The assembly chamber and support systems are designed to withstand this event. The workers in the facility would be killed if they were present when an explosion occurred. No doses were evaluated because it would be highly unlikely that anyone would survive an explosion in the assembly chamber.

Consequences for Public

The assembly chamber and support systems are being designed to withstand the design basis earthquake. Should an explosion occur due to other initiators, the consequence to the public are expected to be significantly below DOE evaluation guidelines, since the design of the assembly chamber and the associated safety systems will control the release of particulates to the public and collocated workers.

RAD-13
Information on this postulated accident at TA-18 was not in the 2002 Basis for Interim Operations. Efforts should be continued to determine whether changes have occurred to the major accident analysis parameters at the TA-18 Pajarito Site Kiva.

RAD-14
As for RAD-10 the conditions at the TA-55 Plutonium Operations Facility are still the same per the 1996 FSAR that was consulted for the 1999 SWEIS. Given that the MAR is the same the analysis in the 1999 SWEIS is still representative of current conditions and the analysis can continue to represent operations at this facility.

RAD-15
This operation, previously at the CMR Facility, has been moved to the TA-55-4 Plutonium Facility.

RAD-16
As mentioned for RAD-02, the CMR Facility is still operating under the 1998 Basis for Interim Operations that is referenced in the SWEIS, therefore, the SWEIS analysis accurately represents the current operations at the CMR Facility.

Radiological Hazards from Site-Wide Accidents

SITE-01

SITE-02
SITE-02 was a site-wide earthquake causing damage to low- and moderate-capacity structures. An approved FSAR completed in 2002 for the WETF contains analyses involving fire that have higher MARs and source terms than used in the 1999 SWEIS

analysis. The WETF SAR analyzes an accident in which there is a tritium release with an estimated accident frequency of once in 1000 years (1×10^{-3}/yr). One scenario involving high combustible materials and fire resulted in a source term of 2000 g hydrogen-tritium-oxygen (HTO), tritiated water. Other scenarios resulted in lower source terms.

SITE-03
Site-03 was a site-wide earthquake causing damage to all structures. The current WETF contribution would be the same as for SITE-02.

SITE-04
SITE-04 was a site-wide wildland forest fire that generated a radiological source term resulting from the combustion of certain Nuclear Facilities, suspension of contaminated soil and particulate generation from contaminated vegetation. It was analyzed with "worst case" conditions such as defensible space not functioning, complete combustion and breach of facilities, etc. LANL's Area G TWISP Facility and the WETF were the largest contributors to the source term in the 1999 analysis. The TWISP domes contributed the majority of the dose to the total—675 person-rem and 0.34 excess latent cancer facilities. Although expert opinion at that time did not consider it a very credible event that a site-wide fire would reach TA-54, it was included in the wildfire accident analysis because of the relatively large inventory and the fact that forested areas surround Area G. The radiological material at risk quantity of the TWISP domes was determined by dividing the total inventory, separated into combustible and non-combustible materials, by the number of domes at that time—six. Since then additional domes have been built and one of them, building 375, has roughly twice the capacity of most of the other 10 domes. The current inventory for building 375 would be approximately three times greater than an inventory derived using the same averaging technique as was done for the SWEIS; i.e., the current building 375 inventory of 8,528 plutonium equivalent-(PE-) curies of combustible materials and 26,000 PE-curies of non-combustible materials compares with the 11-dome average of 3,094 PE-curies of combustible materials and 9,210 PE-curies of non-combustible materials. If the building-375 inventory were used instead of the dome average in a site-wide wildfire analysis, the dose would be considerably higher, but still well below the results of the conservative analyses in the TA-54 Area G Documented Safety Analysis for a brush/forest fire that spreads to multiple waste storage domes as summarized below.

> *The location of Area G close to vegetation, the occurrence of a large forest fire that could have threatened the domes at TA-54 in May 2000, the high frequency of lightning and lightning caused fires in and around the Los Alamos area (Jemez Mountains), along with the use of fabric domes for TRU waste storage and the wide use of wood crates, resulted in the need to analyze a postulated brush/forest fire that spreads to multiple waste storage domes. The event was estimated to have a frequency of occurrence of greater than once every 100 years. Blowing embers, as exhibited in the Cerro Grande Fire, is a critical event that makes this scenario possible without vegetation directly adjacent to the domes. For a forest/brush fire to affect multiple waste storage domes, blowing embers would have to carry the fires to the individual domes. If an ember falls*

onto the fabric of a storage dome, the evidence indicates that it would burn through the fabric without propagating along the fabric. This behavior is a result of the fire-retardant property of the fabric. Thus, it was concluded that a large forest/brush fire in the vicinity of Area G could cause burning embers to impact multiple waste storage domes and burn through the dome fabric and fall into the dome.

The likelihood of fires starting inside the domes impacted by burning embers is a function of the combustible material present in the dome. The presence of wood crate waste containers in some of the domes, some FRP-type crates and some raw wood crates, enhances the likelihood that a fire would be initiated in the domes. Wood crates may be stored in any of the 12 TRU waste storage domes. As a matter of practice, they are kept together in a few domes. However, was considered conservative for the (Documented Safety Analysis (DSA) to assume that they are scattered throughout all the domes, and that each of the 12 storage domes contains wood crates. Thus, every dome can be subject to a fire initiated by embers burning through the dome fabric.

Four different cases were evaluated in the DSA, varying by parameters such as byoyancy of the release and plume. Source terms for the forest/brush fire scenario were developed on the basis of a single dome fire analysis using the same phenomena and all relevant data, except for the MAR quantities. The single dome fire analysis was based on a configuration of 3,000 drums and a small number of wood crates containing a total of 50,000 PE-Ci. Rather than assume that the MAR is spread out over all 12 waste storage domes, they conservatively assumed that the site MAR limit of 150,000 PE-Ci is located entirely on one side of the site. A conservative storage arrangement was also used.

Two cases using a total MAR of 150,000 PE-Ci were defined for analysis to determine the potential dose from both sides of the site. The source terms ranged from 7.41 PE-Ci to 22.2 PE-Ci.

Dose consequences ranged from a mitigated dose consequence of 5.8 rem to a very unlikely unmitigated dose consequence of 352 rem. The upper-end estimates were based on a very unlikely storage configuration and a total quantity of MAR that is significantly greater than the current inventory. Several controls and mitigations were established resulting from the Area G DSA.

The Cerro Grande Fire was an impetus to conduct a qualitative assessment of changes to major parameters in the 1999 analysis (Gonzales et al. 2003). This spurned a quantitative analysis similar to that conducted in 1999 that is currently under way (LANL 2004). The currently-ongoing quantitative analysis includes a wildfire-risk analysis that has identified a small area of LANL that is at most risk of burning. The high risk areas are the extreme NW corner of TA-16, the western edge of LANL including small portions of TA-08, -69, -58 and –62, and canyons between TA-40 and –21. The only Nuclear

Facilities in the western edge area of high fire risk are the WETF (TA-16-205) and XXXX (TA-16-411). The total inventory for the TWISP (which will transfer to the DVRS) has increased substantially since 1999, but the per-dome arithmetic average, which makes up the MAR used in accident analyses, has remained about the same. The MAR at WETF in 1999 was ~1.36 kg tritium gas and the administrative limit might be increased to 2.0 kg in the future (Tingey 2003).

CHEM-01
The parcel of land inclusive of the water treatment station at TA-00 (Bldg. 1109) has been transferred to Los Alamos County, therefore this accident is moot.

CHEM-02 and CHEM-03
CHEM-02 and CHEM-03 were both accidents postulated at the TA-3 gas plant. Operations generally consist of moving (receiving, inventorying and distribution) about 150 cylinders a day. Currently a typical shipment of a toxic gas is of a D size cylinder or smaller, 2 to 5 lbs., as compared with 150 to 1500 lbs. in the early 1990's.

CHEM-02 and -03 are accident analyses in which two different quantities of chlorine were assumed in the analysis. Toxic gases such as chlorine are no longer stored for long periods of time at the plant. Also, chlorine is not received in the quantities that the SWEIS analyses assumed. Quantities of chlorine temporarily held at the plant are typically ~50-60 percent of the 29 CFR 1910 ceilings.

Other toxic or flammable gases considered in the SWEIS scenarios CHEM-02 and CHEM-03 are either not present at the gas plant today or the quantities are considerable less than what was assumed for the SWEIS. The plant typically has propane and acetylene. On rare occasions the plant might have chlorine or ammonia. Radioactive gases, wastes, and unknowns are not received by the plant. On the order of 13,000 gal each of liquid nitrogen and liquid argon, cryogenic substances, are handled at the plant; dewar sizes of liquid helium also are handled.
There also are tube trailers at the plant that contain oxygen. Carbon monoxide sometimes is present in "D" or smaller size cylinders.

A safety analysis for the gas plant, BUS4-SA-001, R0, was prepared in 2001 (LANL 2001). Based on the discussions above, all indications are that the analyses in the 1999 SWEIS overestimate the impacts that could occur to human health resulting from accidents at the plant.

CHEM-04 and -05
CHEM-04 and -05 were analyses of accidents involving selenium hexafluoride and sulfur dioxide, both considered toxic gases. Plant personnel indicate that the throughput of selenium hexafluoride and sulfur dioxide has been reduced in recent years (Lovato, personal communication). Also, operations are such that toxic gases are distributed at LANL within approximately one hour after their receipt, and this could challenge the estimated frequency of these accidents.

CHEM-06
The maximum chlorine inventory outside the Plutonium Facility at TA-55 is the same as used in the analyses reported in the 1999 SWEIS, therefore the 1999 SWEIS analysis represents current conditions and the SWEIS can continue to represent operations/accidents of similar types at PF-4.

Chemical Hazards from Site-Wide Accidents

SITE-01
SITE-01 was a site-wide earthquake causing damage to low-capacity structures. Much of the impact from chemical hazards for all of the site-wide postulated accidents were related to chlorine. As mentioned above in discussion of the individual facility chemical accidents much of the hazard from chlorine has been eliminated as the result of changes in the ownership of land or minimized as the results of reduced inventories at the gas plant. The hydrogen cyanide inventory has roughly doubled from 7.6 liters (L) to 13.5 L. The phosgene inventory has decreased slightly from 3 lbs. to 1 lb. The formaldehyde inventory has reduced from 30 L to ~14 L.

SITE-02
SITE-02 was a site-wide earthquake causing damage to low- and moderate-capacity structures. The basic difference from SITE-01 is that the additional force from the higher-magnitude earthquake in SITE-02 breaches nitric acid and hydrochloric acid containers at TA-55 and the current quantities of these chemicals are about the same as assumed for the 1999 SWEIS.

SITE-03
Site-03 was a site-wide earthquake causing damage to all structures. There is basically no difference in impact between SITE-03 and SITE-02.

SITE-04
SITE-04 was a site-wide wildland forest fire that generated a radiological source term resulting from the combustion of certain Nuclear Facilities, suspension of contaminated soil and particulate generation from contaminated vegetation. It was analyzed with “worst case” conditions such as defensible space not functioning, complete combustion and breach of facilities, etc. The only chemical contribution to impacts from this site-wide accident in 1999 was from 30 L of formaldehyde at TA-43-1 and this hazard has been reduced to ~14 L.

No new inventories of chemicals have been identified that are located within the high-risk areas for wildland fire as identified by the recent new analysis.

References

Gonzales, G., C. Bare, P. Valerio, and S. Mee. 2003. Radionuclide activity concentrations in conifer trees at the Los Alamos National Laboratory. LA-UR-03-7237, Los Alamos National Laboratory, Los Alamos, NM.

Gonzales, G.C., A.F. Ladino, and P.J. Valerio. 2004. Qualitative Assessment of Wildfire-Induce Radiological Risk at Los Alamos National Laboratory. Interim Internal Status Report – 2003. LA-UR-03-7237, Los Alamos National Laboratory, Los Alamos, NM.

USDOE 2004: DOE/LANL List of Los Alamos National Laboratory Nuclear Facilities, PS-SBO 401, Rev. 4, dated February 17, 2004.

Table 4.11-1. Summary Changes to Risk-Dominant Accidents in 1999 SWEIS (Expanded Operations Alternative).

A. Radiological

Scenario	Facility	Description	Estimated Frequency (1999)	Estimated Frequency (2004)	MAR (1999)	ST (1999)	MAR (2004)	Integrated Population Exposure Person-rem (1999)	Excess Latent Cancer Fatalities (1999)
RAD-01	TA-54 RANT	Plutonium release from RANT facility transuranic waste container storage area fire	1.6×10^{-3} Vol III, p. G-151	1E-02 to 1E-04, avg. 1E-03 (from approved DSA, Section 3.4.2.4)	Initial MAR = 22 drums at 25 PE-Ci each TRU content plus 1 drum at 80 PE-Ci untreated waste (Vol III, p. G-152)	0.13 Pu-239 PE-Ci initial release (elevated); 0.60 Pu-239 PE-Ci suspension release (ground level)	30,000 PE-g [Note: Convert to PE-Ci]. (Approved DSA, Section 3.4.2.4, p. 3-82; but not implemented)	72 Vol I, p. 5-137	0.036 Vol I, p. 5-137
RAD-02	TA-3 CMR	Plutonium release from chemistry and metallurgy research facility due to natural gas pipeline break, gas ingestion into facility, and subsequent explosion and fire	$<10^{-6}$ (Incredible) Vol III, p. G-156		Initial MAR = explosion (2,500 g Pu-239 equiv powder + 500 g Pu-239 solution) + fire (2,487 g Pu-239 equiv powder + 3,000 g Pu-239 equiv solution) Suspension MAR = explosion (2,496 g Pu-239 equiv powder + 2,487 g Pu-239 equiv solution) + 2,994 g Pu-239 equiv solution fire (Vol III, p. G-158)	504 g Pu-239 released in 60 seconds (explosion), 6 g Pu-239 released in two hours (fire), 0.48 g Pu-239 suspension release (ground level)	Same - Operating under 1998 BIO	1.2×10^{5} Vol III, p. G-77	57 Vol III, p. G-77
RAD-03	TA-18 Godiva-IV	Highly enriched uranium release from power excursion accident with Godiva-IV outside Kiva #3	4.3×10^{-6} Vol III, p. G-164	None given in 2002 BIO	Initial MAR = 66,000 g HEU Suspension MAR = 66,000 – 7,194 g HEU (Vol III, p. G-165)	7,194 g HEU and fission products initial release (ground level); 56.1 g HEU suspension release (ground level)	700 g HEU in 2002 BIO	110 Vol I, p. 5-140	0.03 0.06 Vol I, p. 5-140
RAD-04 (Note 1)	TA-15 DARHT	Inadvertent detonation	$<10^{-6}$ (Incredible)	Same	DARHT EIS	[CLASSIFIED] (elevated release)	Same	9×10^{3} Vol III, p.	~5 Vol III, p.

Scenario	Facility	Description	Estimated Frequency (1999)	Estimated Frequency (2004)	MAR (1999)	ST (1999)	MAR (2004)	Integrated Population Exposure Person-rem (1999)	Excess Latent Cancer Fatalities (1999)
		plutonium-containing assembly at DARHT firing point	Vol III, p. G-169					G-78	G-78
RAD-05	TA-21 TSFF	Tritium oxide release due to aircraft crash at TSFF or TSTA	3.8×10^{-6} (TSTA) 5.3×10^{-6} (TSFF) Vol III, p. G-173	None given in OSRs	200 g tritium oxide from 1 building (Vol III, p. G-174)	200 g tritium oxide, elevated release (fire), no suspension release	**TSFF**: 100 g tritium oxide in approved OSRs from 9-23-99 27 g tritium oxide in BIO awaiting approval **TSTA** now radiological	24 Vol III, p. G-78	0.0093 0.012 for TSFF Vol III, p. G-78
RAD-06	TA-50-37	Plutonium release due to aircraft crash at RAMROD	$<10^{-6}$ (Incredible) 6.5×10^{-8} Vol III, p. 180		Initial MAR multi engine = 8,772 PE-Ci Suspension MAR = 8,772 PE-Ci (Vol III, p. G-176)	0.63 Pu-29 PE-Ci released in 30 minutes (elevated release); 2.8 Pu-239 PE-Ci suspension release (ground level)	RAMROD now radiological	7900 Vol III, p. G-78	4.2 ~4 Vol III, p. G-78
RAD-07	TA-50-69 Container Storage Area	Plutonium release from WCRRF transuranic waste container storage area fire	3.0×10^{-4} Vol III, p. G-182		Initial MAR ≈ 1,605 PE-Ci Suspension MAR ≈ 1,522 PE-Ci (Vol III, p. G-184)	0.28 Pu-239 PE-Ci released in 2.4 minutes (elevated); 0.52 Pu-239 PE-Ci suspension release (ground level)	MAR=1,000 PE-Ci (2003 BIO)	1300 Vol I, p. 5-137	0.69 0.7 Vol I, p. 5-137
RAD-08	TA-54 TWISP	Plutonium release from TWISP transuranic waste storage domes due to aircraft crash and fire	4.3×10^{-6} Vol III, p. G-188		Initial combustible MAR = 4,041 PE-Ci Initial noncombustible MAR = 7,854 PE-Ci Suspension MAR = 11,895 PE-Ci (Vol III, p. G-190 and 191)	0.16 Pu-239 PE-Ci initial release (elevated); 0.74 Pu-239 PE-Ci suspension release (ground level)	TWISP will no longer be active DVRS for future	400 Vol I, p. 5-137	0.2 Vol I, p. 5-137
RAD-09	TA-54 TWISP	Plutonium release due to transuranic	4.9×10^{-3} 0.49		Initial MAR = 658 PE-Ci	High activity container, 0.066 Pu-	TWISP will no longer be active	230 Vol I, p. 5-	0.12 Vol I, p.

Scenario	Facility	Description	Estimated Frequency (1999)	Estimated Frequency (2004)	MAR (1999)	ST (1999)	MAR (2004)	Integrated Population Exposure Person-rem (1999)	Excess Latent Cancer Fatalities (1999)
		waste drum failure or puncture (high activity container)	Vol III, p. G-198		Suspension MAR = 658 PE-Ci (Vol III, p. G-199)	239 PE-Ci initial release (ground level0; 0.63 Pu-239 PE-Ci suspension release (ground level); Average activity container, 0.0012 Pu-239 PE-Ci initial release, 0.012 Pu-239 PE-Ci suspension release	DVRS for future	137	5-137
TA-54 Area G DVRS	DVRS-operational spill from a drum BIO, June 2004, Section 3.4.2.1.1		Likely $<10^{0}$/yr to $>10^{-2}$/yr		900 PE-Ci				
RAD-10	TA-55-4	Plutonium release from degraded storage container at plutonium facility	$<10^{-6}$ (Incredible) 7.5 x 10^{-9} Vol III, p. G-207		Initial MAR = 4,500 g WG Pu Suspension MAR = 4,500 – 2.7 g WG Pu (Vol III, p. G-207; in 1996 FSAR)	2.7 g WG-Pu initial release (stack); 4.3 g WG-Pu suspension release (ground level)	Same – operating under 1996 FSAR	560 Vol III, p. G-79	0.28 Vol III, p. G-79
RAD-11 (Note 1)	TA-15 DARHT	Catastrophic containment failure after detonation plutonium-containing assembly at DARHT firing point	$<10^{-6}$ (Incredible) Vol III, p. G-210	Same	DARHT EIS	[CLASSIFIED] (ground level)	Same	~210 Vol III, p. G-79	~0.1 <1 Vol III, p. G-79
RAD-12 (Note 1)	TA-16-411	Classified accident at TA-16-411	1.5×10^{-6} Vol III, p. G-212	Incredible ($<1\times10^{-6}$)	No details in Vol III, p. G-213	Elevated release of Pu	Downgraded to a radiological facility	$\sim1.1\times10^{5}$ 35,800 Vol	~55 0.000027

Scenario	Facility	Description	Estimated Frequency (1999)	Estimated Frequency (2004)	MAR (1999)	ST (1999)	MAR (2004)	Integrated Population Exposure Person-rem (1999)	Excess Latent Cancer Fatalities (1999)
							2002 inventory = 4 kg U-238 (DU) + 0 kg Th-232	I, p. 5-87	Vol I, p. 5-87 18 Vol III, p. G-79
RAD-13	TA-18-116 Pajarito Site Kiva #3	Plutonium release from flux trap irradiation experiment at TA-18	1.6×10^{-5} Vol III, p. G-216		Self-sustained oxidation MAR = 6,000 g Pu Disturbed Molten Metal Surfaces MAR = 6,000 g Pu Suspension MAR = 6,000 g Pu (Vol III, p. G-217 and 218)	6 g WG Pu initial release, plus fission products (ground level); 0.6 g WG Pu suspension release (ground level)	Not in 2002 BIO	160 Vol I, p. 5-138	0.082 0.08 Vol I, p. 5-138
RAD-14	TA-55-4 Plutonium Facility	Plutonium release from ion exchange column thermal excursion at plutonium facility	$<10^{-6}$ (Incredible) Vol III, p. G-47		246 g Plutonium Nitrate plus 1,000 g Plutonium Oxide (Vol III, p. G-225)	2.5 g WG Pu initial release (stack); 4.3 g WG Pu suspension release (ground level)	Same – operating under 1996 FSAR	130 Vol III, p. G-79	0.063 Vol III, p. G-79
RAD-15	TA-3-29 CMR	Plutonium release from laboratory and wing fires at CMR	3.2×10^{-5} Vol III, p. G-235		Initial: Laboratory Fire: 250 g Pu hydride plus 4.25 kg Pu metal Wing Fire: 250 g Pu hydride plus 4.25 kg Pu metal plus 6.0 kg Pu-239 equivalent powders, solutions, and solids (Vol III, p. G-239) Suspension terms: Laboratory Fire = 249 g Pu hydride plus 4.25 kg Pu metal Wing Fire = 248 g Pu hydride plus 4.25 kg	Initial: Laboratory Fire: 0.575 g Pu hydride plus 0.25 g Pu metal Wing Fire: 2.5 g Pu hydride plus 1.06 g Pu metal plus 0.36 g Pu-239 equivalent powders, solutions, and solids (Vol III, p. G-239) Suspension terms: Laboratory Fire = 9.5616e-10 g Pu hydride plus 1.632e-8 g Pu metal	Not in 1998 CMR BIO	175 Lab : Vol I, p. 5-138 3400 Wing: Vol I, p. 5-138 4.5 x 4 = 18 Lab: Vol III, p. G-80 1,700 x 100 = 17,000	0.088 Lab : Vol I, p. 5-138 1.7 Wing: Vol I, p. 5-138 0.0023 x 4 = 0.0092 Lab: Vol III, p. G-80 0.85 x 100 = 85

Scenario	Facility	Description	Estimated Frequency (1999)	Estimated Frequency (2004)	MAR (1999)	ST (1999)	MAR (2004)	Integrated Population Exposure Person-rem (1999)	Excess Latent Cancer Fatalities (1999)
					Pu metal plus 6.0 kg Pu-239 equivalent powders, solutions, and solids (Vol III, p. G-240)	Wing Fire = 0.24 g Pu hydride plus 4.1 g Pu metal plus 5.76 g Pu-239 equivalent powders, solutions, and solids (Vol III, p. G-240)		Wing: Vol III, p. G-80	Wing: Vol III, p. G-80
RAD-15	TA-55-4 Plutonium Facility	Plutonium release from hydride-dehydride glovebox fire **In Table on p. G-45, but not what is in text of Appendix G.**	3.2×10^{-5}			6.6 g WG Pu initial release; 4.34 g WG Pu suspension release (Expanded Operations Alternative only)	Same – operating under 1996 FSAR	1700	0.86
RAD-16	TA-3-29 CMR	Plutonium release due to aircraft crash at chemistry and metallurgy research facility	3.5×10^{-6}			0.69 g Pu-239 initial release (elevated); 0.21 g Pu-239 suspension release (ground level)	Same - Operating under 1998 BIO	56 Vol I, p. 5-137	0.03 Vol I, p. 5-137

Scenario	Facilities	Description	Estimated Freq. (1999)	Estimated Freq. (2004)	MAR (1999)	ST (1999)	MAR (2004)	Integrated Population Exposure (1999)	Excess Fatal Cancers (1999)
SITE-01		Site-wide earthquake causing damage to low-capacity structures/internals	2.9×10^{-3}					27,726 overall Vol I, p. 5-87	16 overall Vol I, p. 5-87
	TA-3-29				Wing limits, powder Vol III, p. G-94	96.9 g Pu-239 initial; 9.4 g suspension	Same – operating under 1998 BIO		
	TA-18-23					22.9 g HEU initial; 0.22 g	138.8 kg PE		

Scenario	Facilities	Description	Estimated Freq. (1999)	Estimated Freq. (2004)	MAR (1999)	ST (1999)	MAR (2004)	Integrated Population Exposure (1999)	Excess Fatal Cancers (1999)
						suspension			
	TA-18-32					202.4 kg PE			
	TA-18-119					4.0 kg PE			
	TA-18-122					0.8 kg PE			
	TA-18-138					0.9 kg PE			
	TA-21-155	(TSTA)				200 g tritium oxide	TSTA now radiological		
	TA-21-209	(TSFF)		None given in OSRs		200 g tritium oxide	**TSFF**: 100 g tritium oxide (in approved OSRs from 9-23-99) 27 g tritium oxide (in BIO awaiting approval)		
	TA-50-1					5.8×10^{-5} g Pu-238, 0.27 g Pu-239 & 0.005 g Am-241 initial; 1.3×10^{-4} g Pu-238, 5.85 g Pu-239 & 0.11g Am-241 suspension			
	TA-50-37					1.0 Pu-239 PE-Ci initial; 0.96 Pu-239 PE-Ci suspension			
	TA-54-38			1E-03 (Approved DSA, p. 3-78)		0.339 Pu-239 PE-Ci initial; 0.033 Pu-239 PE-Ci suspension	30,000 PE-g [Note: Convert to PE-Ci.] (from approved DSA, but not implemented)		
	TWISP					0.19 Pu-239 PE-Ci initial; 1.2 Pu-239 PE-Ci suspension	TWISP no longer active		
SITE-02		Site-wide earthquake causing damage to low- and moderate-capacity structures/internals	4.4×10^{-4}					41,340 overall Vol I, p. 5-87	24 overall Vol I, p. 5-87
	TA-3-29					102.8 g Pu-239 initial; 9.4 g suspension	Same – operating under 1998 BIO		
	TA-16-205			1 x 10^{-3} in DSA		100 g tritium oxide	1000 g tritium oxide (based on NNSA memo)		

Scenario	Facilities	Description	Estimated Freq. (1999)	Estimated Freq. (2004)	MAR (1999)	ST (1999)	MAR (2004)	Integrated Population Exposure (1999)	Excess Fatal Cancers (1999)
	TA-18-23					22.9 g HEU initial; 0.22 g suspension	138.8 kg PE		
	TA-18-32					0.22 g Pu-239	202.4 kg PE		
	TA-18-119						4.0 kg PE		
	TA-18-122						0.8 kg PE		
	TA-18-116					0.028 g Pu-239	0.9 kg PE		
	TA-18-168					0.85 g HEU initial; 18.4 g suspension	138.8 kg PE		
	TA-21-155	(TSTA)				200 g tritium oxide	TSTA now radiological		
	TA-21-209	(TSFF)		None given in OSRs		200 g tritium oxide	**TSFF**: 100 g tritium oxide (in approved OSRs from 9-23-99) 27 g tritium oxide (in BIO awaiting approval)		
	TA-50-1					5.8×10^{-5} g Pu-238, 0.27 g Pu-239 & 0.005 g Am-241 initial; 1.3×10^{-4} g Pu-238, 5.85 g Pu-239 & 0.11g Am-241 suspension			
	TA-50-37					1.0 Pu-239 PE-Ci initial; 0.96 Pu-239 PE-Ci suspension			
	TA-50-69					0.39 Pu-239 PE-Ci initial; 0.037 Pu-239 PE-Ci suspension			
	TA-54-38					0.339 Pu-239 PE-Ci initial; 0.033 Pu-239 PE-Ci suspension	30,000 PE-g (from approved DSA, but not implemented)		
	TWISP					0.12 Pu-239 PE-Ci initial; 1.2 Pu-239 PE-Ci suspension	TWISP no longer active		
	TA-55-4					0.0174 g Pu-238, 5.31g Pu-239, 0.201g Pu-242 & 0.242 g HEU initial; 0.056g Pu-238, 56.7g Pu-239, 1.68	Same – operating under 1996 FSAR		

Scenario	Facilities	Description	Estimated Freq. (1999)	Estimated Freq. (2004)	MAR (1999)	ST (1999)	MAR (2004)	Integrated Population Exposure (1999)	Excess Fatal Cancers (1999)
						g Pu-242 & 0.025 g HEU suspension			
SITE-03		Earthquake causing damage to all structures/internals	7.1×10^{-5}					210,758 overall Vol I, p. 5-87	134 overall Vol I, p. 5-87
	TA-3-29					140.8 g Pu-239 initial; 13.1 g suspension			
	TA-16-205					172 g tritium oxide, 1,188 g tritium gas	1000 g tritium oxide (based on NNSA memo)		
	TA-18-23					22.9 g HEU initial; 0.22 g suspension			
	TA-18-32					0.22 g Pu-239			
	TA-18-116					0.028 g Pu-239			
	TA-18-168					0.85 g HEU initial; 18.4 g suspension			
	TA-21-155	(TSTA)				200 g tritium oxide	TSTA now radiological		
	TA-21-209	(TSFF)		None given in OSRs		200 g tritium oxide	**TSFF**: 100 g tritium oxide (in approved OSRs from 9-23-99) 27 g tritium oxide (in BIO awaiting approval)		
	TA-50-1					5.8×10^{-5} g Pu-238, 0.27 g Pu-239 & 0.005 g Am-241 initial; 1.3×10^{-4} g Pu-238, 5.85 g Pu-239 & 0.11g Am-241 suspension			
	TA-50-37					1.0 Pu-239 PE-Ci initial; 0.96 Pu-239 PE-Ci suspension			
	TA-50-69					0.39 Pu-239 PE-Ci initial; 0.037 Pu-239 PE-Ci suspension			
	TA-54-38					0.339 Pu-239 PE-Ci initial; 0.033 Pu-239 PE-Ci	30,000 PE-g (from approved DSA, but not		

Scenario	Facilities	Description	Estimated Freq. (1999)	Estimated Freq. (2004)	MAR (1999)	ST (1999)	MAR (2004)	Integrated Population Exposure (1999)	Excess Fatal Cancers (1999)
						suspension	implemented)		
	TWISP					0.25 Pu-239 PE-Ci initial; 2.4 Pu-239 PE-Ci suspension			
	TA-55-4					2.04g Pu-238, 69.2g Pu-239, 0.062g Pu-240, 3.36g Pu-242 & 3.74g HEU initial; 1.95g Pu-238, 71.2g Pu-239, 0.3g Pu-240, 3.22g Pu-242 & 3.6g HEU suspension	Same – operating under 1996 FSAR		
	TA-55-185					0.006 Pu-239 PE-Ci initial; 0.06 Pu-239 PE-Ci suspension	Same – operating under 1996 FSAR		
SITE-03		Surface rupture	1 to $3x10^{-5}$						
	TA-3-29					788.5 g Pu-239 initial; 27.6 g suspension	Same – operating under 1998 BIO		
	TA-16-205			1×10^{-3} in DSA		172 g tritium oxide, 1,188 g tritium gas	1000 g tritium oxide (based on NNSA memo)		
	TA-18-23					22.9 g HEU initial; 0.22 g suspension			
	TA-18-32					0.22 g Pu-239			
	TA-18-119						4.0 kg PE		
	TA-18-122						0.8 kg PE		
	TA-18-116					0.028 g Pu-239	557.5 kg PE		
	TA-18-168					0.85 g HEU initial; 18.4 g suspension	0.9 kg PE		
	TA-18-26						60.9 kg ^{239}PuE		
	TA-21-155	(TSTA)				200 g tritium oxide	TSTA now radiological		
	TA-21-209	(TSFF)		None given in OSRS		200 g tritium oxide	**TSFF**: 100 g tritium oxide (in approved OSRs from 9-23-99) 27 g tritium oxide (in BIO awaiting approval)		

Scenario	Facilities	Description	Estimated Freq. (1999)	Estimated Freq. (2004)	MAR (1999)	ST (1999)	MAR (2004)	Integrated Population Exposure (1999)	Excess Fatal Cancers (1999)
	TA-50-1					5.8×10^{-5} g Pu-238, 0.27 g Pu-239 & 0.005 g Am-241 initial; 1.3×10^{-4} g Pu-238, 5.85 g Pu-239 & 0.11g Am-241 suspension			
	TA-50-37					1.0 Pu-239 PE-Ci initial; 0.96 Pu-239 PE-Ci suspension			
	TA-50-69					0.39 Pu-239 PE-Ci initial; 0.037 Pu-239 PE-Ci suspension			
	TA-54-38					0.339 Pu-239 PE-Ci initial; 0.033 Pu-239 PE-Ci suspension	30,000 PE-g (approved DSA, but not implemented)		
	TWISP					0.25 Pu-239 PE-Ci initial; 2.4 Pu-239 PE-Ci suspension	TWISP no longer active		
	TA-55-4					2.04g Pu-238, 69.2g Pu-239, 0.062g Pu-240, 3.36g Pu-242 & 3.74g HEU initial; 1.95g Pu-238, 71.2g Pu-239, 0.3g Pu-240, 3.22g Pu-242 & 3.6g HEU suspension	Same – operating under 1996 FSAR		
	TA-55-185					0.006 Pu-239 PE-Ci initial; 0.06 Pu-239 PE-Ci suspension	Same – operating under 1996 FSAR		
SITE-04		Site-wide wildfire consuming combustible structures and vegetation	0.1					675 overall Vol I, p. 5-87	0.34 overall Vol I, p. 5-87
	TA-16-205			1 x 10^{-4} in DSA		1,360 g tritium gas	1,000 g tritium oxide (based on NNSA memo)		
	TA-21-155	(TSTA)				200 g tritium oxide	TSTA now radiological		
	TA-21-209	(TSFF)		None given in		100 g tritium oxide	**TSFF**: 100 g tritium oxide (in		

Scenario	Facilities	Description	Estimated Freq. (1999)	Estimated Freq. (2004)	MAR (1999)	ST (1999)	MAR (2004)	Integrated Population Exposure (1999)	Excess Fatal Cancers (1999)
	TA-54			OSRs		0.16 Pu-239 PE-Ci initial release (elevated); 0.74 Pu-239 PE-Ci suspension release (ground level)	approved OSRs from 9-23-99) 27 g tritium oxide (in BIO awaiting approval)		

Legend to colors: Blue - data that was verified, references approved and documents implemented;
Green - new, checked data; approved DSA, but not implemented; still operating under old;
Red - scenario that was at CMR in SWEIS, but needs to go to TA-55

B. Chemical

Scenario	Facility	Description	Estimated Frequency (1999)	Estimated Frequency (2004)	MAR (1999)	Source Term (1999)	MAR (2004)	Integrated Population Exposure (1999)	Excess Fatal Cancers (1999)
CHEM-01	TA-00-1109	Chlorine release (150 pounds) from potable water treatment station due to human error during cylinder changeout or maintenance, or due to random hardware failures	1.3×10^{-3}	0	150 pounds chlorine Vol III, p. G-127	150 pounds chlorine	None transferred to LA County	12 above ERPG-3 Vol I, p. 5-141	n/a
CHEM-02	TA-3-476	Multiple cylinder (1500 pounds) from toxic gas storage shed at Gas Plant due to fire or aircraft crash	1.5×10^{-4}		1,500 pounds chlorine Vol III, p. G-135	1,500 pounds chlorine	None – chlorine not stored for water treatment; max shipment 2-5 lb of a toxic gas	292 at or above ERPG-3 Vol I, p. 5-141	n/a
CHEM-03	TA-3-476	Chlorine release (150 pounds) from toxic gas storage shed at Gas Plant due to random cylinder failure or multiple human errors during cylinder handling	1.2×10^{-4}		150 pounds chlorine Vol III, p. G-138	150 pounds chlorine	None – chlorine not stored for water treatment; max shipment 2-5 lb of a toxic gas	239 above ERPG-3 Vol I, p. 5-141	n/a
CHEM-04	TA-54-216	Bounding single container release toxic gas (selenium hexafluoride) from waste cylinder storage	4.1×10^{-3}		75 liters selenium hexafluoride Vol III, p. G-141	75 liters selenium hexafluoride		0 above ERPG-2 Vol I, p. 5-141	n/a
CHEM-05	TA-54-216	Bounding multiple cylinder release toxic gas (sulfur dioxide) from waste cylinder storage	5.1×10^{-4}		300 pounds sulfur dioxide Vol III, p. G-145 & 146	300 pounds sulfur dioxide		0 above ERPG-2 Vol I, p. 5-141	n/a
CHEM-06	TA-55-4	Chlorine gas release outside plutonium facility	6.3×10^{-2}		150 pounds chlorine Vol III, p. G-148	150 pounds chlorine	Same – operating under 1996 FSAR	7 above ERPG-3 Vol I, p. 5-141	n/a
SITE-01		Site-wide earthquake causing damage to low-capacity structures/internals	2.9×10^{-3}					Several tens of people above ERPG-2 or -3 overall Vol I, p. 5-88	

Scenario	Facility	Description	Estimated Frequency (1999)	Estimated Frequency (2004)	MAR (1999)	Source Term (1999)	MAR (2004)	Integrated Population Exposure (1999)	Excess Fatal Cancers (1999)
	TA-00-1109				300 pounds chlorine Vol III, p. G-96	300 pounds chlorine	None - transferred to LA County		
	TA-00-1110				300 pounds chlorine Vol III, p. G-96	300 pounds chlorine	None - transferred to LA County		
	TA-3-66			Improbable (between 10^{-2} and 10^{-4})2001 Sigma Building Safety Survey, Table 1	7.6 liters hydrogen cyanide Vol III, p. G-96	7.6 liters hydrogen cyanide	13.5 lb hydrogen cyanide potentially available 2001 Sigma Building Safety Survey, Section A.4.4		
	TA-3-476				150 pounds chlorine Vol III, p. G-97	150 pounds chlorine	None – chlorine not stored for water treatment; max shipment 2-5 lb of a toxic gas		
	TA-9-21				3 pounds phosgene Vol III, p. G-96	3 pounds phosgene	1 pound phosgene cylinder (told this is `0.5 lb after several years of use; never had 3 lb)		
	TA-43-1				30 liters formaldehyde Vol III, p. G-97	30 liters formaldehyde	14.1 liters formaldehyde (June 9, 2004)		
SITE-02		Site-wide earthquake causing damage to low- and moderate-capacity structures/internals	4.4×10^{-4}					~100 above ERPG-2 or -3 overall Vol I, p. 5-88	
	TA-00-				300 pounds	300 pounds	None - transferred to		

Scenario	Facility	Description	Estimated Frequency (1999)	Estimated Frequency (2004)	MAR (1999)	Source Term (1999)	MAR (2004)	Integrated Population Exposure (1999)	Excess Fatal Cancers (1999)
	1109				chlorine Vol III, p. G-98	chlorine	LA County		
	TA-00-1110				300 pounds chlorine Vol III, p. G-98	300 pounds chlorine	None - transferred to LA County		
	TA-3-66			Improbable (between 10^{-2} and 10^{-4})2001 Sigma Building Safety Survey, Table 1	7.6 liters hydrogen cyanide Vol III, p. G-98	7.6 liters hydrogen cyanide	13.5 lb hydrogen cyanide potentially available 2001 Sigma Building Safety Survey, Section A.4.4		
	TA-3-476				150 pounds chlorine Vol III, p. G-98	150 pounds chlorine	None – chlorine not stored for water treatment; max shipment 2-5 lb of a toxic gas		
	TA-9-21				3 pounds phosgene Vol III, p. G-98	3 pounds phosgene	1 pound phosgene cylinder (told this is `0.5 lb after several years of use; never had 3 lb)		
	TA-43-1				30 liters formaldehyde Vol III, p. G-98	30 liters formaldehyde	14.1 liters formaldehyde (June 9, 2004)		
	TA-55-4				150 pounds chlorine Vol III, p. G-70	150 pounds chlorine	Same – operating under 1996 FSAR		
	TA-55-4				6,100 gallons nitric acid	6,100 gallons nitric acid	Same – operating under 1996 FSAR		

Scenario	Facility	Description	Estimated Frequency (1999)	Estimated Frequency (2004)	MAR (1999)	Source Term (1999)	MAR (2004)	Integrated Population Exposure (1999)	Excess Fatal Cancers (1999)
					Vol III, p. G-99				
	TA-55-249				5,200 gallons hydrochloric acid Vol III, p. G-99	5,200 gallons hydrochloric acid	Same – operating under 1996 FSAR		
SITE-03		Earthquake causing damage to all structures/internals	7.1×10^{-5}					~100 above ERPG-2 or -3 overall Vol I, p. 5-88	
	TA-00-1109				300 pounds chlorine Vol III, p. G-100	300 pounds chlorine	None- transferred to LA County		
	TA-00-1110				300 pounds chlorine Vol III, p. G-100	300 pounds chlorine	None - transferred to LA County		
	TA-3-66			Improbable (between 10^{-2} and 10^{-4})2001 Sigma Building Safety Survey, Table 1	7.6 liters hydrogen cyanide Vol III, p. G-100	7.6 liters hydrogen cyanide	13.5 lb hydrogen cyanide potentially available 2001 Sigma Building Safety Survey, Section A.4.4		
	TA-3-476				150 pounds chlorine Vol III, p. G-100	150 pounds chlorine	None – chlorine not stored for water treatment; max shipment 2-5 lb of a toxic gas		
	TA-9-21				3 pounds phosgene Vol III, p. G-	3 pounds phosgene	1 pound phosgene cylinder (told this is `0.5 lb		

Scenario	Facility	Description	Estimated Frequency (1999)	Estimated Frequency (2004)	MAR (1999)	Source Term (1999)	MAR (2004)	Integrated Population Exposure (1999)	Excess Fatal Cancers (1999)
	TA-43-1 TA-55-4 TA-55-4 TA-55-249				100 30 liters formaldehyde Vol III, p. G-100 150 pounds chlorine Vol III, p. G-70 6,100 gallons nitric acid Vol III, p. G-100 5,200 gallons hydrochloric acid Vol III, p. G-100	30 liters formaldehyde 150 pounds chlorine 6,100 gallons nitric acid 5,200 gallons hydrochloric acid	after several years of use; never had 3 lb) 14.1 liters formaldehyde (June 9, 2004) Same – operating under 1996 FSAR Same – operating under 1996 FSAR Same – operating under 1996 FSAR		
SITE-04	TA-43-1	Site-wide wildfire consuming combustible structures and vegetation	0.1			30 liters formaldehyde	14.1 liters formaldehyde (June 9, 2004)	~11above ERPG-2 from formaldehyde Vol I, p. 5-88	

4.11.2 Preliminary Assessment of Potential Impact of LANL Site Boundary Changes and Land Transfer on Accident Analyses in the SWEIS

Introduction

This report summarizes the results of evaluating the potential for DOE site boundary changes and land transfers to have effects on the analyses of risk-dominant accidents in the *Site-Wide Environmental Impact Statement (SWEIS) for Continued Operation of the Los Alamos National Laboratory* (DOE 1999). A recent DOE policy on the use of site boundaries and commercial ventures and municipal operations within LANL as well as transfers of land to public entities resulted in changes in distances to public receptors at which effects are predicted. These changes potentially create the need to alter the accident analyses in the SWEIS that predict, among other things, radiological dose consequences and health effects to public receptors. As such, we conducted a preliminary assessment of the potential for these changes to cause impacts to radiological dose consequences and effects for risk-dominant accidents reported in the SWEIS.

Risk-dominant accidents analyzed in the SWEIS assess radiological consequences to maximally-exposed individual (MEI) members of the public. Each accident has a location identified, usually the nearest point of public access or location, at which a maximum dose could occur. Highways over which the DOE can exercise control during emergency conditions are not necessarily public MEI locations. Commercial ventures and municipal operations within LANL are not necessarily MEI locations. But analyses for EISs such as the SWEIS often evaluate several public receptor locations for each accident. Pajarito Road, Royal Crest Trailer Park, State Road 502, State Road 4, Diamond Drive, White Rock, or the Los Alamos town site served as MEI or alternate public receptor locations for the 16 risk-dominant radiological accidents. Alternatively, parcels of DOE/LANL property given or transferred to public entities do introduce new locations of unrestricted public access, potentially changing the MEI location for a given LANL facility. This, in turn, can potentially change the results of a radiation dose consequence/human health effects analysis. Given that the SWEIS serves as the baseline to which all subsequent (post-1999) changes in operations and potential accidents are compared under NEPA, it is important to determine whether any major changes in the distance analysis parameter might have occurred because incremental risk from the introduction of new operations are evaluated against the SWEIS. Thus, we contrasted the MEI location for risk-dominant accidents in the SWEIS against the locations of already transferred parcels, new site boundaries, or proposed new commercial ventures and municipal operations. We then used subjective judgment on whether these new locations had the potential to substantially change estimated MEI radiation doses given new distances to public receptors.

Methods

The general procedure for making this assessment was to contrast the role of a site boundary or transferred parcel of land in analyzing accidents under NEPA against the magnitude of the changes in distances to site boundaries or transferred parcels. More specifically, we developed an understanding of the nature of the site boundary and land ownership changes, identified resultant changes in distances to public MEI locations, and considered potential changes to MEI dose consequences and human health effects. We discuss the magnitude of change to accident analyses in the SWEIS.

We consulted key scientists and managers at LANL (as cited throughout this document) that conduct accident analyses or manage related programs or activities as well as reviewing the SWEIS (DOE 1999) for potential impacts. While accident analyses for NEPA can, and often do, have different objectives than accident analyses for facility safety authorization, we note that the DOE has agreed that impacts of the site boundary changes to LANL facility safety authorizations can be assessed at the time of a facility's normally scheduled update to facility safety documents (Satterwhite 2003).

Site Boundary Changes

On December 11, 2002, DOE/NNSA/LASO established a policy on the determination and use of the DOE/LANL site boundary for use in evaluating dose to the Maximally Exposed Offsite Individual (MEOI) in facility safety authorization basis (AB) documents (DOE 2002a). The new boundaries are shown in Figure 1. The policy also included instruction on how to treat potential receptors at commercial ventures and municipal operations within LANL; e.g., the Research Park or the proposed new county landfill. These entities would include parcels of DOE/LANL property that were given to public entities through the Land Transfer process.

The *first objective* of the accident analysis in NEPA reviews is to characterize the overall risk posed by operations, creating a context for the decision maker and putting the operations in perspective for the public (DOE 2002b). The concern is with presenting accidents that illustrate dominant consequences and their likelihood. Dominant consequences are often judged on the basis of maximum dose to the public from a spectrum of accidents, which is often highlighted by a consideration of the MEI member of the public. This MEI is defined as the outdoor, offsite location having the highest exposure and is almost always at the site boundary closest to the release point. Other types of receptors, such as workers and populations in surrounding communities are generally unaffected by the site boundary changes. To obtain a general sense of the magnitude of change to the nearest site boundary for various facilities at LANL we consulted LANL's Probabilistic Risk and Hazards Analysis Group (D-11) (Letellier 2002, 2003). For various facilities, D-11 made preliminary estimates of distances to the new nearest site boundaries for 16 equally spaced points radiating outwardly from each facility. For some of these facilities, distances to long-standing receptor locations were contrasted with new receptor locations. While there are sometimes changes in the distance to the nearest site boundary for several sectors from a given facility, in general there has been very little change to the single nearest receptor. Using TA-55 for example (Figures 4-15a and 4-15b), although the receptor location in sectors 2, 3, 4, 5, 13, 14, 15, and 16 are now closer because of the addition of East Jemez Road (Truck Route) as a new receptor location, the distance to the nearest receptor–Royal Crest Trailer Park–has not changed. There are few examples where the distance to the nearest receptor from a facility has changed substantially.

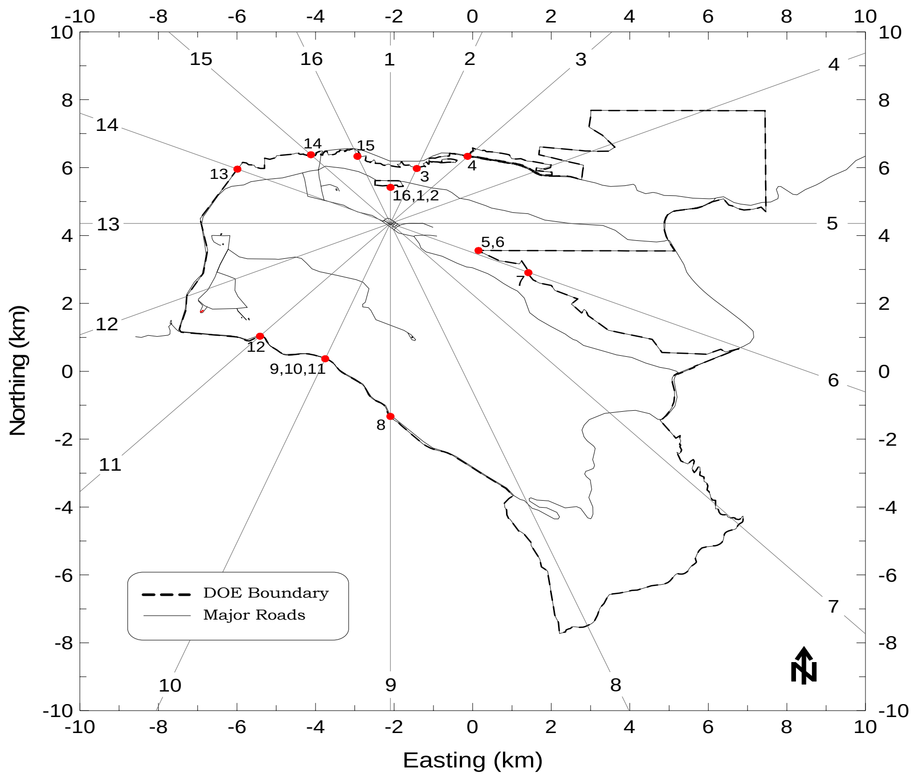

Figure 4-15a. TA-55 old evaluation boundary (Source: Letellier 2002).

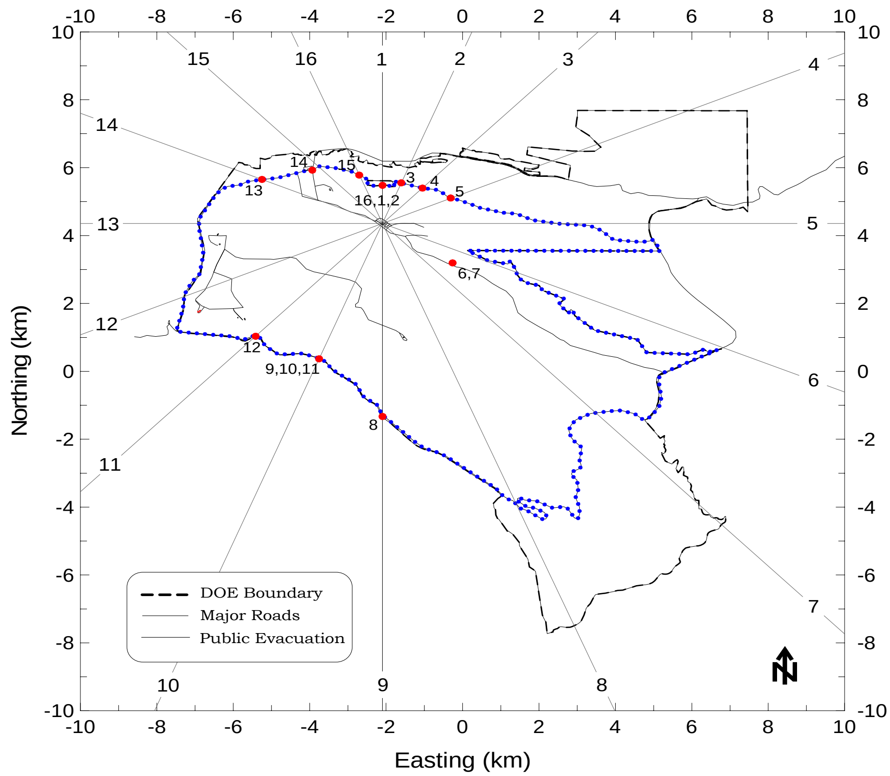

Figure 4-15b. TA-55 new evaluation boundary (Source: Letellier 2002).

The SWEIS is the most recent substantial NEPA baseline documenting the effect of accidents to human health and the environment. For many of the risk-dominant facility-specific accidents, Pajarito Road is an MEI location in the SWEIS. The most substantial changes to site boundaries with potential impact on NEPA assessments may be the allowance of continual public access to East Jemez Road and to the portion of State Road 4 from White Rock to Bandelier (Figure 4-16). With no change to Pajarito Road as a receptor location, the changes for the most part do not affect maximum doses to receptors for the majority of facility-specific accidents in the SWEIS. For example, for the bounding accident in the SWEIS ("RAD-09"), a TRU waste drum puncture or failure at TA-54, the MEI location does not change from Pajarito Road. For RAD-12, an earthquake-induced release of Pu from the DARHT generating relatively high potential MEI doses and potential effects, MEI doses were computed for State Road 4, Pajarito Road, and Bandelier National Monument; these locations remain in effect for the DARHT. Thus, because EISs often do estimate doses at several offsite receptor locations, the impact of a site boundary change is lower than otherwise if only one receptor location was used.

A few facilities will be affected by the change in site boundaries. The LANSCE at TA-53, Beryllium Technology Facility (BTF) at TA-03, and Sigma Facility at TA-03 are examples of facilities that will have a closer MEI. While the change in distance to nearest MEI for the LANSCE could increase dispersion coefficients by a factor of approximately four, it was screened out of final consideration in the SWEIS due to a lack of credible accidents. The BTF was also screened due to a lack of credible accidents. Thus, for some facilities, even though the distance to MEI is shortened, the lack of consequences of concern makes the issue of closer MEIs less impacting. In the SWEIS, the Sigma Facility was retained for detailed analysis of consequences of an accident involving hydrogen cyanide. The magnitude and type of effects are measured by estimating distances within which Emergency Response Planning Guideline (ERPG) conditions could occur. ERPG-2 or -3 effects are irreversible health effects (ERPG-2) or life threatening health effects (ERPG-3). The SWEIS showed that even under adverse dispersion conditions, the ERPG distances did not extend to the Los Alamos town site, which was the nearest public receptor location at approximately 0.7 mi away. East Jemez Road is relatively close (~0.4 mi) to the Sigma Facility. This is one example where the change in policy could result in ERPG-2 and -3 conditions applying to members of the public, at least for the more conservative scenarios analyzed in the SWEIS for this facility.

The *second objective* of accident analyses under NEPA is to realistically quantify the increment in risk among alternatives, as input to a reasoned choice among the alternatives. To achieve this, there is a need to identify significant changes in the frequency or consequence/effect of postulated accidents among the alternatives. Changes in site boundaries would most affect the consequence portion of risk estimates. In our review of the SWEIS for changes in consequences among the different alternatives that could be affected by the site boundary changes we almost always found no change for the No Action Alternative. Since the site boundary changes have minimal impact on consequences, little or no change is expected among the alternatives disclosed in the SWEIS.

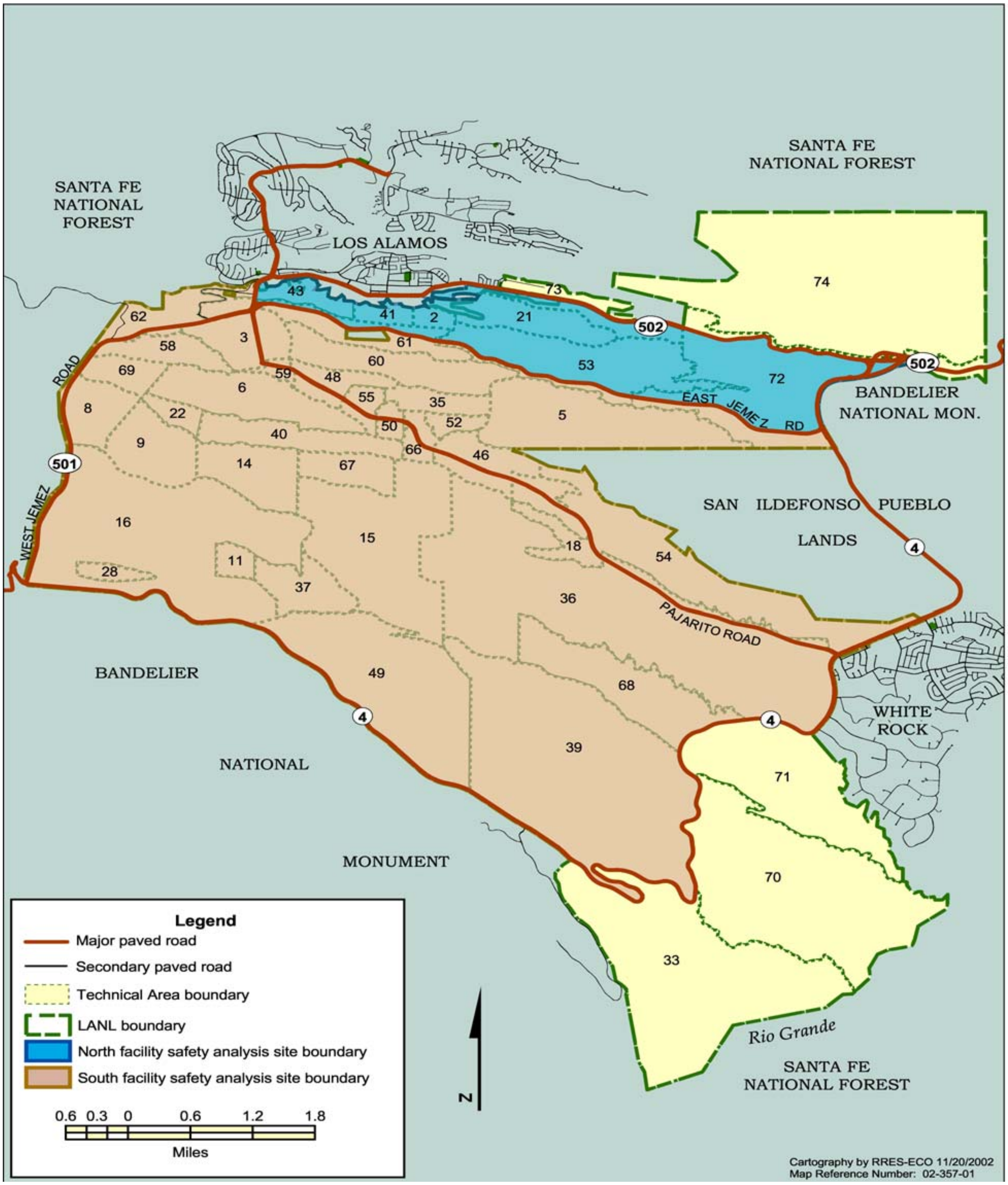

Figure 4-16. Site boundaries for conducting accident analyses at LANL (Source: RRES/ECO).

Land Transfer

Table 4.11.2-1 lists the parcels of land that were transferred in 2002 as well as those remaining to be transferred. The parcels are also shown in Figure 4-17. All of the transfer parcels appear to be located at or very near a DOE/LANL boundary, the majority of them on the north boundary and some on the southeast boundary adjacent to the city of White Rock. The 16 radiological risk-dominant accidents evaluated in the SWEIS and affected facility are listed in Table 4.11.2-2 and the approximate location of some of the key facilities are shown in Figure 4-17. Only two of the 16 radiological accidents appear to concern facility locations that have a shorter distance to a transfer parcel than to the MEI location analyzed in the SWEIS.

Table 4.11.2-1. Land Parcels Transferred and to be Transferred

Designator	Description	Recipient	Transfer Date	Acreage
Transferred				
A-1	Manhattan Monument (0 ac)	County	11/1/06	0.07
A-12	LAAO-1 (East)	County	11/1/06	4.51
A-17	TA-74-1 (West) (3 ac)	County	11/1/06	5.52
A-19	White Rock-1	County	11/1/06	76.33
A-2	Site 22 (0 ac)	County	11/1/06	0.17
A-3	Airport-1 (East) (8 ac)	County	11/1/06	9.44
A-6	Airport-4 (West)	County	11/1/06	4.18
A-9	DP Road-2 (North) (Tank Farm) (4 ac)	County	11/1/06	4.25
B-1	White Rock-2	Pueblo	11/1/06	14.94
B-2	TA-74-3 (North)(Includes B-4)	Pueblo	11/1/06	2089.88
To Be Transferred				
B-3	TA-74-4 (Middle) (Little Otowi)	Pueblo	10/1/07	3.40
C-1	White Rock	Highway	TBD	15.41
C-2	White Rock "Y"-1	Highway	TBD	104.10
C-3	White Rock "Y"-3 (deferred)	Highway	TBD	53.60
A-18	TA-74-2 (South)	County	10/1/07	676.52
A-7	Airport-5 (Central) (7 ac)	County	10/1/07	5.83
A-8	DP Road-1 (South) (25 ac)	County	10/1/07	24.92
A-15	TA-21-1 (West)	County	10/1/07	7.55
A-13	LAAO-2 (West) (LAAO Bldg)	County	10/1/09	8.82
A-4	Airport-2 (North) (90 ac)	County	10/1/09	92.60
A-10	DP Road-3 (East)	County	10/1/09	13.80
A-11 (3)	DP Road-4 (West) (Archives)	County	10/1/10	3.09
A-14	Rendija	County	10/1/11	918.30
A-5	Airport-3 (South) (deferred)	County	None	34.67
A-16	TA-21-2 (East) (deferred)	County	None	252.10
A-20	White Rock "Y"-2 (deferred)	County	None	323.40
C-4	White Rock "Y"-4 (deferred)	Highway	TBD	20.10

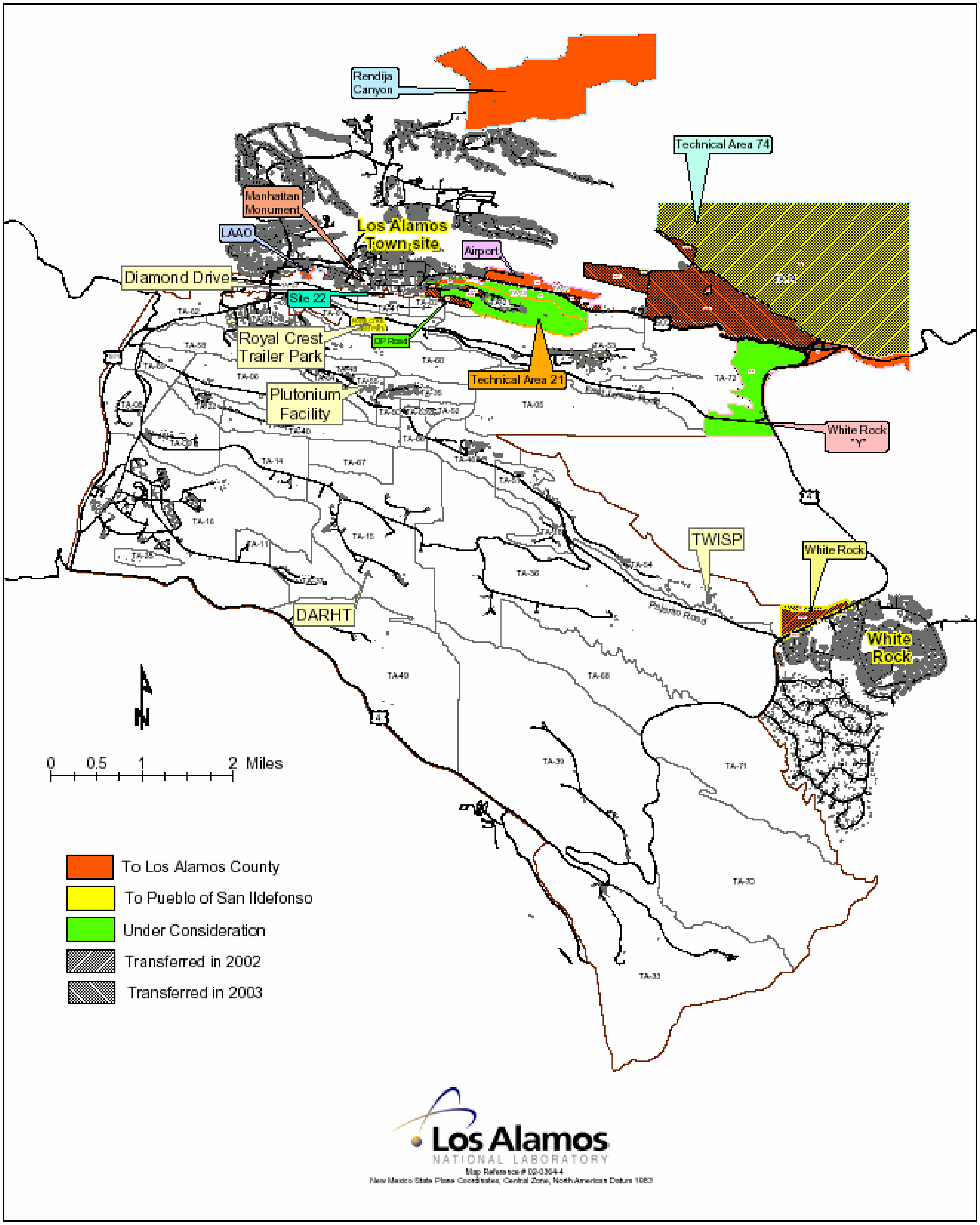

Figure 4-17. Locations of transfer parcels and key SWEIS accident facilities.

Table 4.11.2-2. Sixteen radiological accidents evaluated in LANL SWEIS and affected facilities.

Accident Scenario Designator	Location	Facility
RAD-01	TA-54-38	Radioassay and Nondestructive Testing (RANT) Facility
RAD-02	TA-3-29	Chemistry and Metallurgy Research (CMR) Facility
RAD-03	TA-18-116	Los Alamos Critical Experiments (LACEF) Facility
RAD-04	TA-15-312	Dual Axis Radiographic Hydrodyamic Test (DARHT) Facility
RAD-05	TA-21-209	Tritium Science and Fabrication Facility (TSFF)
RAD-06	TA-50-37	Radioactive Materials, Research, Operations, and Demonstration Facility (RAMROD)
RAD-07	TA-50-69	Waste Characterization, Reduction, and Repackaging Facility (WCRRF)
RAD-08	TA-54-G	Transuranic Waste Inspectable Storage Project (TWISP)
RAD-09	TA-54-G	Transuranic Waste Inspectable Storage Project (TWISP)
RAD-010	TA-55-4	Plutonium Facility
RAD-011	TA-15-312	Dual Axis Radiographic Hydrodyamic Test (DARHT) Facility
RAD-012	TA-16-411	Device Assembly Building
RAD-013	TA-18-116	Los Alamos Critical Experiments (LACEF) Facility
RAD-014	TA-55-4	Plutonium Facility
RAD-015	TA-3-29	Chemistry and Metallurgy Research (CMR) Facility
RAD-016	TA-3-29	Chemistry and Metallurgy Research (CMR) Facility

Facilities for which Pajarito Road was used as an MEI location (e.g., RANT Facility, LACEF at TA-18, WCRRF and TWISP at TA-54, or Plutonium Facility at TA-55) are unaffected by the land transfer because Pajarito Road remains much closer to those facilities than the nearest transferred parcel or group of parcels such as the DOE/LASO property off of Trinity Drive or property in the TA-21 area. Facilities for which Diamond Drive was used as an MEI location such as the CMR are unaffected by the land transfer because Diamond Drive remains closer to those facilities than the nearest transferred parcel or group of parcels such as the DOE/LASO property. Facilities for which State Road 4 south of LANL were used as an MEI location such as the DARHT at TA-15 are unaffected by the land transfer because State Road 4 remains much closer to those facilities than the nearest transferred parcel or group of parcels such as the group of parcels (DOE/LASO, TA-21, Manhattan Monument, Airport, etc.) that are far to the north of the DARHT. Facilities for which the Royal Crest Trailer Park off of E. Jemez Road was used as an MEI location such as the Plutonium Facility at TA-55 are unaffected by the land transfer because the Trailer Park is still closer to those facilities to the south than the nearest transferred parcel or group of parcels such as the group of parcels (DOE/LASO, TA-21, Manhattan Monument, Airport, etc.) to the north of the Plutonium Facility.

Analyses for which the city of White Rock was used as a receptor location for releases from TA-54 facilities have the potential to be impacted because the White Rock transfer parcels are relatively close to TA-54 facilities. Doses to a city of White Rock MEI were estimated in “RAD-08,” “RAD-09,” and “SITE-01.” The White Rock transfer parcels (“White Rock-1,” “White Rock-2” and “White Rock (C-1)”) are as much as 0.34 mi closer to key facilities than a city of White Rock resident. This represents up to a 38 percent decrease in distance to the MEI receptor at White Rock. A decrease in distance to receptor doesn't always result in a dose increase because, depending on the type of release or accident conditions, there may be an area adjacent to the release point that receives none or little of the plume because an elevated plume travels above human receptors due to an elevated release point and/or a buoyant release. Additionally, dose estimates for any given accident in the SWEIS are usually made for several different receptors at a breadth of distances, therefore a change to one dose estimate does not invalidate the comprehensive set of analyses. The TA-54-related accidents had dose estimates made for a closer receptor (~0.13 mi to Pajarito Road) than even the new distance created by the White Rock parcels (~0.59 mi), so the dose to a receptor at the parcels is likely to still be within the range of doses for any give accident. For RAD-08, for example, dose estimates included receptors at Pajarito Road (~0.13 mi) and the dose at Pajarito Road likely bounds any estimates that would be made for the White Rock parcels.

Conclusions

The multiple distances used for analyses of potential accident radiological doses in the SWEIS and the general location of Land Transfer parcels in comparison to previously analyzed receptor locations, result in our judgement that parcels of land transferred to various public entities will have little or no impact on estimated doses in the SWEIS. On this basis there appears to be no need to revise accident analyses in the SWEIS because of land transfers from the DOE to public entities. Although we have not reviewed every facility at LANL for potential impacts to NEPA coverage as a result of the site boundary changes, a review of several facilities and postulated accidents, especially risk-dominant accidents in the SWEIS, resulted in our finding that very few or minimal changes in predicted effects are expected to occur. One exception, a hydrogen cyanide accident at the Sigma Facility, has been noted. The SWEIS still serves the purpose of characterizing LANL operations, differentiating among alternatives, and presenting a baseline that is suitable for tiering and bounding of potential accidents at LANL. We therefore recommend that site boundary changes be considered in future NEPA reviews as appropriate.

References and Key Information Sources:

DOE 2002a: U.S. Department of Energy, *"NNSA/OLASO Policy on Site Boundary for Dose Evaluation of the Directionally Dependant Maximally Exposed Offsite Individual,"* Memorandum, Dec. 11, 2002, R. Erickson (DOE/OLASO).

DOE 2002b: U.S. Department of Energy, "*Analyzing Accidents Under NEPA*," Office of NEPA Compliance and Policy.

DOE 1999: U.S. Department of Energy, "*Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory*," DOE/EIS-0238, Albuquerque Operations Office, Albuquerque, New Mexico, 4 Volumes (January 1999).

Letellier 2002: Personal communication from Bruce Letellier (LANL/D-11) to Gil Gonzales (LANL/RRES-ECO), e-mail December 19, 2002.

Letellier 2003: Personal communications from Bruce Letellier (LANL/D-11) to Gil Gonzales (LANL/RRES-ECO), e-mails February 13, 2003 and February 20, 2003.

Satterwhite 2003: Telephone communication from David Satterwhite (LANL/PS-OAB) to Gil Gonzales (LANL/RRES-ECO), Feb. 12, 2003.

4.12 Wildfire Accident

SITE–04, Site-Wide Wildfire: Consuming Combustible Structures and Vegetation

A theoretical wildfire resulting in the exposure of humans to airborne radiation was one of several operational site-wide accident scenarios analyzed and reported in the 1999 Site Wide Environmental Impact Statement SWEIS for Los Alamos National Laboratory (DOE 1999). The health impact of the wildfire accident was 0.34 latent cancer fatalities (LCFs) resulting from an estimated population dose of 675 person-rem. The dose to the maximally exposed individual (MEI) member of the public was <25 rem, and the estimated frequency of occurrence was approximately once every 10 years, or "likely." While the estimated radiological dose consequence of a wildfire accident was small, the high frequency of occurrence resulted in a risk (product of the frequency and consequence) that was surpassed by only one other postulated accident in the SWEIS.

The wildfire accident analysis assumed multiple source releases including radiological inventories from buildings, suspended soils with environmental (very low) levels of contamination, and ash from burnt vegetation (this ash also had very low levels of contamination). Since the analysis in 1999, radiological inventories in buildings have changed, the vulnerability of buildings to ignition by wildfire has changed as a result of tree thinning, more-accurate and more-comprehensive data have been compiled on concentrations of radionuclides in vegetation, vegetation fuel loads have changed, and the frequency of occurrence has possibly changed.

The LANL site and surrounding vicinity are generally forested areas with high fuel loading. Wildfires are frequent occurrences on nearby U.S. Forest Service land, with obvious potential for encroaching on the LANL site, as demonstrated by recent events. For this site-wide accident, a wildfire risk analysis was completed to help determine areas of concern at LANL for continued wildfire risk that includes the extensive environmental changes since 1999. Based on the results of the wildfire risk analysis, areas of concern were determined and a scenario was postulated that a wildfire is initiated to the southwest of LANL near the border of the Bandelier National Monument and the Dome Wilderness Area. While there is a potential for initiation of a wildfire at many locations within and near the LANL site, this location was considered as resulting in the most widespread potential impact to LANL because there is continuous fuel from these offsite locations to the southwest corner of the Laboratory.

Recent Widespread Environmental Changes

Since the last SWEIS wildlife analysis was completed in 1999, the Cerro Grande Fire occurred, adjacent to and on the LANL site in May 2000. On May 4, 2000, the National Park Service initiated a prescribed burn on the flanks of Cerro Grande Peak within the boundary of Bandelier National Monument. The intended burn was a meadow of about 300 acres (121 ha), at 10,120 ft, located 3.5 miles west of the Laboratory boundary at Technical Area (TA)-16. This technical area is located near the southwest corner of the Laboratory. The prescribed burn was begun in the evening, but, by 1:00 p.m. of the following day, the burn was declared a wildfire.

LANL's meteorological data showed above–average temperatures and low humidity for the first 10 days of the wildfire. Wind speeds averaged 6 to 17 mph and gusted from 27 to 54 mph during these 10 days. Generally, winds tended to be from the southwest to west during this period. By day five of the wildfire, May 8, spot fires began to occur on Laboratory lands. By May 10, the fire moved into the town site of Los Alamos and was proceeding north and east across the TA-16 mesa top. The fire was moving eastward down Water Canyon, Cañon de Valle, Pajarito Canyon, and Cañada del Buey by May 11. Eventually the fire extended northward on Laboratory lands to Sandia Canyon and eastward down Mortandad Canyon into San Ildefonso Pueblo lands. The towns of Los Alamos and White Rock were in the fire's path and more than 18,000 residents were evacuated. By the end of the day on May 10, the fire had burned 18,000 acres (7,280 ha), destroying 235 homes and damaging many other structures. The fire also spread towards LANL, and although fires moved onto the Laboratory's land, all major structures were secured and no releases of radiation occurred. The wildfire was declared fully contained on June 6, having burned 43,000 acres (17,400 ha) of land extending to Santa Clara Canyon on Santa Clara Pueblo lands to the north of the town site. LANL had approximately 6,376 ac (2,580 ha) of low-burn severity, 825 ac(334 ha) of moderate-burn severity, and 203 ac (82 ha) of high-burn severity.

The Cerro Grande Fire of 2000 had an enormous adverse impact on forests on and around LANL. Immediately there were concerns about increased erosion and flooding and the potential impacts on contaminated soil and sediment. Seventy-seven contaminant potential release sites (PRSs) and two nuclear facilities at LANL that contain hazardous and radioactively contaminated soils and materials are located within floodplain areas. Without Department of Energy (DOE) action, these PRSs and nuclear facilities could potentially release contaminants and materials downstream during rainfall events. Numerous cultural resource sites and traditional cultural properties are located in canyons or along drainage areas. These sites were then at an increased risk of flood damage.

The Laboratory conducted assessments and implemented on-the-ground rehabilitation efforts. Under the DOE Special Environmental Analysis (DOE 2000), the Laboratory was to conduct mitigation measures and monitor annually the condition of the burned area. In all, LANL treated over 1,800 acres (728 ha) with techniques similar to those used by the Burned Area Emergency Rehabilitation team. The project was successful, increasing vegetative cover on the severely burned units from around 0 percent to almost 45 percent. Most of the straw wattles that were installed have held sediment on site and allowed vegetation to grow. The Environmental Restoration Project at LANL developed Best Management Practices for all PRSs that were potentially impacted by the fire to eliminate contaminant transport (Veenis 2000).

The drought of 2000–2002 in the southwestern United States, although not unprecedented, has been one of the most severe in 50 years. Precipitation for this region was 25 percent below average during 2000 and 2001 and 65 percent below average through the summer months. The combined effects of prolonged drought and severe outbreak of bark beetles (*Ips confuses*) resulted in tens of millions of dead trees over thousands of square miles in Arizona, New Mexico, Colorado, and Utah. Highest mortality levels are seen in ponderosa pine (*Pinus ponderosa*), douglas-fir (*Pseudotsuga menziesii*) and piñon (*Pinus edulis*) pine trees. Many areas in piñon-juniper habitat have had the entire stand of piñon die leaving only juniper (*Juniperus monosperma*). Bark beetles in western North America have been documented to cause large areas of high mortality that has been linked to both drought and fire in the region (McHugh et al. 2003). The Pajarito Plateau, where LANL is located, has an average 85 percent tree mortality for trees over 1.5 meters tall from 2002 to 2003 (R. Balice, per. comm.). This mortality has left a mosaic of live and dead trees.

In order to decrease the risk from catastrophic environmental fire on the Laboratory, LANL has undertaken a tree-thinning project that was begun in January 2002. The goal of this project was to reduce the threat of wildfire to forested areas and structures on LANL property and to enhance and maintain wildlife habitat and tree species diversity by ensuring vertical and horizontal heterogeneity of age class and structure throughout the forest, and to promote forest health. Tree thinning had been completed on approximately 7,000 acres (2,830 ha) at the time of this study and includes both ponderosa pine and piñon–juniper habitats. Tree thinning and environmental changes were incorporated into the wildfire risk analysis.

Wildfire Risk Analysis Methods

Methods

General Approach

This analysis was largely based on data and results produced during earlier studies and field monitoring activities. A dataset of lightning strike locations and intensities was used to represent wildfire ignitions. Polygons of previously modeled fires were used to evaluate the relative potential for fires to burn within the study area. Fuels data and an existing landcover map were used to characterize the fuels and fire hazards in the study region. We assumed that lightning, modeled fires, and fuels characterizations represent ignitions, fire spread, and flammability, respectively. These are all important components of wildfire risk. The three intermediate results were weighted and combined in the GIS to create a preliminary relative risk rating for each cell in the study region. All analyses were done in ArcView 3.2a Geographical Information System (GIS) software. Cell resolution was set at 15m x 15m (49ft x 49ft).

The Region of Interest

The study region was based on an area used for previous analyses of wildfire behavior (Balice et al. 2000a). This included most of the Los Alamos National Laboratory and all of the Laboratory areas west of TA-18. To the west, north and south, the region of interest extends to the crest of the Sierra de los Valles and the eastern portion of the Valles Caldera National Preserve, the northern extent of the Los Alamos townsite, and Frijoles Canyon, respectively. The typical vegetation in this area consists of piñon-juniper woodlands, ponderosa pine forests, mixed conifer forests, aspen forests and grasslands. Occasional barren areas, shrublands and spruce-fir forests can also be found in the study region. Numerous developed areas, including the Los Alamos townsite and technical areas at LANL are also interspersed throughout the study region.

Lightning Strike Densities and Intensities

Data on the locations of lightning strikes in the eastern portions of the Jemez Mountains and the relative strike intensities of these strikes was provided by Dave Smith (ISR-2) for the year 1998 (Balice et al. 2002b, Balice and Koch 2004). Lightning strikes that were less than 100 kiloamps in intensity were removed from the dataset. Lightning strikes that were located outside of a test region were also removed from the data set. The 131 remaining lightning strike locations and their relative intensities were analyzed in ArcView. From these point locations, a map of densities by relative strike intensities was created and scaled from 0-1, with 1 representing the greatest combined strike density and intensity. The cell-based output of scaled values represents the relative tendencies that fires would be ignited within the polygons.

Modeled Fire Polygons

To assess the potential for fires to burn within each ArcView cell, wildfires were simulated from each lightning strike location using scenarios that reflected conditions in the Los Alamos region for the 1999 time period (n = 57) and the 2002 time period (n = 49), respectively. FARSITE was used as the modeling software (Finney 1998). FARSITE had previously been parameterized with locally collected data representing the fuels and fire hazards of the Los Alamos region (Balice et al. 2000a, Balice and Koch 2004). The parameterized fire behavior modeling system had also been validated against the burn histories of known fires (Balice et al. 2002a, Balice and Koch 2004).

The databases representing the 1999 time period were derived from vegetation and fuels conditions that were present in the Los Alamos region before the Cerro Grande Fire, before the initiation of major thinning and fire hazard reduction activities, and before the initiation of drought induced mortality (e.g. Balice et al. 1999, 2000b). All other conditions for fire behavior simulations were assumed to be that which existed immediately before or during the Cerro Grande Fire (Balice et al. 1997, Balice 1998, Balice et al. 2000a, Balice and Koch 2004). The databases representing the 2002 time period incorporated changes that had occurred as a result of the Cerro Grande Fire, large-scale forest thinning activities, and tree mortality.

Each simulation produced a polygon representing the potential area burned by a wildfire. These multiple theme layers or polygons were then superimposed in the GIS and the total number of fire polygons that occurred in each cell were summed. For both the 1999 time period and the 2002 time period, the greatest number of simulated fires in any given cell was 11. Cell values were then scaled from 0-1 based on these values with 1 representing those cells where 11 simulated fires occurred. The final scaled values represent the relative tendency of a fire to burn through a cell under the conditions of the simulation. Those cells with more fires were assumed to be at greater risk of a fire actually burning through that cell.

Fuels Conditions

We used the fuel model concept (Anderson 1982), canopy heights, and percent canopy cover to model the fuel conditions at each ArcView cell. Values for these parameters were established from previous field sampling that had been conducted throughout the Los Alamos region from 1997 through 2004 (Balice et al. 1999, 2000b). The fuel models were ranked by their relative abilities to support more intense fires. It was assumed that Fuel Model 13 would support the most intense fires. With this assumption, Fuel Model 13 was set equal to one and all other fuel models were ranked accordingly from zero to one. Similarly, 100 feet was assumed to be the maximum canopy height and all other canopy heights were ranked proportionally to this maximum value and scaled from zero to one. For canopy cover, one hundred percent cover was set as the maximum possible and the actual percent canopy cover values were rated proportionately between zero and one.

We used previously developed land cover classification systems for assignment of fuel model, canopy heights, and percent canopy cover values to each land cover class. This was done for conditions that were typical of the 1999 time period (Balice et al. 1997, Balice 1998) and for the 2002 time period (McKown et al. 2001). Then we applied these scaled class assignments to ArcView versions of land cover maps that had been developed before the Cerro Grande Fire (Koch et al. 1997) and after the Cerro Grande Fire (McKown et al. 2001).

Model Development

The five data layers of lightning, modeled fires, and fuel conditions, for each time period, were mathematically combined in the GIS to assess spatial trends of fire risk across the study region. Equal weight was given to each of these three major risk groups, according to the following relationship.

{Density of lightning strikes by their relative intensity + relative number of simulated fires + [relative canopy height + relative percent canopy cover + relative fuel model]/3}/3

Finally, the values for these calculated fire risks were scaled from zero to one. The analysis was repeated for conditions that existed in approximately 1999. This was before the burning of the Cerro Grande Fire, before extensive thinning was initiated, before rehabilitation treatments were applied to the forests of the region, and before the onset of major mortality events. Then the process was repeated for the 2002 conditions, which are after the Cerro Grande Fire, after the thinning of approximately 7000 additional acres, and after the onset of tree mortality.

Model Results

The results indicate that the fire risks within the study region are not homogeneous through space and time. With regard to time, the relative wildfire risks are seen to decrease from the 1999 time period (Figure 4-18) to the 2002 time period (Figure 4-19). The greatest amount of decrease in the wildfire risk appears to have taken place in the mountainous regions on the western boundary of LANL and further to the west, and in the mesa and canyon region of the western and central portion of LANL.

Spatial variations in wildfire risk for the 2002 time period show a general decrease in risk from the mountainous regions in the west to the lower elevations in the eastern portion of the study region (Figure 2). A general ranking of the specific areas for their relative risk is also possible.

First, the greatest fire risk occurs along the Pajarito Ridge from Highway 501 to the Pajarito Ski Area.

Second, the next greatest fire risk occurs in the southwest corner of LANL, adjacent to the Back Gate.

Third, the intervening areas along Highway 501 and the western boundary of LANL are also relatively high in fire risks.

Fourth, portions of the mesa-canyon areas between TA-40 and TA-21 are relatively high in fire risks. This is particularly true for the north-facing slopes of the canyons, although some of the other topographic positions in this area resulted in lower levels of fire risks.

Fifth, the remaining portions of LANL and its immediate surroundings are relatively less at risk from wildfires.

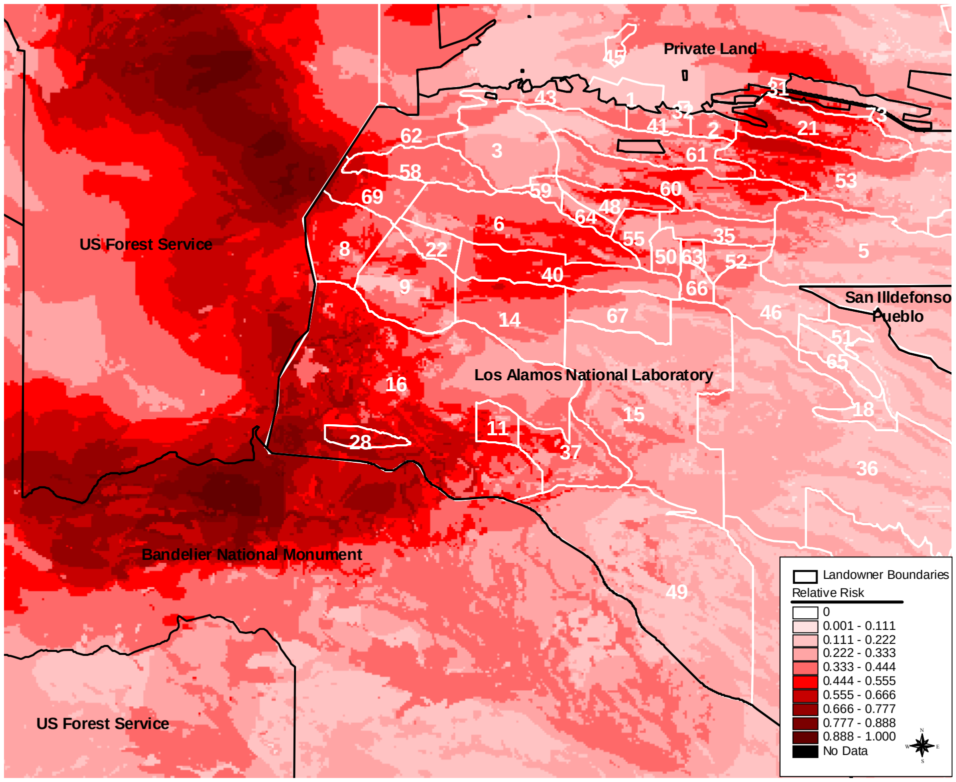

Figure 4-18. Relative risk to wildfire in the Los Alamos region (1999).

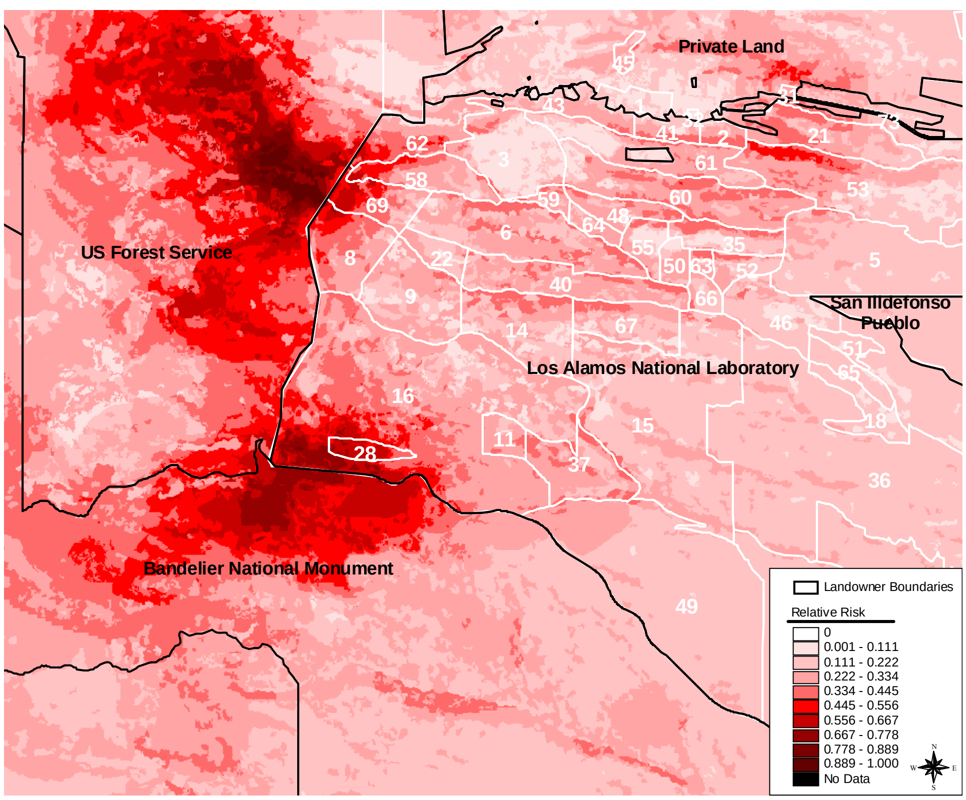

Figure 4-19. Relative risk to wildfire in the Los Alamos region (2002).

Current Wildfire Hazard Conditions

Changes to the fuels and fire hazard conditions in the past five years

The fuels and fire hazard conditions that currently occur in the Los Alamos region are not the same as those that existed in the late 1990s. This is reflected in the most credible wildfire scenario that would be expected in the 2004 time period, which is considerably different from would be expected before 2000. In the wildfire scenario that was reported in the SWEIS (SWEIS reference) for the late 1990s, fuels were heavy and continuous throughout most of the mixed conifer forests of the Sierra de los Valles and extended eastward to the ponderosa pine forests on most of the western portions of LANL property. As ponderosa pine forests transitioned to piñon-juniper woodlands toward the eastern half of LANL, the canopy heights and the total fuel loads were reduced somewhat but maintained their continuous nature of their overstory cover. These heavy and continuous fuels, especially in the mountainous environments, coupled with the southwest-to-northeast wind patterns that are typically prevalent during the fire season, suggested a general wildfire scenario that was validated by the Dome Fire and by the Cerro Grande Fire (Balice et al. 1999, SWEIS reference).

In the general wildfire scenario of the 1990s, fire would be ignited by lightning or by humans in the mountains during high to extreme fire danger levels (Balice et al. 1999, SWEIS reference). A small fire of this type would burn lightly for a day or two until the combination of temperatures, humidities and winds worsen to the point that the fire extends from the ground surface through the fuel ladders into the forest overstory. At this time, the winds would carry the fire through the tree crowns from the mountains in a northeasterly direction toward LANL. The fire would continue to spread across LANL for up to ten days. During this time, all unprotected buildings and facilities in its path would be destroyed. Suppression of the fire would be impossible until the weather conditions moderated sufficiently to allow for the application of effective suppression measures.

Since the writing of the last SWEIS, several aspects of the wildfire conditions in the Los Alamos region have changed significantly. However, some aspects of the wildfire conditions in the region have not changed. For example, sources of ignitions and topographic conditions have not changed since the last SWEIS. During both time periods, fires would most likely be ignited by lightning or by humans. Moreover, ignitions would typically occur most prevalently in the mountainous environments to the west of LANL. Topographic conditions in the Los Alamos region have also not changed in the past five years. The mountainous environments to the west of LANL, and the canyon-mesa environments at LANL present difficulties in management and suppression of fires, and create safety and management issues related to transportation and movements across these topographic barriers. The patchwork of land management agencies in the Los Alamos region has also not changed in the past five years. This creates unique problems to wildfire hazard management that can only be resolved through strong interactions and collaborations among the individual agencies.

Some aspects of weather have changed since the last SWEIS, and some have not changed. The severe wildfire weather conditions tend to occur from mid April to early July, and these have not been altered in the past five years. Similarly, there is still a significantly strong tendency for intense winds to occur during this time period, and the direction of these winds tends to be from the southwest to the northeast. Moreover, the density of lightning strikes is high during the latter portions of the wildfire season, and this has not been altered since the writing of the last SWEIS. What has changed with respect to weather conditions since the time of the last SWEIS is related to temperature and precipitation patterns. The climate has grown significantly hotter and drier in the past five years. This is similar to the 1950's drought in that the precipitation levels are somewhat similar. However, this is in contrast to the 1950's drought in that the recent temperatures are significantly higher.

The levels of fuels in the Los Alamos region are the aspects of wildfire hazards that have been extensively changed since the last SWEIS. First the burning of the Cerro Grande Fire greatly reduced the fuels in approximately 42,000 acres of forested landscape at LANL and to the west of LANL. This is especially true in the severely burned areas where reestablishment of fuels has been limited to regrowth from sprouting shrubs and from seeded grasses. In contrast, regrowth of vegetation in the lightly burned and in the moderately burned sections of the Cerro Grande Fire have resulted in very little net change in the levels of fuels in these areas. Moreover, reseeding with grasses in the severely burned areas of the Cerro Grande Fire, along with other rehabilitation techniques, have resulted in major changes to the post-fire fuel conditions. Immediately after the fire, severely burned forests were essentially unburnable. However, with the establishment of seeded grasses and with the addition of dead trees that have fallen to the ground, many of these areas can now support a surface fire.

In addition to past fires, fire hazard reduction activities in forests and adjacent to facilities at LANL have altered the fuel structures. Before 1997, the forests and woodlands at LANL were essentially unmanaged and severely overstocked with trees and shrubs. The result was a situation that was dangerously high in fuels and fire hazards throughout most of the forests and woodlands at LANL. Between 1997 and 1999, approximately 800 acres of ponderosa pine forest on the western perimeter of LANL and near critical facilities were thinned from below. These fire hazard reduction activities increased dramatically after the Cerro Grande Fire. Between 2001 and 2003, approximately 6000 acres of ponderosa pine forests and piñon-juniper woodlands were thinned. These fire hazard reduction activities focused on creating defensible space around critical buildings and facilities, underneath powerlines and along transportation corridors, and in the surrounding forests and woodlands.

General Wildfire Scenarios

The results of the wildfire risk analysis that incorporates altered fuel conditions that have occurred within the past five years suggest the heightened likelihood of some general wildfire scenarios to occur, relative to other scenarios at LANL. Wildfires that occur today would still be ignited by lightning or by humans. These fires would tend to be ignited in the mountainous regions to the west of LANL, but fires could also be started on LANL. High winds during the fire season, from mid-April to early July, would still tend to carry actively burning wildfires from the southwest to the northeast. Early suppression of wildfires is important to the successful protection of buildings and facilities. Once these fires enter the canopy of forests, they are difficult to control until weathers conditions moderate.

The major impact of fire hazard reduction activities that have occurred in recent years at LANL is that fires would tend to remain on the ground surface, and would also tend more readily to drop from the canopies back to the ground surface. This, in combination with the creation of defensible space adjacent to LANL facilities, would facilitate management and suppression with the result that buildings and facilities would be easier to protect.

With the greatest modeled risk from wildfires occurring along the Pajarito Ridge and along the margins of the Frijoles Canyon, the risk to LANL would still largely arise from the west and the southwest. Thus, TAs 16, 28, 58, 62, and 69 would be at the greatest risk from wildfires. With the second greatest risk from wildfires occurring along the western borders of LANL, TAs 8 and 9, and portions of TA 16 would be at risk from wildfires arising in this area. Secondarily, TAs 3, 6, 11, 14, 22, 37, 40, and 59 would also be at risk from fires arising along the western boundary at LANL. In all of these cases, fires would enter the canyon environments on LANL property and this would create difficulties for control and management, with an increase in danger to adjacent buildings and facilities.

Fires that originate from within the boundaries of LANL would likely be ignited at firing sites at central locations of the site. These would primarily impact TAs 14, 15, 40, and 67. Numerous canyons dissect this area, and this would add to the difficulties of suppressing these fires as they spread across adjacent mesas from canyon to canyon. In addition, the canyon environments contain conditions, including topographic barriers, heavy fuel loads on north-facing aspects, and modified canyon wind patterns, that would complicate the direction of spread of these wildfires. The result is that fires would tend to spread readily in down-canyon and up-canyon directions, as well as traveling across mesas or via airborne embers to adjacent canyons.

Wildfire Frequency

The probability component of the risk equation reported in the 1999 SWEIS only considered the advancement of a large wildfire to the LANL boundary, and then assumed that the fire necessarily continued on a path through LANL, reaching and igniting LANL buildings and causing a radiological release.

The frequency of a large fire encroaching on LANL (1 in 10 years) was estimated in 1999 as the joint probability of ignition in the adjacent forests, high to extreme fire danger, failure to promptly extinguish the fire, and fire-favorable weather. The frequency estimate for ignition in the adjacent forests was based on a 21-year period (1976–1996) and it probably has not changed appreciably in the eight years that have passed. Fire ignitions have continued to occur in adjacent forests. Periods of high to extreme fire danger have continued to occur frequently during the summer months, and fire-favorable conditions have continued as well. The estimated likelihood of a fire reaching a LANL boundary did not include the likelihood of a fire advancing across LANL to encroach on buildings containing (appreciable amounts of) radiological materials, the likelihood of buildings igniting, and the likelihood of a release occurring once buildings are assumed to ignite. The likelihood of a fire encroaching on a building containing radioactive material is dependent on, among other factors, fuel load and continuity of fuel leading up to the space surrounding the buildings. The likelihood of a nuclear facility igniting is dependent on the joint probability of fuel load indices for fuel adjacent to buildings, slope on which the adjacent fuel loads exist, and the combustibility of buildings. This factor was quantified in 1999 and has been updated recently. The likelihood of a release would be related to the damage ratio (likelihood that the material at risk [MAR] was actually impacted by the accident) and the leakpath factor (likelihood that confinement, if any, is breached). While the probability of a large fire encroaching on LANL remains moderate to high, depending on location, probably still on the order of once per 10 years (0.1/yr) or more frequent, the probability of a LANL facility containing a radiological inventory being ignited by a wildfire and releasing some or all of the inventory has been reduced somewhat by the "defensible space" thinning and by the reductions in fuel by the Cerro Grande Fire.

Since the probability estimate for the SWEIS stopped at the LANL boundary, there is no value for the probability of the fire advancing across the Laboratory to nuclear facilities, igniting buildings, and causing a release. Without this value, an assessment of how this probability might have changed cannot be made. Gonzales et al. (2004) conservatively estimated that there is a 50 percent chance that the three factors just mentioned occur, then interact this probability value (0.5) with the assumed probability for a wildfire reaching the Laboratory boundary (0.1). This results in a conservative estimate of the probability for a release to occur resulting from a wildfire and resulting in radiological exposures of 0.05. This interprets to a 5–in–100–year chance of occurrence, which is about equal to once in 20 years, or 5×10^{-2}/yr. This estimate is in agreement with the draft Documented Safety Analysis for Area G. The fact that the Cerro Grande Fire did not result in the ignition of a LANL nuclear facility is evidence that thinning works and preventative maintenance will keep key facilities safer from wildfire than in the past.

Conditions that Favor Wildfire. A wildfire scenario remains in view of the present density and structure of fuel surrounding and within LANL and town site, as well as the occurrence of the four major fires and the behavior of the Cerro Grande Fire, in particular, in the past 21 years. Some protection is afforded LANL by the fire scars of the previous Dome and La Mesa fires, but there is ample fuel continuity remaining to bring an off-site wildfire to the southwest and western boundary of LANL. The current analysis takes into effect the environmental changes and fuel reduction mitigation that have taken place due to the Cerro Grande Fire.

The probability of high to extreme fire danger is determined by the frequency of meteorological conditions of low precipitation for two to three weeks preceding; low relative humidity for three consecutive days; and high temperatures. When the high to extreme fire danger exists in New Mexico in May through July, there are certain to be multiple ignition sources (from lightning and human causes). There is a high frequency of lightning and lightning-caused fires in the Jemez Mountains that we used in the analysis of fire risk. The frequency of a large fire encroaching on LANL is estimated as the joint probability of ignition in the adjacent forests, high to extreme fire danger, failure to promptly extinguish the fire, and a three-day spell of southwesterly to westerly wind over 11 miles per hour (5 meters per second), low humidity, and no precipitation.

Determining the Joint Probability of Occurrence of Weather and Fire Danger Conditions. The probability of occurrence of the weather and fire conditions needed for this scenario were determined using wind data and fire danger data for April through June of 1980 through 1998. These months were chosen on the general knowledge that fire risk and frequency are greater in those months. Note that site-wide fires also are possible, but less probable, in other months besides April through June; thus, the annual frequency of fire–favorable weather is somewhat greater than quantified for April through June.

In general, wind direction at any location varies and does not persist in a single direction for a few days. LANL is no exception. At LANL, persistent daytime winds are interrupted for a few hours when nighttime drainage winds occur. However, granting short interludes of drainage flow, there are many instances in which a dominant direction, such as southwesterly, westerly, northerly, etc., can exist for three days without precipitation.

For determining fire-favorable weather frequency, 15-minute average wind data from the 11.5-meter level of the TA-59 and TA-6 meteorological towers were used. For each day in April through June of 1980 through 1998, an average afternoon wind was calculated from the 15-minute data in order to eliminate local diurnal changes in wind speed and direction that are common to the area. Average afternoon wind speeds of greater than 10 miles (16 kilometers) per hour were chosen to represent strong winds. While this threshold may seem low for a strong wind, wind gusts of over 30 miles (48 kilometers) per hour and sometimes over 40 miles (64 kilometers) per hour were seen on most days when the afternoon average wind was above 10 miles (16 kilometers) per hour. The wind direction thresholds were set at 180° (southerly, meaning from the south) through 292.5° (west–northwesterly). Three-day periods from the same data set were then examined to determine if the ERC, wind speed, and wind direction fell above (or within) set thresholds. All three-day periods falling within the set limits were then extracted.

The results show that it is not uncommon to see a three-day period exhibiting the selected characteristics in a given year, and that when such a three-day period appears, it is likely that more than one such period will occur within that year. Specifically, the resulting statistics show that of the 19 years examined, five of them displayed at least one three-day period within the limits, or one every four years. Of these five years, four of them had an average of 3.6, three-day periods. (An instance of five days in a row is counted as three, three-day periods.) This comes to 15.4 instances in 19 springs.

In summary, fire-favorable weather conditions occur on the order of once per year; the ignition sources are prevalent; and fire fighting is hampered by limited accessibility. Therefore, this analysis concludes that a major fire moving up to the edge of LANL is not only credible but likely, probably on the order of 0.10 per year. This frequency is the same for all alternatives.

General Scenario Description

The SWEIS wildlife scenario used in 1999 predicted a path and outcome very similar to the Cerro Grande Fire. Due to the extent and size of the Cerro Grande Fire and subsequent fire mitigation actions completed since the last SWEIS, a new fire risk analysis was completed in order to incorporate these environmental changes and lessons learned from the Cerro Grande Fire.

The scenario fire begins mid day in the late April through June time frame, at a time of high or extreme fire danger, and is not extinguished in the first hour. The initial location is in an area populated with heavy ponderosa pine fuels that are found between roughly 6,500 and 8,200 feet (1,980 and 2,500 meters) elevation. As the fire grows, local jurisdictions respond to the fire, but are not effective due to remoteness, travel time, lack of road access, fire behavior, etc. Resources from more distant jurisdictions are alerted, but cannot arrive in a short time because of distance, limited roads, and opposing evacuation traffic. It proves impossible to put out the fire with the available resources and existing forest access before it enters the Laboratory. Unlike the Water Canyon fire (greater than 3,000 acres in June 1954), La Mesa Fire (15,300 acres in June 1977), Dome Fire (16,500 acres April 25 to May 5, 1996), Oso Fire (greater than 5,000 acres in June 1998), but very much like the Cerro Grande Fire in May 2000 (43,000 acres), the weather does not change in time to prevent the fire from sweeping across the western part of LANL and into the town site.

This specific analysis assumes a common meteorological situation that favors the fire. In this scenario, the fire begins about 10:00 a.m., reaches a size of 1,000 acres (400 ha) in three hours, and becomes a well-developed crown fire on a broad fire front containing 6,000 acres (2,400 ha) in the second day. Like the La Mesa Fire (Foxx 1981), at times it advances at a rate of 38 chains[5] per hour (0.44 miles [0.7 kilometers]). It starts spot fires 0.5 to 1.25 miles (0.8 to 0.2 kilometers) in advance, aided by prevailing southwest winds of 20 miles per hour and low daytime humidity. It easily jumps canyons and existing fuel break lines around LANL and the townsite, similar to the Cerro Grande Fire.

The daytime convection column reaches to 20 or 25,000 feet (6 to 7,600 meters). In the Oso Fire, the fire burned as actively at night as in the day, with flame heights on the order of 100 feet (30 meters). In this scenario, in order to have a conservative (low height) plume rise, at night the temperature drops and the relative humidity increases. The nighttime plume rise is then about 2,000 feet (600 meters). The fire regains its intensity at 10:00 a.m. each day. Following fire passage, the smoldering remains of vegetation and structures emit smoke and contaminants at the surface level. The Cerro Grande Fire had

[5] 80 chains = 1 mile (1.6 kilometers).

a plume that reached XX feet and followed a similar diurnal pattern as described above which is an important factor in the dispersion of potential contaminants.

The fire reaches State Road 4 and State Road 501, the southwest edge of LANL, at noon on the second day. Protective actions are already underway by LANL, such as relocating some radionuclides and barricading some windows, and releasing nonessential personnel following existing emergency plans. The fuel break along these roads proves inadequate. At this point, the fire has progressed in areas where access is limited, hampering fire suppression activities due to concern for the safety of the firefighters. A control line is established at Pajarito Road and resources are concentrated there. Consequently, Pajarito Road is closed and not available for public evacuation. The fire burns forest to the west of and within LANL, but its eastern extent within LANL is constrained by piñon-juniper woodlands and defined by fuel continuity and density.

From the specific analysis we completed for fuel loads and predicition of fire risks, it is estimated the technical areas most at risk include TA-16, TA-8, TA-69, TA-58, TA-62, and TA-28. This differs slightly from the TA-37, TA-15, and TA-66 that were used in the previous wildfire scenario. Following the continuous fuel lines and steered somewhat by southwesterly winds, the fire enters and crosses Pajarito Canyon and Two Mile Canyon, and by 1:00 a.m. of the third day burns up to the Pajarito Road control line just west of TA-66.

Although it would be expected that the control line would contain most fires, in this conservative accident scenario an adverse meteorological situation exists where the wind picks up to 54 mph as it did in the Cerro Grande Fire that caused the fire to cross State Road 501. On the LANL site, the fire is assumed to consume all combustible structures in its path that are evaluated as having moderate or higher risk from wildfire under the LANL Building Appraisal Program. The fire also exposes the surface of contaminated earth previously protected by vegetation in the firing sites and canyons. This text separately discusses the exposures from fire burning the soil cover and suspending the underlying soil and the exposures from burning structures. Exposures from canyon fires are calculated individually, thus enabling the assessment of fires of lesser extent than the site-wide fire.

This accident analysis does not consider off-site damage directly caused by the flames and smoke from LANL fires, and does not address the direct effects of the fire on the town site. It is recognized that there is continuous fuel joining the National Forest and the residential areas, and that fires in the canyons at LANL also could propagate into the town site.

Dispersion Meteorology and Soil Resuspension Following the Fire

Only certain meteorological conditions are compatible with such a large wildfire. The meteorology of the month of Junewas selected for modeling the accident sequence because any day in June was equally as likely for the wildfire probability and subsequent doses. These conditions are regarded as conservative, in that in this period the wind is generally from LANL toward the nearby Los Alamos townsite and would result in higher total population doses. Santa Fe is much more distant and concentrations would therefore be lower. Under northwesterly winds, exposures in Santa Fe (had the alternate scenario been used) would surely be less than exposures to the Los Alamos town site from the southwesterly winds in this scenario.

Exposures at 100 meters distance from burning exposed soils are calculated using C stability and 6.6 feet (2 meters) per second wind speed. These exposures can be regarded as MEI exposures, although it is unlikely that anyone other than firefighters will be present at that distance. Exposures at 3,300 feet (1,000 meters) are also reported. In canyons, where elongated area sources exist, the calculation provides integrated exposure at 330 and 3,300 feet (100 and 1,000 meters) downwind of the long axis of the area, thus maximizing the exposure. This situation could occur with winds turning to follow the canyon profile, such as under drainage wind conditions. Thus, the calculation applies to plumes that are destined for any receptor within and beyond the contaminated sections of the canyons.

The resuspension factor for soil of 1×10^{-5} meters^{-1} was applied to the mean areal soil concentration in the top layer of the contaminated sites, with the resultant radiological exposures shown in Table G.5.4.4.–1 of the SWEIS in 1999 (DOE 1999). These are the estimated exposures that could occur if all the contamination in the top soil layer were right at the surface, if there were no precipitation or soil cover, if there were wind, and if the receptor were standing above a spot that represented the average soil contamination for the contaminated portion of the site or canyon. These estimates are limited by the theoretical and experimental problems with resuspension factors.

Exposures from Burning Vegetation and Suspended Soil

Suspended ash from vegetation and suspended soil contributed about 7 percent (~50 person-rem) of the total population radiological dose reported in the SWEIS (DOE 1999). Concentrations of radionuclides in vegetation at LANL were largely unavailable when the SWEIS analyses were performed in the late 1990s. Given plant/soil uptake coefficients for some radionuclides in the published literature, concentrations of radionuclides in plants were largely based on concentrations in soil. Since the SWEIS, data have been compiled on concentrations of radionuclides in vegetation at LANL (Gonzales et al. In prep., Gonzales et al. 2000). Comparing data used in the SWEIS with other, more recent, data on concentrations of radionuclides in plants, perspective can be gained on the change in vegetation as a radiation source term for wildfire. One concentration used in the SWEIS was 320 μg uranium per g of dry vegetation (μg/g-dry) collected in 1975 (Miera et al. 1980), which was from a sample collected where uranium concentrations in surface soils were 20 to 3,500 times background levels. This compares to maximum concentrations of 0.65 μg/g-dry in the bark of shrubs that were rooted in transuranic waste material (Wenzel et al. 1987), 0.073[6] μg/g-dry in understory vegetation

[6] Computed using ash/dry weight ratio of 0.1 from Fresquez and Ferenbaugh (1999); [2]Computed using ash/dry weight ratio of 0.08 from Fresquez and Ferenbaugh (1999); [3]Computed by converting radioisotopic data to uranium mass data and using ash/dry weight ratio of 0.029 for bark from Gonzales et al. (2003).

collected at one of 12 LANL Environmental Surveillance Program onsite locations in 1998 (Gonzales et al. 2000), 0.066[2] µg/g-dry in overstory vegetation at one of the same 12 locations and same year, 0.05[2] µg/g-dry in pine needles from the TA-16 Weapons Engineering Tritium Facility (WETF) in 1985 (Fresquez and Ennis 1995), 0.72[2] µg/g-dry in overstory vegetation at the Dual-Axis Radiographic Hydronamic Test (DARHT) Facility in 2002 (Nyhan et al. 2003); and 1.5[3] µg/g-dry in piñon tree bark at a firing site in 2001 (Gonzales et al. 2003). Other than for total uranium, the SWEIS does not identify the concentrations used in source term calculations. Ignoring the other radionuclides, and based on the comparison of the total uranium concentration assumed in the SWEIS with other, more recent data on concentrations of total uranium in plants, the source term from vegetation used in the SWEIS is still bounding of any that would be calculated using other, more recent, concentration data. The predicted MEI dose from vegetation and soil in a site-wide fire remains less than one mrem. Although the Cerro Grande Fire burned only about 7,500 acres (3,040 ha) of forest within LANL, the estimated inhalation dose based on measurements by Kraig et al. (2001) supports our hypothesis that vegetation (and soil) contributes very little radiation dose. Thus, it is still concluded that the dose from the environment that includes vegetation and soil could be increased by a factor of three or four to account for the contamination in the vegetation above ground that becomes airborne.

Beryllium Exposures. As reported in the previous 1999 SWEIS, the eight-hour, time-weighted average for worker exposure to beryllium and its compounds is 0.002 milligram per cubic meter. The acceptable maximum peak for a maximum duration of 30 minutes is 0.025 milligram per cubic meter (NIOSH 1997). These are not thresholds that will protect all people but are useful for comparison to the concentrations from burning over the PHERMEX site. The beryllium concentrations calculated in SWESIS in 1999 (DOE) were 0.0008 milligrams per cubic meter, much less than these thresholds.

Doses Downwind from Firing Sites and Canyon Fires. The doses at 330 feet and 3,300 feet (100 meters and 1,000 meters) downwind from fires over individual firing sites and canyons are provided in Table X. The doses are based on assumptions that the receptor is exposed at those locations for the full time of the plume passage through the whole canyon. It is assumed that the fire front advances at about 0.7 foot per second (0.2 meter per second) in the canyon timber. At this speed, the fire would take 13.5 hours to burn the contaminated area of Pueblo Canyon, 8.9 hours for Los Alamos Canyon, 4.8 hours for Mortandad Canyon, and 1.7 hours for DP Canyon, but only 0.42 hours for Potrillo Canyon and 20 minutes for the EF firing site.

The largest doses from the vegetation fires are at 330 feet (100 meters) downwind of the firing sites, EF (0.21 millirem), and PHERMEX (0.18 millirem). The 5×10^{-7} LCF per millirem risk factor can be applied to the soil doses, to receive assurance that there are no effects expected from the radiological exposures from burning vegetation and ground cover over soils. If the total area of contamination were small, such as for the firing sites and Acid Canyon, then the same values would apply for any wind direction. For the other canyons, however, the exposure is integrated for the entire length of the canyon fire, and so the exposure to the side of the canyon would be less. Because the canyons are parallel, a receptor cannot be directly downwind from more than one canyon, and hence, the exposures from multiple canyons should not be added to obtain a new MEI dose. In order for a receptor to receive exposure from multiple canyons, the wind would have to be transverse to them, as it would be in this site-wide fire with the southwesterly winds. However, if the wind were transverse to multiple canyon fires, the orientation of the canyons would assure that the dose from each would be much less than those for 100 meters distance. One would conclude that, no matter the orientation of the wind, sources, and receptors, the MEI dose from site-wide vegetation fires must be less than 1 millirem.

MACCS2 Code (MACCS2 Methods /Input Discussion)

The MACCS2 computer code models the consequences of an accident that releases a plume of radioactive materials to the atmosphere. Should such an accident occur, the radioactive aerosols and/or gases in the plume would be transported by the prevailing wind while dispersing horizontally and vertically in the atmosphere. MACCS 2 uses a straight-line Gaussian plume model and the source term data input by the user to model the atmospheric dispersion and deposition of radionuclides released from facilities. Plume rise, dry deposition, and precipitation scavenging (below cloud washout) of aerosols, and resuspension of particulate matter that has deposited from the plume is explicitly modeled. The chronic exposure model calculates the resulting doses for all inhabitants living in the area. In the intermediate and long-term phases, the inhalation shielding factor for normal activity used in the dose calculations. Decay of radionuclides to daughter products is accounted for.

Delayed Emissions Following Building Fire

The smoke or emissions from building remains following the passage of the fire were not modeled. The entrainment of surrounding air by strong fires will capture much of the delayed emissions that occur soon after passage of the fire front, converting them into an elevated release as part of the main fire. However, in the LANL landscape there may not be an intense, continuous fire front; hence, some of the contaminants in the surface emissions may travel and disperse at low elevations. The relative amount of the contaminant that is and is not entrained into the main fire plume cannot be evaluated.

Evaluation of Building Fires

This section analyzes potential individual and population radiological and chemical exposures from buildings burning as a result of wildfire initiation. Each building was first screened for its vulnerability to wildfire. Building vulnerabilities were updated in 2004 for this analysis. The building vulnerabilities at TA-54 and the WETF were validated in the field in order to incorporate any of the many fuel load mitigations that occurred in the recent past. Those buildings that were evaluated as vulnerable were then screened for chemical and radiological inventories that were updated in May 2004.

Criteria and Process for Determining Building Vulnerability to Wildfire. The evaluation of vulnerability to wildfire is on the basis of building construction, materials and exposure, slope, and the quantity and structure of external fuel as described below. The total wildland fire vulnerability of over 500 buildings is frequently updated by the LANL Fire Protection Group. The vulnerability is the product of the structure hazard times the sum of the fuel hazard and slope hazard, as defined below.

The structure hazard rating considers the combustibility of the exterior structure:

- Underground—0
- Noncombustible exterior (windowless)—1
- Noncombustible (window exposures)—2
- Combustible exterior—3

Fuel Hazard. This is the product of two components, fuel loading and distance factor. The fuel loading is taken as zero for short grass and asphalt, and for other conditions is determined by the fuel model type, as described in *Aids to Determining Fuel Models For Estimating Fire Behavior* (NWCGP 1982).

The distance factor (DF) expresses the distance of the fuel from the structure.

- DF—0, distance is greater than 4 times the height of the fuel.
- DF—1, distance is greater than 2 times the height of the fuel.
- DF—2, distance is the height of the fuel.
- DF—3, distance is less than 1/2 the height of the fuel.

Slope Hazard. Exposing slopes are rated as follows:

Slope Hazard	Slope
5	Mild (0 to 5 percent)
10	Moderate (6 to 20 percent)
15	Steep (21 to 40 percent)
20	Extreme (41 percent and greater)

The total vulnerability is then calculated as the product of the structure hazard times the sum of the fuel hazard and slope hazard. This number is converted to a word description as follows:

Numerical rating	Vulnerability
0 to 5	None
6 to 49	Very Low
50 to 79	Low
80 to 149	Moderate
150 to 259	High
260 and above	Extreme

Note that this method does not estimate the probability that a wildfire will consume the building. Rather, it quantifies the relative vulnerability of a building to wildfire on the basis of the conditions immediately surrounding a building and the construction type for each building. Table 4.12-1 lists the buildings that have a moderate or higher risk. Other buildings have no significant amounts of MAR and were not evaluated for this accident analysis.

Table 4.12-1. Evaluation of Vulnerability of LANL Buildings to Wildfire.

Technical Area	Building	Wildfire Risk	Nuclear Facility	Hazards	Const. Type	Comments
03	0016/0208	Moderate	No	Rad	2	
03	0040	Moderate	Yes	Rad		
03	0066/0451	High	No	Rad,Chem	2	
03	0169	Moderate	No	Rad		
08	0023	High	Yes	Rad		
21	0155	Moderate	No	Rad		
21	0209	Extreme	Yes	Rad,Chem	2	
36	0001	Moderate	No	Rad		
41	0001/0004	Moderate	No	Rad		
43	0001	Extreme	No	Rad,Chem	2	
54	0033	High	Yes	Rad		
54	0048	Moderate	Yes	Rad		
54	0049	Moderate	Yes	Rad		
54	0153	Moderate	Yes	Rad	3	
54	0215**	Moderate	No	Rad	3	
54	0224**	Moderate	No	Rad	3	
54	0226	Moderate	Yes	Rad	3	
54	0229	Moderate	Yes	Rad	3	
54	0230	Moderate	Yes	Rad	3	
54	0231	Moderate	Yes	Rad	3	
54	0232	Moderate	Yes	Rad	3	

** Only two buildings that have not been verified as being hazards. Building 0215 is in Area L. Last info showed liquid low-level mixed waste storage. Building 0224 is in Area G. Last info showed low-level mixed waste storage. Have made another inquiry. (Source: T. Rudell, PS-4, June 10, 2004).

Since 1999 when the results of this vulnerability assessment were first reported, a reduction in vulnerability from 51 to 21 buildings classified as moderate or high has been achieved, largely as the results of clearing or thinning the forested areas (defensible space) immediately adjacent to the buildings. More importantly, buildings of concern that are located in the wildfire high-risk area such as WETF in TA-16, have been downgraded to low vulnerability.

The vulnerability of nuclear facilities to wildfire was quantified in 1999 and has been updated recently (LANL/FWO 2003). The fuel hazard, slope hazard, and structure hazard of many facilities throughout LANL were quantified and integrated to estimate the wildfire risk of each building. The ratings were “None,” “Very Low,” “Low,” “Moderate,” “High,” and “Extreme.” The SWEIS analysis assumed that buildings with a “Moderate,” “High,” or “Extreme” wildfire vulnerability burned and released their entire content of radiological inventories. A reduction in the wildfire vulnerability of key buildings through reductions in the fuel load around the building could substantially reduce the likelihood of the building igniting and could also reduce the release of radiological materials by lowering the intensity of fire. Since 1999, however, the wildfire vulnerability of only two (Buildings 229 and 230) of several key storage domes at the Transuranic Waste Inspectable Storage Project (TWISP) at TA-54 has been lowered from High to Moderate. The WETF wildfire vulnerability has been reduced from Moderate to Very Low.

Current sources of information were consulted for data on the relative quantities of radiological material at risk of potentially being impacted and released in an accident situation. By definition only “hazard category –1 and –2 (HC-1 and –2)”, nuclear facilities can have off-site impacts from their radiological material inventories when considered on an individual basis. However, since site-wide accidents can involve releases from several facilities, we also considered HC-3 nuclear facilities and non-nuclear (radiological) facilities. So, nuclear facilities that rated Extreme, High or Moderate vulnerability from Table 1 and were within relatively high wildfire risk areas were selected for quantitative contaminant risk assessment. The only two facilities having all three of these properties were building 205 (WETF) and building 411 in TA-16 whose locations are shown in Figure 2.

Public Exposures from Burning Buildings.

The exposures assume no sheltering inside buildings or vehicles and that no protective actions are taken by the individual at those locations. Although Area G is not in the direct path of the fire, it borders a canyon and could be susceptible to a canyon fire even in the absence of a site-wide fire. The results of 1999 SWEIS found that Area G contributed 75 percent of the person rem of the total population exposure. Therefore, it was again included in the wildfire analysis. Changes in inventory or MAR are listed in Table 4.12-2 for individual facilities that were include in the 1999 SWEIS Site-04 analysis.

Vulnerable buildings and the outdoors in the fire path were screened for their chemical inventories and updated for 2004. Six of the twelve facilities include in the SWEIS in 1999 eliminated their chemical inventories. Only TA-3-66 increased their inventory from 7.6 liters of hydrogen cyanide to 13.5 lbs of hydrogen cyanide. All other inventories stayed the same that were available for the analysis of the site-wide earthquake (sections G.5.4.1 and G.5.4.2 of the SWEIS 1999). For fire-vulnerable facilities, the earthquake chemical results in the SWEIS in 1999 are still acceptable for the site-wide fire and would not considered conservative due to the reduction of inventories.

Table 4.12-2. Summary Changes to Risk-Dominant Accidents in 1999 SWEIS (Expanded Operations Alternative).

Scenario	Facility	Description	ST (1999)	MAR (1999)	MAR (2004)	Integrated Population Exposure (person-rem) (1999)	Excess Fatal Cancers (1999)
SITE-04	TA-16-205		1×10^4	1,360 g tritium gas	1,000 g tritium oxide (based on NNSA memo)		0.34 overall Vol. I, p. 5-87
	TA-21-155	TSTA	None given in OSRs	200 g tritium oxide	TSTA now radiological		
	TA-21-209	TSFF	None given in OSRs	100 g tritium oxide	TSFF 100g tritium oxide (in approved OSRs from 9/23/99) 27 g tritium oxide awaiting approval		
	TA-54			0.16 Pu-239 PE-Ci initial release (elevated); 0.74 Pu-239 PE-Ci suspension release (ground level)			

The SWEIS uses representative meteorology for an entire year and presents a mean MEI. The representative meteorology includes winds blowing away from any receptor, and the full range of stabilities, weighted by frequency of occurrence. The wildfire meteorology would possibly result in the same dose to the MEI and population, as does the mean meteorology because it may be close to the annually typical stability and wind speed.

Population Exposures (MELCOR Accident Consequences Code System [MACCS] Results)

In the event of a wildfire approaching from the south, LANL would begin evacuation of the southern area of LANL as soon as it was determined that the fire posed a threat and proceed north with the evacuation. Personnel deemed essential to shutdown operations would remain until such actions were completed. Some emergency response personnel and security personnel would remain at all times in some areas. There are 10,200 LANL employees (including contractors), of which approximately 4,000 live outside of Los Alamos County and 6,200 within Los Alamos County. The 1999 SWEIS reported that the Main Hill Road 502 could evacuate 800 cars per hour, and the combination of the East Jemez and Pajarito roads could evacuate another 800 cars per hour.

In the Cerro Grande Fire, it was decide that if the fire jumped Los Alamos Canyon, then the entire town of Los Alamos would have to be evacuated. Shortly after noon on May 10th, the fire jumped Los Alamos Canyon, which was the last natural barrier before the townsite, and at 1:15 p.m. the County emergency personnel broadcast the directive for all of the people of Los Alamos to evacuate their homes immediately. Although some projections had indicated that it would take up to 12 hours to get all 12,000 residents of Los Alamos out the single road down the mountain, the entire town left within four hours, directed by the small police force. On that day, May 10, the fire burned over 15,500 acres (6,2702 ha) in nine hours—in other words, the Cerro Grande Fire consumed in nine hours the same amount of acreage that the 1996 Dome Fire consumed in nine days. By late afternoon the wind-whipped 200-foot wall of flame reached the western edge of town, and by 6:00 p.m. the first reports of loss of houses came in to the Emergency Operations Center.

In the aftermath of the Cerro Grande Fire, there was considerable interest in describing the potential radiological impacts of the fire itself and of the radionuclide of LANL origin that may have been dispersed during the fire. Kraig et al. (2001) completed radiological dose calculations based on air monitoring data that were collected by the LANL AIRNET system during the Cerro Grande Fire. The dose calculated was the committed effective dose equivalent (CEDE), which is the dose received during the 50 years following the inhalation of radionuclides into the body. Total dose calculated for the nine radionuclides was 0.2 mrem for people in Los Alamos in the 1999 SWEIS and exposure to natural radiological nuclides at Los Alamos is 360 mrem each year (DOE 1999).

Because the differing population density as a function of time cannot be predicted, the results of the MACCS calculations must be presented as exposures to the same populations and receptors as used in the other accident analyses. Under the conservative assumptions applied in this analysis, the collective population dose from the wildfire consuming buildings is estimated to be XXXXX. To this there may be added another 50 person-rem to capture the minor exposures from burning vegetation and from unidentified residual contamination in other buildings and vegetation. Most of this dose, about X percent, would come from the TA-54 Waste Management Complex. A population exposure of XX person-rem would be expected to result in 0.XX excess LCFs.

Effects on Workers

All workers in threatened areas would be evacuated prior to arrival of the fire front. Aircraft crashes with fatalities have occurred while dropping slurry on wildfires. Firefighters on the ground are at risk if they enter an area without an alternate escape route, and there have been historical fatalities from such events. However, because life safety is given first priority over protection of property at LANL, it is not likely that there will be worker fatalities. Some firefighters and other emergency personnel could have significant but transient effects from smoke inhalation.

Additional Environmental Effects

Firewater. Firewater (water used in fighting building fires) at nonnuclear facilities is captured by outdoor containment and temporary dikes erected for fire fighting. Firewater at nuclear facilities is captured by the drain system and is sent to TA-50 for processing. Conceivably, some radioactively contaminated water could reach the outdoor environment, but would be of such small volume that it would not leave the building environs. Resultant contaminated soil would be eroded, pending the return of vegetative cover. As with other contaminated soils, the environmental and human health threat from the new contamination would be assessed and mitigated.

Loss of Protective Cover. The charred plant remains following a severe wildfire are the only immediate visual consequences. The consequences of a wildfire are diverse, continuing through time and space, and frequently having significant changes in geomorphology and biological communities and processes. LANL is perhaps unique in potential consequences, because in addition to a rich presence of biological communities and cultural remains and resources, there exists soil-bearing legacy contaminants from historical operations.

Trees, grass and herbaceous cover, and forest litter are important features in stabilizing soils by (1) reducing the velocity and impact of falling raindrops; (2) reducing the velocity of runoff, thereby encouraging infiltration and discouraging its transport by water and wind; and (3) reducing runoff quantities. Loss of vegetative cover will create a setting that can have pronounced effects on flow dynamics, soil erosion, and sediment deposition. These changes also can have significant ramifications for plant and animal communities and cultural resources.

Runoff, Soil Erosion, and Sedimentation. It has been well established through studies around the world that runoff and sediment yields can dramatically increase following wildfires. Accompanying these physical changes are changes in the composition or quality of runoff water. At Los Alamos, these changes may be severe due to the steepness of the burned terrain and the high severity of the burn, creating water-shedding hydrophobic soils (BAER 2000). These higher runoff quantities will be discharged into the Rio Grande where they will contribute to the overall floodwater storage of Cochiti Lake. Modified hydrologic conditions likely will cause some watercourses that have only rarely had sufficient flows to reach the Rio Grande to increase their frequency of discharge.

Commensurate with higher runoff quantities and velocities will be an increase in soil erosion. Sheetflow will begin transporting soil suspended by rainfall droplet impact. Both rills and gullies will form on sloping ground surfaces with the first significant rainfall event. Higher channel volumes and velocities will promote both downward and lateral scouring of channels in the steeper portions of the watershed and sediment deposition in the lower portions. (These conditions depend on quantity of runoff discharges and resulting changes in channel hydraulics.) Headcutting will increase throughout the channel system. Delta formation will increase at the confluence of watercourses tributaries to the Rio Grande, and added sediment will contribute to the depletion of the sediment reserve of Cochiti Lake.

The gradual establishment of ground cover will correspondingly retard soil erosion and a more stabilized hydrologic regime will return. Due to extensive rehabilitation after the Cerro Grande Fire, runoff, soil erosion, and sedimentation were minimized. To understand the possible impact to downstream water bodies, runoff events after the fire were monitored and sampled by the Laboratory. An extensive network of automated samplers and stream gages served as the cornerstone of this effort. Due to a general lack of intense "monsoon" type rainfall during the summer of 2000, severe runoff passing across the Laboratory was limited to a single event on June 28. Record peak discharges were recorded for several drainages leading onto LANL during that event. For example, in Water Canyon above NM Highway 501, the estimated peak of 840 cubic feet per second (cfs) dwarfed the pre-fire maximum of 0.3 cfs. Concentrations of most metals dissolved in storm water are below the Environmental Protection Agency or New Mexico drinking water standards; however, a few (for example, aluminum, barium, manganese) are above the standards in many samples. Dissolved manganese concentrations increased by about 50 times above pre-fire levels; barium by 20. Concentrations of radionuclides dissolved in storm water are slightly elevated or comparable to pre-fire levels.

Effects on Legacy Contaminants. Active erosion processes have moved some contaminants bound to sediment from the watershed into the Rio Grande, mainly as suspended sediment and bedload sediment. Conversely, many of the remaining legacy contaminants at LANL are present in situ or have not been transported far from their origin or remain on site. Water transport is a major mechanism for the transport of contaminants both in the dissolved and suspended sediment phases. Because vegetation acts to hold soil and reduce erosion, its loss (however short term) may significantly increase the potential for erosion and the transportation of contaminants. Some water courses have only rarely had sufficient flow to reach the Rio Grande, and because of this they have become "discharge sinks" for some contaminants. Increases in runoff amounts and frequency will increase the potential to remove and transport contaminants from the ground surface and subsurface and stream channels on LANL into the Rio Grande and downstream to Cochiti Lake.

Effects on Biological Systems. Although fire is a natural part of biological systems, anthropogenic influences such as grazing, logging, and fire suppression have produced conditions that have pronounced adverse effects on forest ecosystems. Natural high-frequency, low intensity fire regimes have been replaced with low-frequency, high-intensity fires that consume a higher percentage of vegetation. As reflected in other nearby areas that have experienced severe wildfires in the past (e.g., Water Canyon, La Mesa, Dome, and Oso Complex fires), a wildfire at LANL will result in a period of disequilibrium with a reversion to early seral development and a corresponding change in animal use (Allen 1996). Fire debris, fallen trees, and needle cast will gradually begin to check erosion and develop soil conditions that will promote the establishment of grasses and herbaceous vegetation that will in turn further reduce erosion. This gradual reestablishment of ground cover will begin the dynamic process of seral progression toward a wooded or forested plant community.

A loss of forest or woodland habitat will result in a temporary loss of habitat for a broad spectrum of animals. As vegetation is reestablished an altered community of animal species will follow, its composition changing with the evolution of the plant community. The pattern of burned vegetation will play a significant role in renewed wildlife use. Early plant communities of grasses and herbaceous growth can have a high biomass and species diversity as exhibited by nearby areas affected by recent wildfires. This expansion of grass and herbaceous growth could provide additional forage for the large elk population in and around LANL and contribute to existing management concerns.

Impacts on threatened and endangered species (e.g., the Mexican spotted owl, *Strix occidentalis lucida*) will depend on several factors such as the burn pattern, the time of day that the burn occurs, the type of fire, topography, and if nesting is occurring. Threatened and endangered species have remained or returned to nearby areas that have experienced recent burns. Individual response to fire also will vary. Perhaps the most significant impact to threatened and endangered species precipitated by a wildfire could be the general disturbance caused by the fire fighting effort itself (e.g., fire fighting crews, aircraft, and vehicular traffic).

As discussed previously, increased runoff discharges will result in a commensurate increase in channel scouring, enlargement, and headcutting. This process and any accompanying sedimentation will have the potential to degrade or remove the limited riparian vegetation on LANL. Wetlands associated with water courses also would be affected, and perhaps several would be removed for a period of time because of changes in channel morphology. With the degradation of riparian vegetation and wetlands would be an associated reduction or loss of habitat for a variety of invertebrates, small and large mammals, amphibians, reptiles, and a diversity of birds.

Effects on Cultural Resources. LANL is located in a region of abundant and culturally significant prehistoric and historic resources, including traditional cultural properties. As stated, fire is a normal feature of the landscape and has played and continues to play a natural role in the culture of regional communities. Because of anthropogenic influences, the character of recent fires will be different from historic fires and will affect resources differently. Also, the need to protect property and life from wildfire will necessitate measures that can affect cultural resources.

As discussed, high intensity fires can burn an appreciable amount of ground cover and accelerate erosion. Surface erosion can physically disturb surface features and confuse and distort the contextual integrity of the site. More pronounced erosion in the form of gully formation and lateral bank cutting can permanently remove site features. Also, a high intensity fire can scorch organic remains located near the ground surface, decreasing their interpretive value. Historical structures can suffer through direct incineration. Damage to these resources also can occur as a consequence of vehicular traffic and mechanical disturbance (e.g., bulldozers and fire trucks) and other soil disturbing activities connected with the firefighting effort.

Traditional cultural properties present on and adjacent to LANL include ceremonial and archaeological sites, natural features, ethnobotanical sites, artisan material sites, and subsistence features. These resources are an integral part of the landscape and almost certainly are and have been affected by natural fires. Because of the altered character of fires, these resources may be affected to a greater extent. Depending on the characteristics of these properties, they could either be permanently or temporarily affected by a wildfire and its subsequent ancillary effects (e.g., erosion).

Mitigation

After the SWEIS was completed in 1999 actions were initiated to reduce the wildfire risk to major facilities with significant radiological inventories. Specifically, considerations were given to reducing the risk to low or very low for the following facilities:

- TA-3 Building 66/451, Sigma
- TA-54 (Area G) Pads
- TA-21 Building 209,TSFF
- TA-21 Building 155, Tritium Storage and Test Assembly (TSTA)
- TA-16 Building 205/205A, WETF

The planning, evaluation, and the beginning of fire mitigation (described in DOE 1999) that was completed prior to the Cerro Grande Fire undoubtedly contributed to minimizing the impacts to facilities and, possibly, human lives. There also is an ongoing, interagency, collaborative program to reduce the threat of catastrophic wildfire from occurring at LANL and the town site by thinning and removing vegetation at the perimeter and in the surrounding Santa Fe National Forest and Bandelier National Monument. This will reduce the frequency and intensity of wildfires that could impinge on LANL.

Uncertainties

The frequency of wildfire impinging on LANL was estimated as 0.05 per year under the current fuel conditions in the surrounding forest and perimeter. This frequency includes wildfires approaching from the north through west and south. When fire enters LANL or originates from within LANL, there are numerous credible scenarios, most of which consume less of the LANL area than is covered in this analysis. Specifically, this analysis presumes that the fire jumps the Pajarito Road or any other established control line, spots or otherwise burns into all contaminated canyons, and successfully climbs canyon walls to ignite combustible buildings with moderate and higher wildfire vulnerability. The consequences of a complete burning of the western portion of LANL are presented in accord with the conservative nature of this SWEIS as a whole.

The plume rise calculated in the canyon fires is likely to be much less than that which would actually occur resulting in lower doses at a distance of 330 and 3,300 feet (100 and 1,000 meters). This analysis used only the heat content of the fuel over the contaminated area; whereas, there is much fuel to the sides of the fire, and the combined heat would loft the plume thousands of feet. The observed convection columns in the past major forest fires would carry most contaminants far above the breathing zone of downwind individuals.

The wind speed used for dispersion of airborne material from the contaminated site fires was only 2 meters per second, which is probably less than would occur during a wildfire. The doses are inversely proportional to the wind speed, such that if the observed wind were 6 meters per second, the dose would be 1/3 that calculated.

The fraction of the suspended contaminant that is respirable (less than 10 micrometers equivalent aerodynamic diameter) is unknown. According to Section D.5 of the DARHT EIS, the uranium in the soil is not all respirable. The particle size of the airborne soil contamination is likely to be large because the contaminants will be attached to soil particles preceding the fire and to soil and smoke particles in the plume. Because the airborne contaminant particle size is unknown, an respirable fraction of 1.0 is assumed, which is very conservative.

The White Rock and Santa Fe population is included in the MACCS calculations. The additional MACCS calculations for WETF and Sigma made for this wildfire analysis used the winds observed June 7 to 10, 1998, which are toward the Los Alamos town site; whereas, the previous calculations for the other facilities used representative annual meteorology from 1995 (as described in Section G.2.4). Because population is not evenly distributed about these sources, there would be a difference in the integrated population dose (i.e., in the person-rem) depending upon the meteorology used. Because the source inventories at the buildings vulnerable to wildfire do not vary significantly among alternatives, this does not affect the decision. (The inventory at TSTA would be reduced by 25 percent under the Reduced Operations Alternative.)

The model calculations for dispersion of the plumes, for canyon sources several and more kilometers long, are most uncertain. The source was input as a volume having the dimensions of the width and length of the contaminated area, oriented along the axis of the wind direction. Differences in concentrations downwind are noted if the source is entered as a volume source versus a line source. The model also objects to a burning time longer than 60 minutes and was manipulated into accepting these extensively long volumes and longer burn times. The 60-minute limitation in the model is likely intended to prevent the user from exceeding the bounds of experimental data, most of which is for 10 to 30 minute releases. There are no field experiment data to which the canyon results can be compared. However uncertain, the radiological exposures predicted for the canyon fires are orders of magnitude less than the 100–mrem annual limit for public exposure from routine releases.

It has been estimated that there would be 50 person–rem from burning of buildings with residual contamination and from identified and unidentified contaminated soil/vegetation areas. This is a number not supported or disputed by hard data and is believed to be very conservative.

There are no release fractions available for radionuclides other than plutonium and uranium. For consistency only, the ARF $\times$ RF of 4×10^{-4} for uranium was also used for plutonium, americium, and cesium in contaminated soils, which are conservative for plutonium by a factor of 7, and therefore, overestimates the bounding doses for mixed nuclides and by this factor.

There is no ready evidence that burning of the vegetation over the firing sites would produce detectable airborne depleted uranium (DU). The U.S. Army tested DU projectiles at the Jefferson Proving Ground, releasing 50 metric tonnes of uranium in a four–year period, of which 45.5 metric tonnes were not recovered from the area. Special samples showed that most of the DU was on or near the surface. The vegetative undergrowth was regularly controlled through burning, at which time high volume particulate air samples were collected. Analyses of the air samples did not detect any DU (Abbott 1988). For DU munitions in an intense wood-fuel oil fire burning for 2 hours, no airborne DU was collected in the air samplers at various distances out to 328 yards (100 meters), and 0.01 of residual oxides was in the respirable size range (DOE 1994).

The MEI and population doses do not take credit for sheltering in vehicles or buildings, which will easily reduce doses to 1/2 to 1/20 of that outdoors (Engelmann 1990, Engelmann et al. 1991). It should be noted that airborne contamination will be in the smoke, which people are inclined to avoid.

About 400 person-rem, or 75 percent of the total population exposure of 675 person-rem, results from a wildfire at TA-54. The results from RAD–08, an aircraft crash-initiated fire at TA-54, were used for the wildfire. The two fires would be quite different, one entailing aircraft fuel that will challenge waste containers. At present, the combustible loading within the dome structures is small, so that RAD–08 results very conservatively bound the consequences of a wildfire at TA-54.

Another 189 person-rem results from total release of the tritium inventory at WETF, including 1,260 grams in storage, which is assumed to bound an increased administrative limit that may be established. The storage containers are resistant to fire, but have been assumed to release their entire content in tritiated water form, in accord with the highly conservative nature of this analysis.

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ENVIRONMENTAL CHECKLIST
U.S. Department of Energy
Albuquerque Operations Office

Project/Activity Title: ***Support Structures at LANL, FY 96-98***	ACC NO: 6069 DEC-95-0170	Date: 3/5/07
Program Office: Defense Programs	FSS-16 Classification Review:	
A/O Contractor: Los Alamos National Laboratory	AL Tracking Number: **LAN-96-022**	
LANL ESH-20 NEPA Reviewer: Margaret Powers, 505-665-5717 Signature:	Preparer/Contact: LANL ESH-20 Barbara Sinha, 505-665-8968 Signature:	
Project Line Management Signature:		
DOE/LAAO Line Management Official:		

A. BRIEF PROJECT/ACTIVITY DESCRIPTION: (See Block A, Page 2)
Category: Construction/Modification/Operation of Support Structures
Location: All Technical Areas at Los Alamos National Laboratory
Schedule: FY 96-98
Cost: < $25 M per project

B. ENVIRONMENTAL CONCERNS: (See Block B, Page 4)

	Yes	No		Yes	No
1. Air emissions	x		13. Archaeological/cultural resources		x
2. Liquid effluents	x		14. Noise	x	
3. Solid waste	x		15. Radiation/toxic chemical exposures	x	
4. Radioactive matls/soil	x		16. Pesticide/herbicide use		x
5. Hazardous constituents	x		17. High energy sources/ explosives		x
6. Mixed waste (rad + haz)	x		18. Transportation issues	x	
7. Chemical use/storage	x		19. Special status species/ environment		x
8. Petroleum use/storage	x		20. Identified ER site	x	
9. Asbestos materials	x		21. Other		x
10. Utility system	x				
11. Clearing or excavation	x				
12. Activity outside area fence/wildlife	x				

C. PERMITS: (If response is Yes, an explanation is provided in Block C)

The proposed action requires or may require a new local, state, or federal permit, notification, or review. Yes __x__ No ____

The activity would threaten a violation of laws, regulations, DOE Orders, or permits. Yes ____ No __x__

NEPA COMPLIANCE OFFICER'S DETERMINATION/RECOMMENDATION BLOCK (D) IS ON THE FINAL PAGE OF THIS DOCUMENT.

ENVIRONMENTAL CHECKLIST
DOE Albuquerque Operations Office
Support Structures at LANL, FY96-98
DEC-95-0170, ACC NO. 6069

Block A: PROJECT/ACTIVITY DESCRIPTION

Summary: The proposed activities comprise the siting, construction, relocation and operation of small-scale support structures at Los Alamos National Laboratory (LANL) in FY 96-98. Other proposed actions include modifications to existing support structures and buildings to provide space and furnishings necessary for support activities.

Facility: The proposed activities would take place at all Technical Areas of LANL, including leased spaces outside the LANL site boundaries.

Scope: The proposed actions in this checklist are examples of activities related to small-scale support structures proposed to be conducted at LANL in FY 96-98. The items in the bulleted lists are not intended to be an exhaustive list; rather, the lists are presented as examples to illustrate the scope of proposed activities. The scope of this document encompasses only activities that would not:

1. entail extraordinary circumstances that would affect the environmental impacts of the project
2. be related to other actions with potentially significant or cumulatively significant impacts
3. threaten a violation of applicable DOE Orders, statutes, regulations, or permit requirements for environment, safety, and health
4. require siting, construction, or major expansion of waste disposal, recovery, or treatment facilities
5. adversely affect environmentally sensitive resources (e.g., cultural resources, floodplains/wetlands, threatened or endangered species)
6. disturb existing contaminants in the environment such that there would be uncontrolled or unpermitted releases
7. individually, or when grouped with related actions in the same building, exceed $25 million in cost per project.

1. LANL proposes to site, construct, relocate and operate small-scale support buildings and support structures within or contiguous to a developed area. Examples of these structures include, but are not limited to, the following:

- small permanent buildings
- transportables
- transportainers
- lockers
- tension domes
- temporary structures for field work

The structures would be used for activities supporting the main scientific research and development mission of LANL. Support structures include, but are not limited to, the following:

- airport buildings, hangars, control towers, rooms
- cafeterias, kitchens, lunchrooms
- control rooms, guard stations, and security towers
- data processing facilities
- electronic equipment testing, fabrication, and repair shops
- fire stations and substations

- garages for equipment and vehicles (forklifts, dump trucks, passenger vehicles, vans, emergency response vehicles)
- health services facilities
- libraries, museums, exhibit areas
- mechanical property testing shops (provided no explosive or radioactive materials are used)
- offices
- passageways
- photographic processing darkrooms (provided hazardous waste recovery systems are connected to sanitary drainlines)
- radio dispatch facilities
- recreation facilities, exercise/fitness facilities
- security, safety, and environmental monitoring stations
- shipping and receiving facilities for commercial materials, laboratory supplies and standards
- shipping and receiving facilities for soil, rock, and other site characterization and monitoring samples
- shops for such activities as carpentry, welding, calibration, printing and machining
- solid waste compaction (excluding radioactive, hazardous, or explosive waste)
- storage space for materials, equipment, and supplies (computer components, radio and electronic equipment, compressed gases, custodial supplies, tools, janitorial supplies, packing and absorbent materials, water treatment chemicals, construction materials, administrative supplies, archaeological, biological, and geological specimens, publications and reference material, automotive parts, lubricants and additives)
- training/conference areas
- vehicle maintenance and servicing facilities
- visitor reception areas
- waste collection areas
- waste staging areas

2. LANL proposes to modify its existing support structures and existing buildings to provide space and furnishings necessary for support activities. Examples of these remodeling modifications include, but are not limited to, the following:

- add new furniture, carpeting, pictures, bulletin boards, desks, whiteboards, bookcases, dividers, monitoring equipment, audio-visual equipment
- install walls, baseboards, thresholds, doors, windows, ceilings, cabinets, benches, sinks, restrooms, partitions, door hardware
- relocate furniture, workbenches, equipment, and utility connections
- remove walls, baseboards, thresholds, doors, windows, ceilings, cabinets, benches, sinks, restrooms, partitions, door hardware

3. LANL proposes to construct, install, operate, and modify short term and long term safe, secure storage areas for its classified documents, radioactive material, and fissile material. Installation or construction of new safe, secure storage areas would be into existing facilities currently used for activities involving the stored materials. Examples of these safe, secure storage areas include, but are not limited to, the following:

- vaults
- vault-type rooms
- cages

- floor holes

4. LANL proposes to site, construct, modify, and replace-in-kind elements needed for the proper functioning of its existing support structures and buildings. Examples of these elements include, but are not limited to:

- above-ground storage tanks of 5000 gallons or less for petroleum products (diesel fuel, gasoline), lubricants, non-PCB dielectric fluids, detergents/surfactants, water conditioning chemicals
- access roads in previously cleared, developed areas
- catwalks, structural platforms, railings, ramps, walkways, ladders, stairs, loading docks
- fencing in developed areas
- freight and personnel elevators
- infrastructure in developed areas
    - ◊ communications and electrical cables and ducts
    - ◊ gas, water, and sanitary wastewater distribution and collection lines to existing mains
    - ◊ sanitary wastewater holding tanks
    - ◊ water tanks
    - ◊ other water supply and distribution system appurtenances
    - ◊ water booster, pump, and lift stations
    - ◊ water, sewer, and gas mains in existing utility corridors
- parking lots, sidewalks
- spill containment structures (curbing, berms, dikes, trenches, sumps and vaults, modular tanks) and associated pumps and piping
- temporary access roads to facilitate repairs to existing roads
- traffic signs and signals, turn lanes, bar ditches, culverts, dry arroyo crossings, guardrails, pullouts, and similar modifications to existing roads and highways
- weather protection structures (canopies, roofs, rain gutters) for outdoor equipment, loading docks, entryways

5. LANL proposes to relocate its support activities within the LANL facility and, in some instances, from and to leased existing buildings at TA-0 locations, i.e. outside the fenced LANL boundaries . The relocation would be into a building used for activities similar to the activities at the old location. If necessary, minor modifications would be made to the new facility's utilities, waste handling, or monitoring systems to ensure that the safety and health of workers and the public is adequately protected. The relocation would result in no changes in overall operations or increases in emissions or waste streams.

Block B: ENVIRONMENTAL CONCERNS

LANL intends to perform activities in compliance with all applicable local, state, and federal regulations and orders. LANL would manage waste according to established procedures that are intended to ensure compliance with regulations.

1. Air emissions:
    Some of the proposed activities may require a new non-radioactive air emissions permit or registration. Operations falling under this requirement would not commence until all required permits and registrations were obtained.

2. Liquid effluents:

Operation of support facilities may entail small increases in on-site personnel. Sanitary wastewater would be channeled to existing wastewater collection and treatment facilities. Sanitary wastewater generally is taken to the Sanitary Wastewater System Consolidation at TA-46. Other industrial wastewater is transported to the evaporation lagoons at TA-46. When tie-ins to existing wastewater collection systems are not feasible, sanitary wastewater holding tanks may be installed. Periodically, the waste would be pumped out and trucked to LANL's wastewater treatment plant. Non-hazardous effluents from photographic processing may be discharged into sanitary wastewater systems.

3. Solid waste:

Construction, remodeling, or refurbishment of buildings may produce uncontaminated building debris and items (e.g., packaging material, wallboard, baseboard, ceramics, skirting, wooden supports, cinderblock, conduits, wiring, cables, hardware, pipes, carpeting, furniture) that would be either salvaged and reused or disposed of in the Los Alamos County Landfill.

4. Radioactive materials/soil:

Remodeling or refurbishment of buildings may produce radioactive contaminated building debris and items (wallboard, hardware, lighting fixtures, cables, pipes, conduits, brackets, furniture). All radioactive waste and potentially radioactive waste would be managed in accordance with LANL procedures for identification, segregation, labeling, packaging, transport, and disposal. LANL's Waste Management personnel would take radioactive waste to TA-54, Area G, where it would be stored or disposed of.

Support activities at LANL include the storage of radioactive (e.g., tritium) and fissile (plutonium, uranium, americium) material. For long term storage, these materials are kept in vaults. For short term storage (days), materials are kept in other safe, secure areas (e.g., cages, floor holes, and vault-type rooms). Construction, installation, operation, and modification of vaults and short term storage areas would be done in a way that would continuously maintain the safety and security of the stored material. Construction, installation, operation, and modifications would be done in conformance with DOE Order 5480.5, "Safety of Nuclear Facilities" and DOE Order 6430.1, "General Design Criteria".

5. Hazardous constituents:

Removal of solid hazardous waste may constitute part of building remodeling. Any hazardous solid waste resulting from remodeling or operations would be taken by LANL's Waste Management personnel to TA-54, where it would be segregated, treated, and/or packaged, and then shipped off-site for treatment and disposal.

The operation of health services facilities constructed as described in this document may produce medical waste (e.g., needles, swabs, blood-contaminated gauze). This waste would be disposed of off-site at a facility permitted for disposal of medical waste.

Some liquid hazardous waste may result from operation of photo darkrooms, electronic shops and mechanical testing shops. Any hazardous liquid waste resulting from operations would be delivered to TA-54, where it would be segregated, treated, and/or packaged and then shipped off-site for treatment and disposal.

6. Mixed waste (rad + haz)

Building modifications that entail modifications of drains, pumps, or pipes may produce small amounts of mixed waste, which would be managed in accordance with LANL procedures for identification, segregation, labeling, packaging, transport, and storage. Liquid mixed waste would be collected in approved containers for storage at TA-54, Area L until treatment or disposal alternatives become available. Solid mixed waste would be containerized and stored at TA-54, Area G, until treatment or disposal alternatives become available. As off-site treatment or disposal alternatives become available, waste may be shipped off-site to permitted facilities for treatment and disposal. Whenever possible LANL would avoid or minimize production of mixed waste by product substitution or using alternative techniques.

7. Chemical use/storage:

Some small structures constructed as described in this document would be used for chemical storage. They would house such items as janitorial supplies (e.g., bleach, disinfectant, detergent), small quantities of chemical reagents or compressed gases, and products used for routine maintenance (e.g., roofing tar, rust inhibitors, lubricants, degreasers, solvents, paint, paint thinner, and paint removers). Other products, such as water conditioning chemicals, may be stored in above-ground tanks. All chemicals would be stored in appropriate containers, cabinets, and vessels. All chemicals would be properly labeled according to established LANL and facility procedures. Material Safety Data Sheets would be readily available.

8. Petroleum use/storage:

Above-ground storage tanks with capacities of 5000 gallons or less may be used to contain various petroleum products (e.g., gasoline, motor oil, diesel fuel, dielectric oil). Tanks would usually be encased in a prefabricated vault of pre-stressed concrete. Appropriate spill control measures would be implemented as required under LANL's Spill Prevention Control and Countermeasures Plan.

9. Asbestos materials:

Modifications of buildings may produce asbestos-contaminated waste (wallboard, floor and ceiling tile, transite, insulation). All asbestos removals would be conducted by trained personnel using personal protective equipment as specified in the work permit. Personnel would use all necessary monitoring and containment measures. LANL's Waste Management personnel would take the asbestos to TA-54. Asbestos contaminated with radioactive material would be disposed of in a monofill disposal pit at TA-54, Area G. Other asbestos waste would be held at TA-54, Area J, pending shipment and disposal off-site by an independent contractor at a Toxic Substances Control Act (TSCA) permitted asbestos disposal site.

10. Utility system:

Utilities for new support structures would be provided by tie-ins in to existing utility lines. Modifications of some existing buildings and support structures would include modifications to utility systems. All new utility installations and modifications to existing utilities would be made in conformance with the relevant code requirements for those utilities.

11. Clearing or excavation:

Construction or modification of structures within an already developed area may entail some grading or leveling. Small areas may be excavated for utility trenches, structural bracing, or guy wires. All excavation activities are reviewed for potential impacts to cultural resources. Activities that involve potential impacts to cultural resources, floodplains, wetlands, or threatened or endangered species are not encompassed by this document. Any clearing or excavation activity, however, has the potential to encounter previously buried materials. If buried material or remains of cultural significance are encountered, appropriate action would be taken under applicable programs, if required.

12. Activity outside area fence/wildlife:

Relocation of some support functions may be from or to TA-0, outside the boundaries of LANL, for example, within the Los Alamos townsite. All activities outside LANL boundaries would be reviewed by the owner or agency having jurisdiction over the area as well as by the appropriate LANL divisions.

14. Noise:

Construction activities in which heavy equipment is used would temporarily increase noise levels.

15. Radiation/toxic chemical exposures:

To protect worker health and safety and to prevent environmental releases, construction and remodeling activities in which asbestos, hazardous waste, or radioactive waste is removed, or activities which take place in active hazardous or radioactive material/waste handling areas, would be conducted according to Standard Operating Procedures and Special Work Permits and with the use of appropriate monitoring and personnel protective measures.

All activities would be performed in accordance with radiological dose guidelines presented in DOE Order 5480.11. All activities would be performed in ways that ensure worker exposure is kept as low as reasonably achievable and below 5 rem annually in all cases.

18. Transportation issues:

Construction materials and equipment would be transported to the site of construction activities. Relocation of support activities would involve the transportation of nonhazardous, nonradioactive materials. These activities are not expected to pose a risk, other than normal traffic/transportation risks, to the public or to workers. LANL would transport all solid, radioactive, hazardous, and mixed waste in accordance with Department of Transportation regulations, DOE Orders, and LANL policy. These wastes may be transported off-site to permitted disposal facilities as part of LANL’s waste management program.

20. Identified ER Site:

Some activities encompassed by this document may be conducted in or near Solid Waste Management Units (SWMUs). To ensure the protection of the workers, all activities would be performed consistent with the requirements specified in 29 CFR 1910.20. This regulation primarily consists of ten required elements:

1. Hazard Analysis
2. Employee Training
3. Personal Protective Equipment
4. Medical Surveillance
5. Site Monitoring
6. Site Control
7. Decontamination
8. Emergency Response
9. Confined Space
10. Spill Containment

In addition to meeting the requirements of 29 CFR 1910.20, all activities would be performed in accordance with radiological dose guidelines presented in DOE Order 5480.11. All activities would be performed in ways that ensure worker exposure is kept as low as reasonably achievable and below 5 rem annually in all cases.

Block C: PERMITS

LANL intends to conduct these projects and activities in accordance with all applicable statutory and regulatory requirements, permits, and DOE Orders. Permit modifications, notifications, reviews, and/or registrations may be required before beginning a specific operation.

Block D. NCO CLASSIFICATION/RECOMMENDATION:

Signature: ____

Title: ____ Date: _________________

Attachment B. All Projects 1999–2004 Under NEPA LAN-96-022

AccNo	Project Title	TA	Bldg	AccDate
8328	Site Wide Fire Alarm Replacement Project	0	0	4/3/2001
8903	ESA-Wide Support Structures	0	0	6/4/2002
9241	Emergency Parking Signs Along Pajarito Road	0	0	10/29/2002
9448	Replace Air Relief Valve and Manhole	0	0	1/29/2003
9978	Traffic Signal Upgrade	0	0	8/11/2003
7670	SUPPORT FOR TGS UPGRADES	2	35	8/27/1999
7541	NEW CONDENSING UNIT	3	409	5/6/1999
7624	ELECTRICAL INFRASTRUCTURE UPGRADES, SM-43 MITIGATION	3	0	7/21/1999
7663	FABRICATION OF LATTICE INJECTOR FOR 75K ENGINE	3	1698	8/23/1999
7676	A CLEAN ROOM FOR RECEIVING AND INSPECTION OF SPECIMENS	3	142	9/3/1999
7695	SILVER PLATING CYCLOTRON PARTS	3	66	9/17/1999
7709	TA-3-SM-38 SECURITY UPGRADES	3	28	9/30/1999
7720	SM-43 SCIF EXPANSION	3	43	10/20/1999
7745	ELECTRICAL INFRASTRUCTURE UPGRADES, TA-3-40	3	40	11/10/1999
7799	TO CLEAN THE LEAD BUILDING	3	379	1/13/2000
8034	EXPAND PARKING LOT NE OF SM-16	3	0	6/22/2000
8035	CONSTRUCT SOUTH CMR PARKING	3	0	6/22/2000
8036	ENIWETOK DR PARKING	3	0	6/22/2000
8309	Science & Technology Based Research Lab (STBRL) Computer Room Project	3	207	3/14/2001
8333	Lecture Hall Building, TA-03, FMU-81	3	1403	4/12/2001
8352	TAUS Trailer Relocation, TA-3-trlr #82	3	0	4/24/2001
8383	3-130 Install Security Fence	3	0	5/14/2001
8384	SCC, WTA Duct Bank	3		5/17/2001
8393	Wellness Center	3	0	5/29/2001
8398	ESH-2 Medical Clinic	3	0	5/30/2001
8501	TA-3-40, Plating Shop	3	40	8/6/2001
8605	Remove Contaminated Soil and Install Asphalt to Provide Storage Area for TA-3-159	3	0	11/27/2001
8612	S-3 Security Systems Facility	3	0	12/4/2001
8618	MST Office Building	3	0	12/7/2001
8752	S-Div Jcats Vault Type Room & Offices TA-3-39	3	39	3/18/2002
8825	Cover Sink in Hood 1890	3	29	4/29/2002
8909	Quantum Ion Trapping Lab	3	40	6/10/2002
8924	Quantum Information Project - Conference Room and Study Center	3	40	6/18/2002
8935	TA-3-39, Calibration Modular Laboratories	3	39	7/3/2002
8957	Kirby Trailers	3	22	7/23/2002
9092	Kitchen Installation in Rm-1011	3	29	9/5/2002
9094	Shower Room Extension, TA-53	3	141	9/6/2002
9115	Install Locker Room Addition	3	141	9/10/2002
9140	Kirby bldg utilities and transformer pad	3	2239	9/18/2002
9145	Reconfigure Lunch Room for Offices	3	66	9/20/2002
9189	Install New Plasma Screen TV & Speakers in Room A104	3	29	10/10/2002
9208	Install New Plasma Screen TV and Speakers in Room A104	3	29	10/15/2002
9232	Install new storage container, TA-3	3	141	10/23/2002

AccNo	Project Title	TA	Bldg	AccDate
9236	Modify Fuel Oil Lines, TA-3	3	57	10/21/2002
9239	Parking Lots, TA-3	3	141	10/25/2002
9264	Replace Fire Hydrant #791	3	31	11/9/2002
9270	Relocate Fuel Oil Lines	3	57	11/6/2002
9271	Removal of Diesel Day Tank, TA-3	3	22	11/6/2002
9297	Repair 8 inch Water Leak, TA-3	3	100	11/15/2002
9308	Repair Steam Condensation Leak, TA-3	3	31	11/22/2002
9309	Replace Condensation Line, TA-3	3	39	11/22/2002
9334	Repair Steam Condensate Leak	3	132	12/4/2002
9358	Building Addition for TA-3-481	3	481	12/11/2002
9369	TA-3-216 Sidewalk	3	216	12/16/2002
9384	Tie-in Condensate	3	35	12/19/2002
9387	2nd Addition to LANL Medical Facility	3	2006	12/23/2002
9392	TA 3-216 Room Remodel to Vault	3	216	1/6/2003
9401	Install a Lift Power Pole	3	22	1/9/2003
9405	Install Cathodic Protection to Fuel Oil Tank	3	26	1/9/2003
9446	Repair Water Leak	3	223	1/29/2003
9463	Repair or Replace PIV # 1434	3	0	2/3/2003
9469	Site Preparation of Modular Office Trailer	3	1349	2/5/2003
9479	Replace Power Poles	3	0	2/10/2003
9481	Install Tee and Valves	3	0	2/10/2003
9491	Reconfigure Parking Lot TA-3-38	3	38	2/12/2003
9501	Make-up Water Line Break	3	592	2/20/2003
9503	EISU Project TA-3-40	3	40	2/20/2003
9504	Repair Underground Condensate Leak	3	66	2/20/2003
9518	Install New 15' PVC Sewer Line	3	192	3/1/2003
9539	Concrete Splash Blocks	3	29	3/10/2003
9548	Repair Underground Condensate Leak	3	223	3/12/2003
9557	Removal of Concrete Pads	3	22	3/17/2003
9582	Install Bollards	3	39	3/27/2003
9588	Build Dirt Ramp	3	779	3/27/2003
9593	SM-16 Access Road	3	16	3/27/2003
9606	Modify Underground Condensate Line	3	66	4/1/2003
9615	TA-03-114 Locker Room Addition	3	141	4/3/2003
9653	Locate and Repair Water Leak at CMR	3	29	4/10/2003
9682	Construct Wooden Stairs	3	2240	4/16/2003
9714	Install Slab and Dewar	3	0	3/28/2003
9731	TA-3-39 Install Utilities	3	39	4/30/2003
9739	Install 3' x 3' Concrete Pad	3	0	5/1/2003
9769	Install Internet Line in Rom-S007	3	29	5/13/2003
9770	Install Fax Line in Rm-A123 and Relocate Internet Ports	3	29	5/13/2003
9804	Site Work for TA-3-481	3	481	5/29/2003
9818	Install Asphalt Walkway	3		6/4/2003
9820	Fill In Excavated Area	3	1437	6/4/2003
9835	Motorcycle Parking Lot - CMR	3	29	6/4/2003
9857	TA-3-43-A3H Power and A/C Upgrade	3	0	6/20/2003
9858	TA-3-43-D231 Install Cooling Unit	3	43	6/20/2003
9868	TA-03 Beryllium Technology Facility Storage Vault	3	0	6/23/2003
9903	Design a 150 Car Parking Lot & Entrance from W/Jemez in the area west of the Wellness Center	3	0	7/8/2003

AccNo	Project Title	TA	Bldg	AccDate
9236	Modify Fuel Oil Lines, TA-3	3	57	10/21/2002
9906	Paving & Temporary Fence on the South Side of SM-141	3	141	7/15/2003
9909	TA-3 Repair Sidewalks & Lawn Sprinklers	3	0	7/15/2003
9911	TA-3 Gravity Sewer Line	3	0	7/15/2003
9919	TA-3-22 Turbine #3 Removal	3	22	7/15/2003
9931	Design a 200 Car Parking Lot & Entrance Road in the TA-3, SM-70 (Batch Plant) Area	3	70	7/16/2003
9975	North Eniwetok Drive Sidewalk	3	0	8/11/2003
9979	Knife Gate Installation at TA-3-1409	3	1409	8/11/2003
9984	Wellness Center Parking Lot	3	0	8/27/2003
9985	Liquid Nitrogen Tank Installation	3	170	8/12/2003
9994	Security Division Office Building	3	0	8/13/2003
10018	Drilling Laydown Area	3	132	8/21/2003
10102	Repair Water Leak	3	38	10/3/2003
10122	Reinforce Fencing and Pedestrian Gate	3	1409	10/17/2003
10132	Casa Grade Traffic Loops	3	41	10/17/2003
10142	Excavate Valve Box to Expose Valve	3	123	10/23/2003
10176	Pot Hole for Drains Discharge	3	223	10/30/2003
10196	Construct Retaining Wall	3	223	11/12/2003
10207	Asphalt Overlay at TA-3-1405	3	1405	11/13/2003
10221	Extension of Leak Repair	3	31	11/24/2003
10228	Move Overhead Tel/Data Line	3	780	11/25/2003
10235	Install Loading Ramp Outside Wing-3 Filter Tower Roll-up Door	3	29	12/1/2003
10281	NISC and SM-43 sidewalk	3	43	1/7/2004
10288	TA-3 Emergency water leak repair.	3	223	1/8/2004
10355	TA-3, 142 Install double doors.	3	142	2/17/2004
10378	Five new transportainers, TA-03,FMU-2.	3	0	3/4/2004
10408	Install new 15 inch PVC sewer line.	3	3038	3/19/2004
10427	TA-03 Anchor Canopy	3	223	3/29/2004
10439	TA-03 Replace Gas Valve Box	3	471	3/31/2004
10441	TA-03 Repair Gas Valve Box	3	218	3/31/2004
10443	TA-03 Repair Gas Key Valve	3	410	3/31/2004
10451	TA-03 Grease and Exercise Valve Under Pavement	3	253	3/31/2004
10458	TA-03 Eliminating Gas Valves	3	70	4/1/2004
10491	South Gateway Parking Lot	3	0	4/13/2004
10500	TA-3-65 Reset Valve Box	3	65	4/14/2004
10502	Repair Cathodic Protection Rectifiers	3	4200	4/14/2004
10526	Steam leak isolate hi-voltage switch and new move to new location.	3	1544	4/22/2004
10554	Install new handicap sign at TA-3-2322.	3	2322	5/3/2004
10556	Install new 15 inch sewer line/drop existing water line 2.	3	223	5/4/2004
10565	TA-03 crash gate installation.	3	1912	5/5/2004
10577	Install pole for lighting.	3	149	5/6/2004
10580	Install Hydrogen Generator Pads	3	1269	5/10/2004
10587	TA-03 Repair Water Leak on 6 in Water Main	3	100	5/11/2004
7656	TMSE, 431/432 CONFIGURATION	4	55	8/17/1999
8438	CGRP Task #41, TA-06 Storage Facility	6	0	6/28/2001
9165	Repair Water Leak on 6-inch Water Line	6	0	10/8/2002
7473	EMERGENCY RESPONSE CONSOLIDATION OFFICE	8	0	3/19/1999
7643	SECURITY UPGRADES AT TA-8, BUILDINGS 22 AND 23	8	22	8/9/1999

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7662	TA-8-21 OFFICE UPGRADES	8	21	8/23/1999
7735	TA-8-21 VAULT RENOVATION	8	21	10/28/1999
8984	Locate Valves on 12 in. water line	8	1	7/29/2002
9307	Cut and Cap 6 inch water line, TA-8	8	0	11/22/2002
9811	Repair or Replace Gas Valve	8	70	5/29/2003
9937	Dynex Weather Enclosure	8	0	7/24/2003
10256	Gunsight, Potholing, New Access Road and New Retaining Wall	8	1	12/9/2003
10259	Tech Area Guide Signs	8	0	12/9/2003
10271	TA-8 Connector Road - Gun Site Stabilization	8	0	12/22/2003
10383	Natural Gas Valve Box Repair	8	70	3/9/2004
7637	TA-9 STEAM AND CONDENSATE	9	48	8/4/1999
8394	Creating a Jogging/Bicycle Path from TA-9 to TA-15	9	0	5/29/2001
9133	Repair Water Leak on 8-inch Line	9	48	9/17/2002
9586	Spread 30 Ton's of Base Course Dirt	9	0	3/27/2003
9806	Repair Water Leak on 8' Water Line	9	50	5/29/2003
9807	Replace Valve Box #12	9	30	5/29/2003
9808	Replace Valve Box #18	9	33	5/29/2003
9809	Replace Valve Box #28	9	21	5/29/2003
9977	TA-09 Restore Power	9	43	8/11/2003
10363	Repair Water Leak	9	38	2/21/2004
10498	Repair or Replace SV 09-003	9	51	4/14/2004
10582	LPGPRO Repairs Lighting Protection	9	53	5/10/2004
8767	TA-11-30 Vault-Type Room	11	30	3/20/2002
9045	LN2 Dewar Pad	11	30	8/22/2002
9863	Repair Water Leak	11	4	6/23/2003
7754	TA-15, RECYCLE OIL STORAGE	15	0	11/17/1999
8437	Task #41, Replacement Work, TA-15	15	0	6/28/2001
8900	Paving, TA-15-312	15	312	6/4/2002
8979	Installation of Frost Free Hydrant at PHERMEX Firing Site	15	0	7/29/2002
9306	Repair Valve Box, TA-15	15	0	11/22/2002
9325	DARHT Firing point Removal and Clean Up	15	312	12/2/2002
9915	TA-15-534 Vessel Preparation Facility Fence Relocation	15	534	7/15/2003
9949	Paving TA-15-312	15	0	7/24/2003
9950	Paving TA-15-313	15	0	7/24/2003
10012	Repair/Install Fence	15	446	8/27/2003
10437	TA-15 Reset Gas Valve Box	15	563	3/31/2004
10438	TA-15 Replace Top of Gas Valve Box	15	233	3/31/2004
10444	TA-15 Excavate & Replace Grease Riser on Valve	15	185	3/31/2004
10447	TA-15 Excavate & Reset Valve Box	15	494	3/31/2004
10448	TA-15 Reset Valve Box & Install Line Marker	15	563	3/31/2004
10449	TA-15 Install Line Marker	15	183	3/31/2004
10485	TA-15 Install access control fence.	15	312	4/8/2004
7703	TA-16 BUILDING 218 SECURITY UPGRADES	16	2198	9/28/1999
7711	RE-ROOF TA-16 TRAILERS	16	659	10/7/1999
7759	TA-16 SWMU EROSION CONTROL	16	0	11/23/1999
7902	New ESA-TSE Office Building Near	16		3/27/2000
8315	Cannon De Valle Ecological Risk Assessment	16	0	3/22/2001
8334	TA-16 Building 200 Electrical Infrastructure Upgrades	16	200	4/12/2001
8342	Waste Storage Container, TA-16-260	16	260	4/23/2001

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8722	Install Office Transportable at TA-16 (Outside Security Fence)	16	0	3/5/2002
8738	TA-16 Office Transportable	16	0	3/11/2002
9174	TA-16 Occupancy	16	210	10/8/2002
9364	Straighten Valve Box	16	0	12/12/2002
9365	Raise Valve Box	16	0	12/12/2002
9367	Building 304 Fiber Installation	16	304	12/16/2002
9417	Relocate Transportainer	16	328	1/15/2003
9525	Replace Rotted Utility Pole	16	54	3/4/2003
9532	Removal and Install of New Dock	16	202	3/6/2003
9553	Installation of New Dock for Modula Project	16	193	3/17/2003
9719	Repair Line	16	766	5/5/2003
9760	S&E Hookup disconnect	16	210	5/12/2003
9805	Relocate Leaking Water Line Located Under a Slab	16	0	5/29/2003
9864	Replace Fire Hydrant #577	16	0	6/23/2003
9925	TA-16/West Jemez Road Upgrade	16	0	7/16/2003
9945	TA-16-933 Sidewalk and Asphalt Driveway	16	0	7/24/2003
10014	TA-16 Drilling Lay-Down Area	16	0	8/21/2003
10032	TA-16 Construct Staging Area	16	0	9/3/2003
10055	WETF Diesel Generator Relocation	16	401	9/10/2003
10069	Detour Road for Weapons Plant Support Facility	16	207	9/17/2003
10075	Parts Storage Transportainer for WETF	16		10/1/2003
10095	Two contractor Trailers, TA-16, FMU-5	16	1095	10/14/2003
10095	Two contractor Trailers, TA-16, FMU-5	16	1096	10/14/2003
10099	Replace Valve Box #150	16	221	10/3/2003
10100	Replace Valve Head	16	332	10/3/2003
10119	Repair Water Leak on 2 1/2 Inch Water Line	16	16	10/17/2003
10120	TA-16 Pedestrian Walkway Enhancements	16	200	10/17/2003
10164	Reroute L.S./Plug Existing Force Main Inlet	16	984	10/23/2003
10169	WETF Diesel Generator Relocation Project	16	205	10/30/2003
10204	Replace Fire Hydrant #604	16	460	11/12/2003
10224	Repair Water Leak by Abandoned Guard Shack	16	1451	11/24/2003
10247	Replace Fire Hydrant	16	380	12/8/2003
10248	Replace Fire Hydrant #584	16	380	12/8/2003
10249	Replace Fire Hydrant #875	16	225	12/8/2003
10250	Raise Valve Box #51	16	203	12/8/2003
10251	Raise Valve Box #53	16	463	12/8/2003
10252	Replace Fire Hydrant #557	16	225	12/8/2003
10258	Repair Leak or Replace Fire Hydrant # 590	16	411	12/9/2003
10283	Emergency water leak repair TA-16	16	370	1/7/2004
10316	Emergency water leak repair outside bldg 304.	16	304	1/26/2004
10396	Repair broken cleanouts.	16	946	3/17/2004
10440	TA-16 Replace Broken Top on Gas Valve Box	16	243	3/31/2004
10442	TA-16 Replace Top of Gas Valve Box	16	1488	3/31/2004
10483	Install visual high level alarm.	16	332	4/7/2004
10497	Relocate TA-8-112 to TA-16, FMU-5	16	286	4/14/2004
10585	TA-16 Repair Water Leak	16	1451	5/11/2004
10591	TA-16 Repair Water Leak	16	1489	5/12/2004
7626	BURIAL OF POWER LINES CROSSING PIDAS	18	0	7/21/1999
7640	FENCING AT TA-18-127	18	127	8/6/1999

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8117	TA-18 Office Building	18	0	8/10/2000
8270	TA-18 Sewer Replacement	18	0	2/5/2001
8299	TA-18 Office Building	18	0	3/1/2001
8426	Repair Hummer Trails TA-18	18	0	6/19/2001
8495	Widen Roadway	18	0	7/27/2001
8610	SNM Special Storage Modifications	18	122	11/30/2001
8748	SST Storage Trailer(s) Access and Maintenance Procedure	18	309	3/14/2002
8789	Startup Plan for SSTs	18	0	4/3/2002
8791	Startup Plan for Storage vaults	18	0	4/3/2002
8793	TA-18: The Second 90-Day Plan/SSEP Tier 1	18	309	4/4/2002
9530	TA-18 Natural Gas System Upgrade	18	0	3/5/2003
9642	WFO/ES&H Form for Real Time Radiography Transport System	18	227	4/9/2003
9965	TA-18 Electrical Power for Trailers	18	0	8/11/2003
9987	TA-18 Electrical Power for PTLA Trailers	18	30	8/12/2003
10071	Site Prep for Dumpsters	18	303	9/17/2003
10334	Repair Water Leak TA-18	18	147	2/4/2004
10418	TA-18 Prep trailer for off-site relocation.	18	300	3/22/2004
10499	Repair or Replace SV 18-003	18	141	4/14/2004
7458	TA-21 STEAM LINE	21	0	3/11/1999
7671	RELOCATION OF LANL RECORDS CENTER FROM TA-21 TO TA-3, SM 39*	21	0	8/30/1999
8982	Install Sidewalk, TA-21-357	21	357	7/29/2002
9260	Sidewalk Repair, TA-21	21	357	10/31/2002
10096	Raise Valve Box #25	21	155	9/29/2003
10097	Raise Valve Box #26	21	155	10/3/2003
10098	Raise Valve Box #49	21	0	10/3/2003
10399	Two transportainers, TA-21, FMU-3.	21	497	3/18/2004
10457	Carport, TA-21, FMU-3	21	210	3/31/2004
7396	STORAGE FACILITY AT TA-22	22	0	1/20/1999
9407	TA-22 Additional Parking Area	22	0	1/10/2003
9976	Duct Bank Construction for Building 115, TA-22	22	115	8/11/2003
10101	Repair Water Leak	22	52	10/3/2003
10170	Repair Water Leak and Extend Existing Permit Location	22	32	10/30/2003
10453	TA-03 Repair Gas Key Valve	22	34	3/31/2004
7717	Wildlife Dedication Ceremony, TA-33	33	0	10/12/1999
8408	Boundary Fence, TA-33	33	0	6/11/2001
8725	Freeway	33	0	3/7/2002
8744	Install Double-Wide Trailer at TA-33	33	0	3/13/2002
9080	Install Holding Tank	33	0	9/4/2002
9082	Install Office Trailer, TA-33	33	0	9/5/2002
9226	Install Trailer, TA-33	33	425	10/23/2002
9255	Pad Installations, TA-33	33	209	10/31/2002
9372	Install Trailer 280	33	280	12/16/2002
9442	Dig up Valve Box to Repair Valve	33	27	1/24/2003
9644	Pedestrian Gate at TA-33	33	0	4/9/2003
9700	Installation of Gates at TA-33	33	0	4/28/2003
9867	TA-33 Primary Power Upgrades	33	0	6/23/2003
9889	TA-33-39 Electrical Upgrades	33	39	6/27/2003

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8117	TA-18 Office Building	18	0	8/10/2000
9946	Parking Area Development	33	0	7/24/2003
9974	TA-33 Refurbishment Project	33	24	8/11/2003
10048	TA-33 Security Upgrades	33	0	9/3/2003
10058	Contractor Trailer, TA-33, FMU-5	33	0	9/10/2003
10201	Excavate Leaking Valve & Re-Pack Valve	33	114	11/12/2003
10324	TA-33 Connect utilities to pre-fab building.	33	0	1/29/2004
10370	GENSET	33	0	2/26/2004
10505	Repair or Replace Broken Valve Box #3	33	217	4/15/2004
10517	Leased transportable, TA-33, FMU-5.	33	302	4/19/2004
7425	DOSIMETRY SERVICES BIOASSAY PROGRAM, TA-35	35	2	2/22/1999
7677	TMSE, POTABLE WATER	35	0	9/3/1999
7785	INSTALLATION OF CAMERA FOR SURVEILLANCE	35	2	12/15/1999
7918	ELECTRICAL SYSTEMS UPGRADE TA-35 BUILDING 2	35	2	3/27/2000
8211	FWO-SEM Instrumentation & Controls Shop TA-35-2	35	2	11/15/2000
8440	Frit (crushed glass) Transfer System, TA-35	35	2	6/28/2001
8445	New Net Station Maintenance	35	2	7/9/2001
9315	Install forms for concrete foundation	35	126	11/25/2002
9561	Replace Fire Hydrant #847	35	88	3/18/2003
9680	TA-35 Safe Pedestrian Access	35	207	4/16/2003
10279	New transportainer, TA-35, FMU-1 siting	35	586	1/6/2004
10421	Relocate 13.2 power line.	35	270	3/23/2004
9150	Level and add fill dirt for installation of a 10' x 20' Morgan shed, TA-36	36	107	9/23/2002
9248	TA-36-69 Parking Lot	36	69	10/30/2002
9679	Repair Electric Gate Opener	36	69	4/16/2003
9788	HE Prep Facility - Primary Power	36	0	5/21/2003
10395	Realign dropped gravity line.	36		3/17/2004
10446	TA-36-78 HE Prep Facility	36	78	3/31/2004
9451	Replace Air Relief Valve and Manhole	37	0	1/29/2003
9441	Install Floor Drain to Drain Water from Pit	39	0	1/24/2003
10450	TA-39 Grease and Exercise Valve	39	89	3/31/2004
7777	REPLACE ROOF AT TA-40-73	40	73	12/10/1999
10377	New transportainer, TA-40, FMU-5.	40	111	3/3/2004
10593	TA-40 Repair Gas Leak & Exercise Valve	40	1	5/12/2004
10594	TA-40 Repair Gas Leak & Exercise Valve	40	16	5/12/2004
10595	TA-40 Repair Gas Leak & Exercise Valve	40	5	5/12/2004
10200	Locate and Repair Water Leak	43	0	11/12/2003
7743	ELECTRICAL INFRASTURCTURE UPGRADES, TA-46-31	46	31	11/8/1999
8301	Main Gate Replacement and Paved Access Installation	46	2	3/5/2001
8950	Garage Extension TA-46-335	46	335	7/16/2002
9072	Secure storage kit behind TA-46-546	46	546	8/29/2002
9119	Parking Bumper	46	376	9/11/2002
9301	Anchor Parking Bumper, TA-46	46	477	11/15/2002
9360	Replace Fire Hydrant #654	46	254	12/12/2002
9712	Set Bumper Guards Along Roadway	46	0	4/28/2003
9791	Install Security Fence	46	33	5/21/2003

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10047	Drop Tower Installation	46	30	9/3/2003
10390	Replace valve box top destroyed by snow plow.	46	120	3/16/2004
10428	TA-46 Install RAS Chlorination Line	46	337	3/29/2004
10476	Replace reuse valves.	46	334	4/5/2004
10479	New Transportainer, TA-46, FMU-1.	46	573	3/6/2004
7742	LN-2 STORAGE TANK	48	0	11/8/1999
7746	ELECTRICAL INFRASTRUCTURE UPGRADES, TA-48-1	48	1	11/10/1999
7924	REPLACE CHILLERS	48	1	3/28/2000
8351	Mass Spectrometer Installation - Room N107	48	45	4/24/2001
8362	TA-46-154 HVAC Unit Replacement	48	154	4/26/2001
8424	TA-48 RC-45 Refurbishment	48	45	6/15/2001
8444	LN-2 Storage Tank Installation	48	1	7/9/2001
8925	Trailer Utility Installation and Building 31 Removal	48	0	6/18/2002
8965	Site Preparation for Project Office Transportables	48	0	7/24/2002
9610	48-0217, 0218 Site Preparation	48	217	4/3/2003
9910	Repair Water Leak on 12 inch line	48	0	7/15/2003
10352	New Transportainer, TA-18, FMU-1	48	229	2/16/2004
8288	Interagency Helitac Base Upgrades, TA-49	49	0	2/20/2001
9449	Replace Air Relief Valve and Manhole	49	0	1/29/2003
9450	Replace Air Relief Valve and Manhole	49	0	1/29/2003
9953	TA-49-115 Security Fence Installation	49	0	7/24/2003
10353	Repair Emer. Water Leak	49	115	2/16/2004
10503	Backfill, Re-dress, and Landscape After Water Leak	49	170	4/14/2004
7661	SECURITY GATES PROCUREMENT, DESIGN, AND INSTALLATION	50	1	8/23/1999
8392	Cerro Grande Fire Rehabilitation Project: Task 16, TA-50 Ventilation Upgrades	50	1	5/29/2001
9107	Life Manhole Covers, TA-50	50	1	9/9/2002
9621	Lay Base coarse to & Around Transportainer	50	0	4/7/2003
10085	Patch Pot Hold	50	0	9/25/2003
7892	TA-51/12 REMODEL	51	12	3/8/2000
7892	TA-51/12 REMODEL	51	12	3/8/2000
8820	TA-51 Turning Lanes	51	0	4/25/2002
9131	Flow Meter Install, TA-51	51	0	9/16/2002
10241	Repair Broken Water Line	51	27	12/4/2003
7564	RENOVATE PARKING LOT	52	1	5/24/1999
7850	RELOCATE ENTRANCE TO SECURE AREA TA-52 BUILDING 43	52	0	2/8/2000
10068	Install Basecourse	52	33	9/25/2003
10394	Repair water leak on 1 1/4 inch line.	52	44	3/16/2004
7583	COOLING TOWER REPLACEMENT FOR TA-53	53	64	6/14/1999
7665	TA-53 ACCELERATION LANE	53	0	8/26/1999
7710	PERSONNEL ACCESS IMPROVEMENTS TO BLDG 30, 36, AND 1138	53	30	10/1/1999
7710	PERSONNEL ACCESS IMPROVEMENTS TO BLDG 30, 36, AND 1138	53	36	10/1/1999
7948	NEW PARKING LOT	53	25	4/19/2000
8594	TA-53, Cooling Tower and Associated Structure Demolition	53	0	11/14/2001

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8818	TA-53 Traffic Upgrades	53	0	4/25/2002
8946	TA-53 Main Gate Modifications	53	0	7/12/2002
9056	TA-53, Extend Concrete Pad	53	0	8/28/2002
9149	Upgrade Computer Vault, TA-53	53	1	9/23/2002
9230	Footings to Support new Condenser, TA-53	53	18	10/23/2002
9350	Trailer Installation	53	4	12/9/2002
9359	Replace Fire Hydrant #823	53	26	12/12/2002
9361	Replace Fire Hydrant #827	53	4	12/12/2002
9694	Level Manhole Working Surface	53	111	4/22/2003
9866	Repair or Replace Valve Box #226	53	0	6/23/2003
9940	Flight Path #13 Construction	53	0	7/24/2003
10028	LEDA Storage Building	53	0	8/25/2003
10143	Excavate Valve Box #96	53	365	10/23/2003
10145	Excavate Valve Box #72 to Straighten	53	0	10/23/2003
10222	Emergency Repair of Water Leak	53	6	11/24/2003
10223	Repack Valve on PIV #1356	53	807	11/24/2003
10350	New Shed, TA-53, FMU-4	53	0	2/10/2004
10400	New carport, TA-53, FMU-4.	53	1286	3/18/2004
10501	TA-53-1 Repair Leak	53	1	4/14/2004
10504	Repair or Replace Broken Valve Box #68	53	4	4/14/2004
7417	ENTRANCE CANOPIES AT TA-54	54	0	2/12/1999
7556	EXERCISE PATH, TA-54	54	0	5/19/1999
7943	RELOCATE MOBILE LEAD DECON TRAILER	54	0	4/12/2000
8171	Gravel Parking Lot-Administration Area	54	0	10/1/2000
8396	Cerro Grande Fire Rehabilitation Project: Task 16, TA-54 Emergency Vehicle Access Point	54	242	5/29/2001
8688	Carpenter Shop	54	0	2/12/2002
8689	Tool Room	54	0	2/12/2002
8694	Trailer Utility Installation	54	455	2/19/2002
8824	54 West Office Building	54	0	4/29/2002
9057	Pad for TA-54-281	54	281	8/28/2002
9067	Pave pad 2 & 4 , TA-54	54	0	8/29/2002
9093	Gravel Parking Lot, TA-54	54	0	9/6/2002
9104	Duct bank and transformer pad, TA-54	54	247	9/6/2002
9105	Replace/Install Security Gate, TA-54	54		9/6/2002
9138	Shaft Field Drainage, TA-54	54	0	9/18/2002
9139	BMP Work at Area G	54	0	9/18/2002
9184	Install Pipe Ballards	54	0	10/10/2002
9324	Shop Driveway, TA-54	54	473	12/2/2002
9333	RRES Transportainer	54	153	12/4/2002
9349	Access Control Trailer, TA-54 West	54	0	12/9/2002
9386	TA-54-153 Install Power pole	54	153	12/23/2002
9500	Install Telephone Pole, for Relocation of Fiber Cable	54	0	2/20/2003
9510	Repair Eyewash	54	0	2/26/2003
9538	Pave Pads 2 & 4, Phase II	54	0	3/10/2003
9725	Extend Power & Phone	54	0	4/28/2003
9800	TA-54 Power Install to Progrommaatic Units	54	0	6/4/2003
9875	Reconfigure 54-218 for Berthold Counter	54	218	7/15/2003
10015	Drilling Lay Down Area	54	0	8/21/2003
10129	Install Conduit to Air Monitor Station	54	242	10/17/2003

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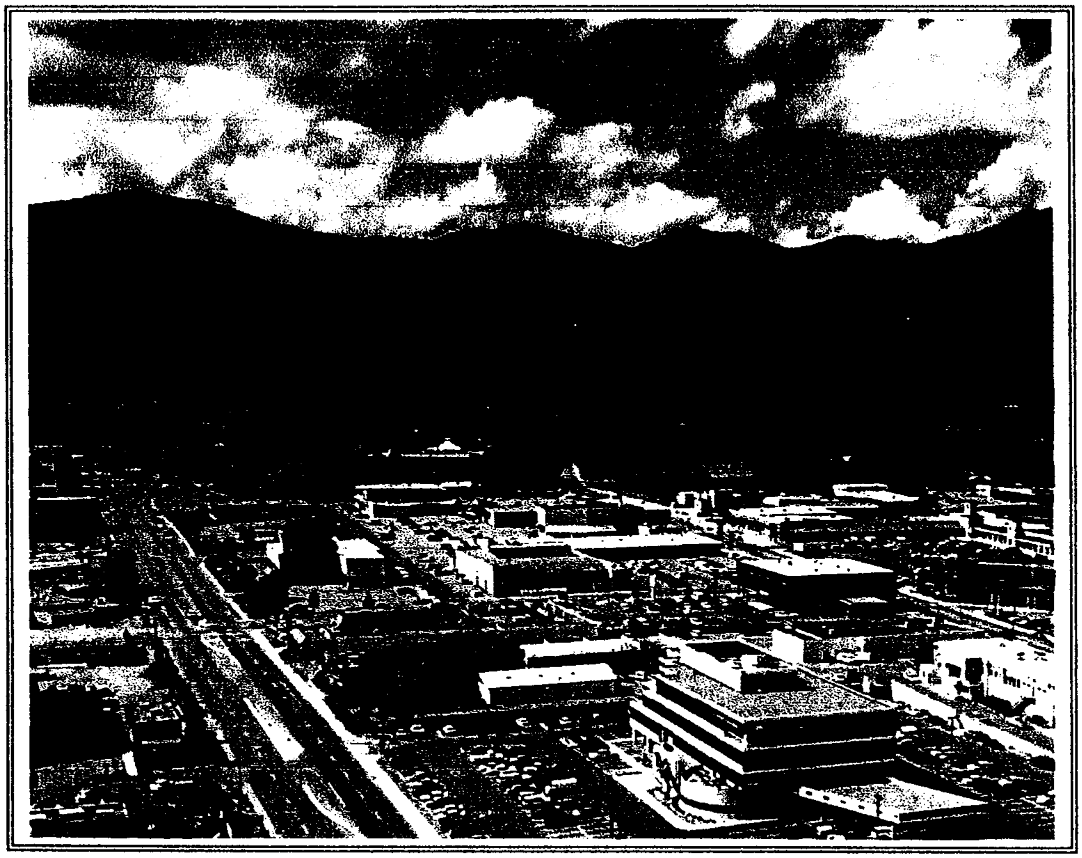
10168	CCP Office Building	54	0	10/28/2003
10253	TA-54 Electrical Trench	54	1003	12/8/2003
10303	New Transportainer, TA-54, FMU-6	54	0	1/19/2004
10307	Modified transportainer, TA-54, FMU-6.	54		1/20/2004
10314	Two new transportainers,TA-54, FMU-6.	54	0	1/26/2004
10319	Relocate RRES units, TA-54, FMU-6.	54	0	1/28/2004
10354	54-473 Slab.	54	473	2/17/2004
7532	TA-55 SALVAGE AREA*	55	0	4/30/1999
7628	TMSE, NMT CLASSIFIED LAN	55	0	7/22/1999
7656	TMSE, 431/432 CONFIGURATION	55	4	8/17/1999
8129	NMT-8/JCNNM Building*	55	0	8/22/2000
8156	Storage Building	55	0	9/13/2000
8248	Manufacturing Technical Support Facility (MTSF) /(also known as NMT FY 01 Office Building)	55	0	1/8/2001
8523	Install of Hood in PF-4-115	55	4	8/15/2001
8868	Reconfigure Office Space	55	41	5/22/2002
8911	FITS Parking Lot	55	0	6/10/2002
8980	Temporary Parking (False PIDAS)	55	0	7/29/2002
9262	PIDAS Work, Install Conduit for new guard station	55	0	11/6/2002
9274	Install Frit Deliver	55	0	11/12/2002
9654	Set Barriers TA-55	55	265	4/10/2003
9662	Dedicated Tube Trailer for Aragon Line, Phase 2	55	0	4/15/2003
9665	Install Frit Delivery	55	0	4/15/2003
9702	Nitrogen System Upgrade	55	4	4/23/2003
9774	Remodel SNM Unpacking Room in PF-4 data TA-55	55	4	5/15/2003
9778	Electronic Messaging Signs	55	9	5/20/2003
10041	New CMR Upgrades	55	0	9/3/2003
10128	Install LN2 Line	55	0	10/17/2003
10280	Install nitrogen dewar system	55		1/6/2004
10318	Install new nitrogen system.	55	0	2/2/2004
10409	TA-55 Pajarito East parking structure.	55	0	3/19/2004
10424	Two transportainers, TA-55, FMU-7.	55	347	3/29/2004
10424	Two transportainers, TA-55, FMU-7.	55	348	3/29/2004
7562	PARKING LOT, TA-58, FM-81	58	0	5/21/1999
9645	SM-31 Parking Lot	58	31	4/10/2003
10239	Fill Material for Parking Structure	58	0	12/2/2003
7604	INSTALL CONCRETE PAD FOR A/C UNIT	59	2	6/29/1999
7706	TA-59-EMERGENCY VEHICLE ACCESS PAD	59	0	9/29/1999
8821	TA-59 to TA-18	59	0	4/25/2002
10373	Repair sewer line break.	59	34	3/1/2004
10382	Replace Valve Boxes Destroyed By Snow Removal	59	0	3/9/2004
7571	SALT DOME, NEW LOCATION - 99-0124	60	0	6/2/1999
8403	Storage Yard Fencing - Sigma Mesa	60	0	6/7/2001
8568	TA-60-02, Heavy Truck Scale Installation Project (New Location)	60	0	10/3/2001
9062	Construction to install new concrete slab	60	29	8/28/2002
9263	Repair Driveway, TA-60	60	1	11/6/2002
9429	Install A Stop Sign at TA-60	60	0	1/16/2003
9447	Repair or Replace Valve Box	60	85	1/29/2003

AccNo	Project Title	TA	Bldg	AccDate
9580	Sigma Mesa Building	60	0	3/27/2003
9970	Install Base Course Pad at TA-60	60	0	8/11/2003
10155	Sigma Mesa Metal Building	60	0	10/23/2003
10213	TA-60 Storage Yards	60	29	11/17/2003
10358	Install ground rod and anchor canopy.	60	201	2/18/2004
10392	Relocate TA-03-922 to TA-60, FMU-8.	60	0	3/16/2004
10419	Leased semi-trailer, TA-60, FMU-8.	60	244	3/23/2004
7456	SALT DOME, NEW LOCATION - 99-0043	61	0	3/9/1999
8033	CONSTRUCT TA-61 PARKING	61	0	6/22/2000
8214	Border Station	61	23	11/20/2000
9126	Camouflage at Royal Crest Court NE	61		9/13/2002
9129	Candy Stripe, TA-61	61	0	9/13/2002
9390	Repair Defective Secondary Wires Leading to Fire Pumps	61	42	1/6/2003
9436	Provide Power to Tech Meter#4	61	0	1/22/2003
10138	Excavate & Remove CMP Manhole	61	0	1/17/2003
7896	PARKING LOT, FWO-DO	63	0	3/8/2000
8339	FWO Division Administration Building, (Proposed)	63	0	4/18/2001
9134	Repair Water Leak on Meter	63	1	9/17/2002
9459	Install Service Pole	63	0	2/3/2003
9622	TA-63 FWO-DO Office Building	63	0	4/7/2003
10455	TA-63 Erosion Control Sigma Mesa	63	53	3/31/2004
10473	IM-DO Office building project development.	63	0	4/5/2004
7668	ESH-18 STORAGE TENT	64	0	8/27/1999
8306	Replacement of TA-64 Compound Structures (Cerro Grande Fire)	64	0	3/12/2001
9458	TA-64 PTLA Buildings	64	0	2/3/2003
10171	Fence Installation TA-64	64	64	10/30/2003
10391	Clean out border.	64	1	3/16/2004
7667	PAVE PARKING LOT	66	0	8/26/1999
8409	FWO Division Administration Building (New Location)	66	0	6/13/2001
7757	SKID MOUNTED DATA RECORDING STRUCTURE	69	0	11/19/1999
9562	Raise valve Boxes-69	69	0	3/18/2003
9589	TA-69 Repair Water Leak	69	0	3/27/2003
9697	WTA Sub-Station Manhole	69	0	4/22/2003
9715	Roadway Sign Instllation	69	0	4/30/2003
10175	Remove & Replace Approximately 1000 LF of 6-feet & 8-feet of Water Line Pipe	69	0	10/30/2003
10285	Mechanical equipment enclosure, TA-69, FMU-8 Siting	69	0	1/8/2004
10310	TA-69 emergency repair to tank fill line leak.	69	0	1/22/2004
10445	TA-69 Replace Tank Fill Valve and CMP	69	0	3/31/2004
9164	Re-route 2-inch Water Line Around Building #9	72	9	10/8/2002
9587	Primary Metering Station	72	0	3/27/2003
10134	Loops for State Road 4 & East Jemez	72	0	10/17/2003
10328	PTLA Post #10, TA-72.FMU-3.	72	0	2/3/2004
9626	Repair or Replace Fire Hydrant #612	80	202	4/7/2003

ATTACHMENT C

III. LAND USE AND COMMUNITY CHARACTER



III. Land use and community character

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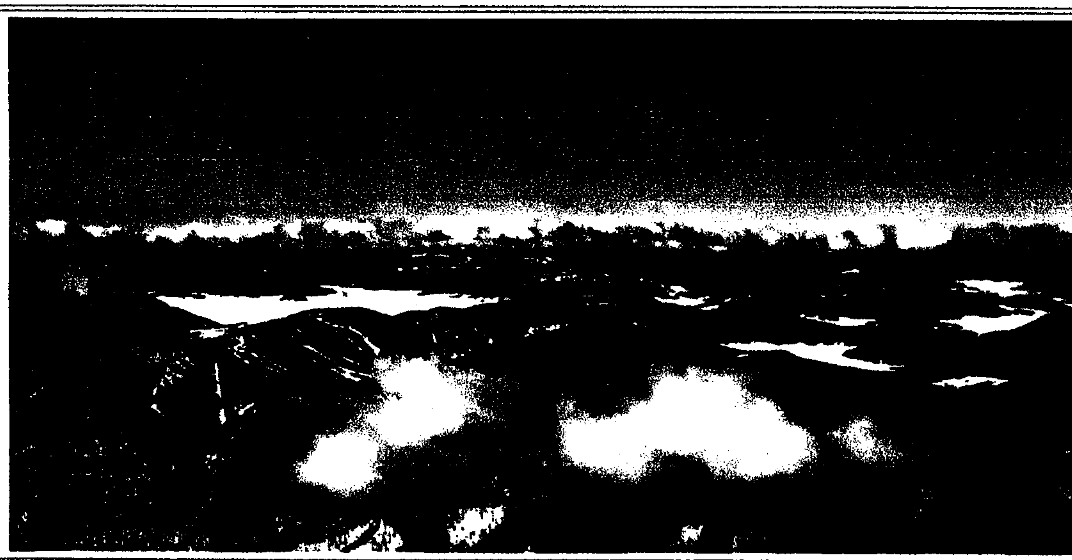
III. LAND USE AND COMMUNITY CHARACTER

A. LAND USE MAPS, DEFINITIONS AND POLICIES

The Land Use Maps (Map 1 for Los Alamos Townsite, Map 2 for White Rock and Map 3 for the entire County) illustrate the land development component of the Los Alamos County Comprehensive Plan. The entire Comprehensive Plan must be considered when interpreting the maps. As Neighborhood Plans are adopted, they will serve as amendments to the Comprehensive Plan and the Land Use Maps.

The following categories indicate proposed and/or current land use on the maps. These categories are defined in detail in Sections B and C below:

1. Land Use Categories I. (Preservation Lands), II. (Development Lands) and III. (Conservation-Holding Lands) include land transferred (or to be transferred) to the County by the Federal Government (Public Law 105-119). These categories result from extensive research and analysis conducted by the Open Space Advisory Committee (OSAC) over the course of several years. The resulting Open Space Plan is incorporated here by reference, and is available at the Community Development Department for review by interested parties.
2. Category IV. (Downtown) incorporates, by reference, the Plan adopted for Downtown Los Alamos in 2002 and proposes that a Plan of similar scope be developed for downtown White Rock.
3. Category V. (Other Land Uses) depicts current conditions and includes policy inferred from the Vision Statement, Desired Outcomes and Action Items.



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B. OPEN SPACE CATEGORIES FOR COUNTY-OWNED LANDS

1. Preservation Lands possess natural, environmental, wildlife, scenic, recreational, and cultural values that are important to the community. Preservation Lands will be managed to retain these qualities and merit strong protection from development and uses that degrade these values. In addition to lands with natural or cultural values, Preservation Lands include tracts having characteristics rendering them un-developable, such as public safety hazards. Preservation Lands shall be managed to maintain their natural, wildlife, and open-space values and for maintenance of public trails and parks and recreation facilities and sites.

a. Natural Areas: These lands have the highest natural, environmental, wildlife, scenic, and cultural values. They shall be managed to retain their open, natural qualities and access shall be directed to designated trails, which may be seasonally limited because of wildlife concerns. Other than trails, trailheads, compatible trail structures, signage, and associated parking areas, there shall be no structures or motorized use in these areas. Placement of utility corridors shall be discouraged, but if absolutely necessary for community purposes, shall be accomplished with minimal impact. The disturbed lands shall be restored to their original contours and natural conditions, and only minimal access for maintenance shall be permitted.

To preserve these lands and protect them from future development, they shall either:

(1) be restricted by permanent conservation easements held by a land trust, or

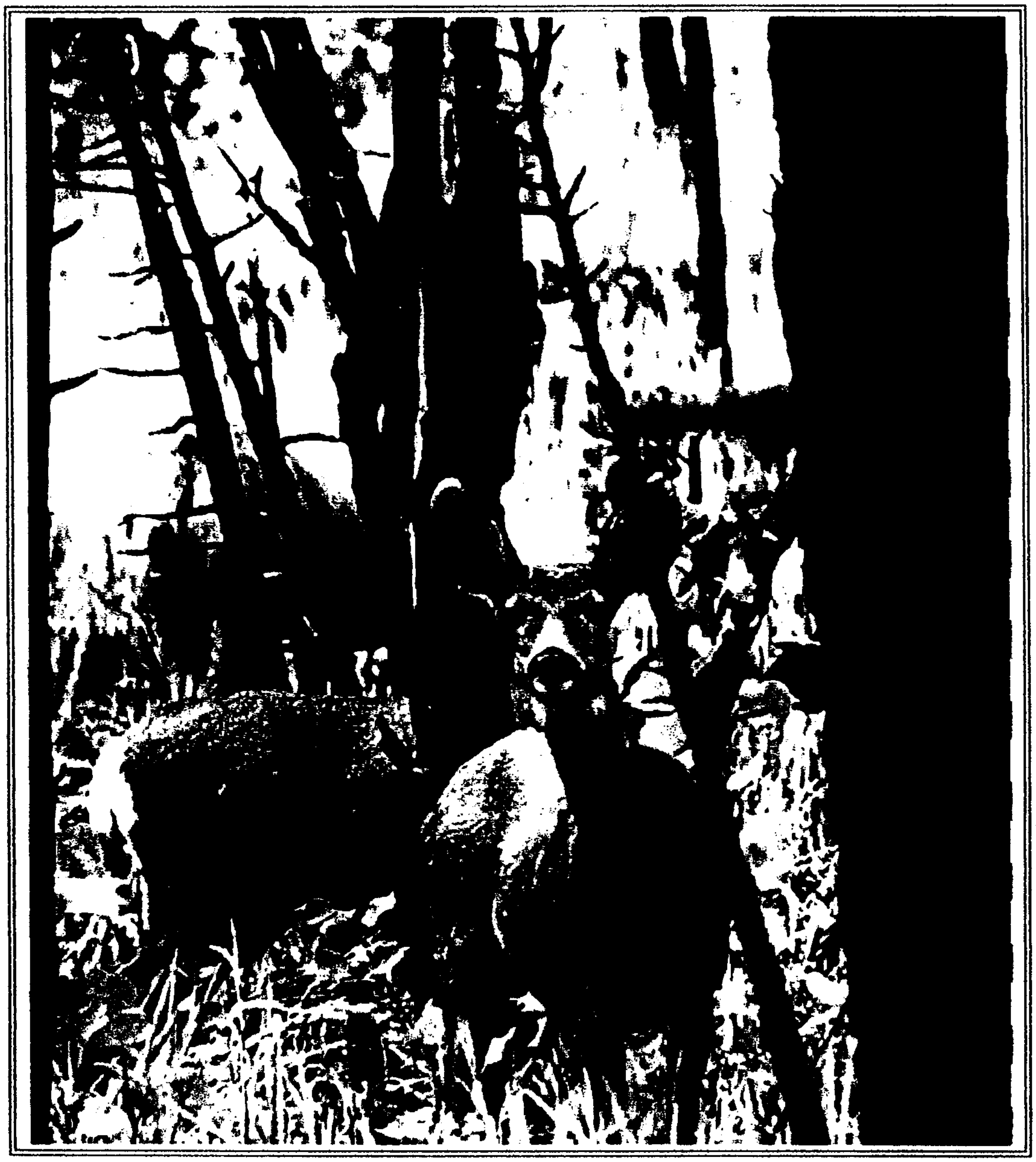
(2) require a 2/3rds vote of the electorate to be reclassified for other uses.

b. Low-Impact Recreation Areas: These lands have high natural, environmental, wildlife, scenic, trail, and cultural values and shall be managed to retain their open, natural, and low-impact recreational qualities. While these lands shall, for the most part, be managed in a manner similar to lands in the Natural Areas sub-category, low-impact recreational and educational facilities and utility corridors shall be permitted if they are designed to fit in and blend with their natural surroundings. Controls on structures shall include use of natural materials, definition of building envelopes, height limitations, lighting and noise standards, site restoration standards, and other measures designed to ensure compatibility with surroundings. Road access is discouraged, but where required, shall be strictly limited and managed to minimize impact on natural values.

Reclassifying parcels in this sub-category for higher-intensity uses shall require a 2/3rds vote of the electorate.

c. Parks and Recreation Areas: These lands have developed and undeveloped parks, golf courses, ball fields, and recreation facilities. Parks and Recreation Lands shall be managed and developed to accommodate community recreational use under the guidance of the Parks and Recreation Board. Where these lands abut other Preservation Lands, uses shall be designed and managed to minimize impact on adjacent lands.

Reclassifying parcels in this sub-category to higher-intensity uses shall require a 2/3rds vote of the electorate.



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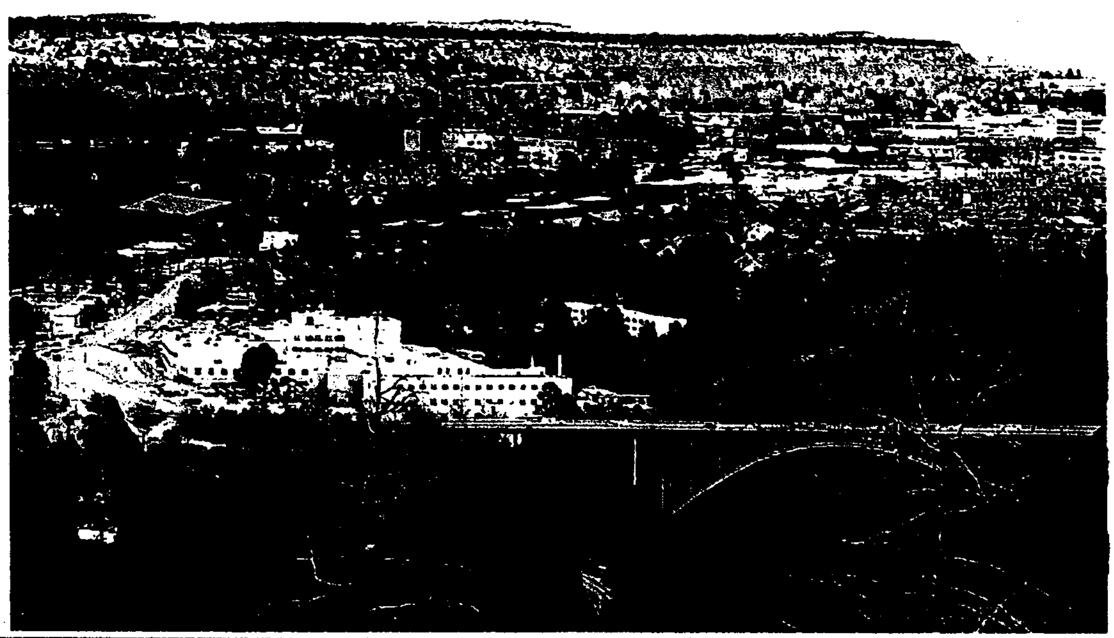
2. DEVELOPMENT LANDS

Development Lands do not possess key natural, wildlife, scenic, recreational, or cultural values, are near or adjacent to existing development and infrastructure, and are suitable for other community purposes and certain types of development.

a. Open-Space Compatible Development: While these lands could be available for urban use, they should be developed with sensitivity to community open-space objectives since they may be adjacent to or significantly affect other lands that have these values. Included in these lands are County-owned lands that may be redeveloped and are adjacent to or in close proximity to open-space lands. Designation of these lands may be accomplished by an overlay to existing zoning. Open-Space compatible development may be restricted through setbacks, locations, height, light, and noise restrictions, fencing, and other design controls to meet the objective of producing a gradual and sensitive transition from open space to built uses.

b. Controlled Development: These are lands that either are not adjacent to open space or do not affect open-space values. These lands are available for development according to the County's development code and may be placed in an appropriate zoning category through rezoning.

c. Redevelopment: These are County-owned lands adjacent to open-space areas that could be redeveloped with consideration of open-space values.



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Conservation-Holding Lands are County-owned lands and future transfer sites that possess both preservation values and development potential, but which the community has not yet had the opportunity to evaluate with respect to the relative merits of preservation versus development. The intent of this category is to prevent sprawl by optimizing development of the community's core areas, while reserving some lands for future development opportunities.

For consideration as Conservation-Holding Lands, parcels must exhibit characteristics making them suitable for development: slopes of less than 25%, access to infrastructure, adjacent to existing development to prevent sprawl, as well as characteristics that make them suitable for preservation: natural, environmental, wild-life, scenic, recreational, and cultural values that are important to the community. These lands will be managed in the same way as Preservation Lands Low-Impact Recreation until they are otherwise designated.

After a site has been placed in the Conservation-Holding category, the County Council can direct OSAC at any time to conduct a systematic analysis so that conservation requirements and development opportunities are fully understood. Only after such an analysis may portions or all of the site be moved to Preservation and/or Development Lands categories. Such reclassification shall require action by the Council or a simple majority vote of the electorate. Land retained in the Conservation-Holding category after such analysis cannot be considered for reclassification for a minimum of five years.

The purpose of this designation is to balance open space protection with other community objectives identified in the Desired Outcomes and Action Statements. Any development must preserve open-space values through adherence to site and design standards that may require set-backs, buffers, height limits, etc.

C. LAND USE TYPES:

These land use types reflect existing conditions or policy direction drawn from the Vision Statement, Desired Outcomes, and Action Items. For mapping, and to establish land use types conducive to making comprehensive planning policy, the County's thirty-one zoning categories have been blended into ten broad types of land use. These land use definitions and their depiction on the Land Use Maps show both current conditions and proposed uses and are intended to provide policy direction.

1. Downtown:

This land use category applies to the mixed-use commercial/community cores of Los Alamos and White Rock. The County has adopted a detailed plan for Downtown Los Alamos, incorporated herein by reference. Developing a plan for downtown White Rock is an Action Item of this Comprehensive Plan. [see **II.B.2.e.(1)**]

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2. Mixed Use:

Mixed Use is any combination of uses including Institutional, Commercial, Professional Office, Single-Family, Multifamily and Open Space could be used to promote walkability, economic development, greater diversity in housing, and site planning that is sensitive to adjacent open space. Mixed Use development may also be considered appropriate for new or re-development outside of the downtown areas.

3. Institutional. Characterized by existing schools, churches and civic buildings; these are institutional uses that help build community and that the County would like to encourage to remain in place.

4. Commercial: Characterized by a mix of office and retail uses, the zoning categories underlying this land use will be revised to also allow residential.

5. Industrial: Characterized by manufacturing, warehousing and storage, these are land uses the County values for their economic development potential. Limited office, related retail and even live-work residential will be considered as possible uses in revising the underlying zoning categories to bring them into conformance with this Plan.

6. Professional Office: Characterized by predominantly office uses in a park-like setting, the zoning categories underlying this land use will be revised to also allow residential, live/work, light manufacturing and related retail, so that a mix of complimentary uses can co-exist within close proximity and convenient walking distance.

7. Single-Family Residential: Characterized by low-density residential, attached and detached dwelling units; the underlying zoning categories may be simplified, but the single-family, low-density character of existing neighborhoods will not be changed.

8. Multifamily Residential: Characterized by mid- to high-density residential, all attached dwelling units; the underlying zoning categories generally result in townhouse

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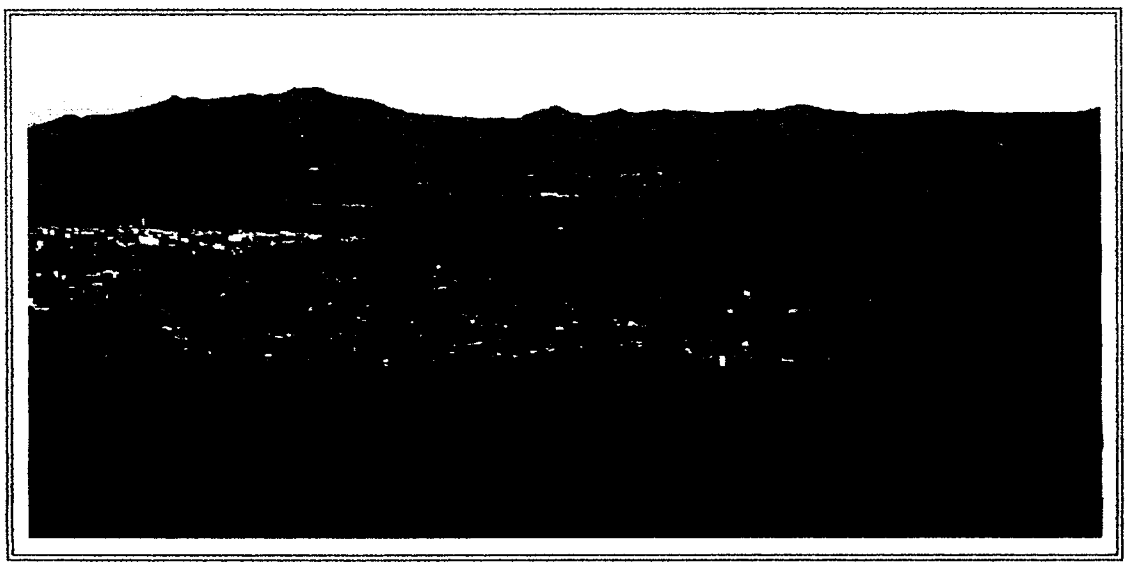
and apartment developments. These densities tend to produce the most affordable housing products in Los Alamos County, and are valued as such. The zoning code may be revised to allow live/work units and limited, neighborhood-serving commercial uses.

9. Open Space Areas: Includes Preservation Lands, Development Lands and Conservation Holding Lands.

10. Federal: This designation indicates ownership rather than land use and applies to large percentage of Los Alamos County. Federal lands include properties owned by the Bureau of Land Management (BLM), the General Services Administration (GSA), the Department of Energy (DOE), the National Forest Service(NFS), and the National Park Service(NPS). Lands owned by Tribal and Pueblo governments are also included. The County government has no jurisdiction over Federal Lands, however, these lands have been included in this planning process. To achieve the goals set forth in this Plan, the County will continue to seek the cooperation of each of these government entities.



The community crafted Vision Statement speaks of the County's unique setting, its small town atmosphere, natural surroundings and past, of recreation and a relaxed pace of life "where shopkeepers and neighbors know your name..." Preserving these qualities requires attention to the physical design of the community in addition to land use policies, historic districts, open space preservation, recreational facilities, infrastructure and programs.

Specific urban design studies have been completed for downtown Los Alamos and are called for to address downtown White Rock, major entrances into both townsites and the Los Alamos Community Hub. The following general policies are intended to serve as guidelines until Neighborhood Plans can be completed and to provide direction for revisions to the County's Land Development Code.

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Los Alamos County derives its "sense of place" from its extraordinary mountain backdrop, high mesa setting, well-defined canyon edges and geographic isolation. These attributes contribute to its compact urban form, and small town flavor. These physical attributes are valued and will be preserved.

Los Alamos County's urban development is relatively low-density and small-scale. Outside of the two downtown cores identified for the White Rock and Los Alamos townsites, and the Los Alamos Community Hub, new development should reflect the small scale, low density surroundings. Residential infill in existing neighborhoods should reflect the height, scale, massing and setbacks of adjacent residential developments. Non-residential infill should reflect the scale and design character of its surroundings.

In order to preserve the small town ambiance, opportunities to meet informally will be expanded by providing stronger pedestrian, bicycle and transit connections, by allowing appropriately scaled mixed use infill and new development, and by enhancing the public realm and creating new public, outdoor spaces such as pocket parks, small courtyards, wider sidewalks, and outdoor dining and entertainment opportunities as part of neighborhood plans and streetscape improvement plans.

1. Transfer lands:

The Atomic Energy Community Act of 1955 required the federal government to provide financial assistance to the communities created during the era of the Manhattan Project until they were able to achieve financial self-sufficiency. In 1955 the Department of Energy (DOE) reached an "Agreement in Principle" with the County of Los Alamos to end annual payments. In exchange, the DOE proposed, in part, to transfer to the County some lands not required for Los Alamos National Laboratory (LANL) operations in order to create affordable housing and achieve self-sufficiency. Public Law 105-119, enacted in 1998, provided the legal authority for these land transfers [***] and stipulated that: "The parcels of land conveyed or transferred under this section shall be used for historic, cultural or environmental preservation purposes, economic diversification or community self-sufficiency purposes."

2. Entryway design overlays and Corridors:

a. Entryway Design Overlays identify the major entrances into Los Alamos and White Rock townsites. The County will undertake urban design studies for these Entryways and establish Design Overlay Zones and public improvements to enhance their function and aesthetics.

b. Entryway Corridor Plan

The Entryway Corridor Plan (ECP) will reflect the Community Vision and the goals set forth in the Comprehensive Plan and should be incorporated as a subsection of the overall Los Alamos Comprehensive Plan (LACCP). The Comprehensive Plan Steering Committee (CPSC) should carefully consider the important impact on the community character made by these properties during the process of ECP development. The east Entryway Corridors for both Los Alamos and White Rock begin at the intersection of Highway 502 and Highway 4 and continue to the beginning of each community's residential area.

The ECP will include the following guidelines: the values in the Vision Statement must be respected; viewsheds need to be identified and protected; clean industry uses should receive preference; ingress and egress must be designed to address both safety and visual impact; trail connections must be preserved and enhanced; County-owned land should require the highest standards; re-establish the historic "Gate". Covenants should be attached to the title of any lands sold within these areas to ensure compliance with the LACCP and the yet-to-be-developed ECP, which will become an incorporated section of the LACCP. [***]

3. Community Hubs:

This land use classification applies to significant community hubs or core areas outside of the two downtowns that merit more detailed land use and design studies to enhance their function as mixed-use community activity centers. They provide the form and fabric of the community. The current Proposed Land Use Map identifies a single Community Hub located within the Los Alamos townsite straddling Diamond Drive and encompassing the UNM branch campus and Los Alamos High School. Additional Community Hubs may be identified in the future.

(Insert photo here)

ATTACHMENT D

Table DP-1. Profile of General Demographic Characteristics: 2000

Geographic area: San Ildefonso Pueblo CDP, New Mexico

[For information on confidentiality protection, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total population	**458**	**100.0**
SEX AND AGE		
Male	218	47.6
Female	240	52.4
Under 5 years	35	7.6
5 to 9 years	36	7.9
10 to 14 years	41	9.0
15 to 19 years	42	9.2
20 to 24 years	36	7.9
25 to 34 years	49	10.7
35 to 44 years	72	15.7
45 to 54 years	50	10.9
55 to 59 years	24	5.2
60 to 64 years	29	6.3
65 to 74 years	29	6.3
75 to 84 years	9	2.0
85 years and over	6	1.3
Median age (years)	32.4	(X)
18 years and over	314	68.6
Male	156	34.1
Female	158	34.5
21 years and over	297	64.8
62 years and over	59	12.9
65 years and over	44	9.6
Male	17	3.7
Female	27	5.9
RACE		
One race	451	98.5
White	74	16.2
Black or African American	-	-
American Indian and Alaska Native	364	79.5
Asian	-	-
Asian Indian	-	-
Chinese	-	-
Filipino	-	-
Japanese	-	-
Korean	-	-
Vietnamese	-	-
Other Asian [1]	-	-
Native Hawaiian and Other Pacific Islander	-	-
Native Hawaiian	-	-
Guamanian or Chamorro	-	-
Samoan	-	-
Other Pacific Islander [2]	-	-
Some other race	13	2.8
Two or more races	7	1.5
Race alone or in combination with one or more other races: [3]		
White	81	17.7
Black or African American	-	-
American Indian and Alaska Native	367	80.1
Asian	-	-
Native Hawaiian and Other Pacific Islander	-	-
Some other race	17	3.7

Subject	Number	Percent
HISPANIC OR LATINO AND RACE		
Total population	**458**	**100.0**
Hispanic or Latino (of any race)	48	10.5
Mexican	9	2.0
Puerto Rican	-	-
Cuban	-	-
Other Hispanic or Latino	39	8.5
Not Hispanic or Latino	410	89.5
White alone	47	10.3
RELATIONSHIP		
Total population	**458**	**100.0**
In households	458	100.0
Householder	150	32.8
Spouse	72	15.7
Child	175	38.2
Own child under 18 years	122	26.6
Other relatives	42	9.2
Under 18 years	20	4.4
Nonrelatives	19	4.1
Unmarried partner	13	2.8
In group quarters	-	-
Institutionalized population	-	-
Noninstitutionalized population	-	-
HOUSEHOLD BY TYPE		
Total households	**150**	**100.0**
Family households (families)	119	79.3
With own children under 18 years	58	38.7
Married-couple family	72	48.0
With own children under 18 years	32	21.3
Female householder, no husband present	36	24.0
With own children under 18 years	18	12.0
Nonfamily households	31	20.7
Householder living alone	23	15.3
Householder 65 years and over	10	6.7
Households with individuals under 18 years	68	45.3
Households with individuals 65 years and over	30	20.0
Average household size	3.05	(X)
Average family size	3.43	(X)
HOUSING OCCUPANCY		
Total housing units	**178**	**100.0**
Occupied housing units	150	84.3
Vacant housing units	28	15.7
For seasonal, recreational, or occasional use	11	6.2
Homeowner vacancy rate (percent)	-	(X)
Rental vacancy rate (percent)	5.0	(X)
HOUSING TENURE		
Occupied housing units	**150**	**100.0**
Owner-occupied housing units	131	87.3
Renter-occupied housing units	19	12.7
Average household size of owner-occupied units	3.11	(X)
Average household size of renter-occupied units	2.63	(X)

\- Represents zero or rounds to zero. (X) Not applicable.

[1] Other Asian alone, or two or more Asian categories.

[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

[3] In combination with one or more of the other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000.

Table DP-2. Profile of Selected Social Characteristics: 2000

Geographic area: San Ildefonso Pueblo CDP, New Mexico

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
SCHOOL ENROLLMENT		
Population 3 years and over enrolled in school	**120**	**100.0**
Nursery school, preschool	7	5.8
Kindergarten	-	-
Elementary school (grades 1-8)	64	53.3
High school (grades 9-12)	30	25.0
College or graduate school	19	15.8
EDUCATIONAL ATTAINMENT		
Population 25 years and over	**239**	**100.0**
Less than 9th grade	14	5.9
9th to 12th grade, no diploma	32	13.4
High school graduate (includes equivalency)	75	31.4
Some college, no degree	78	32.6
Associate degree	16	6.7
Bachelor's degree	15	6.3
Graduate or professional degree	9	3.8
Percent high school graduate or higher	80.8	(X)
Percent bachelor's degree or higher	10.0	(X)
MARITAL STATUS		
Population 15 years and over	**301**	**100.0**
Never married	114	37.9
Now married, except separated	109	36.2
Separated	-	-
Widowed	29	9.6
Female	29	9.6
Divorced	49	16.3
Female	27	9.0
GRANDPARENTS AS CAREGIVERS		
Grandparent living in household with one or more own grandchildren under 18 years	**10**	**100.0**
Grandparent responsible for grandchildren	4	40.0
VETERAN STATUS		
Civilian population 18 years and over	**283**	**100.0**
Civilian veterans	25	8.8
DISABILITY STATUS OF THE CIVILIAN NONINSTITUTIONALIZED POPULATION		
Population 5 to 20 years	**99**	**100.0**
With a disability	11	11.1
Population 21 to 64 years	**230**	**100.0**
With a disability	33	14.3
Percent employed	51.5	(X)
No disability	197	85.7
Percent employed	62.4	(X)
Population 65 years and over	**40**	**100.0**
With a disability	24	60.0
RESIDENCE IN 1995		
Population 5 years and over	**369**	**100.0**
Same house in 1995	317	85.9
Different house in the U.S. in 1995	49	13.3
Same county	32	8.7
Different county	17	4.6
Same state	12	3.3
Different state	5	1.4
Elsewhere in 1995	3	0.8

Subject	Number	Percent
NATIVITY AND PLACE OF BIRTH		
Total population	**398**	**100.0**
Native	395	99.2
Born in United States	392	98.5
State of residence	321	80.7
Different state	71	17.8
Born outside United States	3	0.8
Foreign born	3	0.8
Entered 1990 to March 2000	-	-
Naturalized citizen	3	0.8
Not a citizen	-	-
REGION OF BIRTH OF FOREIGN BORN		
Total (excluding born at sea)	**3**	**100.0**
Europe	-	-
Asia	-	-
Africa	-	-
Oceania	-	-
Latin America	3	100.0
Northern America	-	-
LANGUAGE SPOKEN AT HOME		
Population 5 years and over	**369**	**100.0**
English only	190	51.5
Language other than English	179	48.5
Speak English less than "very well"	27	7.3
Spanish	18	4.9
Speak English less than "very well"	3	0.8
Other Indo-European languages	-	-
Speak English less than "very well"	-	-
Asian and Pacific Island languages	-	-
Speak English less than "very well"	-	-
ANCESTRY (single or multiple)		
Total population	**398**	**100.0**
Total ancestries reported	*394*	*99.0*
Arab	-	-
Czech[1]	-	-
Danish	-	-
Dutch	-	-
English	9	2.3
French (except Basque)[1]	-	-
French Canadian[1]	-	-
German	-	-
Greek	-	-
Hungarian	5	1.3
Irish[1]	3	0.8
Italian	-	-
Lithuanian	-	-
Norwegian	-	-
Polish	-	-
Portuguese	-	-
Russian	-	-
Scotch-Irish	6	1.5
Scottish	-	-
Slovak	-	-
Subsaharan African	-	-
Swedish	-	-
Swiss	-	-
Ukrainian	-	-
United States or American	-	-
Welsh	-	-
West Indian (excluding Hispanic groups)	-	-
Other ancestries	371	93.2

-Represents zero or rounds to zero. (X) Not applicable.

[1]The data represent a combination of two ancestries shown separately in Summary File 3. Czech includes Czechoslovakian. French includes Alsatian. French Canadian includes Acadian/Cajun. Irish includes Celtic.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-3. Profile of Selected Economic Characteristics: 2000

Geographic area: San Ildefonso Pueblo CDP, New Mexico

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
EMPLOYMENT STATUS		
Population 16 years and over	**287**	**100.0**
In labor force	170	59.2
Civilian labor force	170	59.2
Employed	149	51.9
Unemployed	21	7.3
Percent of civilian labor force	12.4	(X)
Armed Forces	-	-
Not in labor force	117	40.8
Females 16 years and over	**156**	**100.0**
In labor force	84	53.8
Civilian labor force	84	53.8
Employed	79	50.6
Own children under 6 years	**31**	**100.0**
All parents in family in labor force	24	77.4
COMMUTING TO WORK		
Workers 16 years and over	**141**	**100.0**
Car, truck, or van - - drove alone	105	74.5
Car, truck, or van - - carpooled	13	9.2
Public transportation (including taxicab)	-	-
Walked	9	6.4
Other means	4	2.8
Worked at home	10	7.1
Mean travel time to work (minutes)[1]	18.5	(X)
Employed civilian population 16 years and over	**149**	**100.0**
OCCUPATION		
Management, professional, and related occupations	35	23.5
Service occupations	43	28.9
Sales and office occupations	49	32.9
Farming, fishing, and forestry occupations	3	2.0
Construction, extraction, and maintenance occupations	11	7.4
Production, transportation, and material moving occupations	8	5.4
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	3	2.0
Construction	5	3.4
Manufacturing	5	3.4
Wholesale trade	-	-
Retail trade	14	9.4
Transportation and warehousing, and utilities	3	2.0
Information	3	2.0
Finance, insurance, real estate, and rental and leasing	3	2.0
Professional, scientific, management, administrative, and waste management services	11	7.4
Educational, health and social services	39	26.2
Arts, entertainment, recreation, accommodation and food services	25	16.8
Other services (except public administration)	-	-
Public administration	38	25.5
CLASS OF WORKER		
Private wage and salary workers	63	42.3
Government workers	72	48.3
Self-employed workers in own not incorporated business	13	8.7
Unpaid family workers	1	0.7

Subject	Number	Percent
INCOME IN 1999		
Households	**150**	**100.0**
Less than $10,000	39	26.0
$10,000 to $14,999	6	4.0
$15,000 to $24,999	20	13.3
$25,000 to $34,999	25	16.7
$35,000 to $49,999	35	23.3
$50,000 to $74,999	25	16.7
$75,000 to $99,999	-	-
$100,000 to $149,999	-	-
$150,000 to $199,999	-	-
$200,000 or more	-	-
Median household income (dollars)	30,000	(X)
With earnings	109	72.7
Mean earnings (dollars)[1]	32,720	(X)
With Social Security income	47	31.3
Mean Social Security income (dollars)[1]	9,704	(X)
With Supplemental Security Income	2	1.3
Mean Supplemental Security Income (dollars)[1]	2,750	(X)
With public assistance income	-	-
Mean public assistance income (dollars)[1]	-	(X)
With retirement income	22	14.7
Mean retirement income (dollars)[1]	9,764	(X)
Families	**115**	**100.0**
Less than $10,000	22	19.1
$10,000 to $14,999	3	2.6
$15,000 to $24,999	21	18.3
$25,000 to $34,999	20	17.4
$35,000 to $49,999	24	20.9
$50,000 to $74,999	25	21.7
$75,000 to $99,999	-	-
$100,000 to $149,999	-	-
$150,000 to $199,999	-	-
$200,000 or more	-	-
Median family income (dollars)	30,972	(X)
Per capita income (dollars)[1]	11,039	(X)
Median earnings (dollars):		
Male full-time, year-round workers	19,792	(X)
Female full-time, year-round workers	19,250	(X)

Subject	Number below poverty level	Percent below poverty level
POVERTY STATUS IN 1999		
Families	**22**	**19.1**
With related children under 18 years	-	-
With related children under 5 years	-	-
Families with female householder, no husband present	**14**	**29.2**
With related children under 18 years	-	-
With related children under 5 years	-	-
Individuals	**59**	**14.9**
18 years and over	59	20.8
65 years and over	20	50.0
Related children under 18 years	-	-
Related children 5 to 17 years	-	-
Unrelated individuals 15 years and over	19	37.3

-Represents zero or rounds to zero. (X) Not applicable.

[1]If the denominator of a mean value or per capita value is less than 30, then that value is calculated using a rounded aggregate in the numerator. See text.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-4. Profile of Selected Housing Characteristics: 2000

Geographic area: San Ildefonso Pueblo CDP, New Mexico

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent	Subject	Number	Percent
Total housing units	**163**	**100.0**	**OCCUPANTS PER ROOM**		
UNITS IN STRUCTURE			**Occupied housing units**	**146**	**100.0**
1-unit, detached	148	90.8	1.00 or less	135	92.5
1-unit, attached	3	1.8	1.01 to 1.50	8	5.5
2 units	-	-	1.51 or more	3	2.1
3 or 4 units	-	-			
5 to 9 units	-	-	**Specified owner-occupied units**	**109**	**100.0**
10 to 19 units	-	-	**VALUE**		
20 or more units	-	-	Less than $50,000	28	25.7
Mobile home	12	7.4	$50,000 to $99,999	45	41.3
Boat, RV, van, etc	-	-	$100,000 to $149,999	2	1.8
			$150,000 to $199,999	14	12.8
YEAR STRUCTURE BUILT			$200,000 to $299,999	6	5.5
1999 to March 2000	-	-	$300,000 to $499,999	6	5.5
1995 to 1998	5	3.1	$500,000 to $999,999	6	5.5
1990 to 1994	4	2.5	$1,000,000 or more	2	1.8
1980 to 1989	39	23.9	Median (dollars)	69,400	(X)
1970 to 1979	61	37.4			
1960 to 1969	4	2.5	**MORTGAGE STATUS AND SELECTED**		
1940 to 1959	31	19.0	**MONTHLY OWNER COSTS**		
1939 or earlier	19	11.7	With a mortgage	24	22.0
			Less than $300	6	5.5
ROOMS			$300 to $499	4	3.7
1 room	3	1.8	$500 to $699	10	9.2
2 rooms	3	1.8	$700 to $999	2	1.8
3 rooms	10	6.1	$1,000 to $1,499	-	-
4 rooms	22	13.5	$1,500 to $1,999	2	1.8
5 rooms	30	18.4	$2,000 or more	-	-
6 rooms	40	24.5	Median (dollars)	529	(X)
7 rooms	53	32.5	Not mortgaged	85	78.0
8 rooms	-	-	Median (dollars)	204	(X)
9 or more rooms	2	1.2			
Median (rooms)	5.8	(X)	**SELECTED MONTHLY OWNER COSTS**		
			AS A PERCENTAGE OF HOUSEHOLD		
Occupied housing units	**146**	**100.0**	**INCOME IN 1999**		
YEAR HOUSEHOLDER MOVED INTO UNIT			Less than 15.0 percent	66	60.6
1999 to March 2000	-	-	15.0 to 19.9 percent	6	5.5
1995 to 1998	15	10.3	20.0 to 24.9 percent	5	4.6
1990 to 1994	7	4.8	25.0 to 29.9 percent	3	2.8
1980 to 1989	66	45.2	30.0 to 34.9 percent	2	1.8
1970 to 1979	44	30.1	35.0 percent or more	24	22.0
1969 or earlier	14	9.6	Not computed	3	2.8
VEHICLES AVAILABLE			**Specified renter-occupied units**	**19**	**100.0**
None	17	11.6	**GROSS RENT**		
1	58	39.7	Less than $200	7	36.8
2	58	39.7	$200 to $299	3	15.8
3 or more	13	8.9	$300 to $499	4	21.1
			$500 to $749	3	15.8
HOUSE HEATING FUEL			$750 to $999	-	-
Utility gas	115	78.8	$1,000 to $1,499	-	-
Bottled, tank, or LP gas	18	12.3	$1,500 or more	-	-
Electricity	2	1.4	No cash rent	2	10.5
Fuel oil, kerosene, etc	-	-	Median (dollars)	275	(X)
Coal or coke	-	-			
Wood	11	7.5	**GROSS RENT AS A PERCENTAGE OF**		
Solar energy	-	-	**HOUSEHOLD INCOME IN 1999**		
Other fuel	-	-	Less than 15.0 percent	9	47.4
No fuel used	-	-	15.0 to 19.9 percent	-	-
			20.0 to 24.9 percent	-	-
SELECTED CHARACTERISTICS			25.0 to 29.9 percent	3	15.8
Lacking complete plumbing facilities	-	-	30.0 to 34.9 percent	-	-
Lacking complete kitchen facilities	-	-	35.0 percent or more	2	10.5
No telephone service	16	11.0	Not computed	5	26.3

-Represents zero or rounds to zero. (X) Not applicable.

Source: U.S. Bureau of the Census, Census 2000.

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Table DP-1. Profile of General Demographic Characteristics: 2000
Geographic area: San Ildefonso Pueblo, NM

[For information on confidentiality protection, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total population	**1,524**	**100.0**
SEX AND AGE		
Male	727	47.7
Female	797	52.3
Under 5 years	118	7.7
5 to 9 years	128	8.4
10 to 14 years	117	7.7
15 to 19 years	120	7.9
20 to 24 years	98	6.4
25 to 34 years	190	12.5
35 to 44 years	236	15.5
45 to 54 years	230	15.1
55 to 59 years	80	5.2
60 to 64 years	52	3.4
65 to 74 years	80	5.2
75 to 84 years	52	3.4
85 years and over	23	1.5
Median age (years)	34.4	(X)
18 years and over	1,071	70.3
Male	514	33.7
Female	557	36.5
21 years and over	1,023	67.1
62 years and over	185	12.1
65 years and over	155	10.2
Male	67	4.4
Female	88	5.8
RACE		
One race	1,471	96.5
White	811	53.2
Black or African American	-	-
American Indian and Alaska Native	528	34.6
Asian	-	-
Asian Indian	-	-
Chinese	-	-
Filipino	-	-
Japanese	-	-
Korean	-	-
Vietnamese	-	-
Other Asian [1]	-	-
Native Hawaiian and Other Pacific Islander	1	0.1
Native Hawaiian	1	0.1
Guamanian or Chamorro	-	-
Samoan	-	-
Other Pacific Islander [2]	-	-
Some other race	131	8.6
Two or more races	53	3.5
Race alone or in combination with one or more other races: [3]		
White	863	56.6
Black or African American	-	-
American Indian and Alaska Native	544	35.7
Asian	-	-
Native Hawaiian and Other Pacific Islander	1	0.1
Some other race	169	11.1

Subject	Number	Percent
HISPANIC OR LATINO AND RACE		
Total population	**1,524**	**100.0**
Hispanic or Latino (of any race)	687	45.1
Mexican	74	4.9
Puerto Rican	-	-
Cuban	-	-
Other Hispanic or Latino	613	40.2
Not Hispanic or Latino	837	54.9
White alone	287	18.8
RELATIONSHIP		
Total population	**1,524**	**100.0**
In households	1,524	100.0
Householder	557	36.5
Spouse	280	18.4
Child	544	35.7
Own child under 18 years	411	27.0
Other relatives	83	5.4
Under 18 years	38	2.5
Nonrelatives	60	3.9
Unmarried partner	41	2.7
In group quarters	-	-
Institutionalized population	-	-
Noninstitutionalized population	-	-
HOUSEHOLD BY TYPE		
Total households	**557**	**100.0**
Family households (families)	412	74.0
With own children under 18 years	221	39.7
Married-couple family	280	50.3
With own children under 18 years	134	24.1
Female householder, no husband present	100	18.0
With own children under 18 years	64	11.5
Nonfamily households	145	26.0
Householder living alone	123	22.1
Householder 65 years and over	27	4.8
Households with individuals under 18 years	243	43.6
Households with individuals 65 years and over	106	19.0
Average household size	2.74	(X)
Average family size	3.20	(X)
HOUSING OCCUPANCY		
Total housing units	**626**	**100.0**
Occupied housing units	557	89.0
Vacant housing units	69	11.0
For seasonal, recreational, or occasional use	22	3.5
Homeowner vacancy rate (percent)	0.7	(X)
Rental vacancy rate (percent)	5.0	(X)
HOUSING TENURE		
Occupied housing units	**557**	**100.0**
Owner-occupied housing units	425	76.3
Renter-occupied housing units	132	23.7
Average household size of owner-occupied units	2.86	(X)
Average household size of renter-occupied units	2.33	(X)

- Represents zero or rounds to zero. (X) Not applicable.

[1] Other Asian alone, or two or more Asian categories.

[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

[3] In combination with one or more of the other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000.

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Table DP-2. Profile of Selected Social Characteristics: 2000

Geographic area: San Ildefonso Pueblo, NM

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
SCHOOL ENROLLMENT		
Population 3 years and over enrolled in school	**446**	**100.0**
Nursery school, preschool	41	9.2
Kindergarten	5	1.1
Elementary school (grades 1-8)	208	46.6
High school (grades 9-12)	101	22.6
College or graduate school	91	20.4
EDUCATIONAL ATTAINMENT		
Population 25 years and over	**946**	**100.0**
Less than 9th grade	72	7.6
9th to 12th grade, no diploma	90	9.5
High school graduate (includes equivalency)	314	33.2
Some college, no degree	208	22.0
Associate degree	57	6.0
Bachelor's degree	118	12.5
Graduate or professional degree	87	9.2
Percent high school graduate or higher	82.9	(X)
Percent bachelor's degree or higher	21.7	(X)
MARITAL STATUS		
Population 15 years and over	**1,147**	**100.0**
Never married	400	34.9
Now married, except separated	542	47.3
Separated	5	0.4
Widowed	69	6.0
Female	66	5.8
Divorced	131	11.4
Female	66	5.8
GRANDPARENTS AS CAREGIVERS		
Grandparent living in household with one or more own grandchildren under 18 years	**16**	**100.0**
Grandparent responsible for grandchildren	10	62.5
VETERAN STATUS		
Civilian population 18 years and over	**1,074**	**100.0**
Civilian veterans	141	13.1
DISABILITY STATUS OF THE CIVILIAN NONINSTITUTIONALIZED POPULATION		
Population 5 to 20 years	**367**	**100.0**
With a disability	13	3.5
Population 21 to 64 years	**883**	**100.0**
With a disability	131	14.8
Percent employed	47.3	(X)
No disability	752	85.2
Percent employed	75.0	(X)
Population 65 years and over	**151**	**100.0**
With a disability	89	58.9
RESIDENCE IN 1995		
Population 5 years and over	**1,401**	**100.0**
Same house in 1995	1,025	73.2
Different house in the U.S. in 1995	340	24.3
Same county	211	15.1
Different county	129	9.2
Same state	56	4.0
Different state	73	5.2
Elsewhere in 1995	36	2.6

Subject	Number	Percent
NATIVITY AND PLACE OF BIRTH		
Total population	**1,526**	**100.0**
Native	1,483	97.2
Born in United States	1,441	94.4
State of residence	1,110	72.7
Different state	331	21.7
Born outside United States	42	2.8
Foreign born	43	2.8
Entered 1990 to March 2000	14	0.9
Naturalized citizen	18	1.2
Not a citizen	25	1.6
REGION OF BIRTH OF FOREIGN BORN		
Total (excluding born at sea)	**43**	**100.0**
Europe	6	14.0
Asia	-	-
Africa	4	9.3
Oceania	-	-
Latin America	33	76.7
Northern America	-	-
LANGUAGE SPOKEN AT HOME		
Population 5 years and over	**1,401**	**100.0**
English only	640	45.7
Language other than English	761	54.3
Speak English less than "very well"	102	7.3
Spanish	494	35.3
Speak English less than "very well"	67	4.8
Other Indo-European languages	13	0.9
Speak English less than "very well"	3	0.2
Asian and Pacific Island languages	-	-
Speak English less than "very well"	-	-
ANCESTRY (single or multiple)		
Total population	**1,526**	**100.0**
Total ancestries reported	*1,566*	*102.6*
Arab	4	0.3
Czech[1]	3	0.2
Danish	16	1.0
Dutch	15	1.0
English	72	4.7
French (except Basque)[1]	36	2.4
French Canadian[1]	-	-
German	50	3.3
Greek	-	-
Hungarian	11	0.7
Irish[1]	44	2.9
Italian	8	0.5
Lithuanian	-	-
Norwegian	-	-
Polish	-	-
Portuguese	-	-
Russian	17	1.1
Scotch-Irish	14	0.9
Scottish	9	0.6
Slovak	-	-
Subsaharan African	-	-
Swedish	2	0.1
Swiss	7	0.5
Ukrainian	-	-
United States or American	12	0.8
Welsh	3	0.2
West Indian (excluding Hispanic groups)	-	-
Other ancestries	1,243	81.5

-Represents zero or rounds to zero. (X) Not applicable.

[1]The data represent a combination of two ancestries shown separately in Summary File 3. Czech includes Czechoslovakian. French includes Alsatian. French Canadian includes Acadian/Cajun. Irish includes Celtic.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-3. Profile of Selected Economic Characteristics: 2000

Geographic area: San Ildefonso Pueblo, NM

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
EMPLOYMENT STATUS		
Population 16 years and over	**1,113**	**100.0**
In labor force	731	65.7
Civilian labor force	731	65.7
Employed	684	61.5
Unemployed	47	4.2
Percent of civilian labor force	6.4	(X)
Armed Forces	-	-
Not in labor force	382	34.3
Females 16 years and over	**576**	**100.0**
In labor force	355	61.6
Civilian labor force	355	61.6
Employed	336	58.3
Own children under 6 years	**155**	**100.0**
All parents in family in labor force	114	73.5
COMMUTING TO WORK		
Workers 16 years and over	**666**	**100.0**
Car, truck, or van - - drove alone	517	77.6
Car, truck, or van - - carpooled	104	15.6
Public transportation (including taxicab)	-	-
Walked	13	2.0
Other means	7	1.1
Worked at home	25	3.8
Mean travel time to work (minutes)[1]	24.1	(X)
Employed civilian population 16 years and over	**684**	**100.0**
OCCUPATION		
Management, professional, and related occupations	255	37.3
Service occupations	146	21.3
Sales and office occupations	152	22.2
Farming, fishing, and forestry occupations	3	0.4
Construction, extraction, and maintenance occupations	76	11.1
Production, transportation, and material moving occupations	52	7.6
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	3	0.4
Construction	77	11.3
Manufacturing	23	3.4
Wholesale trade	7	1.0
Retail trade	48	7.0
Transportation and warehousing, and utilities	23	3.4
Information	14	2.0
Finance, insurance, real estate, and rental and leasing	22	3.2
Professional, scientific, management, administrative, and waste management services	71	10.4
Educational, health and social services	103	15.1
Arts, entertainment, recreation, accommodation and food services	102	14.9
Other services (except public administration)	21	3.1
Public administration	170	24.9
CLASS OF WORKER		
Private wage and salary workers	321	46.9
Government workers	296	43.3
Self-employed workers in own not incorporated business	66	9.6
Unpaid family workers	1	0.1

Subject	Number	Percent
INCOME IN 1999		
Households	**571**	**100.0**
Less than $10,000	75	13.1
$10,000 to $14,999	52	9.1
$15,000 to $24,999	107	18.7
$25,000 to $34,999	100	17.5
$35,000 to $49,999	76	13.3
$50,000 to $74,999	84	14.7
$75,000 to $99,999	33	5.8
$100,000 to $149,999	39	6.8
$150,000 to $199,999	-	-
$200,000 or more	5	0.9
Median household income (dollars)	30,457	(X)
With earnings	458	80.2
Mean earnings (dollars)[1]	39,721	(X)
With Social Security income	146	25.6
Mean Social Security income (dollars)[1]	10,032	(X)
With Supplemental Security Income	16	2.8
Mean Supplemental Security Income (dollars)[1]	5,950	(X)
With public assistance income	11	1.9
Mean public assistance income (dollars)[1]	3,509	(X)
With retirement income	92	16.1
Mean retirement income (dollars)[1]	12,280	(X)
Families	**421**	**100.0**
Less than $10,000	42	10.0
$10,000 to $14,999	36	8.6
$15,000 to $24,999	70	16.6
$25,000 to $34,999	87	20.7
$35,000 to $49,999	45	10.7
$50,000 to $74,999	75	17.8
$75,000 to $99,999	26	6.2
$100,000 to $149,999	35	8.3
$150,000 to $199,999	-	-
$200,000 or more	5	1.2
Median family income (dollars)	31,531	(X)
Per capita income (dollars)[1]	14,848	(X)
Median earnings (dollars):		
Male full-time, year-round workers	28,056	(X)
Female full-time, year-round workers	22,330	(X)

Subject	Number below poverty level	Percent below poverty level
POVERTY STATUS IN 1999		
Families	**52**	**12.4**
With related children under 18 years	27	10.9
With related children under 5 years	11	11.8
Families with female householder, no husband present	**31**	**28.7**
With related children under 18 years	17	21.5
With related children under 5 years	7	24.1
Individuals	**190**	**12.5**
18 years and over	140	13.0
65 years and over	23	15.2
Related children under 18 years	48	10.7
Related children 5 to 17 years	38	11.8
Unrelated individuals 15 years and over	63	29.4

-Represents zero or rounds to zero. (X) Not applicable.

[1]If the denominator of a mean value or per capita value is less than 30, then that value is calculated using a rounded aggregate in the numerator. See text.

Source: U.S. Bureau of the Census, Census 2000.

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Table DP-4. Profile of Selected Housing Characteristics: 2000

Geographic area: San Ildefonso Pueblo, NM

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total housing units	**627**	**100.0**
UNITS IN STRUCTURE		
1-unit, detached	490	78.1
1-unit, attached	19	3.0
2 units	-	-
3 or 4 units	-	-
5 to 9 units	-	-
10 to 19 units	-	-
20 or more units	3	0.5
Mobile home	111	17.7
Boat, RV, van, etc	4	0.6
YEAR STRUCTURE BUILT		
1999 to March 2000	10	1.6
1995 to 1998	55	8.8
1990 to 1994	63	10.0
1980 to 1989	102	16.3
1970 to 1979	195	31.1
1960 to 1969	26	4.1
1940 to 1959	107	17.1
1939 or earlier	69	11.0
ROOMS		
1 room	3	0.5
2 rooms	7	1.1
3 rooms	38	6.1
4 rooms	68	10.8
5 rooms	193	30.8
6 rooms	169	27.0
7 rooms	100	15.9
8 rooms	29	4.6
9 or more rooms	20	3.2
Median (rooms)	5.5	(X)
Occupied housing units	**558**	**100.0**
YEAR HOUSEHOLDER MOVED INTO UNIT		
1999 to March 2000	65	11.6
1995 to 1998	98	17.6
1990 to 1994	84	15.1
1980 to 1989	133	23.8
1970 to 1979	99	17.7
1969 or earlier	79	14.2
VEHICLES AVAILABLE		
None	28	5.0
1	183	32.8
2	200	35.8
3 or more	147	26.3
HOUSE HEATING FUEL		
Utility gas	309	55.4
Bottled, tank, or LP gas	162	29.0
Electricity	58	10.4
Fuel oil, kerosene, etc	-	-
Coal or coke	-	-
Wood	25	4.5
Solar energy	4	0.7
Other fuel	-	-
No fuel used	-	-
SELECTED CHARACTERISTICS		
Lacking complete plumbing facilities	-	-
Lacking complete kitchen facilities	-	-
No telephone service	48	8.6

Subject	Number	Percent
OCCUPANTS PER ROOM		
Occupied housing units	**558**	**100.0**
1.00 or less	534	95.7
1.01 to 1.50	17	3.0
1.51 or more	7	1.3
Specified owner-occupied units	**301**	**100.0**
VALUE		
Less than $50,000	30	10.0
$50,000 to $99,999	57	18.9
$100,000 to $149,999	32	10.6
$150,000 to $199,999	61	20.3
$200,000 to $299,999	69	22.9
$300,000 to $499,999	44	14.6
$500,000 to $999,999	6	2.0
$1,000,000 or more	2	0.7
Median (dollars)	171,900	(X)
MORTGAGE STATUS AND SELECTED MONTHLY OWNER COSTS		
With a mortgage	109	36.2
Less than $300	6	2.0
$300 to $499	4	1.3
$500 to $699	13	4.3
$700 to $999	28	9.3
$1,000 to $1,499	25	8.3
$1,500 to $1,999	21	7.0
$2,000 or more	12	4.0
Median (dollars)	1,058	(X)
Not mortgaged	192	63.8
Median (dollars)	220	(X)
SELECTED MONTHLY OWNER COSTS AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999		
Less than 15.0 percent	137	45.5
15.0 to 19.9 percent	42	14.0
20.0 to 24.9 percent	31	10.3
25.0 to 29.9 percent	23	7.6
30.0 to 34.9 percent	16	5.3
35.0 percent or more	49	16.3
Not computed	3	1.0
Specified renter-occupied units	**127**	**100.0**
GROSS RENT		
Less than $200	16	12.6
$200 to $299	6	4.7
$300 to $499	33	26.0
$500 to $749	30	23.6
$750 to $999	17	13.4
$1,000 to $1,499	7	5.5
$1,500 or more	-	-
No cash rent	18	14.2
Median (dollars)	492	(X)
GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999		
Less than 15.0 percent	34	26.8
15.0 to 19.9 percent	14	11.0
20.0 to 24.9 percent	7	5.5
25.0 to 29.9 percent	10	7.9
30.0 to 34.9 percent	5	3.9
35.0 percent or more	36	28.3
Not computed	21	16.5

-Represents zero or rounds to zero. (X) Not applicable.

Source: U.S. Bureau of the Census, Census 2000.

D-8

Table DP-1. Profile of General Demographic Characteristics: 2000

Geographic area: Santa Clara Pueblo CDP, New Mexico

[For information on confidentiality protection, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total population	**980**	**100.0**
SEX AND AGE		
Male	478	48.8
Female	502	51.2
Under 5 years	69	7.0
5 to 9 years	83	8.5
10 to 14 years	73	7.4
15 to 19 years	88	9.0
20 to 24 years	81	8.3
25 to 34 years	129	13.2
35 to 44 years	159	16.2
45 to 54 years	117	11.9
55 to 59 years	40	4.1
60 to 64 years	34	3.5
65 to 74 years	55	5.6
75 to 84 years	38	3.9
85 years and over	14	1.4
Median age (years)	32.3	(X)
18 years and over	703	71.7
Male	324	33.1
Female	379	38.7
21 years and over	652	66.5
62 years and over	126	12.9
65 years and over	107	10.9
Male	36	3.7
Female	71	7.2
RACE		
One race	965	98.5
White	64	6.5
Black or African American	-	-
American Indian and Alaska Native	839	85.6
Asian	1	0.1
Asian Indian	-	-
Chinese	-	-
Filipino	-	-
Japanese	1	0.1
Korean	-	-
Vietnamese	-	-
Other Asian [1]	-	-
Native Hawaiian and Other Pacific Islander	1	0.1
Native Hawaiian	-	-
Guamanian or Chamorro	-	-
Samoan	-	-
Other Pacific Islander [2]	1	0.1
Some other race	60	6.1
Two or more races	15	1.5
***Race alone or in combination with one or more other races:* [3]**		
White	70	7.1
Black or African American	2	0.2
American Indian and Alaska Native	854	87.1
Asian	1	0.1
Native Hawaiian and Other Pacific Islander	1	0.1
Some other race	67	6.8

Subject	Number	Percent
HISPANIC OR LATINO AND RACE		
Total population	**980**	**100.0**
Hispanic or Latino (of any race)	171	17.4
Mexican	20	2.0
Puerto Rican	2	0.2
Cuban	-	-
Other Hispanic or Latino	149	15.2
Not Hispanic or Latino	809	82.6
White alone	19	1.9
RELATIONSHIP		
Total population	**980**	**100.0**
In households	980	100.0
Householder	349	35.6
Spouse	145	14.8
Child	347	35.4
Own child under 18 years	216	22.0
Other relatives	89	9.1
Under 18 years	56	5.7
Nonrelatives	50	5.1
Unmarried partner	29	3.0
In group quarters	-	-
Institutionalized population	-	-
Noninstitutionalized population	-	-
HOUSEHOLD BY TYPE		
Total households	**349**	**100.0**
Family households (families)	254	72.8
With own children under 18 years	120	34.4
Married-couple family	145	41.5
With own children under 18 years	69	19.8
Female householder, no husband present	80	22.9
With own children under 18 years	32	9.2
Nonfamily households	95	27.2
Householder living alone	79	22.6
Householder 65 years and over	27	7.7
Households with individuals under 18 years	156	44.7
Households with individuals 65 years and over	93	26.6
Average household size	2.81	(X)
Average family size	3.29	(X)
HOUSING OCCUPANCY		
Total housing units	**400**	**100.0**
Occupied housing units	349	87.3
Vacant housing units	51	12.8
For seasonal, recreational, or occasional use	17	4.3
Homeowner vacancy rate (percent)	0.6	(X)
Rental vacancy rate (percent)	-	(X)
HOUSING TENURE		
Occupied housing units	**349**	**100.0**
Owner-occupied housing units	321	92.0
Renter-occupied housing units	28	8.0
Average household size of owner-occupied units	2.80	(X)
Average household size of renter-occupied units	2.89	(X)

- Represents zero or rounds to zero. (X) Not applicable.

[1] Other Asian alone, or two or more Asian categories.

[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.

[3] In combination with one or more of the other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.

Source: U.S. Census Bureau, Census 2000.

Table DP-2. Profile of Selected Social Characteristics: 2000

Geographic area: Santa Clara Pueblo CDP, New Mexico

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
SCHOOL ENROLLMENT		
Population 3 years and over enrolled in school	**327**	**100.0**
Nursery school, preschool	41	12.5
Kindergarten	16	4.9
Elementary school (grades 1-8)	137	41.9
High school (grades 9-12)	76	23.2
College or graduate school	57	17.4
EDUCATIONAL ATTAINMENT		
Population 25 years and over	**633**	**100.0**
Less than 9th grade	27	4.3
9th to 12th grade, no diploma	89	14.1
High school graduate (includes equivalency)	311	49.1
Some college, no degree	100	15.8
Associate degree	48	7.6
Bachelor's degree	38	6.0
Graduate or professional degree	20	3.2
Percent high school graduate or higher	81.7	(X)
Percent bachelor's degree or higher	9.2	(X)
MARITAL STATUS		
Population 15 years and over	**811**	**100.0**
Never married	313	38.6
Now married, except separated	331	40.8
Separated	5	0.6
Widowed	68	8.4
Female	59	7.3
Divorced	94	11.6
Female	62	7.6
GRANDPARENTS AS CAREGIVERS		
Grandparent living in household with one or more own grandchildren under 18 years	**60**	**100.0**
Grandparent responsible for grandchildren	39	65.0
VETERAN STATUS		
Civilian population 18 years and over	**757**	**100.0**
Civilian veterans	106	14.0
DISABILITY STATUS OF THE CIVILIAN NONINSTITUTIONALIZED POPULATION		
Population 5 to 20 years	**282**	**100.0**
With a disability	55	19.5
Population 21 to 64 years	**577**	**100.0**
With a disability	264	45.8
Percent employed	75.0	(X)
No disability	313	54.2
Percent employed	46.6	(X)
Population 65 years and over	**124**	**100.0**
With a disability	86	69.4
RESIDENCE IN 1995		
Population 5 years and over	**983**	**100.0**
Same house in 1995	891	90.6
Different house in the U.S. in 1995	92	9.4
Same county	47	4.8
Different county	45	4.6
Same state	30	3.1
Different state	15	1.5
Elsewhere in 1995	-	-

Subject	Number	Percent
NATIVITY AND PLACE OF BIRTH		
Total population	**1,077**	**100.0**
Native	1,068	99.2
Born in United States	1,068	99.2
State of residence	901	83.7
Different state	167	15.5
Born outside United States	-	-
Foreign born	9	0.8
Entered 1990 to March 2000	3	0.3
Naturalized citizen	9	0.8
Not a citizen	-	-
REGION OF BIRTH OF FOREIGN BORN		
Total (excluding born at sea)	**9**	**100.0**
Europe	3	33.3
Asia	-	-
Africa	-	-
Oceania	-	-
Latin America	6	66.7
Northern America	-	-
LANGUAGE SPOKEN AT HOME		
Population 5 years and over	**983**	**100.0**
English only	352	35.8
Language other than English	631	64.2
Speak English less than "very well"	83	8.4
Spanish	95	9.7
Speak English less than "very well"	12	1.2
Other Indo-European languages	-	-
Speak English less than "very well"	-	-
Asian and Pacific Island languages	-	-
Speak English less than "very well"	-	-
ANCESTRY (single or multiple)		
Total population	**1,077**	**100.0**
Total ancestries reported	*1,046*	*97.1*
Arab	-	-
Czech[1]	-	-
Danish	-	-
Dutch	-	-
English	3	0.3
French (except Basque)[1]	-	-
French Canadian[1]	3	0.3
German	-	-
Greek	-	-
Hungarian	-	-
Irish[1]	-	-
Italian	-	-
Lithuanian	-	-
Norwegian	8	0.7
Polish	-	-
Portuguese	-	-
Russian	-	-
Scotch-Irish	-	-
Scottish	-	-
Slovak	-	-
Subsaharan African	-	-
Swedish	-	-
Swiss	-	-
Ukrainian	-	-
United States or American	-	-
Welsh	-	-
West Indian (excluding Hispanic groups)	-	-
Other ancestries	1,032	95.8

-Represents zero or rounds to zero. (X) Not applicable.

[1]The data represent a combination of two ancestries shown separately in Summary File 3. Czech includes Czechoslovakian. French includes Alsatian. French Canadian includes Acadian/Cajun. Irish includes Celtic.

Source: U.S. Bureau of the Census, Census 2000.

Table DP-3. Profile of Selected Economic Characteristics: 2000

Geographic area: Santa Clara Pueblo CDP, New Mexico

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
EMPLOYMENT STATUS		
Population 16 years and over	**792**	**100.0**
In labor force	422	53.3
Civilian labor force	422	53.3
Employed	386	48.7
Unemployed	36	4.5
Percent of civilian labor force	8.5	(X)
Armed Forces	-	-
Not in labor force	370	46.7
Females 16 years and over	**410**	**100.0**
In labor force	191	46.6
Civilian labor force	191	46.6
Employed	177	43.2
Own children under 6 years	**108**	**100.0**
All parents in family in labor force	72	66.7
COMMUTING TO WORK		
Workers 16 years and over	**383**	**100.0**
Car, truck, or van - - drove alone	233	60.8
Car, truck, or van - - carpooled	69	18.0
Public transportation (including taxicab)	-	-
Walked	12	3.1
Other means	6	1.6
Worked at home	63	16.4
Mean travel time to work (minutes)[1]	30.9	(X)
Employed civilian population 16 years and over	**386**	**100.0**
OCCUPATION		
Management, professional, and related occupations	106	27.5
Service occupations	92	23.8
Sales and office occupations	105	27.2
Farming, fishing, and forestry occupations	-	-
Construction, extraction, and maintenance occupations	28	7.3
Production, transportation, and material moving occupations	55	14.2
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	9	2.3
Construction	25	6.5
Manufacturing	32	8.3
Wholesale trade	8	2.1
Retail trade	24	6.2
Transportation and warehousing, and utilities	9	2.3
Information	7	1.8
Finance, insurance, real estate, and rental and leasing	-	-
Professional, scientific, management, administrative, and waste management services	7	1.8
Educational, health and social services	84	21.8
Arts, entertainment, recreation, accommodation and food services	67	17.4
Other services (except public administration)	14	3.6
Public administration	100	25.9
CLASS OF WORKER		
Private wage and salary workers	168	43.5
Government workers	195	50.5
Self-employed workers in own not incorporated business	23	6.0
Unpaid family workers	-	-

Subject	Number	Percent
INCOME IN 1999		
Households	**375**	**100.0**
Less than $10,000	107	28.5
$10,000 to $14,999	31	8.3
$15,000 to $24,999	87	23.2
$25,000 to $34,999	38	10.1
$35,000 to $49,999	52	13.9
$50,000 to $74,999	49	13.1
$75,000 to $99,999	8	2.1
$100,000 to $149,999	3	0.8
$150,000 to $199,999	-	-
$200,000 or more	-	-
Median household income (dollars)	20,302	(X)
With earnings	249	66.4
Mean earnings (dollars)[1]	32,984	(X)
With Social Security income	82	21.9
Mean Social Security income (dollars)[1]	9,971	(X)
With Supplemental Security Income	32	8.5
Mean Supplemental Security Income (dollars)[1]	5,023	(X)
With public assistance income	11	2.9
Mean public assistance income (dollars)[1]	1,309	(X)
With retirement income	15	4.0
Mean retirement income (dollars)[1]	11,347	(X)
Families	**275**	**100.0**
Less than $10,000	64	23.3
$10,000 to $14,999	14	5.1
$15,000 to $24,999	76	27.6
$25,000 to $34,999	32	11.6
$35,000 to $49,999	42	15.3
$50,000 to $74,999	36	13.1
$75,000 to $99,999	8	2.9
$100,000 to $149,999	3	1.1
$150,000 to $199,999	-	-
$200,000 or more	-	-
Median family income (dollars)	22,049	(X)
Per capita income (dollars)[1]	9,311	(X)
Median earnings (dollars):		
Male full-time, year-round workers	23,750	(X)
Female full-time, year-round workers	20,221	(X)

Subject	Number below poverty level	Percent below poverty level
POVERTY STATUS IN 1999		
Families	**84**	**30.5**
With related children under 18 years	48	25.3
With related children under 5 years	19	24.4
Families with female householder, no husband present	**35**	**36.5**
With related children under 18 years	25	34.7
With related children under 5 years	13	48.1
Individuals	**315**	**29.6**
18 years and over	231	30.5
65 years and over	46	37.1
Related children under 18 years	84	27.3
Related children 5 to 17 years	61	28.1
Unrelated individuals 15 years and over	64	43.8

-Represents zero or rounds to zero. (X) Not applicable.

[1]If the denominator of a mean value or per capita value is less than 30, then that value is calculated using a rounded aggregate in the numerator. See text.

Source: U.S. Bureau of the Census, Census 2000.

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Table DP-4. Profile of Selected Housing Characteristics: 2000

Geographic area: Santa Clara Pueblo CDP, New Mexico

[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent
Total housing units	**417**	**100.0**
UNITS IN STRUCTURE		
1-unit, detached	341	81.8
1-unit, attached	4	1.0
2 units	-	-
3 or 4 units	-	-
5 to 9 units	-	-
10 to 19 units	-	-
20 or more units	-	-
Mobile home	72	17.3
Boat, RV, van, etc	-	-
YEAR STRUCTURE BUILT		
1999 to March 2000	20	4.8
1995 to 1998	30	7.2
1990 to 1994	14	3.4
1980 to 1989	68	16.3
1970 to 1979	189	45.3
1960 to 1969	32	7.7
1940 to 1959	31	7.4
1939 or earlier	33	7.9
ROOMS		
1 room	9	2.2
2 rooms	15	3.6
3 rooms	122	29.3
4 rooms	52	12.5
5 rooms	79	18.9
6 rooms	92	22.1
7 rooms	15	3.6
8 rooms	32	7.7
9 or more rooms	1	0.2
Median (rooms)	4.6	(X)
Occupied housing units	**375**	**100.0**
YEAR HOUSEHOLDER MOVED INTO UNIT		
1999 to March 2000	19	5.1
1995 to 1998	46	12.3
1990 to 1994	20	5.3
1980 to 1989	83	22.1
1970 to 1979	152	40.5
1969 or earlier	55	14.7
VEHICLES AVAILABLE		
None	63	16.8
1	150	40.0
2	81	21.6
3 or more	81	21.6
HOUSE HEATING FUEL		
Utility gas	326	86.9
Bottled, tank, or LP gas	21	5.6
Electricity	4	1.1
Fuel oil, kerosene, etc	-	-
Coal or coke	-	-
Wood	15	4.0
Solar energy	9	2.4
Other fuel	-	-
No fuel used	-	-
SELECTED CHARACTERISTICS		
Lacking complete plumbing facilities	14	3.7
Lacking complete kitchen facilities	8	2.1
No telephone service	89	23.7

Subject	Number	Percent
OCCUPANTS PER ROOM		
Occupied housing units	**375**	**100.0**
1.00 or less	332	88.5
1.01 to 1.50	25	6.7
1.51 or more	18	4.8
Specified owner-occupied units	**307**	**100.0**
VALUE		
Less than $50,000	59	19.2
$50,000 to $99,999	144	46.9
$100,000 to $149,999	37	12.1
$150,000 to $199,999	11	3.6
$200,000 to $299,999	3	1.0
$300,000 to $499,999	-	-
$500,000 to $999,999	7	2.3
$1,000,000 or more	46	15.0
Median (dollars)	72,500	(X)
MORTGAGE STATUS AND SELECTED MONTHLY OWNER COSTS		
With a mortgage	37	12.1
Less than $300	3	1.0
$300 to $499	19	6.2
$500 to $699	6	2.0
$700 to $999	9	2.9
$1,000 to $1,499	-	-
$1,500 to $1,999	-	-
$2,000 or more	-	-
Median (dollars)	468	(X)
Not mortgaged	270	87.9
Median (dollars)	197	(X)
SELECTED MONTHLY OWNER COSTS AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999		
Less than 15.0 percent	137	44.6
15.0 to 19.9 percent	36	11.7
20.0 to 24.9 percent	31	10.1
25.0 to 29.9 percent	9	2.9
30.0 to 34.9 percent	11	3.6
35.0 percent or more	39	12.7
Not computed	44	14.3
Specified renter-occupied units	**16**	**100.0**
GROSS RENT		
Less than $200	-	-
$200 to $299	-	-
$300 to $499	5	31.3
$500 to $749	6	37.5
$750 to $999	-	-
$1,000 to $1,499	-	-
$1,500 or more	-	-
No cash rent	5	31.3
Median (dollars)	508	(X)
GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999		
Less than 15.0 percent	2	12.5
15.0 to 19.9 percent	3	18.8
20.0 to 24.9 percent	-	-
25.0 to 29.9 percent	-	-
30.0 to 34.9 percent	-	-
35.0 percent or more	6	37.5
Not computed	5	31.3

-Represents zero or rounds to zero. (X) Not applicable.

Source: U.S. Bureau of the Census, Census 2000.

ATTACHMENT E

Services

Find A Doctor

Employment

Location

Contact

Ethics

Board Info

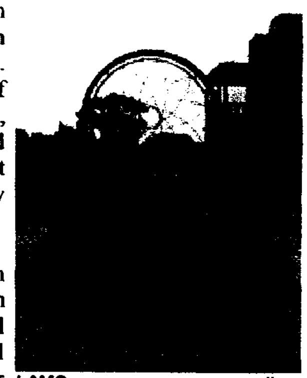
WELCOME

We're pleased to welcome you to LAMC, where we admit a patient and discharge a friend. At LAMC, we are committed to being the quality provider of cost-effective health care to Northern New Mexico. Our acute-care hospital, Clinic Services Division, and other services are offered throughout Northern New Mexico for the convenience of our many friends who have used our hospital over the years. Please contact us for all of your health care needs.

HISTORY

Los Alamos Medical Center is a "second generation," it's parent facility having been the old Army hospital on the base of World War II's Manhattan Project. The current building was constructed by the Army Corps of Engineers in 1951 and was advertised as state of the art upon its grand opening in January, 1952.

In 1963, as the federal government continued to "open" the once secret town and divest itself of many community services, an election was held to choose an organization who would assume operations of the hospital. Lutheran Hospitals and Homes Society of Fargo, ND, won the contest, and, in January, 1964, LHHS founder Fred Knautz purchased the hospital and two adjacent apartment buildings from the Atomic Energy Commission for the grand sum of $1.



LAMC serves a very diverse population. More than 30% of our business comes from outside of Los Alamos County, and we are proud to work with our friends and neighbors in Northern New Mexico.

After that time, LHHS (Lutheran Health Systems - LHS and now Banner Health System - BHS) continued to invest in capital improvements to the building, with the total approaching $20 million. In 2001, Banner announced its intention to focus resources on its network and metropolitan hospitals, and to divest itself of its smaller, free-standing facilities, among them, LAMC. In June, 2002, Province Healthcare of Brentwood, TN., became the new owner of LAMC. Like Lutheran, Province is heavily invested in rural health care and has already taken aggressive steps to upgrade many areas of LAMC.

After that time, LHHS (Lutheran Health Systems - LHS and now Banner Health System - BHS) continued to investin capital improvements to the building, with the current total approaching $20 million. In 2001, Banner announced its intention to focus resources on its network and metropolitan hospitals, and to divest itself of its smaller, free-standing facilities, among

them, LAMC. In June, 2002, Province Healthcare of Brentwood, TN., became the new owner of LAMC. Like Lutheran, Province is heavily invested in rural health care and has already taken aggressive steps to upgrade many areas of LAMC.

And, while many small, rural hospitals are known as stepping stones or training grounds for administrators, LHS demonstrated its commitment to Los Alamos by assigning only four administrators over its 38 years of service. Robert Hill, 1964-1980; Glenn Bryant, 1980-1986; Paul Wilson, 1987-2000, and Ray Vara, 2000-2002, watched over the facility, providing continuity of care to our patients and guests. Greg Partamian assumed LAMC's leadership role with the advent of Province in June, 2002.

The majority of community health care providers, including dentists, were housed in the building until the early '70s, when all but physicians moved to other locations in town. To this day, all but two Los Alamos physician practices have their offices on the LAMC campus, some in the hospital building itself, and some in connecting medical office buildings. This system allows patients the convenience of "one stop shopping" for all of their healthcare services in a single, convenient site.

In addition, one practice, Children's Clinic pediatric physicians, has a branch office in White Rock, also conveniently located at State Road 4 and Rover Blvd., adjacent to LAMC's WR Pharmacy branch.

VISION

Los Alamos Medical Center and its adjacent physician facilities continue to strive for the best, most modern equipment and services that a small hospital can provide. In 1999, a bone density scanner, a spiral CT scanner, new fluoroscopy equipment, and other capital improvements were added, along with a $4 million physician office building. Capital support for such projects came from the continuing net margin achieved by the 47-bed not-for-profit facility each year, as well as from the continuing work of the Hospital Auxiliary of LAMC. Auxiliary members presented the idea for a bone density scanner to LAMC's board, and after receiving conceptual approval, proceeded to raise the nearly $60,000 required to purchase the unit. Through the efforts of these tireless volunteers, LAMC acquired a new service, saving patients what had previously been a 70-mile round trip to Santa Fe to obtain this exam. Now, under the investor-owned Province system, $1.1 million was spent in the first 7 months of ownership with another $6 million committed to specific projects in the next 18 months.

It is this kind of corporate and community support, garnered from throughout Northern New Mexico, which has enabled Los Alamos Medical Center to continue its commitment to excellence throughout the 50 years since its construction. As we move into the 21st Century under Province's leadership, we expect to offer another 50 years of quality, cost-effective health care to the residents of Northern New Mexico.

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Presbyterian is New Mexico's only private not-for-profit healthcare system and its largest provider of healthcare.

Medical Group
Provider Directory

Española Hospital

Española Hospital is an 80-bed general and acute care hospital located in Española, New Mexico, approximately 90 miles north of Albuquerque. Española Hospital is fully accredited by the Joint Commission on Accreditation of Hospitals.

1010 Spruce St., Española, NM 87532
Directions

Providing the finest care and service possible has been the hallmark of Española Hospital since it first opened in 1948. Over the years, we have expanded to meet the growing needs of the Española valley. Recently, we have added many new services to provide state of the art treatment to our clients. To assist you in taking care of your health care needs please call us at (505) 753-7111.

Phone Numbers

All phone numbers are (505) area code

Administration	753-1502	Medical Records	753-1531
Ambulance: Non-emergency	753-1576	**Multi-Specialty Clinic**	367-0340
Anesthesia Services	753-1555	**Nursing Office**	753-1541
Business Office	753-1508	**Occupational Medicine**	753-1538
Day Surgery	753-1569	**Physical Therapy**	753-1596
Home Healthcare	753-1510	Primary/**Urgent Care**	367-0320
Human Resources	753-1537	**Radiology** (X-Ray)	753-1519
Laboratory	753-1512		

Hospital Services

At Española Hospital, we are committed to provide you with quality medical care in the following specialized areas of medicine:

In-patient

- **Babynet**
- Cardiology
- **Case Management Services**
- **Colon and Rectal surgery**
- Ear, Nose and Throat surgery
- **Emergency Medicine**
- **Española EMS**
- **Family Practice**
- **Labor and Delivery**
- **Laparoscopic Surgery**
- **Obstetrics and Gynecology**
  - **Babynet**
- Ophthalmology
- **Orthopedics**
- Pathology
- **Pediatrics**

E-3

- **General Surgery**
- **Intensive Care Unit**
- **Internal Medicine**
- Podiatry
- Pulmonary Medicine
- **Sleep Medicine**
- Urology

Outpatient

- **Ambulatory/ Day Surgery**
- **CT scanning**
- Dietary Consultation
- Echocardiography
- **Home health Services**
- **Laboratory services**
- **Multi-Specialty Clinic**
- **MRI**
- **Occupational Medicine**
- **Physical and speech therapy**
- Respiratory therapy
- **Sleep laboratory**
- **Ultrasound**
- **Urgent Care Clinic**
- Wound care
- **X-ray**

Staff

- **Active Medical Physicians listed by Specialty**
- **Staff photos**

Other Española Facilities

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- **Española Urgent Care**
- **Española Sleep Medicine Center**
- **Regional Home Care**

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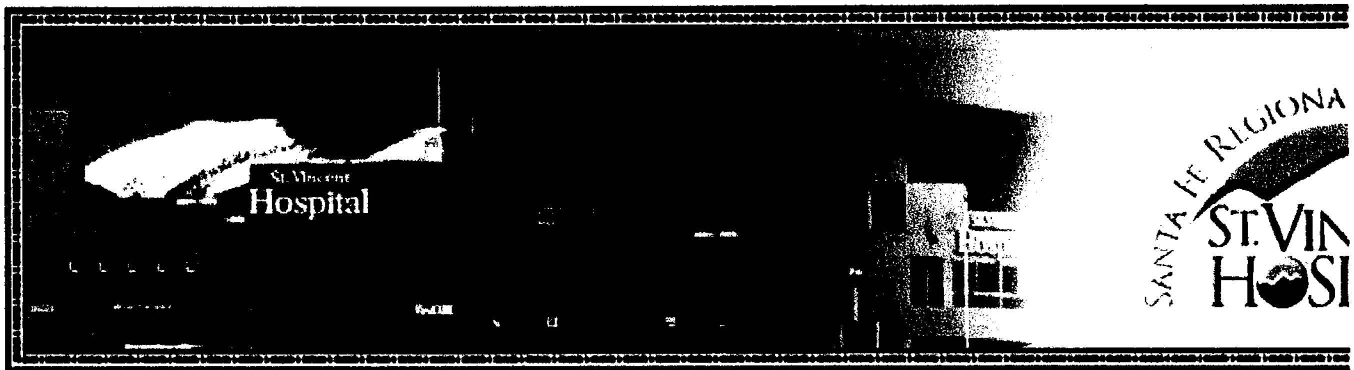

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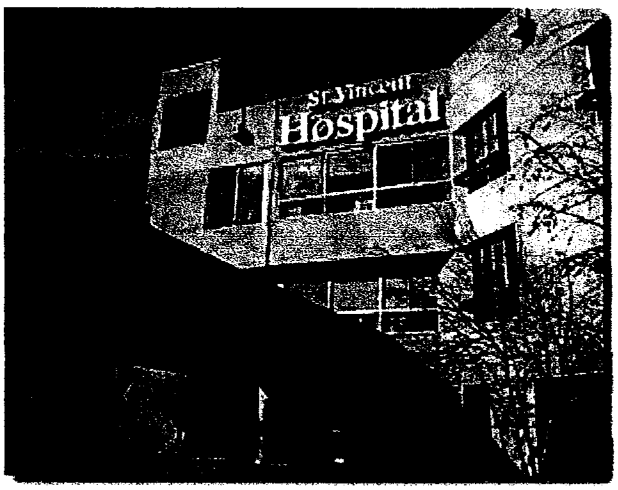

Established in 1865, St. Vincent Hospital
has been caring for the communities of Santa Fe and northern New Mexico for more than 130 years. Originally run by the Sisters of Charity, today's St. Vincent is a non-profit, non-affiliated hospital with a board of directors. Many things have changed since the hospital opened its doors in 1865, but its mission remains the same, to care for all the people of Santa Fe, northern New Mexico, and southern Colorado regardless of their ability to pay.

Events:

June

Tuesday - Thursc Week)

- Cancer Su| St. Vincent I various Can For more in: Lou Ann A 5731.

St. Vincent Hospital Helps Launch Northern New Mexico's First EKG Network

St. Vincent Hospital is working with northern New Mexico emergency departments, ED physicians, cardiologists and EMS personnel to create the nation's first rural EKG Network...(read more)

Santa Fe Cancer Center Performs New, State-of-the-Art Radiation Therapy for the First Time

E-5

The Santa Fe Cancer Center recently performed its first Intensity Modulated Radiation Therapy a state-of-the-art therapy that provides the most targeted treatment to tumors while limiting exposure to sensitive surrounding tissues...(read more)

ATTACHMENT F

Los Alamos County New Mexico

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Administration

LAPD Administration encompasses the Communicatio Detention, Animal Control, and Records Divisions, as \ Internal Affairs. Administration interfaces with other Cc employees as well as the general public on many matt directly related to patrol or law enforcement, which are nevertheless important to the overall operation of the Department. These include building maintenance, cas coordination with the courts, citizen complaints, gener requests for information, records maintenance, buildin and much more.

LAPD Administration is overseen by an Administrative Captain. For questions that involve an emergency or law enforcement, contact Police Administration.

Police Administration
2500 Trinity Drive
Los Alamos, NM 87544 U.S.A.
505-662-8226
505-662-8287 fax

Printer-friendly Version

Back to Web Site

Los Alamos County
A Unique Blend of Science and Scenery

Los Alamos Fire Department

Los Alamos Fire Department (LAFD) is the second largest career fire department in the state of New Mexico. The department provides a multi-disciplined, multi-dimensional mission of fire, rescue, emergency medical, public education and life safety services to the citizens and visitors of Los Alamos County.

Included in the services LAFD provides are the protection of the Los Alamos National Laboratory (LANL), a large nuclear research and development complex; protection of the communities of Los Alamos and White Rock; and assistance in the provision of emergency response for an extensive urban wildland interface.

LAFD was organized under the Manhattan Project in April 1943. At that time it consisted of 7 civilian firefighters and 25 volunteer firefighters. In September 1943, the firefighter functions were taken over by the military. The Fire Department was governed by the US Atomic Energy Commission and the US Department of Energy (DOE) until the Incorporated County of Los Alamos took it over in September 1989.

Today, LAFD operates 6 fire stations with 129 authorized positions; 34 officers, 84 firefighters and 9 civilian support personnel.

Contact Deputy Chief
Doug Tucker for
further information
662-8301

June 2003

WASTE VOLUME FORECAST

Revision 0

Prepared by

Anne White, Aurora Technical Services

Craig Bachmeier, Infrastructure, Facilities, & Construction

James Scott, Abaxial Technology, Inc.

Los Alamos
NATIONAL LABORATORY

CONTENTS

ACRONYM LIST

ATS	Aurora Technical Services
BUS	Business Operations Division
C	Chemistry Division
AAC	Actinide Analytical Chemistry
CFR	Code of Federal Regulations
CMR	Chemistry and Metallurgy Research
D&D	Decommissioning and Demolition
DOE	Department of Energy
DX	Dynamic Experimentation Division
EES	Earth and Environmental Sciences Division
EIP	e-p Instability Program
EM	Environmental Management
EPA	Environmental Protection Agency
ER	Environmental Remediation
ESA	Engineering Sciences and Applications Division
ESH	Environment Safety and Health Division (now HSR Division)
FWO	Facilities and Waste Operations Division
FY	Fiscal Year
HLW	High-Level Waste
HSR	Health, Safety, Radiation Division
LANL	Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center Division
LIR	Laboratory Implementing Requirement
LLW	Low-Level Waste
LPY	Liters per Year
MLLW	Mixed Low-Level Waste
MST	Materials Science and Technology Division
NARS	Nitric Acid Recycle System
NMED	New Mexico Environment Department
NMT	Nuclear Materials Technology
OSR	Off-Site Source Recovery
OSRP	Off-Site Source Recovery Project
P	Physics Division
P2	Pollution Prevention
PCB	Polychlorinated Biphenyl
PM	Project Management
R&D	Research and Development
RCA	Radiological Control Area
RCRA	Resource Conservation and Recovery Act
RLW	Radioactive Liquid Waste
RLWTF	Radioactive Liquid Waste Treatment Facility

ACRONYM LIST (cont)

RRES	Risk Reduction and Environmental Stewardship
RRES-R	Risk Reduction and Environmental Stewardship—Remediation
SWEIS	Site-Wide Environmental Impact Statement
SWO	Solid Waste Operations
TA	Technical Area
TRU	Transuranic
TSCA	Toxic Substances Control Act
TSTA	Tritium Systems Test Assembly
WIPP	Waste Isolation Pilot Plant

1.0 INTRODUCTION

This report presents a 10-year forecast of Los Alamos National Laboratory (LANL) hazardous and radioactive waste volumes. The waste volume forecast was prepared to support strategic planning for waste management operations and facilities. Knowledge of expected waste volumes will aid waste generators, program managers, and waste management operational organizations in long-term planning and will help ensure that the Laboratory has the right capabilities in place to support programmatic operations. This information will also aid the Laboratory in targeting activities for waste minimization opportunities.

Laboratory Implementing Requirement (LIR) 404-00-02.3 requires that waste generators provide waste forecasts on request for any treatment, storage, and disposal facility to which they discharge waste. The Department of Energy (DOE) also requires waste forecasts for the Integrated Database and the Baseline Environmental Management Report.

Aurora Technical Services (ATS) and Abaxial Technology, Inc., on behalf of the Readiness in Technology Base and Facilities Program Office and in cooperation with LANL technical divisions, prepared this report. Waste management and program/project representatives from Nuclear Materials Technology (NMT), Materials Science and Technology (MST), the Los Alamos Neutron Science Center (LANSCE), Facilities and Waste Operations (FWO), Chemistry (C), and Risk Reduction and Environmental Stewardship (RRES) divisions provided information for this report. The Decommissioning and Demolition (D&D), Environmental Remediation (ER), Off-Site Source Recovery (OSR), and Transuranic (TRU) Waste Characterization (2010) projects also provided input to the report.

This report describes the approach and process used in developing the volume forecasts and then presents a discussion of the volume forecast data and any potential impacts to LANL activities. The appendix includes additional details and assumptions for each of the waste categories based on the program/project interviews.

Projections were made based on historical data combined with both near- and long-term program plans. It should be noted that the 10-year forecast is based on many assumptions. The near-term forecasts rely on relatively good information from managers directing currently funded programs/projects. The long-term forecasts were based on program/project manager expectations of long-range potential future funding. Forecasting is uncertain by nature, and thus, users are cautioned when using out-year forecasts. The near-term forecasts are likely to be more reliable than the longer-term forecasts. The data will be updated annually, and over time, the uncertainties should decrease and the usefulness of the information should improve. An attempt was made to tie projected waste generation to major programs within each division. The actual volumes will vary from this estimate; however, the forecasts provide a good basis for planning decisions.

The approach used in this study was to identify the organizations, programs, and projects that are responsible for the majority (>80%) of the waste by type. These activities were selected for detailed inquiry and modeling. The remaining 20% were simply extended based on historical trends. Projections for ER and D&D wastes have been included where appropriate. In most cases, reductions for waste minimization activities have not been factored into the totals. These contributions will be recognized as they occur in future updates to this report.

2.0 FORECASTING

2.1 DATA COLLECTION

Data were collected from the LANL divisions, programs, and projects by ATS analysts familiar with environmental/WM practices at LANL. An initial query of existing data sources was performed to identify historical generation and to identify the divisions that generate most of the waste. Data sheets were prepared with historical trends and a preliminary forecast developed from existing sources such as the FWO-solid waste operations (SWO) waste database, LANL Site-Wide Environmental Impact Statement (SWEIS) data, Environmental Management (EM) Integrated Planning and Budgeting System data, Waste Management Facility Strategic Plan, and other sources.

ATS analysts initially conducted interviews with division waste management personnel to review the data sheets and the preliminary forecasts. The waste management representatives validated the historical data and identified the key programs/projects (or groups) responsible for the majority of the waste. The waste management representatives assigned a portion of the total division volume to each of the key programs/projects based on process knowledge or records where they exist. Generally, detailed records of waste volumes generated by program or project do not exist, and this assignment required judgment by the waste management professionals.

After the waste generating activities were identified and a baseline volume was established, program/project contacts were identified. The responsible managers for each key program/project then were interviewed regarding their vision of the next 10 years. Based on these interviews, relative values (delta factors) of program-waste-generating activity were developed. These values measured future program activity relative to the baseline year.

This approach is not perfect; however, it does provide a reasonable way to formulate waste volumes based on out-year program plans. Generally, the waste management professionals understand the historical volumes, but they do not have a good idea of what the programs are planning. On the other hand, the program managers understand the future of their activities, but their understanding of the waste volumes to be generated is limited. This approach combined the best information from both sources.

2.2 DATA STRUCTURE

The data were collected by division but are reported by waste type. The waste types of interest include transuranic (TRU) waste, radioactive liquid waste (RLW), low-level waste (LLW), mixed low-level waste (MLLW), and chemical/hazardous waste. The data for each division are reported by key program/project. Additional data are supplied to document the program/project forecasts (delta factors). The notes and assumptions also have been included in the report details.

3.0 WASTE PROJECTIONS

3.1 TRU WASTE

3.1.1 Definition and Scope

TRU waste contains >100 nCi of alpha-emitting TRU isotopes per gram of waste having half-lives >20 yr (atomic number greater than 92), except for (1) high-level waste (HLW); (2) HLW waste that the DOE has determined, with the concurrence of the Administrator of the Environmental Protection Agency (EPA), does not need the degree of isolation required by Code of Federal Regulations (CFR) 40 CFR 191; or (3) waste that the United States Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR 61. TRU waste is generated during research, development, and nuclear weapons production.

The TRU waste volumes reported by year in this projection include routine, nonroutine, newly generated, and legacy TRU wastes; thus, totals will not agree with TRU waste generation volumes periodically reported in the annual Pollution Prevention Roadmap and elsewhere. Two reasons exist for the data discrepancies between this report and the quarterly and annual pollution prevention (P2) reports. First, the P2 reports record waste in the year in which it was generated, whereas this report records waste in the year in which it was processed for disposal. Second, the P2 reports contain only routine waste data. Routine waste is defined as waste produced from any type of production operation, analytical, and/or research and development (R&D) laboratory operations; treatment, storage, and disposition facility operations; "work for others"; or any other periodic or recurring work that is considered ongoing in nature. Nonroutine waste is defined as one-time operations waste: wastes produced from environmental restoration program activities, including primary and secondary wastes associated with retrieval and remediation operations; legacy wastes; and D&D/transition operations.

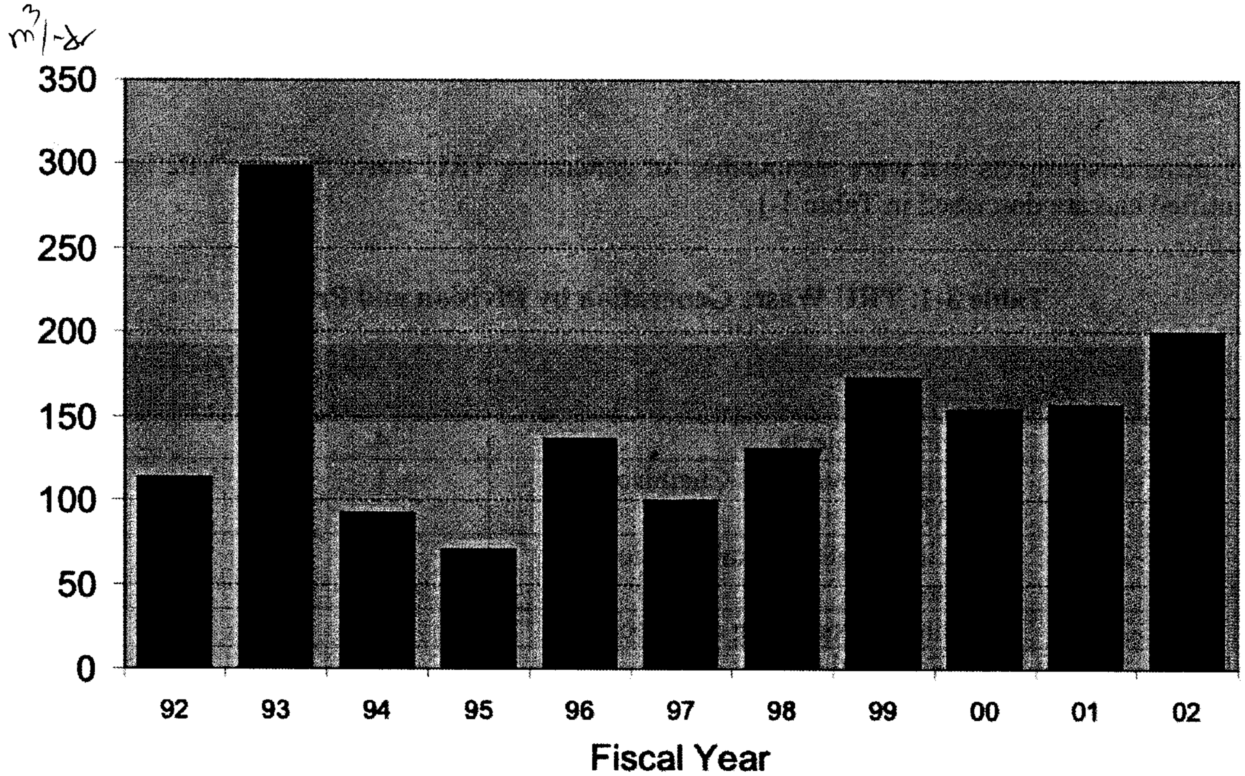
3.1.2 Historical Trends

The average generation of TRU waste over the past 11 years has been 148 m^3/yr. Volumes have been trending higher for the past decade as the Laboratory's nuclear materials mission at Technical Area (TA)-55 has expanded and as legacy waste is processed.

The historical generation of TRU waste is shown by fiscal year in Fig. 3-1.

3.1.3 Generator Divisions

NMT, FWO, and RRES are the key divisions responsible for generating most of the TRU waste at LANL (see Fig. 3-2). Small amounts have been generated by C Division in the past; however, they are not expected to generate significant waste in the future. The FWO and RRES wastes are related to NMT program activities.



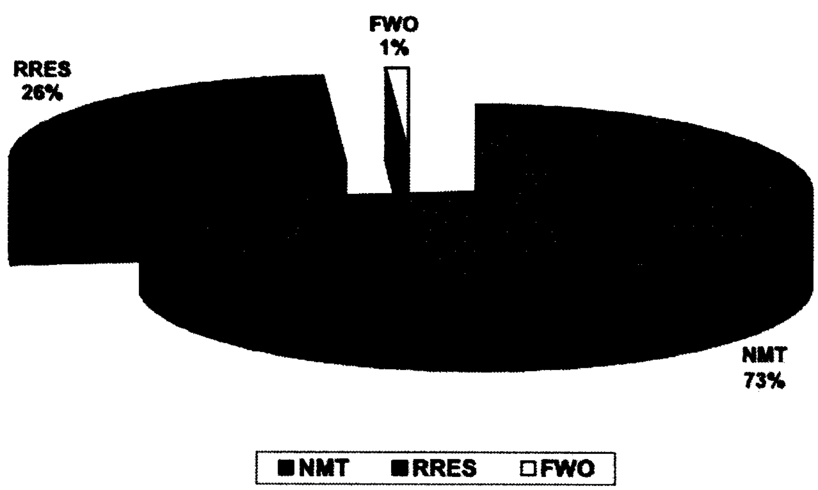


Fig. 3-1. Past TRU waste generation.

Fig. 3-2. TRU waste-generating divisions.

3.1.4 Key Program/Projects

Key programs/projects that were responsible for generating TRU waste during FY02 have been identified and are described in Table 3-1.

Table 3-1. TRU Waste Generation by Division and Project

Organization	Program/Project	Volume FY02 (m^3)	Percentage
NMT	Various Projects	4	
NMT-1	Actinide Analytical Chemistry (AAC)	1	
NMT-2	Nuclear Material Stabilization and Packaging	38	
NMT-2	Actinide Processing and Recovery	15	
NMT-5	Pit Fabrication	24	
NMT-9	^{238}Pu Operations	5	
NMT-9	^{238}Pu Heat Sources	13	
NMT-6, 11	Plutonium R&D Support	13	
NMT-11	EM Technology Support	5	
NMT-11	Energy Programs	1	
NMT-15	Material Disposition	3	
NMT-15	Nonproliferation Technologies	1	
NMT-16	Pit Surveillance	1	
NMT-3,4,7,8,13	Infrastructure	4	
NMT	Nonroutine TRU Waste	17	
	NMT Subtotal	**129**	**73%**
RRES-WD	Off-Site Source Recovery Project	48	
RRES-WD	Project 2010	0*	
RRES-ER	Environmental Restoration	0	
	RRES Subtotal	**48**	**26%**
FWO-WFM	Radioactive Liquid Waste Treatment Facility	2	
	FWO Subtotal	**2**	**1%**
	Total	**179**	**100%**

*Project 2010 repackages drums that are logged into the database; however, the majority of these drums are not new waste.

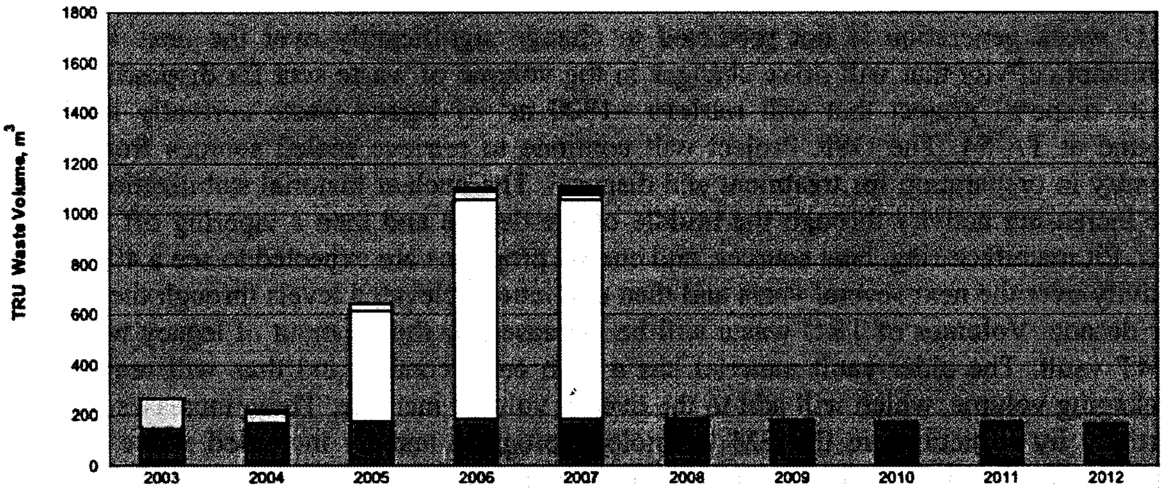
3.1.5 Forecast

TRU waste generation is not predicted to change significantly over the next 10 years. The dominant activity that will drive changes in the volume of waste sent for disposition is the EM waste disposal project that will retrieve ~1800 m^3 of legacy waste currently located below ground at TA-54. The OSR Project will continue to retrieve sealed sources from around the country in preparation for treatment and disposal. The nuclear material stabilization project will see increasing activity through the middle of the decade and then a tapering off in the second half. Pit manufacturing, heat sources, and energy programs are expected to see a 40% increase in activity over the next several years and then continue at elevated levels through the remainder of the decade. Volumes of TRU waste will be increased by the cleanout of legacy waste from the NMT vault. The older vault material has a high curie content and thus will require a greater packaging volume, which will add to the overall volume increase. These increases will be offset partially by reductions in the EM technology program and by increased waste minimization activities. Projected TRU volumes are shown in Fig. 3-3.

3.1.6 Analysis

The primary issue related to TRU waste volumes is the limited above-ground storage capacity at LANL. From FY05 to FY07, large quantities of legacy TRU waste are scheduled to be retrieved from underground storage for processing, repackaging, and shipment to the Waste Isolation Pilot Plant (WIPP). It is not expected that this waste will impact LANL storage facilities significantly because the waste will not be retrieved until sufficient storage space has been created by TRU shipping operations. Further, the schedule is flexible, and although it is projected to begin in FY05 and take 3 years to complete, it can be delayed or extended or both to adjust to the availability of storage space. However, retrieving the legacy waste will require new and modified capabilities for the retrieval operation itself because this waste is located deeper underground than waste previously retrieved and because it is packaged in various containers of unknown integrity.

The general short-term trend is toward increased waste volumes due to expanded NMT program activities; thus, LANL and NMT will need to find additional opportunities for waste minimization. The DOE Secretary's goal for waste minimization requires overall reductions in the quantity of newly generated routine TRU waste sent to TA-54 by 2005.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total, cubic meters	264	218	643	1,100	1,108	185	179	172	171	165
■RRES-ER	0	9	0	13	31	0	0	0	0	0
□RRES-OSRP	116	40	30	30	20	10	5	5	5	3
□RRES-2010	0	0	437	873	873	0	0	0	0	0
■NMT Routine	126	148	156	163	163	154	154	150	149	145
■NMT Nonroutine	17	17	17	17	17	17	17	17	17	17
■FWO	5	3	4	4	4	4	4	0	0	0

Fig. 3-3. TRU waste forecast.

3.2 RADIOACTIVE LIQUID WASTE

3.2.1 Definition and Scope

For the purposes of this forecast, RLW is defined as all waste influent to the Radioactive Liquid Waste Treatment Facility (RLWTF) located at TA-50. The RLWTF has been treating aqueous low-level wastewaters from LANL facilities since 1963. The plant is capable of treating in excess of 20,000,000 liters per year (LPY) of wastewater. Some 1800 drains and other sources attached to the RLW industrial collection system connect 15 TAs, 13 facility management units, and 62 buildings to the TA-50 plant. TAs 54, 21, and 16 do not have direct connections to the main RLW industrial waste line, and any wastes from these areas are trucked to the TA-50 plant. The remainder of the Laboratory's TAs discharge wastewater directly to RLWTF through the plant's main industrial line. Much of the wastewater discharged to the RLWTF industrial wastewater line is not radioactive. In addition to the main industrial wastewater line, two smaller lines connect TA-55 with TA-50 and exclusively carry acid and caustic radioactive wastes.

3.2.2 Historical Trends

The average generation of RLW waste over the past 11 years has been ~20 million liters per year (LPY). Volumes have been trending lower for the past 4 years because the Laboratory's waste minimization program has removed nonradioactive sources from the RLW collection system. These trends are shown in Fig. 3-4.

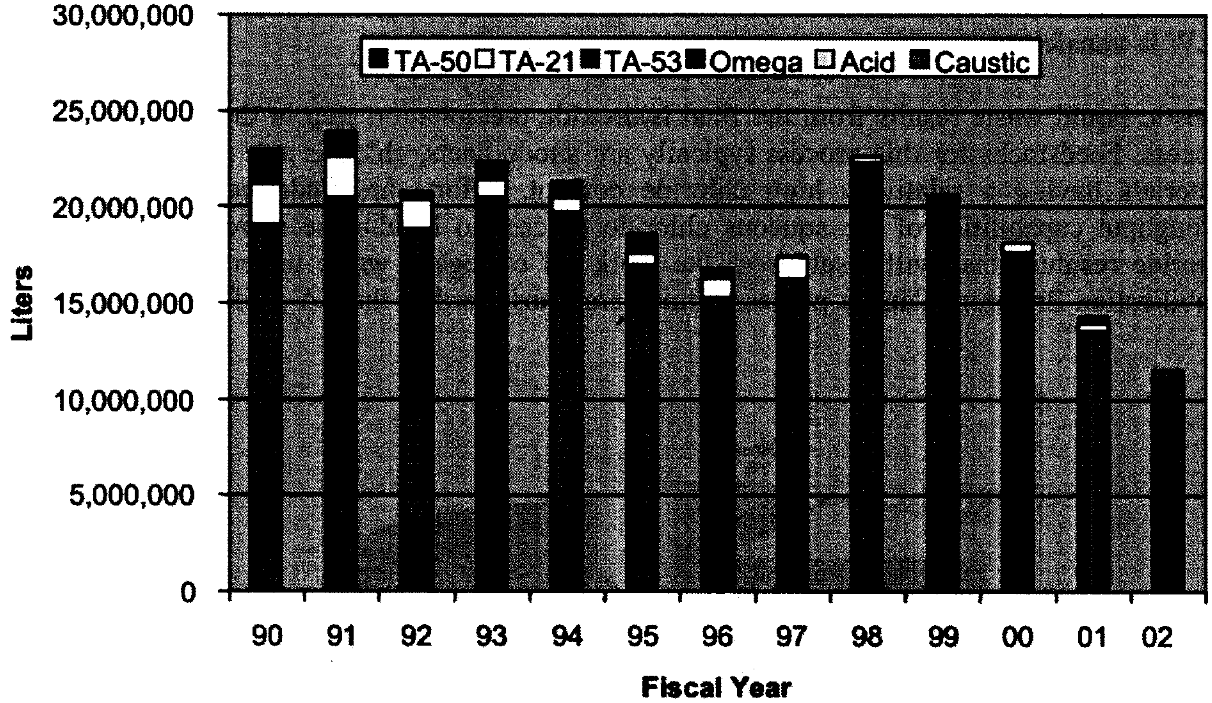


Fig. 3-4. Past generation of radioactive liquid waste.

3.2.3 Generator Divisions

NMT, C, and MST divisions produced the majority of RLW at LANL in FY02. Small quantities of RLW were produced by other divisions, including Engineering Sciences and Applications (ESA), Dynamic Experimentation (DX), and RRES-ER (see Fig. 3-5).

3.2.4 Key Program/Projects

Key programs/projects that were responsible for generating RLW waste during FY02 have been identified and are described in Table 3-2.

3.2.5 Forecast

RLW waste generation is not predicted to change significantly over the next 10 years. The dominant activities that will drive any change include the waste minimization program and continuing efforts to divert nonradioactive liquid wastes currently being sent to the RLWTF. The nuclear materials programs at TA-48 and TA-55 and at the TA-03 Chemistry and Metallurgy Research (CMR) and Sigma facilities will continue to drive future generations. The planned increase in activity in the pit-manufacturing and other NMT programs is expected to increase RLW flows in the same degree as the predicted increases in TRU waste volumes.

Figure 3-6 presents the predicted RLW volumes through FY12.

3.2.6 Acid and Caustic Waste

TA-55 generates both acidic and caustic wastes that are transferred to the RLWTF through waste lines. These lines are separate from the industrial waste line through which the bulk of the TA-55 RLW is transferred.

Caustic liquid waste results from the final hydroxide precipitation step in the aqueous chloride process. Feedstocks for this process typically are anode heels, chloride salt residues, and other materials having a relatively high chloride content. Efforts are underway to upgrade the throughput capabilities of the aqueous chloride process to handle the increased quantities of chloride residues that will result from the work off of legacy waste under the 94-1 Residue Stabilization Program. Caustic process liquids are transferred to the TA-50 RLWTF, Room 60,

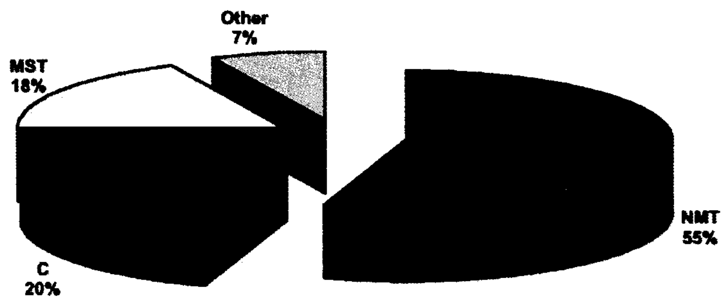
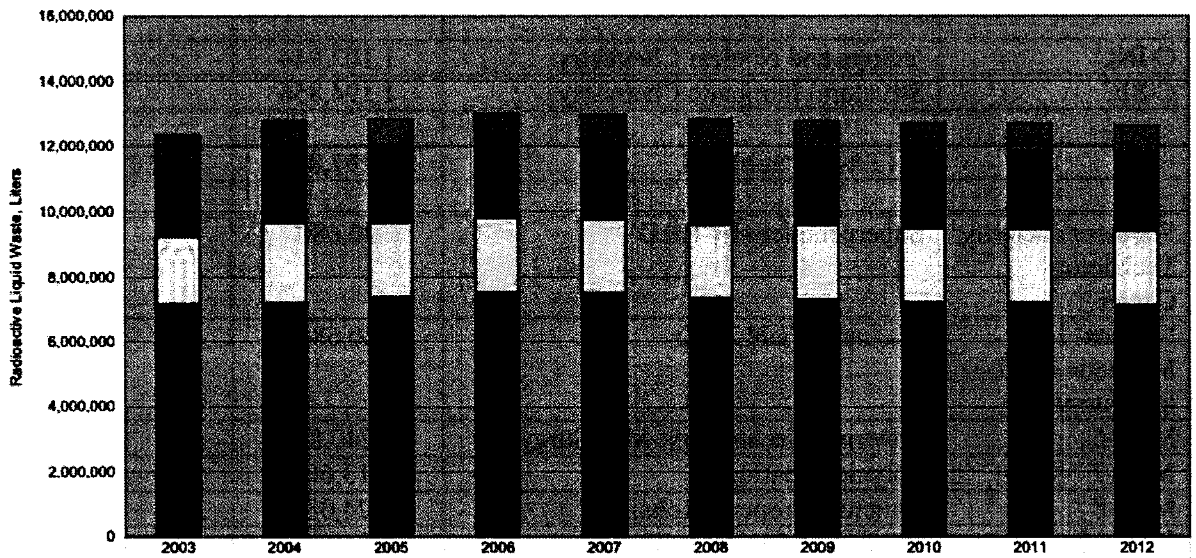


Fig. 3-5. Radioactive liquid waste generators.

Table 3-2. Radioactive Liquid Waste Generation by Division and Program

Organization	Program/Project	Volume FY02 (liters)	Percentage
NMT-1	AAC	379,137	
NMT-2	Nuclear Material Stabilization and Packaging	530,792	
NMT-2	Actinide Processing and Recovery	227,482	
NMT-5	Pit Fabrication	821,464	
NMT-9	^{238}Pu Operations	56,871	
NMT-9	^{238}Pu Heat Sources	132,698	
NMT-6, 11	Plutonium R&D Support	960,480	
NMT-11	EM Technology Support	252,758	
NMT-11	Energy Programs	50,552	
NMT-15	Material Disposition	284,353	
NMT-15	Nonproliferation Technologies	31,595	
NMT-16	Pit Surveillance	442,327	

NMT-3,4,7,8,13	Infrastructure	2,148,443	
	NMT Subtotal	**6,318,950**	**55%**
C-INC	Isotope and Nuclear Chemistry	1,102,944	
C-SIC	Structural Inorganic Chemistry	1,194,856	
	C (TA-48) Subtotal	**2,297,800**	**20%**
Superconductivity Technology Center	Superconductivity R&D	20,680	
National High Magnetic Field laboratory	Magnetic Field R&D	20,680	
MST-6	Materials Technology: Metallurgy	1,240,812	
MST-7	Polymer Coatings	413,604	
MST-8	Structure/Property Relations	124,081	
MST-10	Condensed Matter and Thermal Physics	124,081	
MST-11	Electronic and Electrochemical Materials	124,081	
	MST Subtotal	**2,068,020**	**18%**
HSR[a] & C-ACS	Occupational Health and Analytical Chemistry	626,200	
ESA-TSE	Tritium Systems Test Assembly (TSTA)	125,240	
ESA-TSE	Weapons Engineering Tritium Facility	62,620	
RRES	ER—D&D	62,620	
	Other Subtotal	**804,230**	**7%**
	Total	**11,489,000**	**100%**



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total, liters	12,345,735	12,780,160	12,824,431	12,987,238	12,959,685	12,799,887	12,772,334	12,695,425	12,664,428	12,606,567
■Other	804,230	804,230	804,230	804,230	804,230	804,230	804,230	804,230	804,230	804,230
■C	2,320,778	2,343,756	2,366,734	2,389,712	2,389,712	2,400,741	2,400,741	2,412,690	2,412,690	2,412,690
□MST	2,068,020	2,439,502	2,262,415	2,262,413	2,262,413	2,262,413	2,262,413	2,262,413	2,262,413	2,262,413
■NMT	7,152,707	7,192,672	7,391,052	7,530,882	7,503,330	7,332,502	7,304,950	7,216,092	7,185,095	7,127,234

Fig. 3-6. Radioactive liquid waste forecast.

for final processing via the caustic waste line. Over the next 3 to 5 years, throughput quantities are expected to increase modestly. Table 3-3 summarizes the expected production of caustic waste over the next 10 years. The Nuclear Material Stabilization and Packaging Project and the Actinide Processing and Recovery Project produce most of the caustic waste.

Table 3-3. Caustic Waste Forecast

Year	Caustic Waste Volume Liters
2003	10,000
2004	11,000
2005	12,000
2006	12,000
2007	12,000
2008	10,500
2009	10,000
2010	10,000
2011	10,000
2012	10,000

Acidic liquid waste is derived from processing plutonium feedstock using nitric acid for matrix dissolution. Following oxalate precipitation, the effluent is sent to the evaporator, where the overheads are removed and sent via the acid waste line to TA-50 RLWTF, Room 60, for final processing. The acid waste stream must be neutralized before treatment, which requires the addition of NaOH. The total effluent is increased because of the addition of neutralizing NaOH. The acid waste stream is expected to increase dramatically in FY03 and then to decrease sharply beginning in FY04 as the Nitric Acid Recycle System (NARS) comes on line and more acid is recycled. The actinide-processing-and-recovery, pit-fabrication, and mixed-oxide waste programs produce most of the acid waste. Because current plumbing in PF-4 precludes the use of recycled nitric acid in many programs, large volumes currently are being produced. When the NARS upgrade is complete, this volume effectively will be eliminated.

Table 3-4 shows the expected volumes of acid waste over the next 10 years.

3.2.7 Analysis

The general trend in RLW volumes is for steady to slightly increasing waste volumes due to predicted temporary increases in NMT and MST waste volumes. These increases may be offset in whole or in part by waste minimization program activities and the diversion of nonradioactive liquid wastes from the RLWTF. The possible effects of waste minimization are not included in the RLW volume forecast. The RLW program is planning for an eventual transition to zero liquid discharge. To attain zero liquid discharge of RLW, careful planning, new construction, and aggressive influent minimization activity will be required.

Superficially, it would seem that the current facility and strategy for collecting and treating RLW is adequate. In the recent past, the facility has handled ~20 million liters of RLW, about twice the

Table 3-4. Acid Waste Forecast

Year	Acid Waste Volume Liters	NaOH Volume Liters	Total Volume Liters
2003	60,000	33,000	93,000
2004	60,000	33,000	93,000
2005	24,000	8,400	32,400
2006	24,000	8,400	32,400
2007	24,000	8,400	32,400
2008	24,000	8,400	32,400
2009	20,000	7,000	7,000
2010	20,000	7,000	7,000
2011	20,000	7,000	7,000
2012	20,000	7,000	7,000

current volume. The ~20 million liters was processed in a regulatory environment far different from the present environment. With today's more stringent regulatory requirements, the facility is only marginally adequate for current volumes and could operate at former volumes only with very great difficulty. At current volumes there is insufficient effluent tankage at peak periods. It is questionable whether environmental compliance of the RLWTF effluent can be maintained in an aging, inflexible facility in an increasingly stringent regulatory environment, even at current volumes. The inflexible space at the present RLWTF will not accommodate process upgrades easily.

In addition, although the volume of acid and caustic wastes is small in comparison to the total, these waste streams account for about two-thirds of the radioactivity at the RLWTF. These streams are processed in a separate facility, Room 60, which has very limited throughput capability. Current increases in acid waste discharge to the RLWTF have reached the limit of the Room 60 capability, and any further increases could well impact programmatic schedules.

Other issues at the RLWTF are related to the age of the facility. Maintenance costs are increasing, and waste treatment occurs in more than a dozen rooms on multiple levels, raising as-low-as-reasonably achievable issues (for example, co-mingling areas) and leading to operational complexity and inconvenience at the 40-year-old TA-50-01 facility. In addition, operational concerns exist with the existing facility, such as potential concerns resulting from the use of underground single-walled pipes and tanks, outside operation of the evaporator, and over-road shipping of evaporator bottoms from TA-55.

3.3 LOW-LEVEL WASTE

3.3.1 Definition and Scope

LLW is defined as waste that is radioactive and not classified as HLW, TRU waste, spent nuclear fuel, or by-product materials (e.g., uranium or thorium mill tailings). Test specimens of fissionable material irradiated only for R&D and not for the production of power or plutonium may be classified as LLW, provided that the activity of TRU waste elements is <100 nCi/g of waste.

3.3.2 Historical Trends

The average generation of LLW over the past 10 years has been 2850 m^3/yr. The total volumes have been fluctuating strongly for the past decade, primarily because the nonroutine and ER volumes increase sharply in years in which decontamination, demolition, and remediation activities increase. Routine LLW generation is trending lower over the same time period.

The historical trends in LLW generation are shown in Fig. 3-7.

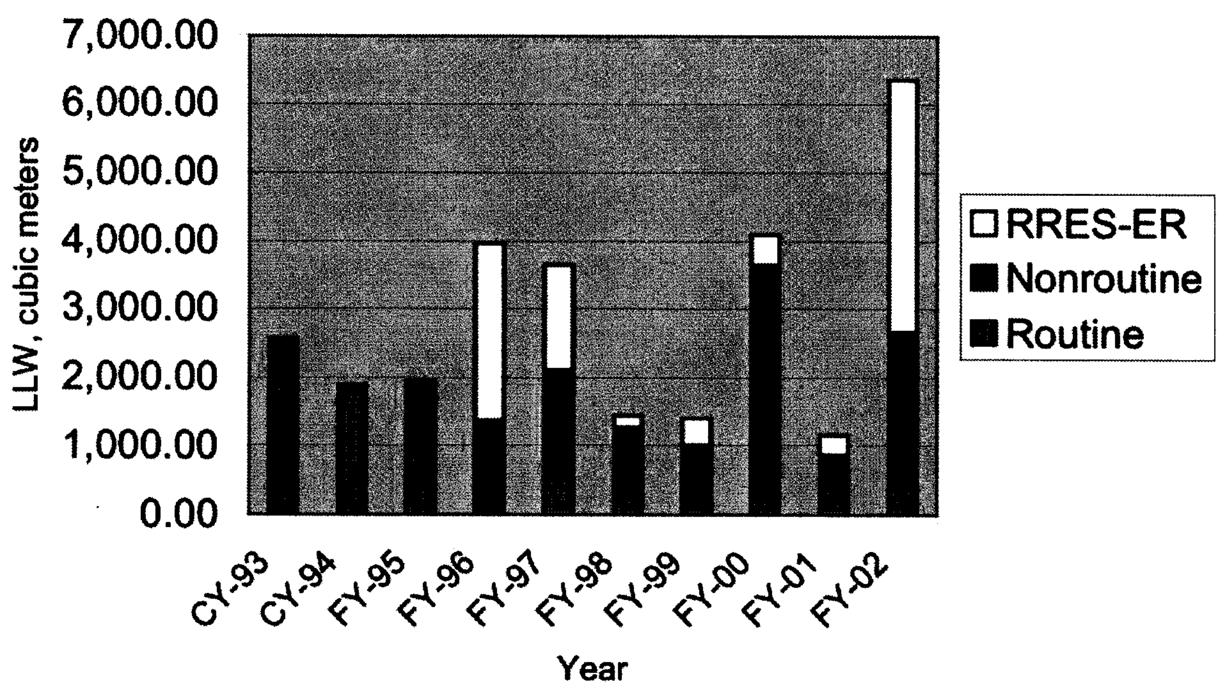


Fig. 3-7. Historical LLW generation.

RRES, NMT, FWO, LANSCE, and MST divisions produced the majority of LLW at LANL in FY02. Small quantities of LLW were produced by other divisions, including ESA, DX, C, Business Operations (BUS), and Health, Safety, Radiation (HSR). This generation of LLW by division is shown graphically in Fig. 3-8.

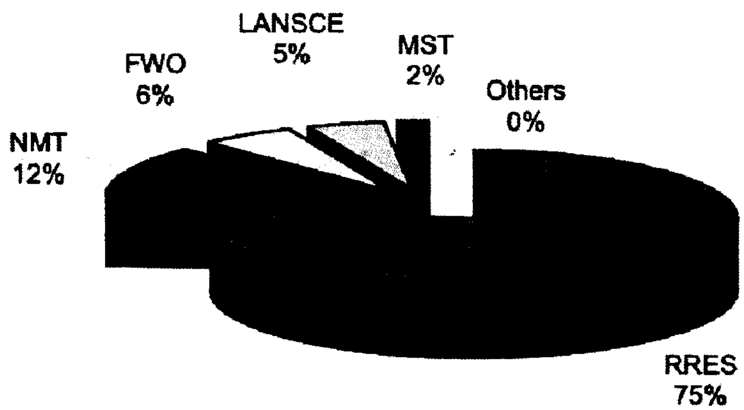


Fig. 3-8. LLW-generating divisions.

3.3.3 Key Program/Projects

Key programs/projects that were responsible for generating LLW during FY02 have been identified and are described in Table 3-5.

Table 3-5. LLW Generation by Division and Project

Organization	Program/Project	Volume FY02 (m^3)	Percentage
RRES-R	Environmental Remediation	5186.4	
RRES-ET	Nuclear Material Characterization	11.2	
RRES-ET	Electronics Sort and Segregate	38.5	
RRES-ET	Other	3.03	
	RRES Subtotal	**5239**	**75%**
NMT-1	AAC	48.2	
NMT-2	Nuclear Material Stabilization and Packaging	67.5	
NMT-2	Actinide Processing and Recovery	28.9	
NMT-5	Pit Fabrication	104.4	
NMT-9	^{238}Pu Operations	7.2	
NMT-9	^{238}Pu Heat Sources	16.9	
NMT-6, 11	Pu R&D Support	122.1	
NMT-11	EM Technology Support	32.1	
NMT-11	Energy Programs	6.4	
NMT-15	Material Disposition	36.1	
NMT-15	Nonproliferation Technologies	4.0	
NMT-16	Pit Surveillance	56.2	
NMT-3,4,7,8,13	Infrastructure	273.1	
	NMT Subtotal	**803**	**12%**
FWO-SWO	Solid Waste Operations	344.3	
FWO RLWTF	Radioactive Liquid Waste	52.7	
	FWO Subtotal	**397**	**6%**
LANSCE	Lagoon Cleanout	229	
LANSCE	EIP	12.5	
LANSCE	Other Programs	100.5	
	LANSCE Subtotal	**342**	**5%**
MST-6	Materials Technology: Metallurgy	8.2	
MST-NHMFL	National High Magnetic Field Laboratory	0.2	
MST-FAC	Facilities and Operations	97.6	
	MST Subtotal	**106**	**2%**
DX-4	Dual-Axis Radiographic Hydrotest Facility	86	
ESA	Various Projects	61	
ESH-17	Environmental Sampling	31	
BUS-4	Legacy Launderables	16	
C	Various Projects	12.2	
Other Projects	Various	29	
	Other Subtotal	**235**	**0%**
	Total	**7123**	**100%**

3.3.4 Forecast

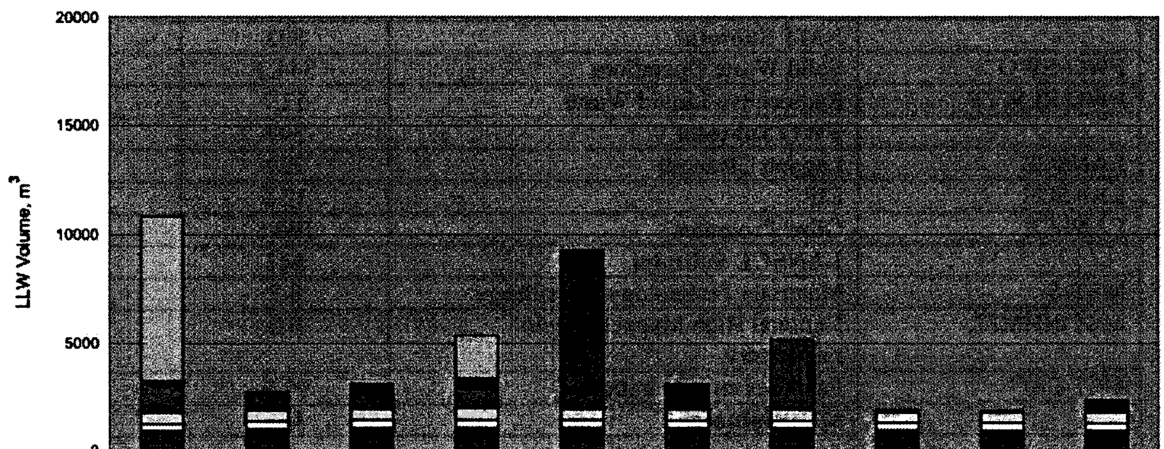
The generation of routine LLW has been trending downward over the past few years, and that trend is expected to continue over the next decade. Total LLW generation is predicted to remain volatile over the next 10 years. The activity that will drive the volatility in total waste volume is the ER project. The volumes of waste generated by the ER project will be substantial through FY08, with peak activity occurring in FY07. Although small changes in non-ER waste generation are projected to occur, the total non-ER waste volume is expected to remain relatively constant.

Figure 3-9 presents the predicted LLW volumes through FY12 by division.

3.3.5 Analysis

Solid LLW generated by the Laboratory's operating divisions is characterized and packaged for disposal at the on-site LLW disposal facility at TA-54, Area G. Area G has a limited useable volume. An FY03 analysis of the LLW landfill at TA-54 indicated that 11,200 m^3 remained for LLW disposal. The ER project plans the generation of very large volumes of contaminated soil waste over the next few years. The estimates range from 10,915 m^3 (projected by John Kelly) to 13,000 m^3 (projected by Skip Natalie of PS-4).

In either case, the ER project could use all of the remaining volume at the LLW disposal trench in a just a few years. When packaged LLW, low-level construction waste, and low-level D&D waste are added to the ER LLW, the planned volume will exceed the remaining disposal volume by FY04–05. Waste produced from D&D and ER projects are low-activity wastes and can be



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total, cubic meters	10,826.61	2,709.23	3,113.37	5,382.37	9,284.00	3,107.90	5,177.37	1,899.35	1,870.25	2,360.73
Const.	7,600.00			2,000.00						
D&D	135.00	20.00	500.00	500.00	1,000.00	1,000.00	0.00	0.00	0.00	500.00
ER	1,274.00	742.00	593.00	839.00	6,262.00	114.00	3,192.00	24.00	0.00	0.00
RLWTF	52.67	52.67	52.67	52.67	52.67	52.67	52.67	52.67	52.67	52.67
FWO	483.14	499.46	508.97	515.67	509.21	501.03	499.71	495.45	493.96	491.19
LANSCE	341.90	354.40	354.40	354.40	341.90	341.90	341.90	341.90	341.90	341.90
MST	105.86	179.43	219.93	219.93	220.73	220.73	216.73	121.33	121.33	121.33
NMT	834.04	861.27	884.40	900.71	897.50	877.58	874.36	864.00	860.39	853.64

Fig. 3-9. LLW generation forecast.

disposed of at the Envirocare site in Utah. Because the SWEIS (through a DOE Record of Decision in the fourth quarter of 1999) has received regulatory approval, construction of additional disposal sites now is allowed. Additional sites for LLW disposal near Area G could provide on-site disposal for many years. However, the preferred option may be to reserve the new burial sites for higher-activity LLW that cannot travel over the highway. This would mean sending most of the LLW to Envirocare for disposal. Cost is the issue with shipping lower-activity LLW off site for disposal.

3.4 MIXED LOW-LEVEL WASTE

3.4.1 Definition and Scope

For waste to be considered MLLW, it must contain Resource Conservation and Recovery Act (RCRA) materials and meet the definition of radioactive LLW. LLW is defined as waste that is radioactive and is not classified as HLW, TRU waste, spent nuclear fuel, or by-product materials (e.g., uranium or thorium mill tailings). Test specimens of fissionable material irradiated only for R&D and not for the production of power or plutonium may be classified as LLW, provided that the activity of TRU waste elements is <100 nCi/g of waste. Because MLLW contains radioactive components, it is regulated by DOE Order 435.1. Because it contains RCRA waste components, MLLW also is regulated by the State of New Mexico through LANL's operating permit, the Federal Facility Compliance Order/Site Treatment Plan provided by the New Mexico Environment Department (NMED), and the EPA.

Most of the Laboratory's routine MLLW results from stockpile stewardship and management and from R&D programs. Most of the nonroutine waste is generated by off-normal events such as spills in legacy-contaminated areas. ER and waste management legacy operations also produce MLLW.

3.4.2 Historical Trends

The average generation of MLLW over the past 10 years has been 79.2m^3/yr. Total volumes have fluctuated for the past decade primarily because of the strong variation in nonroutine and ER volumes. Routine MLLW generation has trended lower over the same time period. MLLW historical generation rates are shown in Fig. 3-10.

3.4.3 Generator Divisions

NMT, RRES, FWO, MST, and LANSCE are the key divisions responsible for generating most of the MLLW waste at LANL. Other divisions generate small volumes, generally <1 m^3. These divisions typically include ESA, DX, C, Project Management (PM), and Earth and Environmental Sciences (EES) (see Fig. 3-11).

3.4.4 Key Program/Projects

Key programs/projects that were responsible for generating MLLW during FY02 have been identified and are described in Table 3-6.

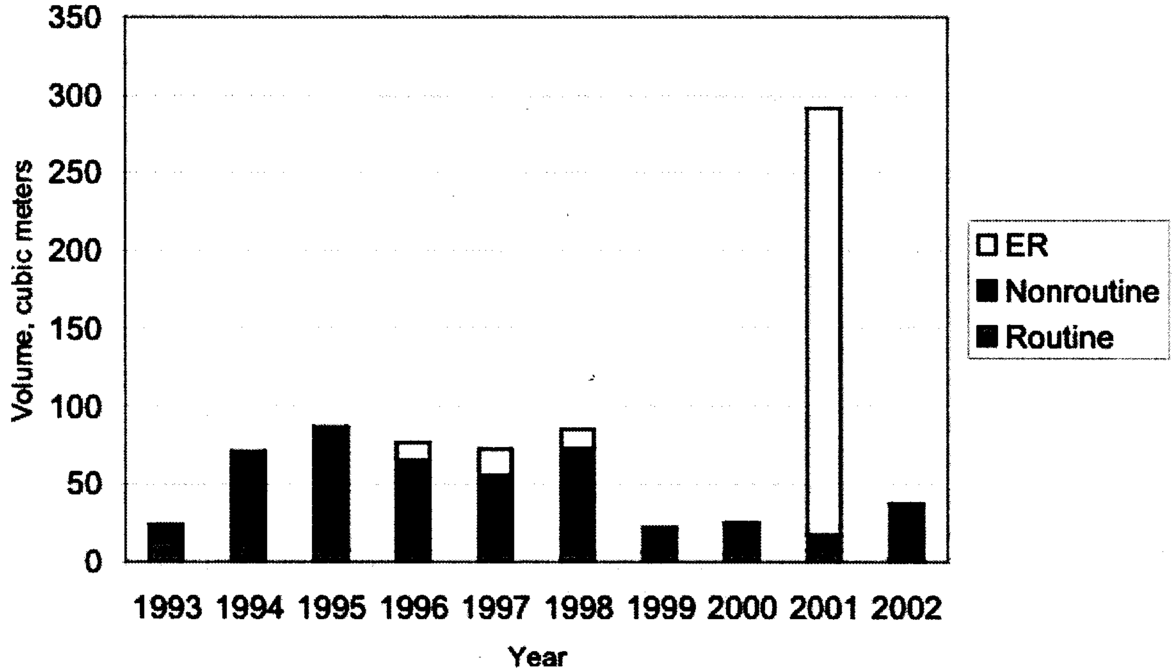


Fig. 3-10. MLLW historical generation.

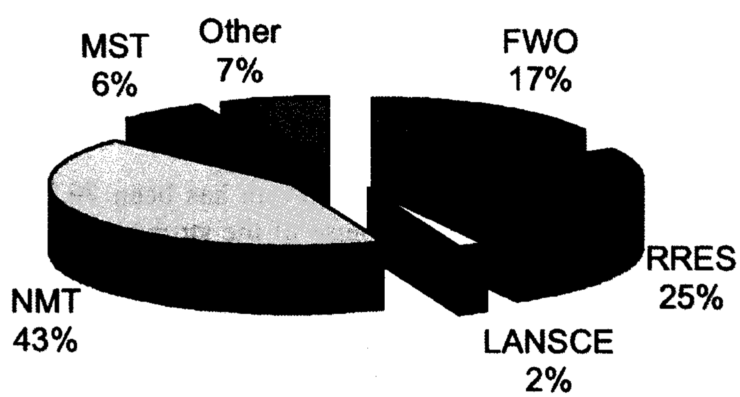


Fig. 3-11. MLLW generator divisions.

3.4.5 Forecast

The generation of routine MLLW has been trending downward over the past few years, and that trend is expected to continue over the next decade. However, the total MLLW generation has been volatile and is predicted to remain somewhat volatile over the next 10 years. The activity that will drive the volatility in total MLLW volume is the ER project. As with LLW, the volumes of waste generated by the ER project will be substantial through FY08, with peak activity occurring in FY07. Although small changes in non-ER waste generation are projected to occur, the total non-ER waste volume is expected to remain relatively constant or to decrease slightly.

Table 3-6. MLLW Generation by Division and Program

Organization	Program/Project	Volume FY02 (m^3)	Percentage
RRES-R	Environmental Remediation	0	
RRES-ET	Nuclear Material Characterization	3.1	
RRES-ET	Electronics Sort and Segregate	4.2	
RRES-ET	Other	2.0	
	RRES Subtotal	**9.3**	**25%**
NMT-1	AAC	2.11	
NMT-2	Nuclear Material Stabilization and Packaging	0.57	
NMT-2	Actinide Processing & Recovery	0.24	
NMT-5	Pit Fabrication	0.16	
NMT-9	^{238}Pu Operations	0.15	
NMT-9	^{238}Pu Heat Sources	0.34	
NMT-6, 11	Plutonium R&D Support	1.07	
NMT-11	EM Technology Support	0.32	
NMT-11	Energy Programs	0.06	
NMT-15	Material Disposition	0.15	
NMT-15	Nonproliferation Technologies	0.02	
NMT-16	Pit Surveillance	0.01	
NMT-3,4,7,8,13	Infrastructure	10.21	
	NMT Subtotal	**16.2**	**43%**
FWO-WFM	Facilities Management	5.4	
FWO RLWTF	Radioactive Liquid Waste	1.0	
	FWO Subtotal	**6.4**	**17%**
LANSCE-FM	Routine Maintenance Debris	0.67	
LANSCE-7	Equipment Upgrade	0.04	
	LANSCE Subtotal	**0.71**	**2%**
MST-6	Materials Technology: Metallurgy, Lab Cleanout	1.27	
MST-10	Condensed Matter Lab Cleanout	0.2	
MST-FAC	Facilities and Operations	0.69	
	MST Subtotal	**2.18**	**6%**
DX-6	Explosives Testing	0.57	
ESA-TSE	Routine Maintenance	0.62	
PM-DS	Distributed Services, Cleanout Waste	0.34	
EES-10	Tritium Tracer Field Studies	0.25	
C-ACT, INC, SIC	Various Projects	0.94	
	Other Subtotal	**2.7**	**7%**
	Total	**37.55**	**100%**

Figure 3-12 presents the predicted MLLW volumes through FY12 by division.

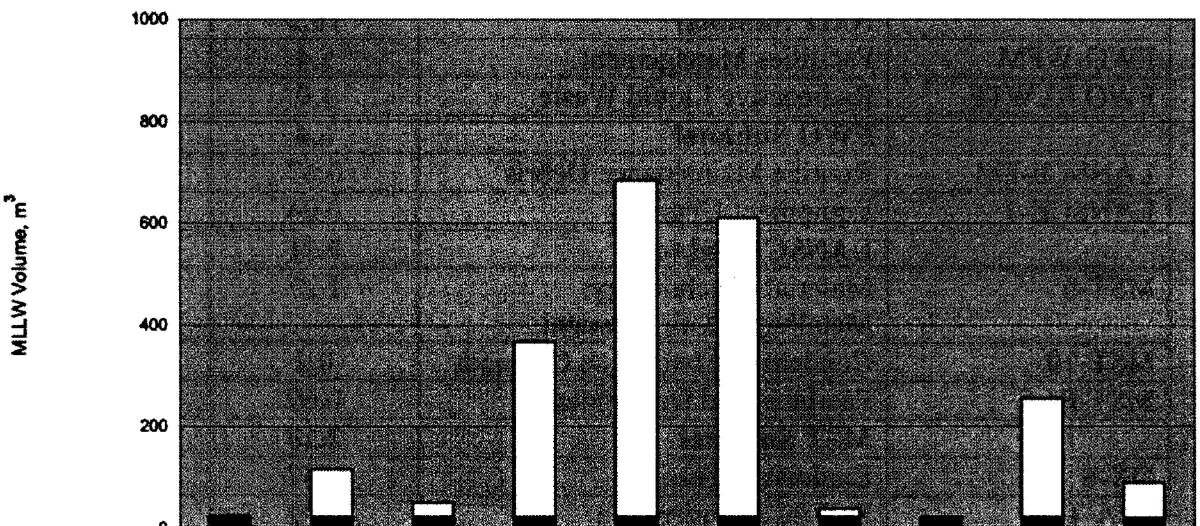
3.4.6 Analysis

Routine MLLW is generated in radiological control areas (RCAs). Hazardous materials and equipment containing RCRA materials, as well as MLLW materials, are introduced into the RCAs as needed to accomplish specific activities. In the course of operations, hazardous materials become contaminated or activated and are designated as MLLW when the item reaches the end of life and is declared waste.

Typically, MLLW is transferred to a satellite storage area after it is generated. Whenever possible, MLLW materials are surveyed to confirm the radiological contamination levels; if decontamination will eliminate either the radiological or the hazardous component, materials are decontaminated and removed from the MLLW category.

Waste classified as MLLW is managed in accordance with appropriate WM and Department of Transportation requirements and shipped to TA-54. From TA-54, MLLW is sent to commercial or DOE treatment and disposal facilities. The waste is treated/disposed of by various processes (e.g., segregation of hazardous components and macroencapsulation or incineration).

Because virtually all MLLW is shipped off site for treatment and disposal, the consequence of increased MLLW generation for the Laboratory is cost. However, the current projections call for nearly stable generation rates except in mid-decade. No significant impact to infrastructures or operations is forecast.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total, cubic meters	24.58	116.12	50.28	366.38	682.34	610.12	38.08	22.99	254.97	89.90
ER	2.00	93.00	27.00	343.00	659.00	587.00	15.00	0.00	232.00	68.00
FWO	4.13	4.21	4.24	4.26	4.25	4.21	4.20	4.18	4.18	4.17
LANSCE	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NMT	16.56	16.91	17.04	17.12	17.09	16.91	16.88	16.81	16.79	16.73
MST	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00

Fig. 3-12. MLLW volume forecast.

3.5 CHEMICAL/HAZARDOUS WASTE

3.5.1 Definition and Scope

The scope of this section includes both hazardous waste and nonhazardous chemical waste.

Hazardous waste is divided into three waste types: RCRA waste, Toxic Substances Control Act (TSCA) waste, and State special solid waste. For the purposes of reporting the waste minimization, LANL distinguishes between routine and nonroutine waste generation. Routine generation results from production, analytical, and/or other R&D laboratory operations; treatment, storage, and disposal operations; and "work for others" or any other periodic and recurring work that is considered to be ongoing. Nonroutine waste is cleanup stabilization waste and relates mostly to the legacy from previous site operations.

The RCRA and 40 CFR 261.3, as adopted by the NMED, define hazardous waste as any solid waste that

- is generally hazardous if not specifically excluded from the regulations as a hazardous waste;
- is listed in the regulations as a hazardous waste;
- exhibits any of the defined characteristics of hazardous waste (i.e., ignitability, corrosivity, reactivity, or toxicity); or
- is a mixture of solid and hazardous waste.

Hazardous waste also includes substances regulated under the TSCA, such as polychlorinated biphenyls (PCBs) and asbestos.

Finally, a material is hazardous if it is regulated as a special waste by the State of New Mexico as required by the New Mexico Solid Waste Act of 1990 (State of New Mexico) and defined by the most recent New Mexico Solid Waste Management Regulations, 20NMAC 9.1 (NMED), or current revisions.

Hazardous waste commonly generated at the Laboratory includes many types of laboratory research chemicals, solvents, acids, bases, compressed gases, metals, and other solid waste contaminated with hazardous waste. This waste may include equipment, containers, structures, and other items that are intended for disposal and that are contaminated with hazardous waste (e.g., compressed gas cylinders). Also included are asbestos waste from the abatement program, wastes from the removal of PCB components, contaminated soils, and contaminated wastewaters that cannot be sent to the sanitary wastewater system or wastewater treatment plants.

Some hazardous wastes are disposed of through Duratek Federal Services, a Laboratory subcontractor. This company sends waste to permitted treatment, storage, or treatment storage disposal facilities; recyclers; energy recovery facilities for fuel blending or burning for British-thermal-unit recovery; or other licensed vendors (as in the case of mercury recovery). Much of the hazardous waste is shipped by the generators directly off site for disposal.

Nonhazardous chemical waste is chemical waste that is not hazardous waste, as defined above, but which fails to meet the waste acceptance criteria for sanitary landfill burial or sanitary wastewater treatment.

3.5.2 Historical Trends

The generation of routine chemical/hazardous waste has been trending downward over the past 10 years. Total chemical/hazardous waste volumes have fluctuated for the past decade primarily because of the strong variation in nonroutine and ER volumes. This strong variation is expected to continue in the future. Because the total chemical/hazardous waste generation is dominated by the bulk waste generated by ER, D&D, and construction activities, it is more informative to discuss bulk and other wastes separately. Bulk wastes are mostly contaminated soils, other chemical/hazardous wastes are lower-volume, higher-risk wastes.

The historical generation rate for chemical/hazardous waste is shown in Fig. 3-13.

3.5.3 Generator Divisions

3.5.3.1 Bulk Chemical/Hazardous Waste

RRES and FWO are the key divisions responsible for generating most of the high volume chemical/hazardous waste at LANL (see Fig. 3-14a). These two divisions produce 96% of all chemical/hazardous waste generated at LANL. Most of this waste is in the form of lightly contaminated soils, rubble, sludges or wastewater, and it is shipped directly off site for disposal.

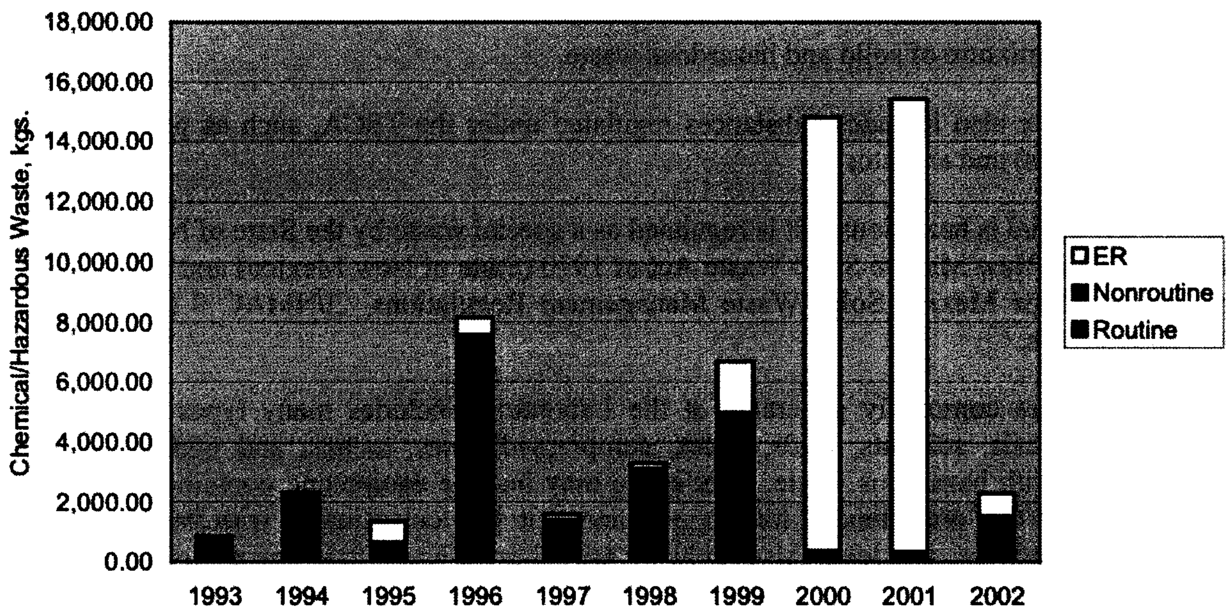


Fig. 3-13. Chemical/hazardous waste volume forecast.

Fig. 3-14a. Bulk chemical/hazardous waste generator divisions.

3.5.3.2 Other Chemical/Hazardous Waste

Other chemical/hazardous waste is generated in the course of Laboratory operations, including routine, nonroutine, and nonhazardous chemical waste. For the purposes of this discussion, these three types of lower volume chemical/hazardous waste have been aggregated.

The Laboratory generates hazardous and nonhazardous chemical waste as a result of research, development, and related operations. These wastes are generated at much lower volumes than the bulk wastes discussed previously. A total of 19 divisions produce such waste. The principal generators of this chemical/hazardous waste are ESA, MST, ESH, Physics (P), BUS, C, and DX divisions, as shown in Fig. 3-14b.

3.5.4 Key Program/Projects

3.5.4.1 Bulk Waste

Key programs/projects that were responsible for generating bulk chemical/hazardous waste during FY02 have been identified and are described in Tables 3-7 and 3-8.

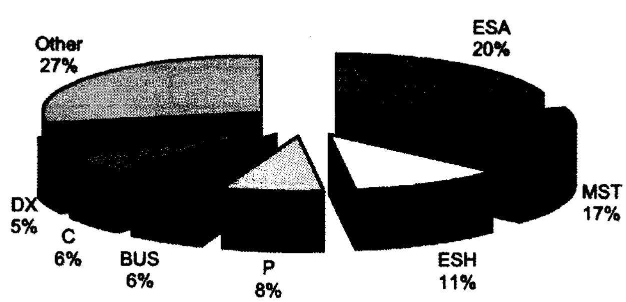


Fig. 3-14b. Other chemical/hazardous waste generator divisions.

Table 3-7. Bulk Chemical/Hazardous Waste by Division and Project

Organization	Program/Project	Weight FY02 (kg)	Percentage
RRES-R	Environmental Remediation	1,707,925.8	
	RRES Subtotal	**1,707,925.8**	**83%**
FWO-WFM	Infrastructure Maintenance and Upgrades	86,753.00	
FWO-SWO	Aggregation of New Mexico Special Soils	112,164.80	
FWO-CGRP	Asbestos Abatement Program	7,506.30	
FWO-UI	Infrastructure Upgrades	151,896.00	
FWO-DF	Infrastructure Maintenance	245.00	
	FWO Subtotal	**358,565.1**	**17%**
	Total	**2,066,490.9**	**100%**

3.5.4.2 Other Chemical/Hazardous Waste

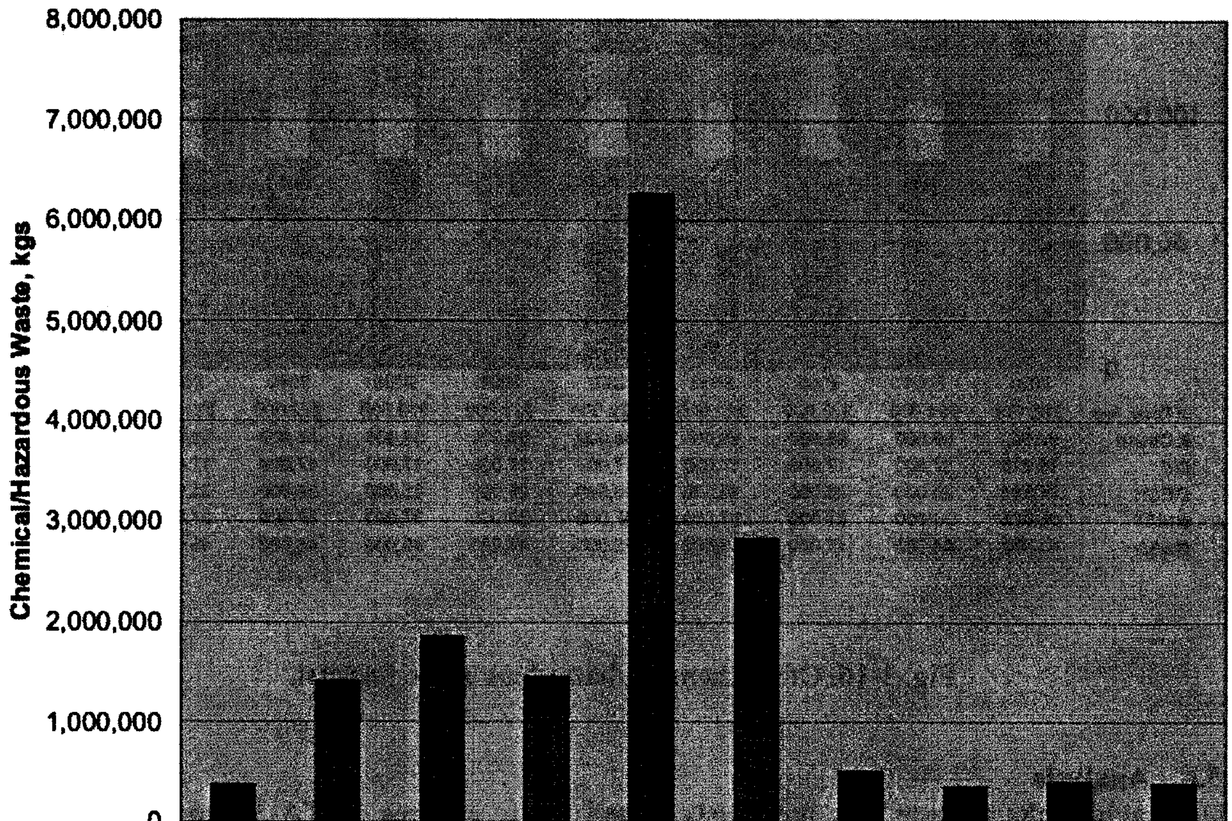
Nearly all divisions at the Laboratory generate chemical/hazardous waste. Specific programs generate some of this waste, but much of the waste is not traceable to specific program activities. For this reason, the non-bulk chemical/hazardous waste has been aggregated by division and not by program. The aggregated totals are shown in Table 3-8.

Table 3-8. Other Chemical/Hazardous Waste by Division and Project

Organization	Program/Project	Weight FY02 (kg)	Percentage
ESA Division			
	ESA Subtotal	**43,992.1**	**20%**
MST Division			
	MST Subtotal	**36,874.7**	**17%**
ESH Division			
	ESH Subtotal	**24,684.7**	**11%**
P Division			
	P Subtotal	**16,628.9**	**8%**
BUS Division			
	BUS Subtotal	**12,732.2**	**6%**
C Division			
	C Subtotal	**12,269.3**	**6%**
DX Division			
	DX Subtotal	**10,302,2**	**5%**
Other Divisions			
	Other Subtotal	**62,649.1**	**27%**
	Total	**220,132.8**	**100%**

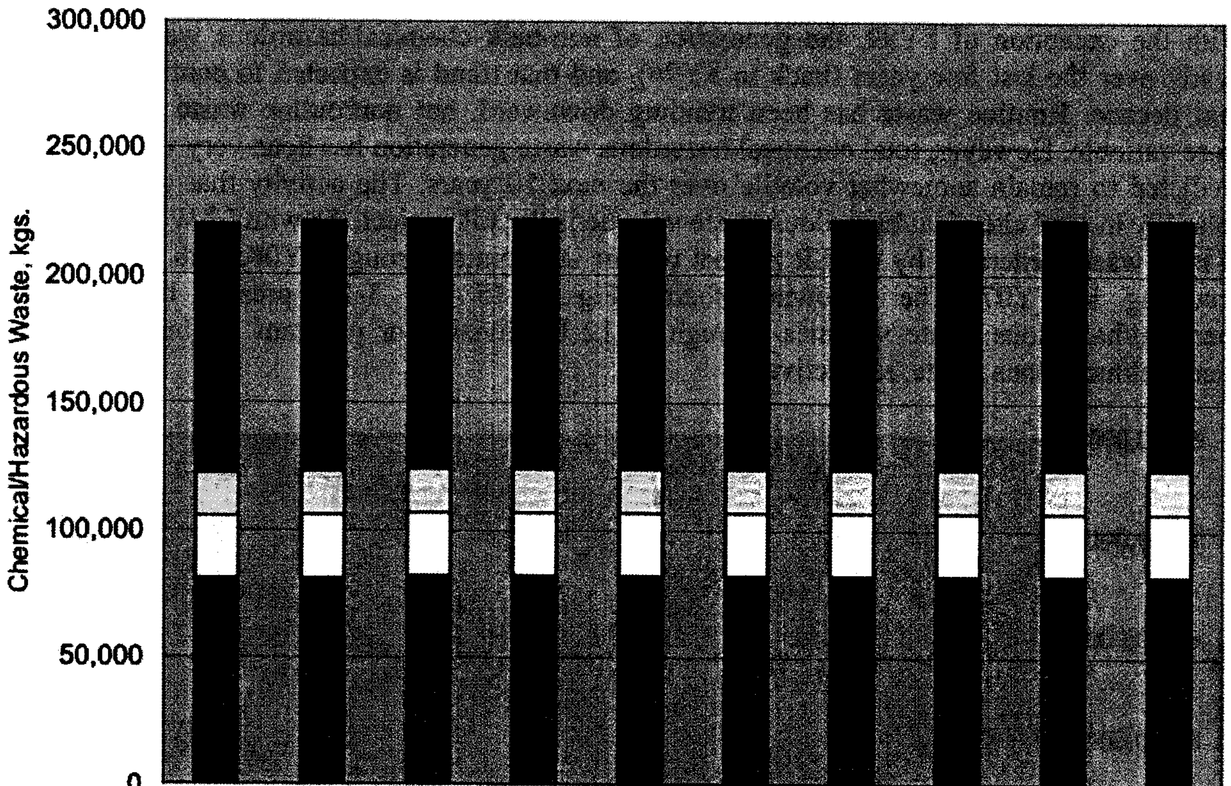
3.5.5 Forecast

With the exception of FY99, the generation of non-bulk chemical/hazardous waste has been steady over the last few years (back to FY96), and that trend is expected to continue over the next decade. Routine waste has been trending downward, but nonroutine waste is somewhat more variable. However, total chemical/hazardous waste generation has been very volatile and is predicted to remain somewhat volatile over the next 10 years. The activity that will drive the volatility in total chemical/hazardous waste volume is the ER project. As with LLW, the volumes of bulk waste generated by the ER project will be substantial through FY08, with peak activity occurring in FY07. The following charts, Figs. 3-15 and 3-16, present the predicted chemical/hazardous waste volumes through FY12 by division or program for bulk and other chemical/hazardous waste, respectively.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total, kgs	375,365	1,405,200	1,851,600	1,448,400	6,266,400	2,828,400	507,600	360,000	398,400	387,600
■FWO	358,565	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000
■ER	16,800	1,045,200	1,491,600	1,088,400	5,906,400	2,468,400	147,600	0	38,400	27,600

Fig. 3-15. Bulk chemical/hazardous waste forecast.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
■Total, kgs	220,132	221,000	222,000	222,000	222,000	222,000	222,000	222,000	222,000	222,000
■Others	97,952	98,000	98,000	98,000	98,000	98,000	98,000	98,000	98,000	98,000
□P	16,629	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000
□ESH	24,684	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
■MST	36,875	37,000	37,000	37,000	37,000	37,000	37,000	37,000	37,000	37,000
■ESA	43,992	44,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000

Fig. 3-16. Other chemical/hazardous waste forecast.

3.5.6 Analysis

Chemical/hazardous waste was previously stored onsite at Area L, TA-54, to await off-site disposal. The Laboratory has taken measures to limit the size of the Area L storage site. The Laboratory has chosen to develop a series of consolidated waste storage facilities where waste can be accumulated for up to 90 days before direct shipment off site for disposal. Currently, four such sites exist at the Laboratory and two more are planned. Over 90% of all chemical/hazardous waste now is shipped directly off site for treatment and disposal, and that fraction is likely to increase in the future. There is no foreseeable impact to Area L from chemical/hazardous waste volume increases. Very large increases in waste volumes could have a small impact on hazardous waste operations at TA-54 in terms of increased record keeping and other administrative efforts. However, a recent reduction in required paper work will minimize the impact on administration.

APPENDICES

Appendix A. Methodology

For each program contributing to TRU waste generation, an FY02 waste volume was determined and converted to the percentage of the total generated waste volume. The data for this waste determination were obtained from division WM coordinators and waste operations team leaders. These data form the baseline for the 10-year projections. These baseline data then were reviewed and validated by division group leaders and project leaders. Once the baseline data were validated, the group management was asked to project funding for the next 10 years. Although these projections will become more speculative in the out years, they represent the best thinking of those responsible for planning future and continuing projects. The projected budget changes then were converted to multiples of the current budgets called delta factors. The delta factors then were used to multiply the baseline waste volumes to obtain estimates of out-year waste volumes. This process implies a linear relationship between budget and waste generation. Although that assumption is probably accurate to the first order, serious caveats to the assumption exist. The assumption does not include known changes within programs; for example, the NMT 10-year vault work-off program will be processing high-curie "aged" metal and the waste volumes will necessarily increase per unit of processed metal relative to newly generated waste. The linear assumption does not account for planned reductions in waste due to minimization activities. For example, the NMT NARS will be expanded to include most of the PF-4 operations; thus, acid waste is expected to drop to very low values in the next few years. Nevertheless, the linear-budget/waste-volume relationship is a good first estimate.

Appendix B. TRU Waste

This appendix presents the data supporting the 10-year TRU waste volume forecast.

The solid TRU waste baseline for the 10-year projections is the FY02 generation profile, which is provided in Table 3-1 of Section 3.1.4.

These baseline data were reviewed and validated by division group leaders and project leaders. The delta factors generated by the methodology of Appendix A are shown for NMT Division in Table B-1.

Table B-1. NMT Division Growth Forecast and Delta Factors

Group	Program	Percentage of Total Items by Group	Allocation Via Program Baseline period Oct 1 01 through Aug 31, 02	Delta Factor 2003	Delta Factor 2004	Delta Factor 2005	Delta Factor 2006	Delta Factor 2007	Delta Factor 2008	Delta Factor 2009	Delta Factor 2010	Delta Factor 2011	Delta Factor 2012
NMT-2	Nuclear Material Stabilization and Packaging (70%)	42%	29.40%	1.1	1.2	1.3	1.4	1.4	1.2	1.2	1.1	1.1	1
	Actinide Processing and Recovery (30%)		12.60%	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
NMT-5	Pit Fabrication	19%	19.00%	1.1	1.2	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4
NMT-9	Pu-238 Operations (30%)	14%	4.20%	1	1	1	1	1	1	1	1	1	1
	Pu-238 and Heat Sources (70%)		9.80%	1.1	1.2	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4
NMT-6 and 11 (40%)	Plutonium R&D Support	7%	9.80%	1	1	1	1	1	1	1	1	1	1
NMT-11 (60%)	EM Technology Support (50%)	7%	3.50%	1	1	1	0.9	0.8	0.6	0.5	0.5	0.5	0.5
	Energy Programs (10%)		0.70%	1.1	1.2	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4
NMT-15	Material Disposition (90%)	3%	2.70%	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.1	1	1
	Non Proliferation Technologies (10%)		0.30%	1	1	1	1	1	1	1	1	1	1
Unclaimed	Unclaimed	3%	3.00%	1	1	1	1	1	1	1	1	1	1
NMT-1	CAAC (to be distributed across programs as per allocations)	1%	1.00%	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
NMT-16	Pit Surveillance	1%	1.00%	1	1	1	1	1	1	1	1	1	1
NMT-3, 4, 7, 8, 13	Infrastructure	3%	3.00%	1	1	1	1	1	1	1	1	1	1
Total	Total	100%	100%										

Application of the delta factors in Table B-1 to the baseline leads to projected waste volumes, in cubic meters, for out years, are shown in Table B-2.

Table B-2. Projected Solid TRU Waste for NMT Division

Group	Program	Percentage of Total Items by Group	Allocation Via Program Baseline period Oct 1 01 through Aug 31, 02	Baseline Volume (129.01)	Incorp. Delta Factor 03	Incorp. Delta Factor 04	Incorp. Delta Factor 05	Incorp. Delta Factor 06	Incorp. Delta Factor 07	Incorp. Delta Factor 08	Incorp. Delta Factor 09	Incorp. Delta Factor 10	Incorp. Delta Factor 11	Incorp. Delta Factor 12
NMT-2	Nuclear Material Stabilization and Packaging (70%)	42%	29.40%	37.93	29.00	45.51	49.31	53.10	53.10	45.51	45.51	41.72	41.72	37.93
	Actinide Processing and Recovery (30%)		12.60%	16.26	17.88	19.51	19.51	19.51	19.51	19.51	19.51	19.51	19.51	19.51
NMT-5	Pit Fabrication	19%	19.00%	24.51	26.96	29.41	31.87	34.32	34.32	34.32	34.32	34.32	34.32	34.32
NMT-9	Pu-238 Operations (30%)	14%	4.20%	5.42	5.42	5.42	5.42	5.42	5.42	5.42	5.42	5.42	5.42	5.42
	Pu-238 and Heat Sources (70%)		9.80%	12.64	13.91	15.17	16.44	17.70	17.70	17.70	17.70	17.70	17.70	17.70
NMT-6 and 11 (40%)	Plutonium R&D Support	14%	9.80%	12.64	12.64	12.64	12.64	12.64	12.64	12.64	12.64	12.64	12.64	12.64
NMT-11 (60%)	EM Technology Support (50%)	7%	3.50%	4.52	4.52	4.52	4.52	4.06	3.61	2.71	2.26	2.26	2.26	2.26
	Energy Programs (10%)		0.70%	0.90	0.99	1.08	1.17	1.26	1.26	1.26	1.26	1.26	1.26	1.26
NMT-15	Material Disposition (90%)	3%	2.70%	3.48	3.83	3.83	4.18	4.18	4.18	4.18	4.18	3.83	3.48	3.48
	Non Proliferation Technologies (10%)		0.30%	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Unclaimed	Unclaimed	3%	3.00%	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
NMT-1	CAAC (to be distributed across programs as per allocations)	1%	1.00%	1.29	1.42	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55
NMT-16	Pit Surveillance	1%	1.00%	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29
NMT-3, 4, 7, 8, 13	Infrastructure	3%	3.00%	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87	3.87
Total	Total	100%	1	129.01	125.99	148.06	156.01	163.16	162.71	154.22	153.77	149.63	149.28	145.48

The FWO TRU waste generation rate is tied directly to NMT activities. However, the rate also is influenced by NMT waste minimization activities, which reduce RLW influent and cemented TRU solids sent to the TA-50 RLTF. In FY98–99, NMT-generated TRU waste increased, whereas TRU waste from FWO (RLWTF) decreased. These changes occurred because waste minimization activities in NMT reduced evaporator bottoms that were sent to the RLWTF for processing and because of reduced liquid influent to the RLWTF. In the future, full utilization of the NARS process in NMT is expected to reduce the acid waste influent to the RLWTF dramatically. Thus, the FWO TRU waste generation rate is not necessarily linear with NMT activity, and applying NMT delta factors directly to the FWO baseline may not yield the best results. To project the FWO TRU volumes, RLWTF personnel projected future wastes relative to the FY02 baseline, including known process changes and waste minimization efforts. These RLWTF projections then were modified by NMT delta factors. The projected FWO TRU waste generation rate is presented in Table B-3.

RRES Division TRU waste is generated by the ER project and the Off-Site Source Recovery Project (OSRP).

RRES also is engaged in repackaging TRU waste for shipment to WIPP; however, this waste is not newly generated. The repackaging results in the generation of a small secondary TRU waste stream and in an increase in the volume of TRU waste because the density is lowered for shipment. These expanded volumes are not included in the TRU waste totals because the repackaging is done in real time in preparation for immediate shipment to WIPP. The repackaged waste does not impact the availability of storage space.

The RRES project 2010 is a project to retrieve legacy TRU waste buried at TA-54 for characterizing, processing, and repackaging for shipment to WIPP. Very large quantities of TRU waste are involved in this retrieval operation. However, the project is not expected to impact the availability of aboveground storage greatly because the material will be retrieved only as storage becomes available. Storage capacity is expected to increase because of the transfer of previously stored materials to WIPP. The schedule for RRES-2010 is flexible; if necessary, it can be delayed beyond FY05 or extended beyond FY07. The actual schedule will be contingent on the rate at which the storage area becomes available. Although the RRES-2010 project impact is

Table B-3. Projected FWO Division TRU Waste Generation

Year	TRU Waste, m^3
2002	2
2003	5
2004	3
2005	4
2006	4
2007	4
2008	4
2009	4
2010	0
2011	0
2012	0

expected to be small, the project totals are included in the overall projections because these large volumes will have to be accommodated by shipment of previously stored materials to WIPP and because the resource load imposed by retrieval of such large volumes of waste is increased.

The RRES-ER project TRU waste generation by year, as estimated by D. McInroy (RRES-R), is shown in Table B-4.

The RRES-OSRP TRU waste generation by year, as estimated by L. Leonard (RRES-OSRP), is shown in Table B-5.

These TRU waste generation volumes were incorporated into the waste forecast table so that the forecast chart presented in Fig. 3-3 of Section 3.1.5 could be determined. These values represent the best estimate of the future generation of TRU waste and will be updated annually.

Table B-4. RRES-ER TRU Waste Forecast

Baseline	RRES-ER, m^3
2003	0
2004	9
2005	0
2006	13
2007	31
2008	0
2009	0
2010	0
2011	0
2012	0

Table B-5. RRES-OSRP TRU Waste Forecast

Year	OSRP, m^3
2003	116
2004	40
2005	30
2006	30
2007	20
2008	10
2009	5
2010	5
2011	5
2012	3

Appendix C. Radioactive Liquid Waste

This appendix presents the data supporting the 10-year radioactive liquid waste volume forecast.

The RLWTF influent information for the past 5 years was obtained from facility records. The average of the last 2 years was taken as a baseline quantity for forecasting future influent volumes. The years 1998 through 2000 were excluded from the average because in 2001, permanent changes were made to the TA-48 boiler and the TSTA cooling tower that resulted in eliminating their discharge to the RLWTF industrial waste line. That plumbing change resulted in eliminating ~3,5000,000 LPY of nonradioactive influent to the RLWTF. Because this change is permanent, it is inappropriate to average volumes across the time period before the change. In addition to the main industrial waste line to the RLWTF, two separate lines (the acid waste line and the caustic waste line) connect TA-55 with the RLWTF at TA-50: the acid waste line and the caustic waste line. These lines typically carry small volumes of waste relative to the industrial waste line influent. The yearly influent (in liters) for 1998–2002 is shown in Table C-1.

The waste lines are metered by facility so that it is relatively easy to determine the volume produced by each major facility. The actual 2002 influent volumes, listed by facility or TA, are presented in Table C-2.

Table C-1. RLWTF Influent by Year

Influent (Liters)	CY 1998	CY 1999	CY 2000	CY 2001	CY 2002	Average
RLW Influent, industrial waste line	22,307,000.00	20,465,000.00	17,858,000.00	13,559,000.00	11,489,000.00	12,524,000.00
Caustic Waste Treated in Rm-60	0.00	7,931.00	3,816.00	11,607.00	1,684.00	6,259.50
Acid Waste Treated in Rm 60	41,930.00	40,364.00	11,847.00	15,500.00	33,719.00	28,672.00

Table C-2. TA-50 RLW Baseline

TA50 RLW Influent (Baseline)		
Facility	Facility Allocation	Flow, Liters
CMR	30%	3,757,200
TA-55 (industrial waste line)	25%	3,131,000
TA-48	20%	2,504,800
Target Fab/SM-66/MSL	18%	2,254,320
TA-59	5%	626,200
TA-21	1%	125,240
TA-16	0.5%	62,620
ER-D&D	0.5%	62,620
Total Flow	100%	12,524,000

Because the site generating RLW is usually known, it is sometimes possible to segregate the waste by division at sites where groups from only one division are present; however, in some cases, groups from more than one division are present at a site. Because the effluent from the entire site is metered, it is not possible to absolutely determine the contributions of the various divisions at the site. In those cases, estimates based on operational experience are made. For example, both NMT and C divisions contribute to the CMR RLW total; however, because the C Division contribution is small compared with the NMT total, all CMR waste is assigned to NMT. In cases where estimates can be made reasonably regarding waste volumes by division, they have been made. The resulting FY02 allocation of RLW by division is shown in Table C-3.

The baseline value for estimating future RLW volumes was obtained by averaging FY01 and FY02 volumes. Where the actual 2002 division allocation is applied to baseline quantity, the results are shown in Table C-4.

These division allocations form the basis of forecasting out-year volumes by division. As with the TRU waste stream, contributions by group and program were estimated by the WM coordinators and the division waste operations team leaders for each of the three major divisions. To forecast out-year volumes, delta functions were applied to the baseline volume. The delta functions were estimated by group and project leaders based on the estimated budget growth for the out-year period. The assumption was that change in waste generation is linear with budget change. Factors such as process change and waste minimization activities will cause a departure from the linear projection, but they are expected to be small. A potentially greater change is the elimination of nonradioactive sources of influent to the RLWTF. There have been several such sources identified but not yet eliminated. The elimination of identified sources is not considered in this forecast.

The forecast tables for NMT, C, and MST divisions are shown in Tables C-5 through C-7.

Table C-3. TA-50 FY02 Influent by Division

TA50 RLW Influent (2002 actual)		
Division	Flow, liters	%
NMT	6,318,950	55
C	2,297,800	20
MST	2,068,020	18
Other	804,230	7
Total Flow	11,489,000	100

Table C-4. TA-50 Baseline Influent

TA50 RLW Influent (baseline)		
Division	Flow, liters	%
NMT	6,888,200.00	55
C	2,504,800.00	20
MST	2,254,320.00	18
Other	876,680.00	7
Total Flow	12,524,000	100

NMT Division:

Table C-5. RLW Generation Forecast for NMT Division

Group	Program	Allocation	Allocation	Volume (l)	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
NMT-2	Nuclear Material Stabilization and Packaging (70%)	12%	8.40%	578,609	636,470	694,331	752,191	810,052	810,052	694,331	694,331	636,470	636,470	578,609
	Actinide Processing and Recovery (30%)		3.60%	247,975	272,773	297,570	297,570	297,570	297,570	297,570	297,570	297,570	297,570	297,570
NMT-5	Pit Fabrication	13%	13.00%	895,466	985,013	1,074,559	1,164,106	1,253,652	1,253,652	1,253,652	1,253,652	1,253,652	1,253,652	1,253,652
NMT-9	Pu-238 Operations (30%)	3%	0.90%	61,994	61,994	61,994	61,994	61,994	61,994	61,994	61,994	61,994	61,994	61,994
	Pu-238 and Heat Sources (70%)		2.10%	144,652	159,117	173,583	188,048	202,513	202,513	202,513	202,513	202,513	202,513	202,513
NMT-6 and	Plutonium R&D Support	12%	15.20%	1,047,006	1,047,006	1,047,006	1,047,006	1,047,006	1,047,006	1,047,006	1,047,006	1,047,006	1,047,006	1,047,006
NMT-11	EM Technology Support (50%)	8%	4.00%	275,528	275,528	275,528	275,528	247,975	220,422	165,317	137,764	137,764	137,764	137,764
	Energy Programs (10%)		0.80%	55,106	60,616	66,127	71,637	77,148	77,148	77,148	77,148	77,148	77,148	77,148
NMT-15	Material Disposition (90%)	5%	4.50%	309,969	340,966	340,966	371,963	371,963	371,963	371,963	371,963	340,966	309,969	309,969
	Non Proliferation Technologies (10%)		0.50%	34,441	34,441	34,441	34,441	34,441	34,441	34,441	34,441	34,441	34,441	34,441
Unclaimed	Unclaimed	0%	0.00%	-	-	-	-	-	-	-	-	-	-	-
NMT-1	CAAC	6%	6.00%	413,292	454,621	495,950	495,950	495,950	495,950	495,950	495,950	495,950	495,950	495,950
NMT-16	Pit Surveillance	7%	7.00%	482,174	482,174	482,174	482,174	482,174	482,174	482,174	482,174	482,174	482,174	482,174
NMT-3, 4, 7	Infrastructure	34%	34.00%	2,341,988	2,341,988	2,148,443	2,148,443	2,148,443	2,148,443	2,148,443	2,148,443	2,148,443	2,148,443	2,148,443
	Total	100%	100%	6,888,200	7,152,707	7,192,672	7,391,052	7,530,882	7,503,330	7,332,502	7,304,950	7,216,092	7,185,095	7,127,234

C Division:

Table C-6. RLW Generation Forecast for C Division

Program	Allocation	Volume (l)	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12
Isotope and Nuclear Chemistry	48%	1,102,944	1,113,973	1,125,003	1,136,032	1,147,062	1,147,062	1,158,091	1,158,091	1,158,091	1,158,091	1,158,091
		-	-	-	-	-	-	-	-	-	-	-
Structural Inorganic Chemistry	52%	1,194,856	1,206,805	1,218,753	1,230,702	1,242,650	1,242,650	1,242,650	1,242,650	1,254,599	1,254,599	1,254,599
		-	-	-	-	-	-	-	-	-	-	-
Total	100%	2,297,800	2,320,778	2,343,756	2,366,734	2,389,712	2,389,712	2,400,741	2,400,741	2,412,690	2,412,690	2,412,690

MST Division:

Table C-7. RLW Generation Forecast for MST Division

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Superconductivity Technology Center	0.01	20680	20,680	12,408	5,552	5,552	5,552	5,552	5,552	5,552	5,552	5,552
National High Magnetic Field Laboratory	0.01	20680	20,680	12,408	5,552	5,552	5,552	5,552	5,552	5,552	5,552	5,552
Center for Integrated Nanotechnologies	0.00	0	-	-	-	-	-	-	-	-	-	-
Materials Integration Science Laboratory	0.00	0	-	-	-	-	-	-	-	-	-	-
MST-6: Materials Technology: Metallurgy	0.60	1240812	1,240,812	1,943,177	2,040,336	2,040,336	2,040,336	2,040,336	2,040,336	2,040,336	2,040,336	2,040,336
MST-7: Polymers and Coatings	0.20	413604	413,604	248,162	111,039	111,039	111,039	111,039	111,039	111,039	111,039	111,039
MST-8: Structure/Property Relations	0.06	124081	124,081	74,449	33,312	33,312	33,312	33,312	33,312	33,312	33,312	33,312
MST-10: Condensed Matter and Thermal Physics	0.06	124081	124,081	74,449	33,312	33,312	33,312	33,312	33,312	33,312	33,312	33,312
MST-11: Electronic and Electrochemical Materials and Devices	0.06	124081	124,081	74,449	33,312	33,312	33,312	33,312	33,312	33,312	33,312	33,312
MST-OPS: Operational Support	0.00	0	-	-	-	-	-	-	-	-	-	-
MST-DO: MST Division Office	0.00	0	-	-	-	-	-	-	-	-	-	-
Non-Routine	0	0	-	-	-	-	-	-	-	-	-	-
Total	1.00	2,068,020	2,068,020	2,439,502	2,262,415	2,262,413	2,262,413	2,262,413	2,262,413	2,262,413	2,262,413	2,262,413

The "Other" category includes RLW from TA-59, TA-16, TA-21, and other small-quantity generators. The baseline volume assigned to "Other" is 804,230 LPY. This RLW volume was held constant, although an overall decrease in volume of as much as 10% is expected in the 10-year forecast period.

The above out-year projections were combined to produce the forecast shown in Fig. 3-6 of Section 3.2.5.

In addition to the industrial waste line, two other lines transfer RLW to the RLWTF: the acid line and the caustic line. The projections for the acid and caustic lines were obtained from RLWTF personnel and validated by the TA-55 waste operations team leader. The acid-line waste projections are presented in Table C-8. The sharp drop in the acid-line volume is due to full implementation of the NARS.

The forecasted caustic-line volumes were generated using the same protocol and are shown in Table C-9. The increases are due to the expected increased throughput of the aqueous chloride line as the 94-1 legacy waste is worked off.

Table C-8. Room 60 Acid Waste Forecast

Year	Acid Waste Volume Liters	NaOH Volume Liters	Total Volume Liters
2003	60,000.00	33,000.00	93,000.00
2004*	60,000.00	33,000.00	93,000.00
2005	24,000.00	8,400.00	32,400.00
2006	24,000.00	8,400.00	32,400.00
2007	24,000.00	8,400.00	32,400.00
2008	24,000.00	8,400.00	32,400.00
2009**	20,000.00	7,000.00	7,000.00
2010***	20,000.00	7,000.00	7,000.00
2011	20,000.00	7,000.00	7,000.00
2012	20,000.00	7,000.00	7,000.00

Table C-9. Caustic Waste Forecast

Year	Caustic Waste Volume Liters
2003	10,000
2004	11,000
2005	12,000
2006	12,000
2007	12,000
2008	10,500
2009	10,000
2010	10,000
2011	10,000
2012	10,000

Appendix D. Low-Level Radioactive Waste

This appendix presents the data supporting the 10-year LLW volume forecast.

The LLW baseline for the 10-year projections is the FY02 generation profile and is shown in Table 3-5 of Section 3.3.4.

These baseline data were reviewed and validated by division group leaders and project leaders.

The RRES-R LLW waste generation is not driven by budget as much as by the remediation schedule. The remediation schedule must be coordinated with the decommissioning and demolition schedule for excess structures to achieve the maximum efficiency and best cost performance. Therefore, the RRES-R estimates were developed in conversations with remediation project management. The estimates are provided in Table D-1.

NMT Division has found a strong correlation between the volume of TRU waste and the volume of LLW. Because the volumes of TRU waste were developed using the delta factors shown in Appendix B, it is appropriate to use those same delta factors to develop the LLW volumes. Application of these NMT delta factors to the LLW baseline leads to the projected out-year waste volumes shown in Table D-2.

Table D-1. RRES-R LLW Forecast

Low-Level Radioactive Waste	
Fiscal Year	ER Waste Volume (in Cubic Meters)
03	587
04	1538
05	497
06	290
07	6331
08	1617
09	31
10	11
11	5
12	0

Table D-2. NMT LLW Forecast

Group	Program	Percentage of Total Items by Group	Allocation Via Program Baseline period Oct 1 01 through Aug 31, 02	Baseline Volume (803.2 m3)	Incorp. Delta Factor 03	Incorp. Delta Factor 04	Incorp. Delta Factor 05	Incorp. Delta Factor 06	Incorp. Delta Factor 07	Incorp. Delta Factor 08	Incorp. Delta Factor 09	Incorp. Delta Factor 10	Incorp. Delta Factor 11	Incorp. Delta Factor 12
NMT-2	Nuclear Material Stabilization and Packaging (70%)	12%	8.40%	67.47	74.22	80.96	87.71	94.46	94.46	80.96	80.96	74.22	74.22	67.47
	Actinide Processing and Recovery (30%)		3.60%	28.92	31.81	34.70	34.70	34.70	34.70	34.70	34.70	34.70	34.70	34.70
NMT-5	Pit Fabrication	13%	13.00%	104.42	114.86	125.30	135.74	146.18	146.18	146.18	146.18	146.18	146.18	146.18
NMT-9	Pu-238 Operations (30%)	3%	0.90%	7.23	7.23	7.23	7.23	7.23	7.23	7.23	7.23	7.23	7.23	7.23
	Pu-238 and Heat Sources (70%)		2.10%	16.87	18.55	20.24	21.93	23.61	23.61	23.61	23.61	23.61	23.61	23.61
NMT-6 and 11 (40%)	Plutonium R&D Support	12%	15.20%	122.09	122.09	122.09	122.09	122.09	122.09	122.09	122.09	122.09	122.09	122.09
NMT-11	EM Technology Support (50%)	8%	4.00%	32.13	32.13	32.13	32.13	28.92	25.70	19.28	16.06	16.06	16.06	16.06
	Energy Programs (10%)		0.80%	6.43	7.07	7.71	8.35	9.00	9.00	9.00	9.00	9.00	9.00	9.00
NMT-15	Material Disposition (90%)	5%	4.50%	36.14	39.76	39.76	43.37	43.37	43.37	43.37	43.37	39.76	36.14	36.14
	Non Proliferation Technologies (10%)		0.50%	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.02
Unclaimed	Unclaimed	0%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NMT-1	CAAC (to be distributed across programs as per allocations)	6%	6.00%	48.19	53.01	57.83	57.83	57.83	57.83	57.83	57.83	57.83	57.83	57.83
NMT-16	Pit Surveillance	7%	7.00%	56.22	56.22	56.22	56.22	56.22	56.22	56.22	56.22	56.22	56.22	56.22
NMT-3, 4, 7, 8, 13	Infrastructure	34%	34.00%	273.09	273.09	273.09	273.09	273.09	273.09	273.09	273.09	273.09	273.09	273.09
Total	Total	100%	100%	803.20	834.04	861.27	884.40	900.71	897.50	877.58	874.36	864.00	860.39	853.64

The FWO LLW waste generation arises from two primary sources: the TA-54 solid waste operation and the RLWTF. The solid waste operation is influenced by several factors, including activity in other Laboratory divisions, reclassification of waste formerly handled as TRU, and generation of secondary waste streams from repackaging operations. The RLW LLW volume is driven primarily by the activity in NMT Division. Overall, the FWO solid waste operation LLW is, as with TRU waste, forecasted to increase in the near term and to be followed by a gradual reduction. The RLW is assumed, somewhat conservatively, to remain constant for the next decade. The projected FWO LLW waste generation rate is presented in Table D-3.

The LANSCE generation of LLW has been nearly constant over the past few years. With one exception, it is projected to remain nearly constant. The exception is the Mo99 project, which is scheduled to run for 3 years, between FY04 and FY06. The two other projects that regularly generate LLW are the lagoon cleanout project and the EIP project. The balance of LANSCE operations produces ~100 m^3 of LLW per year. The forecast for LANSCE LLW production is shown in Table D-4.

MST generates LLW as a result of activities in MST-FAC, facilities operations, the National High Magnetic Field Laboratory, and MST-6. The baseline generation rate for LLW in MST Division is based on historical waste generation data. The facility representative reviewed the data to ensure that all buildings generating waste in the MST Division were covered. The baseline for LLW was the average of FYs 98, 99, 00, and 01. Group and project leaders were interviewed to determine the likely growth of projects and thus the waste generation in their areas. The resulting baseline is shown in Table D-5.

Table D-3. FWO LLW Forecast

Low-Level Radioactive Waste	
Fiscal Year	FWO Waste Volume (in Cubic Meters)
2003	483
2004	499
2005	509
2006	516
2007	509
2008	501
2009	500
2010	495
2011	494
2012	491

Table D-4. LANSCE LLW Forecast

	Low-Level Radioactive Waste				
Fiscal Year	LANSCE Waste Volume (in Cubic Meters)				
	Lagoons	EIP	Mo99	Other Programs	
2003	229.4	12.5		100	341.9
2004	229.4	12.5	12.5	100	354.4
2005	229.4	12.5	12.5	100	354.4
2006	229.4	12.5	12.5	100	354.4
2007	229.4	12.5		100	341.9
2008	229.4	12.5		100	341.9
2009	229.4	12.5		100	341.9
2010	229.4	12.5		100	341.9
2011	229.4	12.5		100	341.9
2012	229.4	12.5		100	341.9

Table D-5. RRES-R LLW Baseline

Low-Level Radioactive Waste	
MST Groups/Projects	Volume, m^3
Superconductivity Technology Center	0.00
National High Magnetic Field Laboratory	0.00
Center for Integrated Nanotechnologies	0.20
Materials Integration Science Laboratory	0.00
MST-6: Materials Technology: Metallurgy	8.06
MST-7: Polymers and Coatings	0.00
MST-8: Structure/Property Relations	0.00
MST-10: Condensed Matter and Thermal Physics	0.00
MST-11: Electronic and Electrochemical Materials and Devices	0.00
MST-OPS: Operational Support	97.60
MST-DO: MST Division Office	0.00
Nonroutine	0.00

The MST waste projections based on the above baseline and the projected project activity are presented in Table D-6.

Table D-6. MST LLW Forecast

Group	LLW Projections, m³									
	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12
Superconductivity Technology Center	0.00									
National High Magnetic Field Laboratory										
Center for Integrated Nanotechnologies	0.20	0.00	1.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Materials Integration Science Laboratory	0.00	1.03	0.39	1.03	1.03	1.03	1.03	1.03	1.03	1.03
MST-6: Materials Technology: Metallurgy	8.06	10.00	16.00	16.00	16.00	12.00	12.00	12.00	12.00	12.00
MST-7: Polymers and Coatings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MST-8: Structure/Property Relations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MST-10: Condensed Matter and Thermal Physics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MST-11: Electronic and Electrochemical Materials and Devices	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MST-OPS: Operational Support	97.60	168.40	201.60	203.70	203.70	203.70	108.30	108.30	108.30	108.30
MST-DO: MST Division Office	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Various other organizations contribute to the generation of LLW, including ESA, ESH, BUS, C, and DX divisions. These divisions contribute ~3% of the total LLW volume in a given year and are likely to appear and disappear at unpredictable intervals. They are not considered in this forecast.

Appendix E. Mixed Low-Level Waste

This appendix presents the data supporting the 10-year MLLW volume forecast. These data were reviewed and validated by group leaders and project leaders.

The FY02 generation profile is shown in Table 3-2 of Section 3.4.4.

The RRES-R MLLW waste generation is not driven by budget as much as by the remediation schedule. As with RRES-R-generated LLW, the RRES-R MLLW estimates were developed in conversations with remediation project management. The estimates (provided by John Kelly of RRES-R) are shown in Table E-1.

NMT Division has found a significant correlation between the volume of TRU waste and the volume of MLLW. Because the volumes of TRU waste were developed using the delta factors shown in Appendix B, it is appropriate to use those same delta factors to develop the LLW volumes. Application of these NMT delta factors to the LLW baseline leads to projected waste volumes for out years, as shown in Table E-2.

Table E-1. RRES-R MLLW Volume Forecast

Mixed Low-Level Waste

Fiscal Year	ER Waste Volume (in Cubic Meters)
03	2
04	93
05	27
06	343
07	659
08	587
09	15
10	0
11	232
12	68

Table E-2. NMT Division MLLW Forecast

Group	Program	Percentage of Total Items by Group	Allocation Via Program Baseline period Oct 1 01 through Aug 31, 02	Baseline Volume (13.3 m3)	Incorp. Delta Factor 03	Incorp. Delta Factor 04	Incorp. Delta Factor 05	Incorp. Delta Factor 06	Incorp. Delta Factor 07	Incorp. Delta Factor 08	Incorp. Delta Factor 09	Incorp. Delta Factor 10	Incorp. Delta Factor 11	Incorp. Delta Factor 12
NMT-2	Nuclear Material Stabilization and Packaging (70%)	5%	3.50%	0.57	0.62	0.68	0.74	0.79	0.79	0.68	0.68	0.62	0.62	0.57
	Actinide Processing and Recovery (30%)		1.50%	0.24	0.27	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
NMT-5	Pit Fabrication	1%	1.00%	0.16	0.18	0.19	0.21	0.23	0.23	0.23	0.23	0.23	0.23	0.23
NMT-9	Pu-238 Operations (30%)	3%	0.90%	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
	Pu-238 and Heat Sources (70%)		2.10%	0.34	0.37	0.41	0.44	0.48	0.48	0.48	0.48	0.48	0.48	0.48
NMT-6 and 11 (40%)	Plutonium R&D Support	9%	6.60%	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
NMT-11 (60%)	EM Technology Support (50%)	4%	2.00%	0.32	0.32	0.32	0.32	0.29	0.26	0.19	0.16	0.16	0.16	0.16
	Energy Programs (10%)		0.40%	0.06	0.07	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09
NMT-15	Material Disposition (90%)	1%	0.90%	0.15	0.16	0.16	0.17	0.17	0.17	0.17	0.17	0.16	0.15	0.15
	Non Proliferation Technologies (10%)		0.10%	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Unclaimed	Unclaimed	0%	0.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NMT-1	CAAC (to be distributed across programs as per allocations)	13%	13.00%	2.11	2.32	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.53
NMT-16	Pit Surveillance	5%	5.00%	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
NMT-3, 4, 7, 8, 13	Infrastructure	63%	63.00%	10.21	10.21	10.21	10.21	10.21	10.21	10.21	10.21	10.21	10.21	10.21
Total	Total	100%	100%	16.20	16.56	16.91	17.04	17.12	17.09	16.91	16.88	16.81	16.79	16.73

The FWO MLLW waste generation arises primarily from facilities and maintenance operations and includes such items as activated fluorescent bulbs and lead-soldered copper joints from RCAs. This level of waste generation is predicted to continue into the next decade with some decrease due to the replacement of mercury-containing bulbs. The projected FWO MLLW waste generation rate is presented in Table E-3.

MST generates MLLW primarily as a result of activities in MST-FAC (facilities operations). The baseline generation rate for LLW in MST Division is based on historical waste generation data. The facility representative reviewed the data to ensure that all buildings generating waste in MST Division were covered. The baseline for MLLW was the average of FYs 98, 99, 00, and 01. Group and project leaders were interviewed to determine the likely growth of projects and thus the waste generation in their areas.

The MST waste projections based on the above baseline and the projected project activity are displayed in Table E-4.

The generation of MLLW at LANSCE has been small and somewhat variable over the past few years. Most of the MLLW is the result of routine maintenance and periodic equipment upgrades. Because these activities are basic to the operation of the facility, LANSCE MLLW is projected for continued generation of ~1 m^3/yr. These data were provided by Ben Poff (LANSCE) and are shown in Table E-5.

Table E-3. FWO Division MLLW Forecast

Mixed Low-Level Radioactive Waste	
Fiscal Year	**FWO Waste Volume (in Cubic Meters)**
2003	4.13
2004	4.21
2005	4.24
2006	4.26
2007	4.25
2008	4.21
2009	4.20
2010	4.18
2011	4.18
2012	4.17

Table E-4. MST Division MLLW Forecast

Group	MLLW Projections, m^3									
	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12
Superconductivity Technology Center	0	0	0	0	0	0	0	0	0	0
National High Magnetic Field Laboratory	0	0	0	0	0	0	0	0	0	0
Center for Integrated Nanotechnologies	0	0	0	0	0	0	0	0	0	0
Materials Integration Science Laboratory	0	0	0	0	0	0	0	0	0	0
MST-6: Materials Technology: Metallurgy	0	0	0	0	0	0	0	0	0	0
MST-7: Polymers and Coatings	0	0	0	0	0	0	0	0	0	0
MST-8: Structure/Property Relations	0	0	0	0	0	0	0	0	0	0
MST-10: Condensed Matter and Thermal Physics	0	0	0	0	0	0	0	0	0	0
MST-11: Electronic and Electrochemical Materials and Devices	0	0	0	0	0	0	0	0	0	0
MST-OPS: Operational Support	0	0	0	0	0	0	0	0	0	0
MST-DO: MST Division Office	0	0	0	0	0	0	0	0	0	0
Non-Routine	1	1	1	1	1	1	1	1	1	1

Table E-5. LANSCE MLLW Forecast

LANSCE MLLW	
Year	MLLW
	m3
2003	1
2004	1
2005	1
2006	1
2007	1
2008	1
2009	1
2010	1
2011	1
2012	1

In most years, a total of 1.5 to 3.0 m^3 of MLLW is produced by a combination of divisions. The divisions change from year to year, but the total remains relatively stable. In FY02, the divisions were C, EES, ESA, PM, and DX and the total quantity generated was 2.7 m^3. This total is part of the baseline value but is not specifically projected into out years.

Appendix F. Chemical/Hazardous Waste

This appendix presents the data supporting the 10-year chemical/hazardous waste volume forecast.

The FY02 generation profile is shown in Section 3.5. That waste profile serves as the baseline for the 10-year projection.

Bulk Chemical/Hazardous Waste

Over 90% of the chemical/hazardous waste generated at the Laboratory is bulk waste generated by the ER Project and FWO Division. This waste predominantly comprises lightly contaminated soils, sludges and nonhazardous chemical wastes from the sanitary wastewater plant. These wastes are shipped directly off site for disposal.

The RRES-R chemical/hazardous waste generation is driven by the remediation schedule. As with RRES-R-generated LLW and MLLW, the estimates for chemical/hazardous waste volumes were developed in conversations with remediation project management. The estimates are shown in Table F-1.

FWO Division generates chemical/hazardous waste as a result of ongoing infrastructure maintenance, upgrades, and cleanouts and as a result of the operation of the sanitary wastewater plant. The waste predominantly comprises contaminated soils, wastewater, and sludges. The operations that produce these wastes are likely to continue at essentially the current level for the foreseeable future. Therefore, the forecast is for essentially constant volumes of FWO bulk chemical/hazardous waste (see Table F-2).

Table F-1. RRES-R Bulk Chemical/Hazardous Waste Forecast

Chemical/Hazardous Waste	
Fiscal Year	ER Waste (kg)
03	16,800
04	1,045,200
05	1,491,600
06	1,088,400
07	5,906,400
08	2,468,400
09	147,600
10	0
11	38,400
12	27,600

Table F-2. FWO Bulk Chemical/Hazardous Waste Forecast

Chemical/Hazardous Waste	
Fiscal Year	FWO Waste (kg)
03	358,565
04	360,000
05	360,000
06	360,000
07	360,000
08	360,000
09	360,000
10	360,000
11	360,000
12	360,000

Other Chemical/Hazardous Waste

Less than 10% of the chemical/hazardous waste generated at LANL is non-bulk waste. However, many of these wastes are much more hazardous than the lightly contaminated bulk wastes. These wastes are generated as a result of R&D and laboratory operations and contain chemicals that are toxins, acute toxins, persistent bioaccumulative toxins, carcinogens, and teratogens. Approximately 48% of these wastes are nonhazardous chemical substances. Nonhazardous chemicals are substances that are not classified as hazardous by the EPA or the state but do not meet waste acceptance criteria for disposal at sanitary landfills or sanitary wastewater plants. The Hazardous Operations team in FWO-SWO disposes of these chemical wastes. The non-bulk chemical/hazardous waste is projected by division, and the forecast for nearly constant generation is shown for the major generating divisions in Table F-3.

Table F-3. Non-Bulk Chemical/Hazardous Waste Forecast by Division

Chemical/Hazardous Waste Volumes					
Fiscal Year	ESA	MST	ESH	P	Others
	kg	kg	kg	kg	kg
2003	43,992	36,875	24,684	16,629	62,649
2004	44,000	37,000	25,000	17,000	63,000
2005	45,000	37,000	25,000	17,000	64,000
2006	45,000	37,000	25,000	17,000	65,000
2007	45,000	37,000	25,000	17,000	65,000
2008	45,000	37,000	25,000	17,000	65,000
2009	45,000	37,000	25,000	17,000	65,000
2010	45,000	37,000	25,000	17,000	65,000
2011	45,000	37,000	25,000	17,000	65,000
2012	45,000	37,000	25,000	17,000	65,000

Attachment H. Final D&D Waste Projections

Bldg Number	Bldg Name	Construction Type	No of Floors	Total Height (ft)	Gross SF	ft^3	yd^3	m^3	UNCONT waste?	RAD waste?
03-0016	ION BEAM FACILITY	CONCRETE SHEAR WALLS	7	70	56,259	3,938,130	145,857	111,507		X
03-0028	OFFICE BLDG	CONCRETE SHEAR WALLS	2	20	17,174	343,480	12,721	9,726	X	
03-0031	CHEMICAL WHSE	CONCRETE MOMENT FRAME	1	10	30,049	300,490	11,129	8,508	X	
03-0039	TECH SHOP	CONCRETE FRAME WITH INFILL SHEAR WALLS	3	30	152,567	4,577,010	169,519	129,597		X
03-0043	ADMINISTRATION BLDG	CONCRETE MOMENT FRAME	7	70	315,737	22,101,590	818,577	625,802	X	
03-0208	EQUIPMENT BLDG	STEEL MOMENT FRAME	1	10	1,440	14,400	533	408	X	
03-0246	Z CABLE CONTROL BLDG C116500	STEEL MOMENT FRAME	1	10	68	680	25	19	X	
03-0247	Z CABLE STRESSER BLDG C116501	STEEL MOMENT FRAME	1	10	288	2,880	107	82	X	
03-0379	Z LEAD POUR & PAINT C116402	UNREINFORCED MASONRY BEARING WALLS	1	10	1,603	16,030	594	454	X	
03-0409	OCC MEDICAL FACILITY	WOOD, COMMERCIAL AND INDUSTRIAL	1	10	9,956	99,560	3,687	2,819	X	
03-0481	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	3,327	33,270	1,232	942	X	
03-0482	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	3,325	33,250	1,231	941	X	
03-0490	BADGE OFFICE			10	0	0	0	0	X	
03-0510	PHOTO LAB BLDG	STEEL MOMENT FRAME	2	20	9,006	180,120	6,671	5,100	X	
03-0542	GUARD STATION			10	0	0	0	0	X	
03-0587	Security Division			10	160	1,600	59	45	X	
03-1381	TRAILER	WOOD, LIGHT FRAME	1	10	592	5,920	219	168	X	
03-1526	Z CRAFTS TRAILER E21339	WOOD, LIGHT FRAME	1	10	880	8,800	326	249	X	
03-1527	TRAILER	WOOD, LIGHT FRAME	1	10	550	5,500	204	156	X	
03-1539	TRAILER	WOOD, LIGHT FRAME	1	10	720	7,200	267	204	X	
03-1544	TRAILER	WOOD, LIGHT FRAME	1	10	702	7,020	260	199	X	
03-1545	TRAILER	WOOD, LIGHT FRAME	1	10	702	7,020	260	199	X	
03-1552	TRAILER	WOOD, LIGHT FRAME	1	10	1,994	19,940	739	565	X	
03-1553	TRAILER	WOOD, LIGHT FRAME	1	10	844	8,440	313	239	X	
03-1559	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,688	16,880	625	478	X	
03-1565	TRAILER	WOOD, LIGHT FRAME	1	10	1,022	10,220	379	289	X	
03-1566	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,680	16,800	622	476	X	
03-1575	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,680	16,800	622	476	X	
03-1586	TRAILER	WOOD, LIGHT FRAME	1	10	1,997	19,970	740	565	X	
03-1635	TRANSPORTABLE PO 9976M	WOOD, LIGHT FRAME	1	10	1,690	16,900	626	479	X	
03-1636	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,680	16,800	622	476	X	
03-1732	TRAILER LP 2372J	WOOD, LIGHT FRAME	1	10	672	6,720	249	190	X	
03-1739	TRAILER PO 9113U	WOOD, LIGHT FRAME	1	10	840	8,400	311	238	X	
03-1741	TRAILER PO 9112U	WOOD, LIGHT FRAME	1	10	1,440	14,400	533	408	X	
03-1745	TRAILER PO 9115U	WOOD, LIGHT FRAME	1	10	980	9,800	363	277	X	

Bldg Number	HE waste?	Light Construction	Heavy Construction	TOTAL Volume UNCONTAMINATED (yd^3)	TOTAL Volume UNCONTAMINATED (m^3)	TOTALVolume HE (yd^3)	TOTAL Waste Volume HE (m^3)	TOTAL Volume RADIOLOGICAL (yd^3)	TOTAL Volume RADIOLOGICAL (m^3)
03-0016			0.85					145,857	111,507
03-0028			0.85	12,721	9,726				
03-0031			0.85	11,129	8,508				
03-0039			0.85					169,519	129,597
03-0043			0.85	818,577	625,802				
03-0208			0.85	533	408				
03-0246			0.85	25	19				
03-0247			0.85	107	82				
03-0379			0.85	594	454				
03-0409		0.33		3,687	2,819				
03-0481		0.33		1,232	942				
03-0482		0.33		1,231	941				
03-0490			0.85	0	0				
03-0510			0.85	6,671	5,100				
03-0542			0.85	0	0				
03-0587			0.85	59	45				
03-1381		0.33		219	168				
03-1526		0.33		326	249				
03-1527		0.33		204	156				
03-1539		0.33		267	204				
03-1544		0.33		260	199				
03-1545		0.33		260	199				
03-1552		0.33		739	565				
03-1553		0.33		313	239				
03-1559		0.33		625	478				
03-1565		0.33		379	289				
03-1566		0.33		622	476				
03-1575		0.33		622	476				
03-1586		0.33		740	565				
03-1635		0.33		626	479				
03-1636		0.33		622	476				
03-1732		0.33		249	190				
03-1739		0.33		311	238				
03-1741		0.33		533	408				
03-1745		0.33		363	277				

Bldg Number	Estimated Waste Volume UNCONTAMINATED (yd³)	Estimated Waste Volume UNCONTAMINATED (m³)	Estimated Waste Volume HE (yd³)	Estimated Waste Volume HE (m³)	Estimated Waste Volume RADIOLOGICAL (yd³)	Estimated Waste Volume RADIOLOGICAL (m³)
03-0016					123,978	94,781
03-0028	10,813	8,267				
03-0031	9,460	7,232				
03-0039					144,091	110,158
03-0043	695,791	531,932				
03-0208	453	347				
03-0246	21	16				
03-0247	91	69				
03-0379	505	386				
03-0409	1,217	930				
03-0481	407	311				
03-0482	406	311				
03-0490	0	0				
03-0510	5,670	4,335				
03-0542	0	0				
03-0587	50	39				
03-1381	72	55				
03-1526	108	82				
03-1527	67	51				
03-1539	88	67				
03-1544	86	66				
03-1545	86	66				
03-1552	244	186				
03-1553	103	79				
03-1559	206	158				
03-1565	125	95				
03-1566	205	157				
03-1575	205	157				
03-1586	244	187				
03-1635	207	158				
03-1636	205	157				
03-1732	82	63				
03-1739	103	78				
03-1741	176	135				
03-1745	120	92				

Bldg Number	Bldg Name	Construction Type	No of Floors	Total Height (ft)	Gross SF	ft^3	yd^3	m^3	UNCONT waste?	RAD waste?
03-1750	TRAILER PO 3297Z	WOOD, LIGHT FRAME	1	10	1,960	19,600	726	555	X	
03-1760	TRAILER PO 9115U	WOOD, LIGHT FRAME	1	10	980	9,800	363	277	X	
03-1769	Security Division			10	320	3,200	119	91	X	
03-1814	GUARD TOWER STA #334	OTHER-DESCRIBE BRIEFLY IN COMMENTS FIELD/SUPP DOC	1	10	36	360	13	10	X	
03-1949	Ion Beam TRANSPORTAINER			10	48	480	18	14	X	
03-2294	ROVER SEMI-TRAILER			10	256	2,560	95	72	X	
03-3072	ROVER SEMI-TRAILER			10	160	1,600	59	45	X	
06-0001	STORAGE BLDG	WOOD, LIGHT FRAME	1	10	1,557	15,570	577	441	X	
06-0002	COMPRESSOR BLDG	WOOD, LIGHT FRAME	1	10	76	760	28	22	X	
06-0003	FABRICATION BLDG	WOOD, LIGHT FRAME	1	10	647	6,470	240	183	X	
06-0005	STORAGE BLDG	WOOD, LIGHT FRAME	1	10	300	3,000	111	85	X	
06-0006	STORAGE BLDG	WOOD, LIGHT FRAME	1	10	2,563	25,630	949	726	X	
06-0007	STORAGE BLDG	CONCRETE SHEAR WALLS	1	10	228	2,280	84	65	X	
06-0008	LAB BLDG	CONCRETE SHEAR WALLS	2	20	697	13,940	516	395	X	
06-0009	FIRING CHAMBER	CONCRETE SHEAR WALLS	1	10	353	3,530	131	100	X	
08-0001	LABORATORY & SHOP BLDG	CONCRETE SHEAR WALLS	1	10	3,555	35,550	1,317	1,007		
08-0002	SHOP & STORAGE BLDG	CONCRETE SHEAR WALLS	1	10	408	4,080	151	116		
08-0003	LABORATORY BLDG	CONCRETE SHEAR WALLS	1	10	647	6,470	240	183		
08-0020	GUARD STATION	CONCRETE SHEAR WALLS	1	10	187	1,870	69	53	X	
08-0024	FLASH X-RAY R&D	CONCRETE SHEAR WALLS	2	20	2,231	44,620	1,653	1,263		
08-0025	UTILITY BLDG	CONCRETE SHEAR WALLS	1	10	99	990	37	28		
08-0026	STORAGE/SALVAGE BLDG	WOOD, LIGHT FRAME	1	10	638	6,380	236	181		
08-0028	GUARD SHACK	CONCRETE SHEAR WALLS	1	10	87	870	32	25		
08-0029	UTILITY BLDG	CONCRETE SHEAR WALLS	1	10	99	990	37	28		
08-0030	M.A.S.H. RESEARCH LAB	WOOD, LIGHT FRAME	1	10	638	6,380	236	181		
09-0020	OFFICE	CONCRETE SHEAR WALLS	1	10	189	1,890	70	54	X	
09-0021	LAB & OFFICE BLDG	CONCRETE SHEAR WALLS	2	20	25,423	508,460	18,832	14,397		X
09-0022	MAGAZINE	CONCRETE SHEAR WALLS	1	10	9	90	3	3		
09-0023	MAGAZINE	CONCRETE SHEAR WALLS	1	10	9	90	3	3		
09-0024	MAGAZINE	CONCRETE SHEAR WALLS	1	10	9	90	3	3		
09-0025	MAGAZINE	CONCRETE SHEAR WALLS	1	10	10	100	4	3		
09-0026	MAGAZINE	CONCRETE SHEAR WALLS	1	10	9	90	3	3		
09-0027	MAGAZINE	CONCRETE SHEAR WALLS	1	10	9	90	3	3		
09-0029	STOCK & EQUIP BLDG	CONCRETE SHEAR WALLS	1	10	4,675	46,750	1,731	1,324		

Bldg Number	HE waste?	Light Construction	Heavy Construction	TOTAL Volume UNCONTAMINATED (yd^3)	TOTAL Volume UNCONTAMINATED (m^3)	TOTALVolume HE (yd^3)	TOTAL Waste Volume HE (m^3)	TOTAL Volume RADIOLOGICAL (yd^3)	TOTAL Volume RADIOLOGICAL (m^3)
03-1750		0.33		726	555				
03-1760		0.33		363	277				
03-1769			0.85	119	91				
03-1814			0.85	13	10				
03-1949			0.85	18	14				
03-2294		0.33		95	72				
03-3072		0.33		59	45				
06-0001		0.33		577	441				
06-0002		0.33		28	22				
06-0003		0.33		240	183				
06-0005		0.33		111	85				
06-0006		0.33		949	726				
06-0007			0.85	84	65				
06-0008			0.85	516	395				
06-0009			0.85	131	100				
08-0001	X		0.85			1,317	1,007		
08-0002	X		0.85			151	116		
08-0003	X		0.85			240	183		
08-0020			0.85	69	53				
08-0024	X		0.85			1,653	1,263		
08-0025	X		0.85			37	28		
08-0026	X	0.33				236	181		
08-0028	X		0.85			32	25		
08-0029	X		0.85			37	28		
08-0030	X	0.33				236	181		
09-0020			0.85	70	54				
09-0021	X		0.85			18,832	14,397	18,832	14,397
09-0022	X		0.85			3	3		
09-0023	X		0.85			3	3		
09-0024	X		0.85			3	3		
09-0025	X		0.85			4	3		
09-0026	X		0.85			3	3		
09-0027	X		0.85			3	3		
09-0029	X		0.85			1,731	1,324		

Bldg Number	Estimated Waste Volume UNCONTAMINATED (yd^3)	Estimated Waste Volume UNCONTAMINATED (m^3)	Estimated Waste Volume HE (yd^3)	Estimated Waste Volume HE (m^3)	Estimated Waste Volume RADIOLOGICAL (yd^3)	Estimated Waste Volume RADIOLOGICAL (m^3)
03-1750	240	183				
03-1760	120	92				
03-1769	101	77				
03-1814	11	9				
03-1949	15	12				
03-2294	31	24				
03-3072	20	15				
06-0001	190	145				
06-0002	9	7				
06-0003	79	60				
06-0005	37	28				
06-0006	313	239				
06-0007	72	55				
06-0008	439	336				
06-0009	111	85				
08-0001			1,119	856		
08-0002			128	98		
08-0003			204	156		
08-0020	59	45				
08-0024			1,405	1,074		
08-0025			31	24		
08-0026			78	60		
08-0028			27	21		
08-0029			31	24		
08-0030			78	60		
09-0020	59	45				
09-0021			16,007	12,237	16,007	12,237
09-0022			3	2		
09-0023			3	2		
09-0024			3	2		
09-0025			3	2		
09-0026			3	2		
09-0027			3	2		
09-0029			1,472	1,125		

Bldg Number	Bldg Name	Construction Type	No of Floors	Total Height (ft)	Gross SF	ft^3	yd^3	m^3	UNCONT waste?	RAD waste?
09-0030	GAS STORAGE	CONCRETE SHEAR WALLS	1	10	242	2,420	90	69		
09-0031	SOLVENT STORAGE	CONCRETE SHEAR WALLS	1	10	330	3,300	122	93		
09-0032	LAB/OFFICE BLDG	CONCRETE SHEAR WALLS	1	10	2,549	25,490	944	722		
09-0033	LAB BLDG	CONCRETE SHEAR WALLS	1	10	949	9,490	351	269		
09-0034	PROCESS LAB	CONCRETE SHEAR WALLS	1	10	1,771	17,710	656	501		
09-0035	PROCESS LAB	CONCRETE SHEAR WALLS	1	10	1,911	19,110	708	541		
09-0037	PROCESS LAB	CONCRETE SHEAR WALLS	1	10	1,591	15,910	589	450		
09-0043	PROCESS LAB	CONCRETE SHEAR WALLS	1	10	1,768	17,680	655	501		
09-0050	RECEIVING & SHIPPING BLDG	CONCRETE SHEAR WALLS	1	10	576	5,760	213	163		
09-0204	REFRIGERATOR SHELTER	STEEL MOMENT FRAME	1	10	39	390	14	11		
09-0208	DAY MAGAZINE	CONCRETE SHEAR WALLS	1	10	50	500	19	14		
09-0272	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,698	16,980	629	481		
09-0273	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,701	17,010	630	482		
11-0001	STORAGE BLDG	CONCRETE SHEAR WALLS	1	10	618	6,180	229	175		
11-0002	CONTROL BLDG	CONCRETE SHEAR WALLS	1	10	831	8,310	308	235		
11-0024	SHOP/OFFICE BLDG	STEEL LIGHT FRAME	1	10	3,685	36,850	1,365	1,043		
11-0033	EQUIPMENT SHELTER	STEEL MOMENT FRAME	1	10	66	660	24	19		
14-0005	BUNKER	CONCRETE SHEAR WALLS	1	10	375	3,750	139	106		
14-0030	EXPLOSIVE PREP BLDG	CONCRETE SHEAR WALLS	1	10	246	2,460	91	70		
14-0034	CONTROL BLDG	CONCRETE SHEAR WALLS	1	10	342	3,420	127	97		
14-0038	STORAGE SHACK	STEEL MOMENT FRAME	1	10	48	480	18	14		
14-0039	STORAGE SHACK		1	10	48	480	18	14		
14-0040	INSTRUMENTATION BLDG	CONCRETE SHEAR WALLS	1	10	80	800	30	23		
14-0043	ASSEMBLY & STORAGE BLDG	STEEL LIGHT FRAME	1	10	1,000	10,000	370	283		
15-0008	STORAGE BLDG	WOOD, LIGHT FRAME	1	10	324	3,240	120	92		
15-0009	FIRING BUNKER	CONCRETE SHEAR WALLS	1	10	297	2,970	110	84		
15-0020	BRANCH SHOP & LAB BLDG	STEEL BRACED FRAME	1	10	3,699	36,990	1,370	1,047		
15-0022	STORAGE BLDG	CONCRETE SHEAR WALLS	1	10	310	3,100	115	88		
15-0023	LAB/STORAGE BLDG	WOOD, LIGHT FRAME	1	10	780	7,800	289	221		
15-0027	CONTROL BLDG	WOOD, LIGHT FRAME	1	10	560	5,600	207	159		
15-0030	GUARD STATION	UNREINFORCED MASONRY BEARING WALLS	1	10	205	2,050	76	58		
15-0040	LAB & OFFICE BLDG	CONCRETE SHEAR WALLS	1	10	13,487	134,870	4,995	3,819		
15-0044	CONTROL BUILDING	CONCRETE SHEAR WALLS	1	10	508	5,080	188	144		

Bldg Number	HE waste?	Light Construction	Heavy Construction	TOTAL Volume UNCONTAMINATED (yd^3)	TOTAL Volume UNCONTAMINATED (m^3)	TOTALVolume HE (yd^3)	TOTAL Waste Volume HE (m^3)	TOTAL Volume RADIOLOGICAL (yd^3)	TOTAL Volume RADIOLOGICAL (m^3)
09-0030	X		0.85			90	69		
09-0031	X		0.85			122	93		
09-0032	X		0.85			944	722		
09-0033	X		0.85			351	269		
09-0034	X		0.85			656	501		
09-0035	X		0.85			708	541		
09-0037	X		0.85			589	450		
09-0043	X		0.85			655	501		
09-0050	X		0.85			213	163		
09-0204	X		0.85			14	11		
09-0208	X		0.85			19	14		
09-0272	X	0.33				629	481		
09-0273	X	0.33				630	482		
11-0001	X		0.85			229	175		
11-0002	X		0.85			308	235		
11-0024	X		0.85			1,365	1,043		
11-0033	X		0.85			24	19		
14-0005	X		0.85			139	106		
14-0030	X		0.85			91	70		
14-0034	X		0.85			127	97		
14-0038	X		0.85			18	14		
14-0039	X		0.85			18	14		
14-0040	X		0.85			30	23		
14-0043	X		0.85			370	283		
15-0008	X	0.33				120	92		
15-0009	X		0.85			110	84		
15-0020	X		0.85			1,370	1,047		
15-0022	X		0.85			115	88		
15-0023	X	0.33				289	221		
15-0027	X	0.33				207	159		
15-0030	X		0.85			76	58		
15-0040	X		0.85			4,995	3,819		
15-0044	X		0.85			188	144		

Bldg Number	Estimated Waste Volume UNCONTAMINATED (yd^3)	Estimated Waste Volume UNCONTAMINATED (m^3)	Estimated Waste Volume HE (yd^3)	Estimated Waste Volume HE (m^3)	Estimated Waste Volume RADIOLOGICAL (yd^3)	Estimated Waste Volume RADIOLOGICAL (m^3)
09-0030			76	58		
09-0031			104	79		
09-0032			802	613		
09-0033			299	228		
09-0034			558	426		
09-0035			602	460		
09-0037			501	383		
09-0043			557	426		
09-0050			181	139		
09-0204			12	9		
09-0208			16	12		
09-0272			208	159		
09-0273			208	159		
11-0001			195	149		
11-0002			262	200		
11-0024			1,160	887		
11-0033			21	16		
14-0005			118	90		
14-0030			77	59		
14-0034			108	82		
14-0038			15	12		
14-0039			15	12		
14-0040			25	19		
14-0043			315	241		
15-0008			40	30		
15-0009			93	71		
15-0020			1,164	890		
15-0022			98	75		
15-0023			95	73		
15-0027			68	52		
15-0030			65	49		
15-0040			4,246	3,246		
15-0044			160	122		

Bldg Number	Bldg Name	Construction Type	No of Floors	Total Height (ft)	Gross SF	ft^3	yd^3	m^3	UNCONT waste?	RAD waste?
15-0046	EXERCISE FACILITY	CONCRETE SHEAR WALLS	1	10	179	1,790	66	51	X	
15-0138	BUNKER			10	100	1,000	37	28		
15-0140	STORAGE BUILDING	STEEL BRACED FRAME	1	10	1,210	12,100	448	343		
15-0141	BUNKER			10	140	1,400	52	40		
15-0184	PHERMEX CHAMBER/AMP	CONCRETE SHEAR WALLS	1	10	10,144	101,440	3,757	2,872		
15-0185	POWER CONTROL BLDG	CONCRETE SHEAR WALLS	2	20	12,698	253,960	9,406	7,191		
15-0186	DETECTION CHAMBER	CONCRETE SHEAR WALLS	1	10	2,338	23,380	866	662		
15-0189	POWER SUPPLY BLDG	CONCRETE SHEAR WALLS	1	10	452	4,520	167	128		
15-0194	PULSE POWER LAB	STEEL LIGHT FRAME	1	10	1,976	19,760	732	560		
15-0198	TUNNEL	FIELD/SUPP DOC	1	10	905	9,050	335	256		
15-0199	TUNNEL	FIELD/SUPP DOC	1	10	2,027	20,270	751	574		
15-0200	TUNNEL	FIELD/SUPP DOC	1	10	702	7,020	260	199		
15-0201	TUNNEL	FIELD/SUPP DOC	1	10	870	8,700	322	246		
15-0203	REX LABORATORY	STEEL LIGHT FRAME	1	10	3,412	34,120	1,264	966		
15-0213	PLATFORM	WOOD, LIGHT FRAME	1	10	624	6,240	231	177		
15-0245	REX CONTROL ROOM	STEEL MOMENT FRAME	2	20	1,653	33,060	1,224	936		
15-0305	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	3,552	35,520	1,316	1,006		
15-0310	MULTIDIAG OPERATIONS	CONCRETE SHEAR WALLS	1	10	3,194	31,940	1,183	904		
15-0476	TRAILER	WOOD, LIGHT FRAME	1	10	672	6,720	249	190		
16-0007	MACHINE SHOP	WOOD, LIGHT FRAME	1	10	4,653	46,530	1,723	1,317		
16-0058	MAGAZINE	CONCRETE SHEAR WALLS	1	10	299	2,990	111	85		
16-0088	CASTING REST HOUSE	WOOD, LIGHT FRAME	1	10	2,043	20,430	757	578		X
16-0203	Z LUMBER STORAGE C117927	STEEL MOMENT FRAME	1	10	1,043	10,430	386	295		
16-0209	SAFETY OFFICE	CONCRETE SHEAR WALLS	1	10	187	1,870	69	53	X	
16-0242	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,456	14,560	539	412		
16-0243	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	3,241	32,410	1,200	918		
16-0244	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	3,389	33,890	1,255	960		
16-0245	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,691	16,910	626	479		
16-0246	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,688	16,880	625	478		
16-0294	SHED			10	22	220	8	6		
16-0303	REST HOUSE	CONCRETE SHEAR WALLS	1	10	5,405	54,050	2,002	1,530		
16-0304	PLASTICS BLDG	CONCRETE SHEAR WALLS	2	20	19,513	390,260	14,454	11,050		
16-0305	PLASTICS BLDG	CONCRETE SHEAR WALLS	1	10	5,402	54,020	2,001	1,530		
16-0306	PLASTICS BLDG	CONCRETE SHEAR WALLS	2	20	19,639	392,780	14,547	11,121		
16-0307	PLASTICS BLDG	CONCRETE SHEAR WALLS	1	10	7,716	77,160	2,858	2,185		

Bldg Number	HE waste?	Light Construction	Heavy Construction	TOTAL Volume UNCONTAMINATED (yd^3)	TOTAL Volume UNCONTAMINATED (m^3)	TOTALVolume HE (yd^3)	TOTAL Waste Volume HE (m^3)	TOTAL Volume RADIOLOGICAL (yd^3)	TOTAL Volume RADIOLOGICAL (m^3)
15-0046			0.85	66	51				
15-0138	X		0.85						
15-0140	X		0.85						
15-0141	X		0.85			52	40		
15-0184	X		0.85			3,757	2,872		
15-0185	X		0.85			9,406	7,191		
15-0186	X		0.85			866	662		
15-0189	X		0.85			167	128		
15-0194	X		0.85			732	560		
15-0198	X		0.85			335	256		
15-0199	X		0.85			751	574		
15-0200	X		0.85			260	199		
15-0201	X		0.85			322	246		
15-0203	X		0.85			1,264	966		
15-0213	X	0.33				231	177		
15-0245	X		0.85			1,224	936		
15-0305	X	0.33				1,316	1,006		
15-0310	X		0.85			1,183	904		
15-0476	X	0.33				249	190		
16-0007	X	0.33				1,723	1,317		
16-0058	X		0.85			111	85		
16-0088	X	0.33				757	578	757	578
16-0203	X		0.85			386	295		
16-0209			0.85	69	53				
16-0242	X	0.33				539	412		
16-0243	X	0.33				1,200	918		
16-0244	X	0.33				1,255	960		
16-0245	X	0.33				626	479		
16-0246	X	0.33				625	478		
16-0294	X	0.33				8	6		
16-0303	X		0.85			2,002	1,530		
16-0304	X		0.85			14,454	11,050		
16-0305	X		0.85			2,001	1,530		
16-0306	X		0.85			14,547	11,121		
16-0307	X		0.85			2,858	2,185		

Bldg Number	Estimated Waste Volume UNCONTAMINATED (yd^3)	Estimated Waste Volume UNCONTAMINATED (m^3)	Estimated Waste Volume HE (yd^3)	Estimated Waste Volume HE (m^3)	Estimated Waste Volume RADIOLOGICAL (yd^3)	Estimated Waste Volume RADIOLOGICAL (m^3)
15-0046	56	43				
15-0138			0	0		
15-0140			0	0		
15-0141			44	34		
15-0184			3,193	2,441		
15-0185			7,995	6,112		
15-0186			736	563		
15-0189			142	109		
15-0194			622	476		
15-0198			285	218		
15-0199			638	488		
15-0200			221	169		
15-0201			274	209		
15-0203			1,074	821		
15-0213			76	58		
15-0245			1,041	796		
15-0305			434	332		
15-0310			1,006	769		
15-0476			82	63		
16-0007			569	435		
16-0058			94	72		
16-0088			250	191	250	191
16-0203			328	251		
16-0209	59	45				
16-0242			178	136		
16-0243			396	303		
16-0244			414	317		
16-0245			207	158		
16-0246			206	158		
16-0294			3	2		
16-0303			1,702	1,301		
16-0304			12,286	9,393		
16-0305			1,701	1,300		
16-0306			12,365	9,453		
16-0307			2,429	1,857		

Bldg Number	Bldg Name	Construction Type	No of Floors	Total Height (ft)	Gross SF	ft^3	yd^3	m^3	UNCONT waste?	RAD waste?
16-0319	OFFICE	UNREINFORCED MASONRY BEARING WALLS	1	10	334	3,340	124	95	X	
16-0360	STORAGE BLDG	CONCRETE SHEAR WALLS	1	10	3,911	39,110	1,449	1,107		
16-0370	METAL FORMING BLDG	CONCRETE SHEAR WALLS	3	30	19,594	587,820	21,771	16,644		
16-0414	STORAGE BLDG	STEEL BRACED FRAME	1	10	8,488	84,880	3,144	2,403		
16-0415	REST HOUSE	CONCRETE SHEAR WALLS	1	10	4,559	45,590	1,689	1,291		X
16-0435	REST HOUSE	CONCRETE SHEAR WALLS	1	10	4,439	44,390	1,644	1,257		
16-0437	REST HOUSE	CONCRETE SHEAR WALLS	1	10	4,323	43,230	1,601	1,224		
16-0453	LEAN TO STORAGE SHED	FIELD/SUPP DOC	1	10	288	2,880	107	82		
16-0457	Z VALVE HOUSE C113805	STEEL MOMENT FRAME	1	10	42	420	16	12		
16-0476	CONTROL ROOM	CONCRETE SHEAR WALLS	1	10	238	2,380	88	67		
16-0477	REST HOUSE	CONCRETE SHEAR WALLS	1	10	374	3,740	139	106		
16-0478	HIGH SPEED MACHINING	CONCRETE SHEAR WALLS	1	10	1,199	11,990	444	339		
16-0516	PROCESS BLDG	WOOD, LIGHT FRAME	1	10	660	6,600	244	187		
16-0517	EQUIP BLDG	CONCRETE SHEAR WALLS	1	10	318	3,180	118	90		
16-0540	Z STEAM PLANT C106430	STEEL BRACED FRAME	4	40	12,811	512,440	18,979	14,510		
16-0542	Z GAS REGULATOR BLDG C106417	STEEL MOMENT FRAME	1	10	152	1,520	56	43		
16-0897	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,452	14,520	538	411		
16-1451	GUARD STATION	CONCRETE SHEAR WALLS	1	10	187	1,870	69	53	X	
16-1486	STEAM PLANT BOILER #7	FIELD/SUPP DOC	1	10	900	9,000	333	255		
18-0002	METAL BLDG	CONCRETE SHEAR WALLS	1	10	123	1,230	46	35	X	
18-0005	METAL BLDG	CONCRETE SHEAR WALLS	1	10	123	1,230	46	35	X	
18-0186	GUARD TOWER	FIELD/SUPP DOC	1	10	36	360	13	10	X	
18-0187	GUARD TOWER		1	10	36	360	13	10	X	
18-0188	GUARD TOWER	FIELD/SUPP DOC	1	10	36	360	13	10	X	
21-0001	OFFICE VAULT BLDG	UNREINFORCED MASONRY BEARING WALLS	1	10	1,585	15,850	587	449	X	
21-0002N	LABORATORY BLDG			10	14,447	144,470	5,351	4,091	X	
21-0002S	LABORATORY BLDG			0	0	0	0	0	X	
21-0003	LABORATORY BLDG	UNREINFORCED MASONRY BEARING WALLS	1	10	4,733	47,330	1,753	1,340	X	
21-0004	LABORATORY BLDG	UNREINFORCED MASONRY BEARING WALLS	1	10	1,551	15,510	574	439	X	
21-0005N	LABORATORY BLDG.			10	27,039	270,390	10,014	7,656	X	
21-0005S	LABORATROY BLDG			0	0	0	0	0	X	
21-0021	VAULT	CONCRETE SHEAR WALLS	1	10	3,577	35,770	1,325	1,013		X
21-0042	Z PUMP HOUSE C108692	UNREINFORCED MASONRY BEARING WALLS	1	10	64	640	24	18	X	
21-0046	Z WAREHOUSE C106423	STEEL LIGHT FRAME	1	10	1,812	18,120	671	513	X	
21-0080	PRV STATION (WATER)	FIELD/SUPP DOC	1	10	35	350	13	10	X	
21-0089	PRV STATION (WATER)			10	53	530	20	15	X	

Bldg Number	HE waste?	Light Construction	Heavy Construction	TOTAL Volume UNCONTAMINATED (yd^3)	TOTAL Volume UNCONTAMINATED (m^3)	TOTALVolume HE (yd^3)	TOTAL Waste Volume HE (m^3)	TOTAL Volume RADIOLOGICAL (yd^3)	TOTAL Volume RADIOLOGICAL (m^3)
16-0319			0.85	124	95				
16-0360	X		0.85			1,449	1,107		
16-0370	X		0.85			21,771	16,644		
16-0414	X		0.85			3,144	2,403		
16-0415	X		0.85			1,689	1,291	1,689	1,291
16-0435	X		0.85			1,644	1,257		
16-0437	X		0.85			1,601	1,224		
16-0453	X	0.33				107	82		
16-0457	X		0.85			16	12		
16-0476	X		0.85			88	67		
16-0477	X		0.85			139	106		
16-0478	X		0.85			444	339		
16-0516	X	0.33				244	187		
16-0517	X		0.85			118	90		
16-0540	X		0.85			18,979	14,510		
16-0542	X		0.85			56	43		
16-0897	X	0.33				538	411		
16-1451			0.85	69	53				
16-1486	X		0.85			333	255		
18-0002			0.85	46	35				
18-0005			0.85	46	35				
18-0186			0.85	13	10				
18-0187			0.85	13	10				
18-0188			0.85	13	10				
21-0001			0.85	587	449				
21-0002N			0.85	5,351	4,091				
21-0002S			0.85	0	0				
21-0003			0.85	1,753	1,340				
21-0004			0.85	574	439				
21-0005N			0.85	10,014	7,656				
21-0005S			0.85	0	0				
21-0021			0.85					1,325	1,013
21-0042			0.85	24	18				
21-0046			0.85	671	513				
21-0080			0.85	13	10				
21-0089			0.85	20	15				

Bldg Number	Estimated Waste Volume UNCONTAMINATED (yd^3)	Estimated Waste Volume UNCONTAMINATED (m^3)	Estimated Waste Volume HE (yd^3)	Estimated Waste Volume HE (m^3)	Estimated Waste Volume RADIOLOGICAL (yd^3)	Estimated Waste Volume RADIOLOGICAL (m^3)
16-0319	105	80				
16-0360			1,231	941		
16-0370			18,505	14,147		
16-0414			2,672	2,043		
16-0415			1,435	1,097	1,435	1,097
16-0435			1,397	1,068		
16-0437			1,361	1,040		
16-0453			35	27		
16-0457			13	10		
16-0476			75	57		
16-0477			118	90		
16-0478			377	289		
16-0516			81	62		
16-0517			100	77		
16-0540			16,132	12,333		
16-0542			48	37		
16-0897			177	136		
16-1451	59	45				
16-1486			283	217		
18-0002	39	30				
18-0005	39	30				
18-0186	11	9				
18-0187	11	9				
18-0188	11	9				
21-0001	499	381				
21-0002N	4,548	3,477				
21-0002S	0	0				
21-0003	1,490	1,139				
21-0004	488	373				
21-0005N	8,512	6,508				
21-0005S	0	0				
21-0021					1,126	861
21-0042	20	15				
21-0046	570	436				
21-0080	11	8				
21-0089	17	13				

Bldg Number	Bldg Name	Construction Type	No of Floors	Total Height (ft)	Gross SF	ft^3	yd^3	m^3	UNCONT waste?	RAD waste?
21-0110	ACID TANK			#VALUE!		#VALUE!	#VALUE!	#VALUE!	X	
21-0111	ACID TANK			#VALUE!		#VALUE!	#VALUE!	#VALUE!	X	
21-0112	ACID TANK			#VALUE!		#VALUE!	#VALUE!	#VALUE!	X	
21-0113	ACID TANK			#VALUE!		#VALUE!	#VALUE!	#VALUE!	X	
21-0116	WAREHOUSE	STEEL LIGHT FRAME	1	10	2,067	20,670	766	585	X	
21-0149	CORRIDOR STRUCTURE	UNREINFORCED MASONRY BEARING WALLS	3	30	3,762	112,860	4,180	3,196	X	
21-0150	MOLECULAR CHEMISTRY	CONCRETE FRAME WITH INFILL SHEAR WALLS	2	20	14,842	296,840	10,994	8,405		X
21-0155	TRIT SYS TEST ASSEM (TSTA)	STEEL FRAME WITH CONCRETE SHEAR WALLS	1	10	16,349	163,490	6,055	4,629		X
21-0212	CALCIUM BLDG	UNREINFORCED MASONRY BEARING WALLS	1	10	455	4,550	169	129	X	
21-0213	LAB SUPPLY WAREHOUSE	STEEL LIGHT FRAME	1	10	1,728	17,280	640	489		X
21-0228	REPLACEMENT WAREHOUSE	STEEL LIGHT FRAME	1	10	6,040	60,400	2,237	1,710	X	
21-0286	WAREHOUSE	STEEL BRACED FRAME	1	10	3,578	35,780	1,325	1,013	X	
21-0312	CORRIDOR STRUCTURE	UNREINFORCED MASONRY BEARING WALLS	1	10	2,072	20,720	767	587	X	
21-0313	CORRIDOR STRUCTURE	UNREINFORCED MASONRY BEARING WALLS	3	30	4,264	127,920	4,738	3,622	X	
21-0314	CORRIDOR STRUCTURE	UNREINFORCED MASONRY BEARING WALLS	3	30	4,843	145,290	5,381	4,114	X	
21-0315	CORRIDOR STRUCTURE	UNREINFORCED MASONRY BEARING WALLS	4	40	4,773	190,920	7,071	5,406	X	
21-0334	SHED			10	50	500	19	14	X	
21-0335	CONTAINER VESSEL			10	120	1,200	44	34	X	
21-0355	TRAILER	WOOD, LIGHT FRAME	1	10	500	5,000	185	142	X	
21-0359	TRAILER	WOOD, LIGHT FRAME	1	10	540	5,400	200	153	X	
21-0361	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,680	16,800	622	476	X	
21-0365	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,680	16,800	622	476	X	
21-0402	STORAGE BUILDING			10	1,233	12,330	457	349	X	
renumbered to 54-	ROVER SEMI-TRAILER			10	256	2,560	95	72	X	
Renumberd to 60-	STORAGE TRAILER			10	68	680	25	19	X	
21-0458	SHED			10	80	800	30	23	X	
21-0489	TRAILER	WOOD, LIGHT FRAME	1	10	480	4,800	178	136	X	
21-1001	RECORDS CENTER	CONCRETE FRAME WITH INFILL SHEAR WALLS	1	10	15,423	154,230	5,712	4,367	X	
21-1002	Z WAREHOUSE 120 6TH C101157	CONCRETE FRAME WITH INFILL SHEAR WALLS	1	10	15,881	158,810	5,882	4,497	X	
21-1003	Z BLACKFLOW PREVENTER C113740	STEEL MOMENT FRAME	1	10	113	1,130	42	32	X	
21-1004	MORGAN SHED			10	192	1,920	71	54	X	
21-1005	MORGAN SHED			10	192	1,920	71	54	X	

Bldg Number	HE waste?	Light Construction	Heavy Construction	TOTAL Volume UNCONTAMINATED (yd^3)	TOTAL Volume UNCONTAMINATED (m^3)	TOTALVolume HE (yd^3)	TOTAL Waste Volume HE (m^3)	TOTAL Volume RADIOLOGICAL (yd^3)	TOTAL Volume RADIOLOGICAL (m^3)
21-0110		0.33		#VALUE!	#VALUE!				
21-0111		0.33		#VALUE!	#VALUE!				
21-0112		0.33		#VALUE!	#VALUE!				
21-0113		0.33		#VALUE!	#VALUE!				
21-0116			0.85	766	585				
21-0149			0.85	4,180	3,196				
21-0150			0.85					10,994	8,405
21-0155			0.85					6,055	4,629
21-0212			0.85	169	129				
21-0213			0.85					640	489
21-0228			0.85	2,237	1,710				
21-0286			0.85	1,325	1,013				
21-0312			0.85	767	587				
21-0313			0.85	4,738	3,622				
21-0314			0.85	5,381	4,114				
21-0315			0.85	7,071	5,406				
21-0334		0.33		19	14				
21-0335		0.33		44	34				
21-0355		0.33		185	142				
21-0359		0.33		200	153				
21-0361		0.33		622	476				
21-0365		0.33		622	476				
21-0402			0.85	457	349				
renumbered to 54-		0.33		95	72				
Renumberd to 60-		0.33		25	19				
21-0458		0.33		30	23				
21-0489		0.33		178	136				
21-1001			0.85	5,712	4,367				
21-1002			0.85	5,882	4,497				
21-1003			0.85	42	32				
21-1004		0.33		71	54				
21-1005		0.33		71	54				

Bldg Number	Estimated Waste Volume UNCONTAMINATED (yd^3)	Estimated Waste Volume UNCONTAMINATED (m^3)	Estimated Waste Volume HE (yd^3)	Estimated Waste Volume HE (m^3)	Estimated Waste Volume RADIOLOGICAL (yd^3)	Estimated Waste Volume RADIOLOGICAL (m^3)
21-0110	#VALUE!	#VALUE!				
21-0111	#VALUE!	#VALUE!				
21-0112	#VALUE!	#VALUE!				
21-0113	#VALUE!	#VALUE!				
21-0116	651	497				
21-0149	3,553	2,716				
21-0150					9,345	7,144
21-0155					5,147	3,935
21-0212	143	110				
21-0213					544	416
21-0228	1,901	1,454				
21-0286	1,126	861				
21-0312	652	499				
21-0313	4,027	3,079				
21-0314	4,574	3,497				
21-0315	6,010	4,595				
21-0334	6	5				
21-0335	15	11				
21-0355	61	47				
21-0359	66	50				
21-0361	205	157				
21-0365	205	157				
21-0402	388	297				
renumbered to 54-	31	24				
Renumberd to 60-	8	6				
21-0458	10	7				
21-0489	59	45				
21-1001	4,855	3,712				
21-1002	5,000	3,822				
21-1003	36	27				
21-1004	23	18				
21-1005	23	18				

Bldg Number	Bldg Name	Construction Type	No of Floors	Total Height (ft)	Gross SF	ft^3	yd^3	m^3	UNCONT waste?	RAD waste?
21-1006	MORGAN SHED			10	192	1,920	71	54	X	
21-1007	MORGAN SHED			10	192	1,920	71	54	X	
21-1008	MORGAN SHED			10	192	1,920	71	54	X	
21-1009	MORGAN SHED			10	192	1,920	71	54	X	
21-1010	TRANSPORTAINER			10	320	3,200	119	91	X	
22-0001	LOADING BLDG	STEEL MOMENT FRAME	1	10	7,895	78,950	2,924	2,235		
22-0025	PROCESS BLDG	CONCRETE SHEAR WALLS	1	10	227	2,270	84	64		
28-0001	MAGAZINE	CONCRETE SHEAR WALLS	1	10	280	2,800	104	79		
28-0002	MAGAZINE	CONCRETE SHEAR WALLS	1	10	280	2,800	104	79		
28-0003	MAGAZINE	CONCRETE SHEAR WALLS	1	10	280	2,800	104	79		
28-0004	MAGAZINE	CONCRETE SHEAR WALLS	1	10	280	2,800	104	79		
28-0005	MAGAZINE	CONCRETE SHEAR WALLS	1	10	280	2,800	104	79		
33-0024	STORAGE BLDG	CONCRETE SHEAR WALLS	1	10	1,016	10,160	376	288	X	
33-0026	STORAGE BLDG	CONCRETE SHEAR WALLS	1	10	173	1,730	64	49	X	
33-0088	STORAGE BLDG	CONCRETE SHEAR WALLS	1	10	247	2,470	91	70	X	
33-0089	STORAGE BUILDING	CONCRETE SHEAR WALLS	1	10	208	2,080	77	59	X	
33-0129	TEST CELL	CONCRETE SHEAR WALLS	1	10	202	2,020	75	57	X	
36-0022	GUARD HOUSE_#460	CONCRETE SHEAR WALLS	1	10	163	1,630	60	46	X	
36-0069	SECURITY ENHANC PRECINC	UNREINFORCED MASONRY BEARING WALLS	1	10	912	9,120	338	258		
36-0076	TRAILER PO 6002R	WOOD, LIGHT FRAME	1	10	673	6,730	249	191		
36-0082	TRAILER	WOOD, LIGHT FRAME	1	10	665	6,650	246	188		
36-0210	TRAILER PO 9765X	WOOD, LIGHT FRAME	1	10	672	6,720	249	190		
36-0211	TRAILER PO 9765X	WOOD, LIGHT FRAME	1	10	720	7,200	267	204		
39-0002	LAB OFFICE BLDG	CONCRETE SHEAR WALLS	1	10	13,238	132,380	4,903	3,748		
39-0006	FIRING CHAMBER #1	CONCRETE SHEAR WALLS	1	10	561	5,610	208	159		
39-0007	FIRING CHAMBER #2	CONCRETE SHEAR WALLS	1	10	490	4,900	181	139		
39-0008	FIRING CHAMBER #3	CONCRETE SHEAR WALLS	1	10	582	5,820	216	165		
39-0067	CAPACITOR BANK ENCLOSURE	CONCRETE SHEAR WALLS	1	10	280	2,800	104	79		
39-0103	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,680	16,800	622	476		
39-0107	TRANSPORTABLE	WOOD, LIGHT FRAME	1	10	1,680	16,800	622	476		
39-0138	NEUTRON FLUX STORAGE	OTHER-DESCRIBE BRIEFLY IN COMMENTS FIELD/SUPP DOC	1	10	96	960	36	27		
40-0002	MAGAZINE	CONCRETE SHEAR WALLS	1	10	73	730	27	21		
40-0003	PREPARATION BLDG	CONCRETE SHEAR WALLS	1	10	168	1,680	62	48		
40-0004	FIRING POINT	CONCRETE SHEAR WALLS	1	10	572	5,720	212	162		
40-0012	FIRING POINT	CONCRETE SHEAR WALLS	1	10	1,342	13,420	497	380		

Bldg Number	HE waste?	Light Construction	Heavy Construction	TOTAL Volume UNCONTAMINATED (yd^3)	TOTAL Volume UNCONTAMINATED (m^3)	TOTALVolume HE (yd^3)	TOTAL Waste Volume HE (m^3)	TOTAL Volume RADIOLOGICAL (yd^3)	TOTAL Volume RADIOLOGICAL (m^3)
21-1006		0.33		71	54				
21-1007		0.33		71	54				
21-1008		0.33		71	54				
21-1009		0.33		71	54				
21-1010		0.33		119	91				
22-0001	X		0.85			2,924	2,235		
22-0025	X		0.85			84	64		
28-0001	X		0.85			104	79		
28-0002	X		0.85			104	79		
28-0003	X		0.85			104	79		
28-0004	X		0.85			104	79		
28-0005	X		0.85			104	79		
33-0024			0.85	376	288				
33-0026			0.85	64	49				
33-0088			0.85	91	70				
33-0089			0.85	77	59				
33-0129			0.85	75	57				
36-0022			0.85	60	46				
36-0069	X		0.85			338	258		
36-0076	X	0.33				249	191		
36-0082	X	0.33				246	188		
36-0210	X	0.33				249	190		
36-0211	X	0.33				267	204		
39-0002	X		0.85			4,903	3,748		
39-0006	X		0.85			208	159		
39-0007	X		0.85			181	139		
39-0008	X		0.85			216	165		
39-0067	X		0.85			104	79		
39-0103	X	0.33				622	476		
39-0107	X	0.33				622	476		
39-0138	X		0.85			36	27		
40-0002	X		0.85			27	21		
40-0003	X		0.85			62	48		
40-0004	X		0.85			212	162		
40-0012	X		0.85			497	380		

Bldg Number	Estimated Waste Volume UNCONTAMINATED (yd^3)	Estimated Waste Volume UNCONTAMINATED (m^3)	Estimated Waste Volume HE (yd^3)	Estimated Waste Volume HE (m^3)	Estimated Waste Volume RADIOLOGICAL (yd^3)	Estimated Waste Volume RADIOLOGICAL (m^3)
21-1006	23	18				
21-1007	23	18				
21-1008	23	18				
21-1009	23	18				
21-1010	39	30				
22-0001			2,485	1,900		
22-0025			71	55		
28-0001			88	67		
28-0002			88	67		
28-0003			88	67		
28-0004			88	67		
28-0005			88	67		
33-0024	320	245				
33-0026	54	42				
33-0088	78	59				
33-0089	65	50				
33-0129	64	49				
36-0022	51	39				
36-0069			287	219		
36-0076			82	63		
36-0082			81	62		
36-0210			82	63		
36-0211			88	67		
39-0002			4,168	3,186		
39-0006			177	135		
39-0007			154	118		
39-0008			183	140		
39-0067			88	67		
39-0103			205	157		
39-0107			205	157		
39-0138			30	23		
40-0002			23	18		
40-0003			53	40		
40-0004			180	138		
40-0012			422	323		

Bldg Number	Bldg Name	Construction Type	No of Floors	Total Height (ft)	Gross SF	ft^3	yd^3	m^3	UNCONT waste?	RAD waste?
40-0019	OFFICE AND LAB	CONCRETE SHEAR WALLS	1	10	189	1,890	70	54		
40-0023	MACHINE SHOP	CONCRETE SHEAR WALLS	1	10	8,204	82,040	3,039	2,323		
40-0043	STORAGE BUILDING	CONCRETE SHEAR WALLS	1	10	216	2,160	80	61		
40-0045	SOLVENT SHED	WOOD, LIGHT FRAME	1	10	99	990	37	28		
40-0090	TRANSPORTABLE	STEEL LIGHT FRAME	1	10	1,587	15,870	588	449		
41-0002	GUARD HOUSE #318	UNREINFORCED MASONRY BEARING WALLS	2	20	781	15,620	579	442	X	
41-0003	BLOWER HOUSE	CONCRETE SHEAR WALLS	1	10	24	240	9	7	X	
41-0006	COVERED PASSAGEWAY	CONCRETE SHEAR WALLS	1	10	938	9,380	347	266	X	
41-0044	STORAGE BLDG	STEEL MOMENT FRAME	1	10	297	2,970	110	84	X	
41-0054	STORAGE BLDG	FIELD/SUPP DOC	1	10	256	2,560	95	72	X	
49-0023	BOTTLE HOUSE	CONCRETE SHEAR WALLS	1	10	256	2,560	95	72	X	
49-0121	CABLE BLDG	WOOD, COMMERCIAL AND INDUSTRIAL	1	10	377	3,770	140	107	X	
53-0549	TRAILER	WOOD, LIGHT FRAME	1	10	709	7,090	263	201	X	
55-0048	GUARD TOWER STA #407	FIELD/SUPP DOC	1	10	36	360	13	10	X	
55-0125	GUARD TOWER STA #406	FIELD/SUPP DOC	1	10	36	360	13	10	X	
55-0162	GUARD TOWER STA #420	STEEL BRACED FRAME	1	10	49	490	18	14	X	
59-0002	MODULAR OFFICE BLDG	WOOD, LIGHT FRAME	1	10	4,347	43,470	1,610	1,231	X	
60-0019	TEST FABRICAT FAC C00117882	STEEL BRACED FRAME	12	120	17,318	2,078,160	76,969	58,843	X	
69-0003	Z INCINERATOR C110694	STEEL MOMENT FRAME	1	10	560	5,600	207	159	X	

Bldg Number	HE waste?	Light Construction	Heavy Construction	TOTAL Volume UNCONTAMINATED (yd^3)	TOTAL Volume UNCONTAMINATED (m^3)	TOTALVolume HE (yd^3)	TOTAL Waste Volume HE (m^3)	TOTAL Volume RADIOLOGICAL (yd^3)	TOTAL Volume RADIOLOGICAL (m^3)
40-0019	X		0.85			70	54		
40-0023	X		0.85			3,039	2,323		
40-0043	X		0.85			80	61		
40-0045	X	0.33				37	28		
40-0090	X	0.33				588	449		
41-0002			0.85	579	442				
41-0003			0.85	9	7				
41-0006			0.85	347	266				
41-0044			0.85	110	84				
41-0054			0.85	95	72				
49-0023			0.85	95	72				
49-0121			0.85	140	107				
53-0549		0.33		263	201				
55-0048			0.85	13	10				
55-0125			0.85	13	10				
55-0162			0.85	18	14				
59-0002		0.33		1,610	1,231				
60-0019			0.85	76,969	58,843				
69-0003			0.85	207	159				

Bldg Number		Estimated Waste Volume UNCONTAMINATED (yd³)	Estimated Waste Volume UNCONTAMINATED (m³)	Estimated Waste Volume HE (yd³)	Estimated Waste Volume HE (m³)	Estimated Waste Volume RADIOLOGICAL (yd³)	Estimated Waste Volume RADIOLOGICAL (m³)
40-0019				59	45		
40-0023				2,583	1,975		
40-0043				68	52		
40-0045				12	9		
40-0090				194	148		
41-0002		492	376				
41-0003		8	6				
41-0006		295	226				
41-0044		93	71				
41-0054		81	62				
49-0023		81	62				
49-0121		119	91				
53-0549		87	66				
55-0048		11	9				
55-0125		11	9				
55-0162		15	12				
59-0002		531	406				
60-0019		65,424	50,016				
69-0003		176	135				
	Grand Totals	#VALUE!	#VALUE!	140,518	107,426	301,923	230,820

ATTACHMENT I

AirNav.com

Navaids | Airspace Fixes | Aviation Fuel

KLAM Los Alamos Airport

Los Alamos, New Mexico, USA

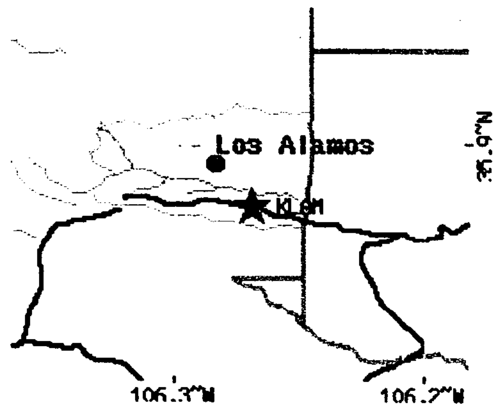
GOING TO LOS ALAMOS? Rent a Car | Reserve a Hotel Room

FAA INFORMATION EFFECTIVE 15 APRIL 2004

Loc | Ops | Rwys | IFR | FBO | Links
Com | Nav | Svcs | Stats | Notes

Location

FAA Identifier: LAM
Lat/Long: 35-52-47.287N / 106-16-09.895W
35-52.78812N / 106-16.16492W
35.8798019 / -106.2694153
(estimated)
Elevation: 7171 ft. / 2185.7 m (surveyed)
Variation: 10E (2005)
From city: 1 mile E of LOS ALAMOS, NM



Airport Operations

Airport use: Open to the public
Sectional chart: DENVER
Control tower: no
ARTCC: ALBUQUERQUE CENTER
FSS: ALBUQUERQUE FLIGHT SERVICE STATION [1-800-WX-BRIEF]
NOTAMs facility: ABQ (NOTAM-D service available)
Attendance: MON-FRI 0600-1500
FOR ARPT ATTENDANT AFT HRS & WKENDS CALL 505-690-6316.
Wind indicator: lighted
Segmented circle: yes
Lights: DUSK-DAWN
ACTVT MIRL RY 09/27 & REIL RY 27 - CTAF.
Beacon: white-green (lighted land airport)

Airport Communications

CTAF/UNICOM: 123.0
WX AWOS-3: 124.175 (505-662-8423)
WX ASOS at SAF (18 nm SE): 128.55 (505-474-3117)

- APCH/DEP SVC PROVIDED BY ALBUQUERQUE ARTCC ON FREQS 132.8/346.35 (TESUQUE PEAK RCAG).

Airport distance calculator

Flying to Los Alamos Airport? Find the distance to fly.

From ______ to KLAM

CALCULATE DISTANCE

Sunrise and sunset

Times for 03-Jun-2004	Local (UTC-6)	Zulu (UTC)
Morning civil twilight	05:20	11:20

Nearby radio navigation aids

VOR radial/distance	VOR name	Freq	Var
SAFr321/22.7	SANTA FE VORTAC	110.60	13E

Sunrise	05:50	11:50
Sunset	20:17	02:17
Evening civil twilight	20:46	02:46

METAR

KSAF 18nm SE 031953Z 19011G19KT 10SM CLR 27/07 A3030 RMK AO2 SLP152 T02670072

TAF

KSAF 18nm SE 031736Z 031818 14016KT P6SM FEW080

Airport Services

Fuel available: 100LL
Parking: tiedowns
Airframe service: MAJOR
Powerplant service: MAJOR

Runway Information

Runway 9/27

Dimensions: 5550 x 113 ft. / 1692 x 34 m
Surface: asphalt/porous friction courses, in good condition
Weight limitations: Single wheel: 43000 lbs
Runway edge lights: medium intensity
Operational restrictions: RY 09/27 ALL LNDGS TO THE WEST & ALL TKOFS TO THE EAST.

	RUNWAY 9	RUNWAY 27
Latitude:	35-52.88662N	35-52.69033N
Longitude:	106-16.71357W	106-15.61613W
Elevation:	7170.7 ft.	7088.0 ft.
Traffic pattern:	left	right
Runway heading:	092 magnetic, 102 true	272 magnetic, 282 true
Markings:	basic, in good condition	nonprecision, in good condition
Visual slope indicator:		2-box VASI on left (2.75 degrees glide path)
Runway end identifier lights:		yes
Obstructions:	60 ft. tree, 324 ft. from runway, 2:1 slope to clear +7 FT FENCE 135 FT FM RY END; +8 FT BLAST FENCE 85 FT FM RY END.	none

Airport Operational Statistics

Aircraft based on the field: 72
Single engine airplanes: 70
Multi engine airplanes: 2

Aircraft operations: avg 55/day
75% local general aviation
17% transient general aviation
7% air taxi
<1% military

Additional Remarks

- LEFT HAND TFC PAT FM LEFT BASE OVER THE RIVER EAST OF TOWN OF WHITE ROCK DUE TO RSTRD AREA SOUTH OF TOWN.
- RY 27 GRADIENT 1.5% UP TO WEST.

- RADIO COMMUNICATION REQUIRED BEFORE ENTERING TFC

ATTACHMENT I

PATTERN.
- STRONG GUSTY CROSSWINDS.

- BLAST BARRIER AER 09.

- NO TOUCH & GO LANDINGS.

- RY 27 MAKE RIGHT TURN ON GO-AROUND OR MISSED APCH; RESTRICTED AREA ADJ TO SOUTH SIDE OF ARPT.

Instrument Procedures

There are no published instrument procedures at KLAM.

Some nearby airports with instrument procedures:

KSAF - Santa Fe Municipal Airport (18 nm SE)
KSKX - Taos Regional Airport (45 nm NE)
KAEG - Double Eagle II Airport (51 nm SW)
KABQ - Albuquerque International Sunport Airport (53 nm S)
KLVS - Las Vegas Municipal Airport (57 nm E)

FBOs, Fuel Providers, and Aircraft Ground Support

Business Name	Contact	Services / Description	Fuel Prices	Comments
Los Alamos Airport	505-662-8420		100LL $2.75 Updated 31-May-2004	2 view add

UPDATE PRICES

Where to Stay: Hotels, Motels, Resorts, B&Bs, Campgrounds

In this space we feature lodging establishments that are convenient to the Los Alamos Airport. If your hotel/inn/B&B/resort is near the Los Alamos Airport, provides convenient transportation, or is otherwise attractive to pilots, flight crews, and airport users, consider listing it here.

FEATURE A LODGING ESTABLISHMENT

Hotels near Los Alamos Airport

	Miles	Price ($)
HOLIDAY INN EXPRESS AND SUITES	2.2	70-100
LOS ALAMOS INN	2.4	71-112
BW HILLTOP HOUSE HOTEL	2.7	71-89

Distances are approximate, and may vary depending on the actual route traveled and the location of the travel start on the airport.

Hotels in other cities near Los Alamos Airport

3 in Los Alamos
2 in Espanola
1 in San Juan Pueblo

Would you like to see your business listed on this page?

If your business provides an interesting product or service to pilots, flight crews, aircraft, or users of the Los Alamos Airport, you should consider listing it here. To start the listing process, click on the button below

ADD YOUR BUSINESS OR SERVICE

Other Pages about Los Alamos Airport

- homepage.mac.com/...
- www.flynewmexico.com/...

ADD A LINK

53 nautical miles
NNE of ABQ

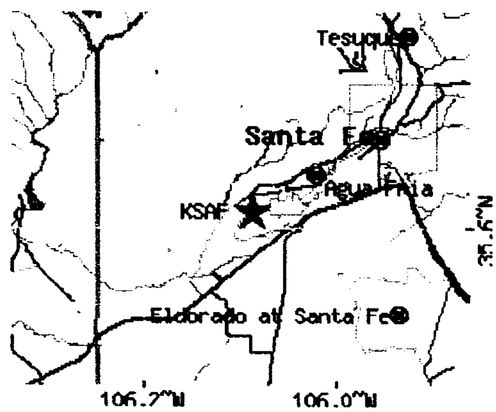
AIRNAV.COM

Navaids | Airspace Fixes | Aviation Fuel

KSAF Santa Fe Municipal Airport
Santa Fe, New Mexico, USA

FAA INFORMATION EFFECTIVE 15 APRIL 2004

Loc | Ops | Rwys | IFR | FBO | Links
Com | Nav | Svcs | Stats | Notes



Location

FAA Identifier: SAF
Lat/Long: 35-37-01.591N / 106-05-21.922W
35-37.02652N / 106-05.36537W
35.6171086 / -106.0894228
(estimated)
Elevation: 6348 ft. / 1934.9 m (surveyed)
Variation: 12E (1980)
From city: 9 miles SW of SANTA FE, NM

Airport Operations

Airport use: Open to the public
Sectional chart: ALBUQUERQUE
Control tower: yes
ARTCC: ALBUQUERQUE CENTER
FSS: ALBUQUERQUE FLIGHT SERVICE STATION [1-800-WX-BRIEF]
NOTAMs facility: SAF (NOTAM-D service available)
Attendance: 0600-2100
FOR SVC AFT HRS CALL 505-471-2525/2700.
Pattern altitude: R/W TFC PAT ALT 7000' MSL.
Wind indicator: lighted
Segmented circle: yes
Lights: DUSK-DAWN
WHEN ATCT CLSD MIRL RY 02/20 PRESET LOW INTST; TO INCR INTST AND ACTVT MIRL RY 15/33 - CTAF.
Beacon: white-green (lighted land airport)

Airport diagram
CAUTION: Diagram may not be current

Airport Communications

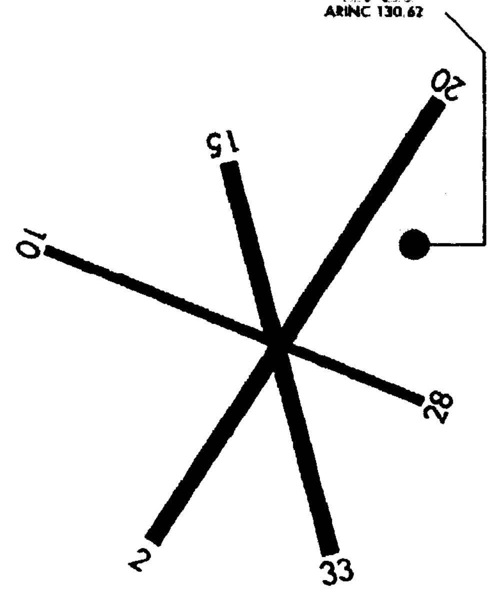
CTAF: 119.5
UNICOM: 122.95
ATIS: 128.55
WX ASOS: 128.55 (505-474-3117)
SANTA FE GROUND: 121.7 [0700-2100]
SANTA FE TOWER: 119.5 239.3 [0700-2100]

I-5

EMERG: 121.5 243.0
WX AWOS-3 at LAM (18 nm NW): 124.175 (505-662-8423)

- APCH/DEP SERVICE PROVIDED BY ALBUQUERQUE ARTCC ON FREQS 132.8/346.35 (SANDIA MOUNTAIN RCAG).

MILLION AIR
ARINC 130.62



Download PDF
of official airport diagram from the FAA

Nearby radio navigation aids

VOR radial/distance	VOR name	Freq	Var
SAFr332/4.7	SANTA FE VORTAC	110.60	13E
OTOr334/(33.5)	OTTO VOR	114.00	13E

Airport Services

Fuel available:	100LL JET-A1 JET-A1+
Parking:	hangars and tiedowns
Airframe service:	MINOR
Powerplant service:	MAJOR
Bottled oxygen:	HIGH/LOW
Bulk oxygen:	HIGH/LOW

Runway Information

Runway 2/20

Dimensions:	8342 x 150 ft. / 2543 x 46 m	
Surface:	asphalt/porous friction courses, in fair condition	
Weight limitations:	Single wheel: 48000 lbs Double wheel: 65000 lbs Double tandem: 105000 lbs	
Runway edge lights:	medium intensity	
	RUNWAY 2	**RUNWAY 20**
Latitude:	35-36.50400N	35-37.62840N
Longitude:	106-05.76770W	106-04.79942W
Elevation:	6273.6 ft.	6347.8 ft.
Traffic pattern:	left	left
Runway heading:	023 magnetic, 035 true	203 magnetic, 215 true
Markings:	precision, in good condition	precision, in good condition
Visual slope indicator:	4-box VASI on left (3.00 degrees glide path)	4-box VASI on left (3.00 degrees glide path)
Runway end identifier lights:		yes
Touchdown point:	yes, no lights	yes, no lights
Instrument approach:	ILS	
Obstructions:	6 ft. hill, 225 ft. from runway, 226 ft. left of centerline, 4:1 slope to clear	none

Runway 15/33

Dimensions:	6307 x 150 ft. / 1922 x 46 m
Surface:	asphalt, in fair condition
Weight limitations:	Single wheel: 48000 lbs Double wheel: 65000 lbs Double tandem: 105000 lbs
Runway edge lights:	medium intensity

Airport distance calculator

Flying to Santa Fe Municipal Airport? Find the distance to fly.

From [ ] to KSAF

CALCULATE DISTANCE

Sunrise and sunset

Times for 03-Jun-2004

	Local (UTC-6)	Zulu (UTC)
Morning civil twilight	05:20	11:20
Sunrise	05:50	11:50
Sunset	20:15	02:15
Evening civil twilight	20:45	02:45

METAR

KSAF 031953Z 19011G19KT 10SM CLR 27/07 A3030 RMK AO2 SLP152 T02670072

TAF

KSAF 031736Z 031818 14016KT P6SM FEW080

Runway edge markings: RY 15/33 MARKINGS WEATHERED.

	RUNWAY 15	RUNWAY 33
Latitude:	35-37.46450N	35-36.45308N
Longitude:	106-05.49318W	106-05.20038W
Elevation:	6316.6 ft.	6270.5 ft.
Traffic pattern:	left	left
Runway heading:	155 magnetic, 167 true	335 magnetic, 347 true
Markings:	nonprecision, in fair condition	nonprecision, in fair condition
Visual slope indicator:	pulsating/steady burning VASI on left (3.00 degrees glide path)	4-box VASI on right (3.00 degrees glide path)
Runway end identifier lights:		yes
Touchdown point:	yes, no lights	yes, no lights
Obstructions:	none	9 ft. hill, 601 ft. from runway, 43 ft. right of centerline, 44:1 slope to clear

Runway 10/28

Dimensions: 6300 x 75 ft. / 1920 x 23 m
Surface: asphalt/porous friction courses, in good condition
Weight limitations: Single wheel: 30000 lbs

	RUNWAY 10	RUNWAY 28
Latitude:	35-37.23360N	35-36.84992N
Longitude:	106-06.08313W	106-04.90140W
Elevation:	6303.5 ft.	6297.3 ft.
Traffic pattern:	left	left
Runway heading:	100 magnetic, 112 true	280 magnetic, 292 true
Markings:	nonprecision, in good condition	nonprecision, in good condition
Touchdown point:	yes, no lights	yes, no lights
Obstructions:	none	11 ft. road, 250 ft. from runway, 260 ft. right of centerline, 4:1 slope to clear

Airport Operational Statistics

Aircraft based on the field:	133	Aircraft operations: avg 233/day
Single engine airplanes:	90	41% local general aviation
Multi engine airplanes:	21	38% transient general aviation
Jet airplanes:	13	11% commercial
Helicopters:	1	5% air taxi
Gliders airplanes:	1	5% military
Military aircraft:	7	

Additional Remarks

- ARMY NATIONAL GUARD AVIATION ON FIELD.
- DOGS & WILDLIFE ACTIVITY ON & INVOF ARPT.

Instrument Procedures

NOTE: All procedures below are presented as PDF files. If you need a reader for these files, you should download the free Adobe Reader.

NOT FOR NAVIGATION. Please procure official charts for flight.
FAA instrument procedures published for use between 13 May 2004 at 0901Z and 10 June 2004 at 0900Z.

IAPs - Instrument Approach Procedures

ILS RWY 02	download (566KB)
RNAV (GPS) RWY 02	download (493KB)
RNAV (GPS) RWY 15	download (563KB)
RNAV (GPS) RWY 20	download (666KB)
RNAV (GPS) RWY 28	download (473KB)
RNAV (GPS) RWY 33	download (474KB)
VOR/DME-A	download (571KB)
VOR RWY 33	download (574KB)
NDB RWY 02	download (539KB)
NOTE: Special Alternate Minimums apply	download (16KB)

Departure Procedures

POAKE ONE	download (232KB)
TAFOY ONE	download (209KB)
ZIASE TWO	download (228KB)
NOTE: Special Take-Off Minimums apply	download (37KB)

Other nearby airports with instrument procedures:

KABQ - Albuquerque International Sunport Airport (43 nm SW)
KAEG - Double Eagle II Airport (45 nm SW)
KLVS - Las Vegas Municipal Airport (46 nm E)
KSKX - Taos Regional Airport (54 nm N)
KAXX - Angel Fire Airport (62 nm NE)

FBOs, Fuel Providers, and Aircraft Ground Support

Business Name	Contact	Services / Description	Fuel Prices	Comments
MILLION AIR	ARINC 130.625 505-471-2700 800-757-9030 [web site] [email]	- Formerly Santa Fe Executive Aviation - Same great staff with the philosophy of providing oustanding service to general aviation!	AVFUEL 100LL Jet A FS $3.04 $2.79 Updated 14-Apr-2004	32 view add
Santa Fe Jet Center	505-471-2525		100LL Jet A FS $3.36 $2.55 SS $3.12 --- Updated 31-May-2004	40 view add

FS=Full service
SS=Self service
UPDATE PRICES

Aviation Businesses, Services, and Facilities

Business Name	Contact	Services / Description	Comments
Skyland Aircraft Inc.	505-473-1047 505-660-3861 [email]	Aircraft maintenance, Aircraft modifications, Aircraft parts, Courtesy transportation, Public telephone, Restrooms	2 view add

Where to Eat: Catering, Restaurants, Food shops

Business Name	Contact	Services / Description	Distance	Comments
Santa Fe Airport Grill	505-471-7412		on airport	3 view add

Where to Stay: Hotels, Motels, Resorts, B&Bs, Campgrounds

In this space we feature lodging establishments that are convenient to the Santa Fe Municipal Airport. If your hotel/inn/B&B/resort is near the Santa Fe Municipal Airport, provides convenient transportation, or is otherwise attractive to pilots, flight crews, and airport users, consider listing it here.

FEATURE A LODGING ESTABLISHMENT

AirNav users who flew into KSAF have stayed at...

	Miles	Price ($)
RED ROOF SANTA FE CERRILLOS RD	4.9	47-67
SLEEP INN	5.8	65-142
SANTA FE COURTYARD BY MARRIOTT	5.3	89-119
LA QUINTA INN SANTE FE	4.1	57-159
COMFORT INN SANTA FE	4.1	72-130

Hotels in other cities near Santa Fe Municipal Airport

46 in Santa Fe

Other hotels near Santa Fe Municipal Airport

	Miles	Price ($)
INN AT SUNRISE SPRINGS	1.9	134-302
HOLIDAY INN SANTA FE	4.4	71-124
LUXURY INN	4.8	50-105
BW INN OF SANTA FE	4.9	77-185
HOLIDAY INN EXPRESS	5.1	80-110
SUPER 8 SANTA FE NM	5.3	45-80
COMFORT SUITES SANTA FE	5.3	135-170
QUALITY INN	5.9	58-155

Distances are approximate, and may vary depending on the actual route traveled and the location of the travel start on the airport. indicates that the hotel is reported to provide airport transportation. Please check with the hotel for hours and availability of transportation to/from Santa Fe Municipal Airport. It is possible that transportation may not be available to/from KSAF but to other nearby airports.

Would you like to see your business listed on this page?

If your business provides an interesting product or service to pilots, flight crews, aircraft, or users of the Santa Fe Municipal Airport, you should consider listing it here. To start the listing process, click on the button below

ADD YOUR BUSINESS OR SERVICE

Other Pages about Santa Fe Municipal Airport

- www.ci.santa-fe.nm.us/...
- www.flynewmexico.com/...

ADD A LINK

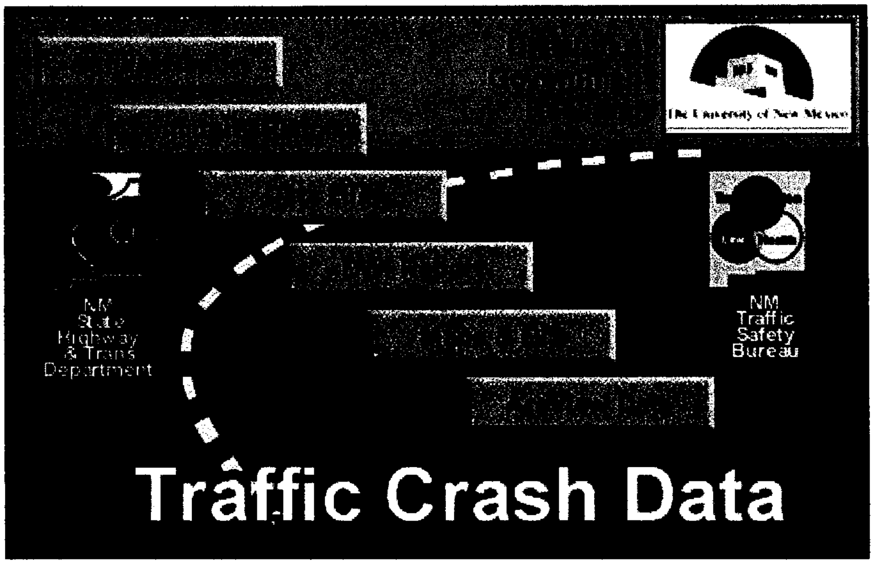
 Privacy Policy Contact

Attachment J

Accidents within Los Alamos County (1995-2002)

Year	Total Number of Accidents in Los Alamos County
1995	343
1996	294
1997	299
1998	263
1999	252
2000	252
2001	270
2002	307

Additional traffic crash data and average daily traffic for routes in New Mexico are contained in the following pages. These data can be used to update table 4.10.1-1 and 4.10.2-1.



Traffic Crash Data

Tables and Maps Organized by District

The 2002 traffic crash data are the most recent available from the New Mexico Department of Transportation's (NM DOT) Transportation Statistics Bureau. The 2002 data have recently been received, and are currently being processed and compiled in SAS format by DGR. This WWW document is being updated to present this current data.

The 1999 crash file contains 15% fewer crashes than the 1998 file. This may be due to problems in implementing the new system after the old system failed, or to underreporting. Care should be used in interpreting differences between 1998 and 1999.

The Division of Government Research (DGR) maintains a comprehensive traffic crash (traffic accident) database for the state of New Mexico. The New Mexico Department of Transportation's (NM DOT) Transportation Statistics Bureau is responsible for the initial compilation and processing of this data. The New Mexico Traffic Safety Bureau (TSB) and the National Highway Traffic Safety Administration (NHTSA) have been providing grant funding to DGR for over twenty years to provide further maintenance and analysis of this traffic crash database.

Although DGR performs this work at UNM, the New Mexico Traffic Safety Bureau is the designated state government agency responsible for disseminating this information to other government agencies, the state legislature, and the public.

Great appreciation is due to the many dedicated police officers throughout the state who are responsible for investigating traffic crashes and collecting this information. Without their hard work and professionalism most of the information presented here would not be available.

This WWW document represents a developing project on the part of the New Mexico Traffic Safety Bureau to make traffic crash information more accessible to the public and other government agencies. However, only selected information is currently available. Much more information will be added as this resource is developed.

- **Data Files**
- **Reports (Annual Data)**
- **Monthly Fatalities Reports**

J-2

- Maps and GIS
- DGR's Home Page

Search NM Traffic Crash Data

If the specific information you need is not present, you can request it from the New Mexico Traffic Safety Bureau. The New Mexico Traffic Safety Bureau can be contacted as follows:

Transportation Programs Division
State Highway and Transportation Department
Virginia Jaramillo, Chief
P.O. Box 1149
604 West San Mateo
Santa Fe, New Mexico 87504-1149
Phone: (505) 827-0427
FAX: (505) 827-0431
Email: Sandra.Martinez@nmshtd.state.nm.us

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DGR is currently preparing dynamic/interactive mapping and data display facilities using ESRI's ArcIMS. Many of these demonstrations are available below. These demonstrations are in the process of being revised. If they are not available please try again later. More information about these demonstrations can be found at DGR's Auxiliary Web Server. In addition to the various formats (HTML, JAVA, and ArcMap) used for these ArcIMS demonstrations, there is also a version of these demonstrations available in ESRI's new ArcReader format. ArcReader is a free, easy-to-use product that allows anyone to view, explore, and print published map files (PMFs). You can click here to download ArcReader. You can find these ArcReader demonstrations in the statewide and urban map pages accesible from the links provided in the Maps and GIS section below.

ArcIMS Demonstrations (2002 Data Available Shortly!)

- New Mexico (statewide) 2002 Traffic Crashes **(HTML)**
- New Mexico (statewide) Thematic Mapper - 2000 Crashes [redacted]

- Alamogordo 2002 Traffic Crashes **(HTML)**
- Albuquerque 2002 Traffic Crashes **(HTML)**
- Artesia 2002 Traffic Crashes **(HTML)**
- Carlsbad 2002 Traffic Crashes **(HTML)**
- Clovis 2002 Traffic Crashes **(HTML)**
- Deming 2002 Traffic Crashes **(HTML)**
- Española Area 2002 Traffic Crashes **(HTML)**
- Farmington 2002 Traffic Crashes **(HTML)**
- Gallup 2002 Traffic Crashes **(HTML)**
- Grants-Milan 2002 Traffic Crashes **(HTML)**
- Hobbs 2002 Traffic Crashes **(HTML)**
- Las Cruces 2002 Traffic Crashes **(HTML)**
- Las Vegas 2002 Traffic Crashes **(HTML)**
- Los Alamos 2002 Traffic Crashes **(HTML)**
- Lovington 2002 Traffic Crashes **(HTML)**

- Portales 2002 Traffic Crashes (HTML)
- Roswell 2002 Traffic Crashes (HTML)
- Santa Fe 2002 Traffic Crashes (HTML)
- Silver City 2002 Traffic Crashes (HTML)
- Taos Area 2002 Traffic Crashes (HTML)
- Tucumcari Area 2002 Traffic Crashes (HTML)

Other Traffic Safety Related Web Sites

- National Highway Traffic Safety Administration (NHTSA)
- New Mexico Traffic Safety Bureau (TSB)
- Traffic Safety Information Links
- UNM's Institute of Public Law (IPL)
- New Mexico's Traffic Safety Law Center (UNM, IPL)
- DWI Resource Center, Inc.
- Safer New Mexico Now!

The 2002 traffic crash data are the most recent available from the New Mexico Department of Transportation's (NM DOT) Transportation Statistics Bureau. The 2002 data have recently been received, and are currently being processed and compiled in SAS format by DGR. This WWW document is being updated to present this current data.

The 1999 crash file contains 15% fewer crashes than the 1998 file. This may be due to problems in implementing the new system after the old system failed, or to underreporting. Care should be used in interpreting differences between 1998 and 1999.

Data Files

DGR maintains a series of traffic crash data files for the New Mexico Traffic Safety Bureau (TSB). These files are in Statistical Analysis System (SAS) format. Portions of these files can be converted to several other formats such as dBase(dbf) and Arc/INFO-ArcView if necessary. SAS and other export files or coverages for selected portions of this data are available for those conducting specialized traffic safety research projects and other government (local communities) agencies.

The New Mexico Traffic Safety Bureau is interested in sponsoring innovative research concerning traffic safety related issues and promoting the use of traffic safety data by local communities and government agencies. There are federal funded grants available for researchers that present acceptable research proposals. Cooperative data use agreements can also be arranged so that local government agencies can obtain this data. Please contact the New Mexico Traffic Bureau for more information.

The following types of data files are available.

DATA Files

- Accident Level Analysis File.
- Occupant Level Analysis File.
- Detail (Vehicle/Driver) Level Analysis File.
- DWI Citation Tracking File.

Reports (Tables, Graphs, Charts)

DGR produces a series of specialized reports concerning traffic crash data for the New Mexico Traffic Safety Bureau (TSB). Portions of the following reports are available:

REPORTS

- **Tables and Maps Organized by District**
  - **District 1**
  - **District 2**
  - **District 3**
  - **District 4**
  - **District 5**
  - **District 6**
- **Driving While Impaired (DWI).**
- **New Mexico Traffic Crash Information (Annual Report).**
- **Community Reports**
- **District Reports**
- **Special Studies**
- **County Crash History**
- **County Crash History By Population**
- **City Crash History**
- **Alcohol-involved Crashes by County Maps**
- **Least Safe Intersection Report, 96-98**
- **Least Safe Intersection Report, 97-99**
- **Alcohol Involved Crash Rankings by County**
- **Special Age Groups**

Maps and GIS

DGR has developed a transportation oriented Geographic Information System (GIS) for displaying maps of traffic crash data. This GIS called the Geographic Road Network Database (GRNDB) can produce maps of the entire state, selected counties, special regions, or selected urban areas.

You can view example traffic crash maps by selecting from the following lists for state and regional maps or urban maps. In addition, urban maps can be viewed by clicking on the colored circles that approximate the urban area location on the following statewide map.

STATE and REGIONAL Maps

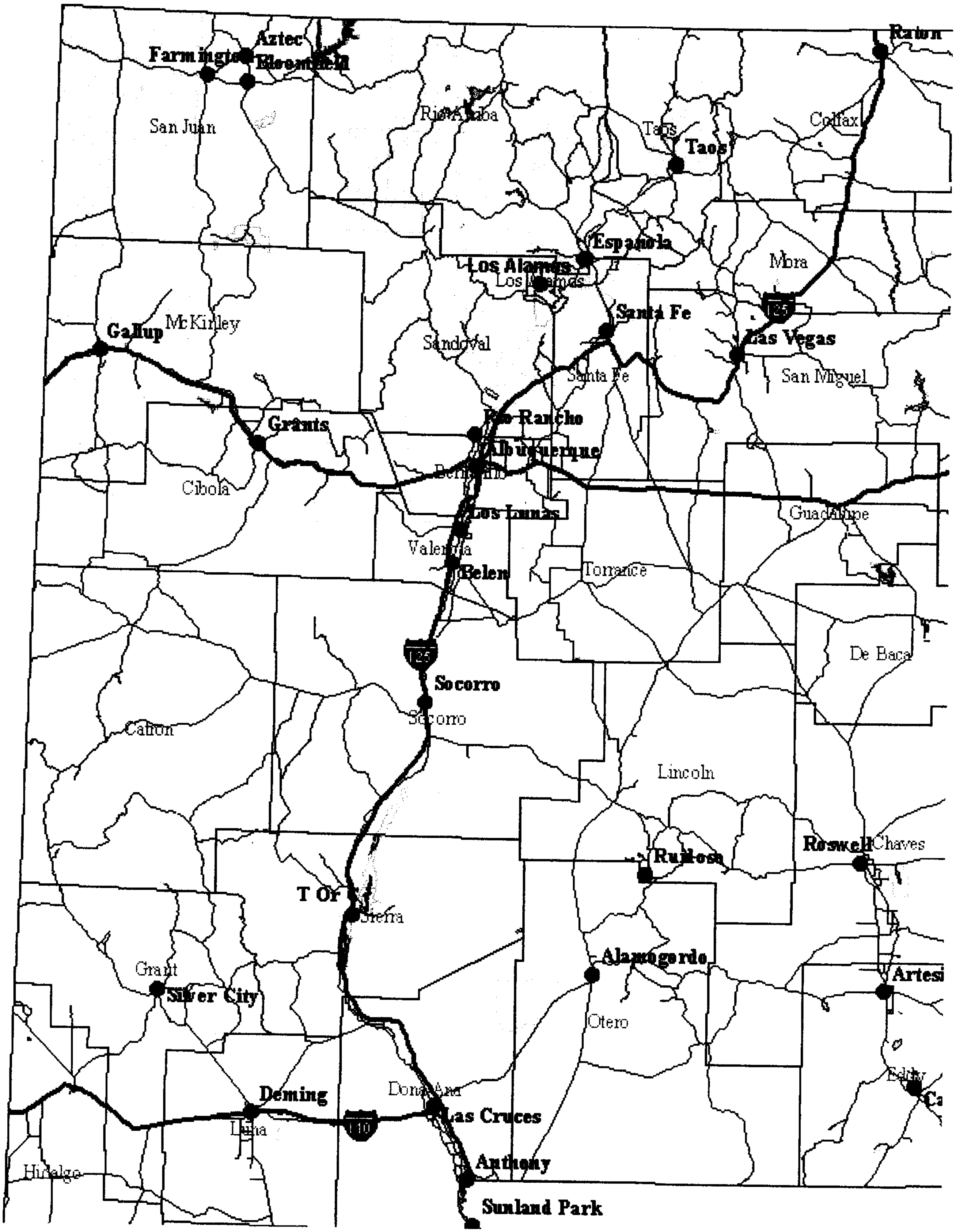
- **Statewide NM**
- **Northwestern NM**
- **Northeastern NM**
- **Southwestern NM**
- **Southeastern NM**
- **New Mexico State Police Districts**
- **Bernalillo Co. NM**
- **Bernalillo Co. (East Mountains Area) NM**
- **Española (Rio Grande) Valley NM**
- **Mesilla (Rio Grande) Valley NM**
- **Southern Sandoval Co. (Rio Rancho-Corrales-Sandia Pueblo-Bernalillo Area)**
- **Valencia (Rio Grande) Valley NM**

URBAN Maps

Click on the urban area's name on the table or on the map below.

Alamogordo	Albuquerque	Anthony & La Union	Artesia	Aztec
Belen	Bloomfield	Carlsbad	Chimayo Valley	Clovis
Corrales	Deming	Española	Farmington	Gallup
Grants & Milan	Hobbs	Las Cruces	Las Vegas	Los Alamos
Los Lunas & Bosque Farms	Lovington	Pojoaque Valley	Portales	Raton
Rio Rancho	Roswell	Ruidoso	Santa Fe	Silver City
Socorro	Sunland Park & Santa Teresa	Taos	Truth or Consequences	Tucumcari

New Mexico Urban Locations



Click on any red urban area for crash data

Click Arrow for DGR Home Page

☆ **Click on the colored circles for information**

For more information:

Traffic Safety Bureau
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Division of Government Research
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Email: dgrint@unm.edu

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GRNDB | New Mexico Data | Health Care Data | Nevada Demo | ArcView Demo | Arc/Info Data | SAS Data

Division of Government Research, UNM / dgrint@unm.edu

Last Revised: 3/11/2004 Keith Smith (ksmith@unm.edu)

Los Alamos County Crash History 2001

For the New Mexico
Traffic Safety Bureau
Under Contract # C04425
MAY 8, 2003

	CRASHES				PERSONS		
	Total	Fatal	Injury	PDO	Total	Killed	In
Total	270	2	68	200	596	3	
	129.61	0.96	32.64	96.01	286.11	1.44	42
Rural	9	0	6	3	19	0	
	6.05	0.00	4.04	2.02	12.78	0.00	4
Urban	261	2	62	197	577	3	
	437.49	3.35	103.92	330.21	967.16	5.03	135
Nonalcohol	254	1	63	190	568	1	
	121.93	0.48	30.24	91.21	272.67	0.48	39
Alcohol	16	1	5	10	28	2	
	7.68	0.48	2.40	4.80	13.44	0.96	2

2000

	CRASHES				PERSONS			
	Total	Fatal	Injury	PDO	Total	Killed	Injured	A
Total	252	0	93	159	646	0	133	1
	122.83	0.00	45.33	77.50	314.87	0.00	64.83	6.8
Rural	7	0	4	3	10	0	4	
	4.78	0.00	2.73	2.05	6.84	0.00	2.73	0.6
Urban	245	0	89	156	636	0	129	1
	416.26	0.00	151.21	265.04	1080.56	0.00	219.17	22.0
Nonalcohol	245	0	91	154	631	0	130	1
	119.42	0.00	44.35	75.06	307.56	0.00	63.36	5.8
Alcohol	7	0	2	5	15	0	3	
	3.41	0.00	0.97	2.44	7.31	0.00	1.46	0.9

1999

	CRASHES				PERSONS			INJURY T	
	Total	Fatal	Injury	PDO	Total	Killed	Injured	A	B
Total	252	1	83	168	619	1	108	11	38
	127.98	0.51	42.15	85.32	314.35	0.51	54.85	5.59	19.30
Rural	6	0	2	4	13	0	4	1	0
	4.06	0.00	1.35	2.71	8.79	0.00	2.71	0.68	0.00
Urban	246	1	81	164	606	1	104	10	38
	501.25	2.04	165.04	334.16	1234.78	2.04	211.91	20.38	77.43
Nonalcohol	247	1	79	167	610	1	102	9	35
	125.44	0.51	40.12	84.81	309.78	0.51	51.80	4.57	17.77
Alcohol	5	0	4	1	9	0	6	2	3
	2.54	0.00	2.03	0.51	4.57	0.00	3.05	1.02	1.52

1998

	CRASHES				PERSONS			INJURY TYPE			
	Total	Fatal	Injury	PDO	Total	Killed	Injured	A	B	C	
Total	263	0	80	183	641	0	114	15	28	71	I
	136.38	0.00	41.48	94.90	332.39	0.00	59.12	7.78	14.52	36.82	n
Rural	7	0	3	4	10	0	4	0	4	0	B
	4.83	0.00	2.07	2.76	6.90	0.00	2.76	0.00	2.76	0.00	1
Urban	256	0	77	179	631	0	110	15	24	71	
	534.74	0.00	160.84	373.90	1318.04	0.00	229.77	31.33	50.13	148.31	
Nonalcohol	259	0	79	180	631	0	113	15	28	70	
	134.31	0.00	40.97	93.34	327.21	0.00	58.60	7.78	14.52	36.30	
Alcohol	4	0	1	3	10	0	1	0	0	1	
	2.07	0.00	0.52	1.56	5.19	0.00	0.52	0.00	0.00	0.52	

Los Alamos Community Report, 2001

Los Alamos is a combined city/county. Therefore, for this report, it is more appropriate to combine the city and county reports into one. Figures and numbers for this report do not correspond to previous years.

Demographics
In 2001, there were 15,961 licensed drivers in Los Alamos. Of these, there were 7,744 females and 8,217 males. The population in Los Alamos was 18,343. The total number of crashes in 2001 was 270, yielding a crash rate of 15 per thousand people (The total number of crashes 270 divided by the population 18,343 multiplied by 1,000). The corresponding rate for the state was 27 per thousand people.

General Crash Information
Since 1992 the number of crashes has shown no consistent pattern. Fatal and injury crashes have also shown no consistent pattern since 1992. Belt usage (as a percentage) has decreased from last year, while belt usage in crashes involving visible and incapacitating injuries has increased. There were no fatalities in the seven intersections with the most crashes in 2001. Of these intersections, both Diamond Drive/ NM 501 and Trinity Drive/ NM 502 were involved four times.

Alcohol-related Crash Information
Information about alcohol-involved crashes is included in all sections of this report. Of the 21 people convicted of DWI in Los Alamos in 2001, 52 percent were first-time DWI convictions (Number of first convictions 11 divided by the total number of people convicted 21 multiplied by 100). The corresponding percentage for the state was 57.

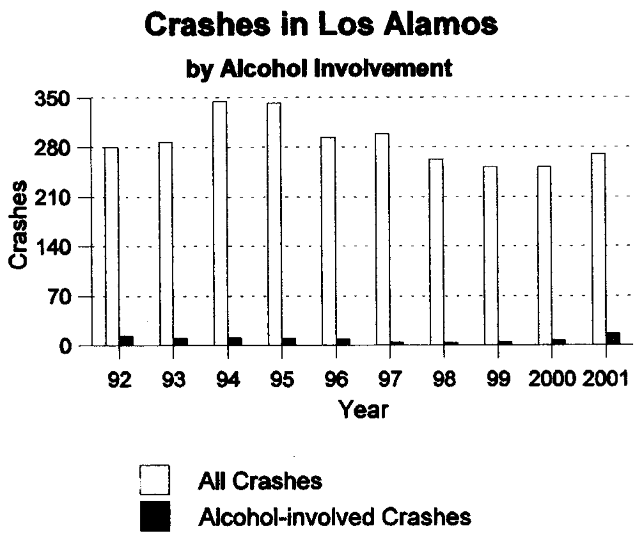
Crash Specifics
Crashes involving other vehicles were the most common class, accounting for 61 percent of all crashes. Crashes involving an other vehicle and a pedestrian resulted in fatalities. Passenger cars were the vehicle type most often involved in crashes, accounting for 51 percent of all vehicles in crashes. Pickups accounted for 22 percent of vehicles involved in crashes. Together these two vehicle types comprised 65 percent of the vehicles involved in injury crashes. The three most common top contributing factors were failing to yield, driver inattention, and following too close. There were two fatal crashes in 2001. The top contributing factors for the fatal crashes were alcohol involvement and failing to yield.

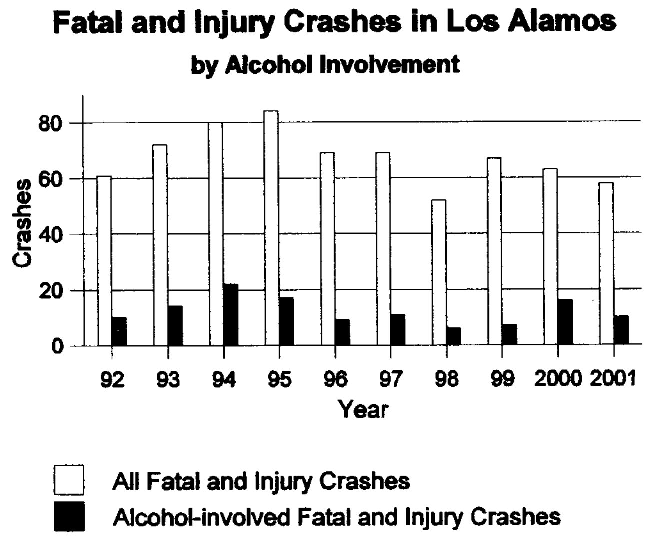
People in Crashes
Overall, males were 58 percent of drivers in crashes, although they account for only 51 percent of licensed drivers in Los Alamos. There were eight pedestrians in crashes; two were killed. Statewide 19 percent of alcohol-involved drivers were under 21; in Los Alamos 31 percent were under 21. No 'teenagers' or young adults were killed in crashes in 2001.

Note: The 1999 crash file contains 15% fewer crashes than the 1998 file. This may be due to problems implementing the new system after the old system failed, or to under reporting. Care should be used in interpreting differences between 1999 and other years in this report.

- Location of arrest/conviction was determined by police agency/court location, not driver residence.
- Crashes and drivers were counted by the city of occurrence/residence.
- Population was counted according to the 2000 Census.
- Young adults are people between the ages of 20 and 24.
- 'Teenagers' are people between the ages of 15 and 19.
- Tables only include variable values for which there are data.

5-11





Passenger Vehicle Seatbelt Usage and Injuries in Los Alamos, 1999-2001

Injury Level	2001		2000		1999	
	Total	No Belt	Total	No Belt	Total	No Belt
Killed	0	0	0	0	1	0
Incapacitating injury	4	0	9	1	5	3
Visible injury	18	1	20	1	22	4
Complaint of injury	44	2	71	0	54	1
Unhurt	473	7	471	7	484	7
Total	539	10	571	9	566	15

The Seven Intersections in Los Alamos with the Most Crashes, 2001

Intersection	Crashes			People	
	Total	Fatal	Injury	Killed	Injured
15th St @ Trinity Dr NM 502	4	0	1	0	1
20th St @ Trinity Dr NM 502	4	0	2	0	3
Canyon Rd @ Diamond Dr NM 501	9	0	1	0	1
Diamond Dr NM 501 @ East Jemez Rd	8	0	1	0	1
Diamond Dr NM 501 @ Orange St	6	0	3	0	4
Diamond Dr NM 501 @ Trinity Dr	7	0	0	0	0
Oppenheimer Dr @ Trinity Dr NM 502	10	0	1	0	1

J-12

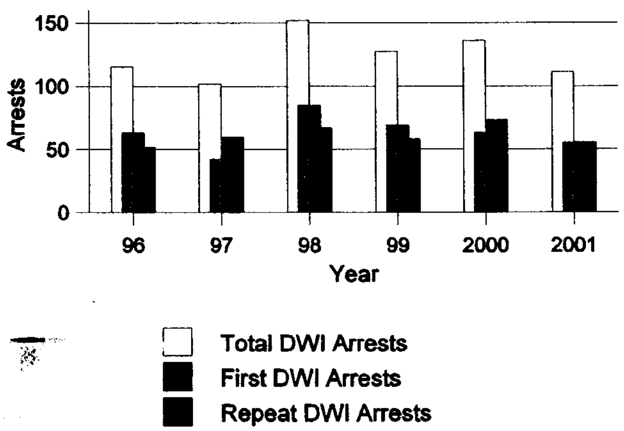
Lifetime DWI Convictions for Drivers
Convicted of DWI Violations in Los Alamos, 2001

Convictions	Since 1997	Since 1971
1st	13	11
2nd	7	5
3rd	1	3
4th	0	2
5th	0	0
6th	0	0
7th	0	0
8th	0	0
9th	0	0
10 or more	0	0
Total	21	21

Convictions are counts of people convicted of DWI by 7/2002 for violations in 2001 in Los Alamos.
Convictions are not comparable to arrests.

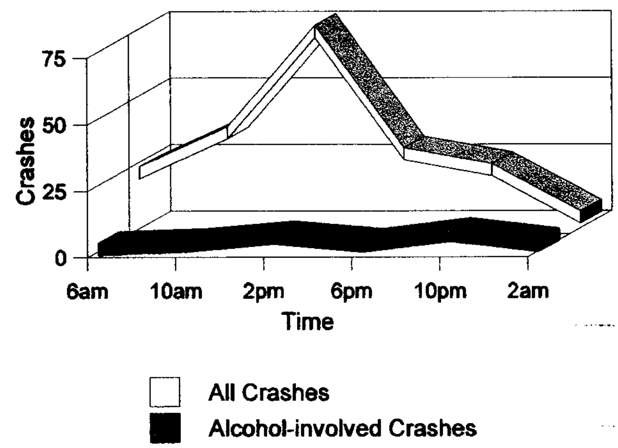
DWI Arrests in Los Alamos

Showing First Arrests and Repeat Offenders



Crashes in Los Alamos

by Hour and Alcohol Involvement



Crashes in Los Alamos by Class, 2001

Class	Crashes					People	
	Total	% of Total	Fatal	% of Fatal	Injury	Killed	Injured
Other vehicle	164	61	1	50	40	1	57
Pedestrian	4	1	1	50	3	2	4
Fixed object	34	13	0	0	7	0	7
Parked vehicle	35	13	0	0	1	0	1
Overturn	13	5	0	0	9	0	11
Other non-collision	4	1	0	0	4	0	4
Pedalcyclist	4	1	0	0	4	0	4
Animal	11	4	0	0	0	0	0
Other object	1	0	0	0	0	0	0
Total	270	100	2	100	68	3	88

J-13

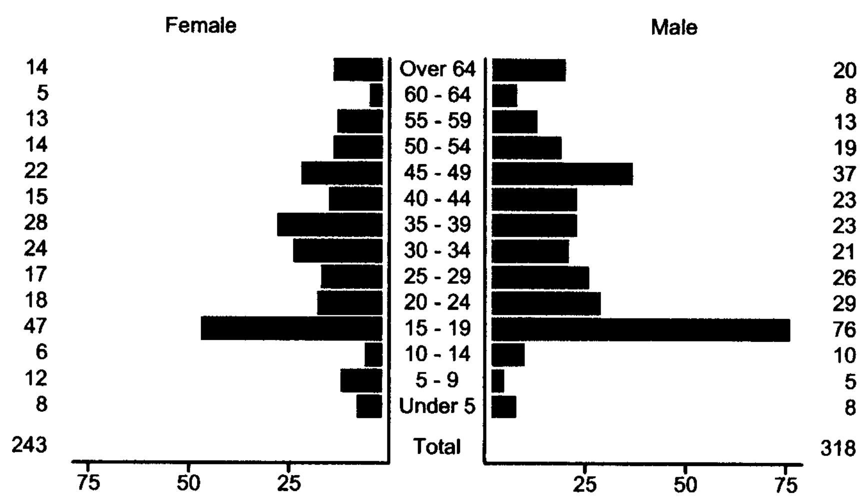
Crashes in Los Alamos by Vehicle Type, 2001

Vehicle Type	Vehicles					People	
	Total	% of Total	Fatal	% of Fatal	Injury	Killed	Injured
Passenger car	257	51	1	17	67	0	46
Pickup	113	22	1	17	15	0	8
Semi	4	1	0	0	0	0	0
Motorcycle	13	3	1	17	11	1	11
Pedalcyclist	6	1	0	0	6	0	6
Pedestrian	8	2	3	50	5	2	5
Van/4 WD	90	18	0	0	22	0	12
Other	3	1	0	0	0	0	0
Unknown	9	2	0	0	0	0	0
Total	503	100	6	100	126	3	88

Crashes in Los Alamos by Top Contributing Factor, 2001

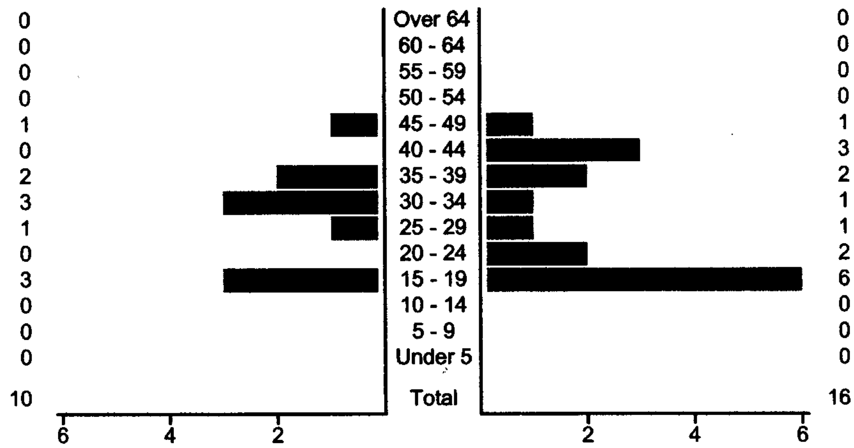
Contributing Factor	Crashes					People	
	Total	% of Total	Fatal	% of Fatal	Injury	Killed	Injured
Alcohol involvement	16	6	1	50	5	2	6
Passing a red light	15	6	0	0	3	0	4
Failing to yield	48	18	1	50	15	1	23
Excessive speed	31	11	0	0	8	0	10
Driving left of center	4	1	0	0	2	0	4
Following too close	38	14	0	0	12	0	15
Improper turning	9	3	0	0	0	0	0
Improper overtaking	1	0	0	0	0	0	0
Improper backing	18	7	0	0	1	0	1
Mechanical defect	3	1	0	0	0	0	0
Driver inattention	40	15	0	0	11	0	12
Improper driving	7	3	0	0	2	0	2
Other	40	15	0	0	9	0	11
Total	270	100	2	100	68	3	88

People in Crashes by Age and Sex in Los Alamos, 2001

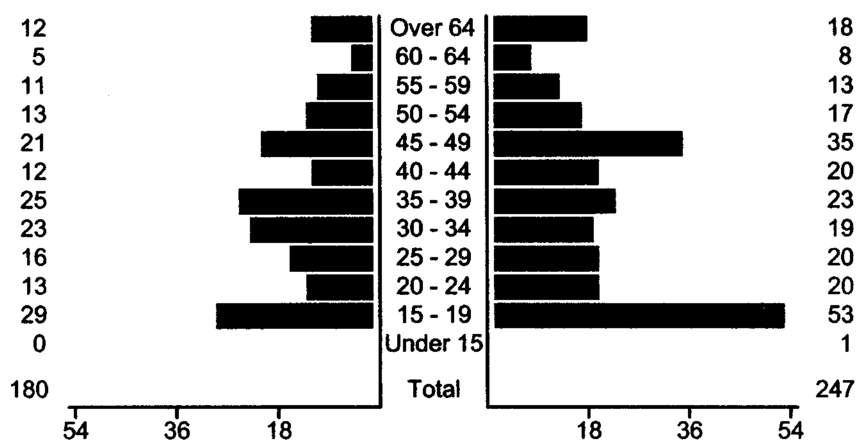


J-14

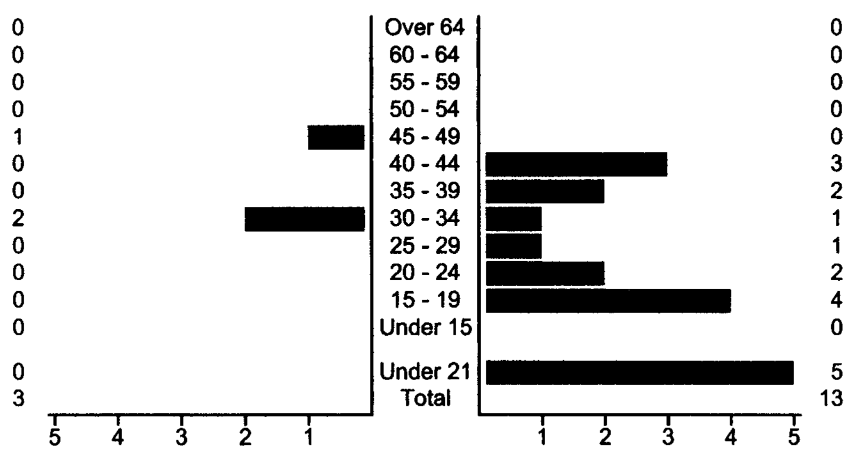
People in Alcohol-Involved Crashes in Los Alamos, 2001
by Age and Sex



Drivers in Crashes by Age and Sex in Los Alamos, 2001

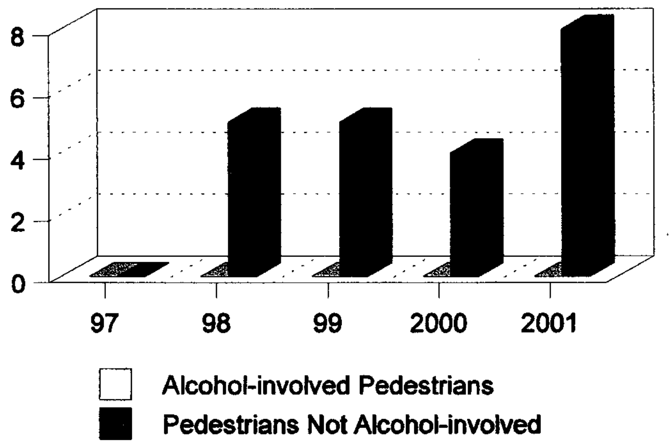


Alcohol-Involved Drivers in Crashes in Los Alamos, 2001
by Age and Sex

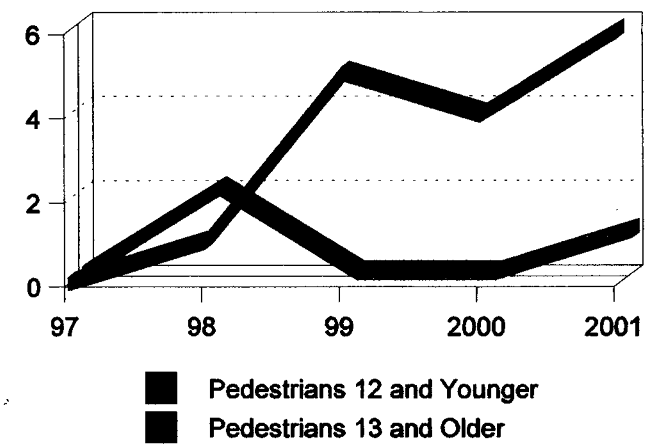


J-15

Pedestrian in Crashes in Los Alamos
by Pedestrian Alcohol-involvement, 1997-2001



Pedestrian in Crashes in Los Alamos
by Age Group, 1997-2001



'Teenagers' and Young Adults in Crashes in Los Alamos by Vehicle Type, 2001

Vehicle	'Teenage' Drivers			Young Adult Drivers		
	Total	Fatal	Injury	Total	Fatal	Injury
Passenger car	60	0	15	21	0	4
Pickup	9	0	3	8	0	0
Motorcycle	0	0	0	1	0	1
Pedalcyclist	1	0	1	1	0	1
Pedestrian	1	0	1	0	0	0
Van/4 WD	13	0	5	2	0	2
Other	0	0	0	1	0	0
Total	84	0	25	34	0	8

'Teenagers' and Young Adults Killed and Injured in Crashes by Year in Los Alamos, 1992-2001

Year	'Teenagers'				Young Adults			
	All Crashes		Alcohol Crashes		All Crashes		Alcohol Crashes	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
2001	0	15	0	0	0	7	0	1
2000	0	37	0	1	0	5	0	0
1999	0	22	0	3	0	10	0	0
1998	0	20	0	0	0	4	0	0
1997	0	33	0	0	0	6	0	0
1996	1	34	0	1	0	9	0	0
1995	0	31	0	0	0	9	0	2
1994	0	31	0	0	0	7	0	0
1993	0	18	0	2	0	8	0	3
1992	0	21	0	1	0	10	0	0

The following breakdown describes the information you are receiving from the Consolidated Highway Data Base (CHDB) report entitled "Road Segments by Traffic (AADT) Info". This report contains Annual Average Daily Traffic for routes in New Mexico which are currently listed in the New Mexico State Highway and Transportation Department's Consolidated Highway Data Base.

Posted Route: The Consolidated Highway Data Base identifies routes as Interstate, United States, New Mexico, County Road, Ramps, Frontage, Loops, etc.

Beginning milepoint: identifies point where roadway section begins.

Direction: Where listing refers to a "P" and "M" at the same milepoint, this signifies a divided highway "Positive" and "Minus" directions. AADT for these two directions should be added together to get one AADT for the Traffic Section. Usually P = North and East bound direction of travel and M = South and West bound direction of travel (according to the direction of the route).

If only a "P" is listed this is not a divided highway and the AADT for both lanes has been totaled and listed.

Functional Class.: functional classification of roads used in traffic monitoring are:

RURAL: Interstate, Principal Arterial, Minor Arterial, Major Collector, Minor Collector, Local Road.

URBAN: Interstate, Principal Arterial, Freeways, Minor Arterial, Collector, Local Road.

County: Reflects county name.

Type: Roadway Segment Type; example: 11 = Major Intersection, 12 = Major Intersection on Interstate, 19 = Minor, 23 = County Line, etc.

Year: Lists three years of Annual Average Daily Traffic (AADT)

Method: used to calculate AADT, the methods used are:

COV - count derived from recent coverage counts; AGF – Annual Growth Factor, generalized from coverage counts within the traffic segment and updated with loop and growth factors; GEN – count generalized from a coverage or ATR count; ATR – count collected from Automatic Traffic Recorder data; WIM – count collected from Weigh-In-Motion stations data

- If a traffic section/segment has not had a coverage count within the three year count cycle, the AADT is factored, and considered non-standard data which lowers the confidence level.

Year: year of actual coverage count.

Terminus: Description of route section.

DVMT: Daily Vehicle Miles Traveled, calculated for each traffic section by multiplying the length of each unique traffic section by AADT. (Used in road design).

OR

Heavy Commercial: Percentage of Heavy Commercial Vehicles larger than a car, passenger truck, or motorcycle.

DATE: 03/19/04 10:14
PROG: R1PRR011
USER: EPENA01
PAGE: 4

Request
NEW MEXICO STATE HIGHWAY & TRANSPORTATION DEPARTMENT

CHDB ROAD SEGMENTS BY POSTED ROUTE/POINT WITH AADT INFO

POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
NM0004 VIA JEMEZ	0.000	P	MNAR	5	SANDOVAL	11	3,387	3,379	3,335	AGF	2001	JCT US 550 AT SAN YSIDRO, NORTHWARD
	0.208	P		5		4	3,387	3,379	3,335	AGF	2001	
	1.385	P		5		15	3,387	3,379	3,335	AGF	2001	
	1.423	P		5		15	3,387	3,379	3,335	AGF	2001	1.423 MILES NORTH OF JCT US 550.
	1.955	P		5		15	3,387	3,379	3,335	AGF	2001	
	2.000	P		4		11	3,246	3,238	3,197	AGF	2001	JCT LOCAL RD. RIGHT TO ZIA PUEBLO.
	2.029	P		4		15	3,246	3,238	3,197	AGF	2001	
	2.067	P		4		4	3,246	3,238	3,197	AGF	2001	4.094 MILES SOUTH OF JCT NM 290.
	6.121	P		4		4	3,246	3,238	3,197	AGF	2001	
	6.161	P		3		11	3,363	3,355	3,312	AGF	2001	JCT NM 290 EAST TO VALLECITOS & PONDEROSA.
	7.955	P		3		4	3,363	3,355	3,312	AGF	2001	
	9.454	P		19		11	1,978	1,839	1,815	COV	2003	JCT NM 485.
	9.461	P		19		4	1,978	1,839	1,815	COV	2003	
	9.503	P		19		4	1,978	1,839	1,815	COV	2003	
	16.819	P		19		4	1,978	1,839	1,815	COV	2003	
	17.319	P		19		4	1,978	1,839	1,815	COV	2003	
	18.300	P		19		4	1,978	1,839	1,815	COV	2003	8.797 MILES NORTH OF JCT NM 485.
	18.319	P				4	1,978	1,839	1,815	COV	2003	

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	20.300	P		19		4	1,978	1,839	1,815	COV	2003
	20.320	P		19		15	1,978	1,839	1,815	COV	2003
	21.372	P		19		15	1,978	1,839	1,815	COV	2003 4.898 MILES SOUTH OF JCT NM 126.
	23.081	P		19		15	1,978	1,839	1,815	COV	2003
	23.294	P		19		15	1,978	1,839	1,815	COV	2003
	23.305	P		19		4	1,978	1,839	1,815	COV	2003
	23.341	P		19		15	1,978	1,839	1,815	COV	2003 2.929 MILES SOUTH OF JCT NM 126.
	24.507	P		19		15	1,978	1,839	1,815	COV	2003
	24.545	P		19		15	1,978	1,839	1,815	COV	2003
	24.625	P		19		15	1,978	1,839	1,815	COV	2003 1.645 MILES SOUTH OF JCT NM 126.
	25.189	P		19		15	1,978	1,839	1,815	COV	2003 1.081 MILES SOUTH OF JCT NM 126.
	26.270	P		6		11	1,139	1,215	1,200	COV	2003 JCT NM 126.
	26.305	P		6		4	1,139	1,215	1,200	COV	2003
	29.562	P		6		15	1,139	1,215	1,200	COV	2003 3.292 MILES NORTH OF JCT NM 126.

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR TERMINUS
NM0004	33.385	P	MNAR	6	SANDOVAL	15	1,139	1,215	1,200	COV	2003
	33.405	P		6		15	1,139	1,215	1,200	COV	2003 7.135 MILES NORTH OF JCT NM 126.
	38.585	P				15	1,139	1,215	1,200	COV	2003

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40.366	P		6		15	1,139	1,215	1,200	COV	2003	
42.721	P		6		4	1,139	1,215	1,200	COV	2003	4.042 MILES SOUTH OF SANDOVAL/LOS ALAMOS CO.
44.925	P		6		4	1,139	1,215	1,200	COV	2003	
46.698	P		6		4	1,139	1,215	1,200	COV	2003	
46.763	P	MJCL	6	LOS ALAMOS	23	1,139	1,215	1,200	COV	2003	SANDOVAL/LOS ALAMOS COUNTY LINE. ditto 501
49.698	P		6		11	473 666	549 666	141 1,059	AGF	2002	on 501 towards diamond Drive JCT NM 501.
49.990	P		7		4	666	666	1,059	AGF	2002	
55.553	P		7		4	666	666	1,059	AGF	2002	
55.595	P	MNAR	7		11	666	664	7,879	AGF	2002	JCT BANDELIER PARK
58.841	P		7		4	666	664	7,879	AGF	2002	
60.090	P		7		4	666	664	7,879	AGF	2002	
61.596	P		7		4	666	664	7,879	AGF	2002	
62.334	P		7		4	666	664	7,879	AGF	2002	URBAN BOUNDARY.
62.379	P		7		4	666	664	7,879	AGF	2002	URBAN BOUNDARY.
62.516	P		7		4	666	664	7,879	AGF	2002	
62.955	P		7		4	666	664	7,879	AGF	2002	1.104 MILES SOUTH OF LOS ALAMOS/SANTA FE CO. [7]
63.071	P				11	2,569	2,573	7,656	AGF	2002	JCT PAJARITO RD.--WHITE ROCK.
63.531	P		9		15	2,569	2,573	7,656	AGF	2002	
63.659	P		9		4	2,569	2,573	7,656	AGF	2002	
63.995	P		9		19	2,569	2,573	7,656	AGF	2002	JCT ROVER BLVD.--WHITE ROCK.
64.059	P	MJCL	9	SANTA FE	23	2,569	2,573	7,656	AGF	2002	LOS ALAMOS/SANTA FE COUNTY LINE.
64.090	P		9		4	2,569	2,573	7,656	AGF	2002	
64.159	P		9		4	2,569	2,573	7,656	AGF	2002	
66.348	P		9		4	2,569	2,573	7,656	AGF	2002	

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                      9
         66.558 P                  15   2,569    2,573    7,656 AGF  2002
                      9
         66.735 P                  11   9,140    9,134    9,176 AGF  2000 JCT JEMEZ RD.
                     12
         66.793 P                   4   9,140    9,134    9,176 AGF  2000
                     12
         67.298 P                   4   9,140    9,134    9,176 AGF  2000
                     12
END---   67.946

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                 HEAVY
ROUTE    MPNT   R CLS   COUNTY      P    2003     2002     2001 METH YEAR TERMINUS
                  COMM
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NM0502     0.000 M                 11   4,812    4,726   10,683 AGF  2002 JCT NM 501 (DIAMOND DR.)--LOS
ALAMOS, EAST TO          6
           0.000 P                 11   4,603    4,520    8,784 AGF  2002 JCT NM 501 (DIAMOND DR.)--LOS
ALAMOS, EAST TO          6
           0.700 M                 11   3,907    3,837    9,068 AGF  2002 JCT OPENHEIMER ST.--LOS ALAMOS
                      6
           0.700 P                 11   4,103    4,029   10,399 AGF  2002 JCT OPENHEIMER ST.--LOS ALAMOS
                      6
           1.520 M                  4   3,907    3,837    9,068 AGF  2002
                      6
           1.520 P                  4   4,103    4,029   10,399 AGF  2002
                      6
           1.720 P                  4   8,010    7,866   19,467 AGF  2002
                      6
           1.750 P                 11  12,187   11,968    6,419 AGF  2002 JCT CANYON RD.--LOS ALAMOS
                      9
           1.870 P                 15  12,187   11,968    6,419 AGF  2002
                      9
           1.950 P                  4  12,187   11,968    6,419 AGF  2002
                      9
           2.310 P                  4  12,187   11,968    6,419 AGF  2002
                      9
           3.040 P                  4  12,187   11,968    6,419 AGF  2002 3.040 MILES EAST OF JCT. NM501
(DIAMOND DRIVE           9
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						Request				
3.600	M	9		2	6,051	5,942	3,180	AGF	2002	
3.600	P	9		2	6,136	6,026	3,239	AGF	2002	
3.860	P	9		4	12,187	11,968	6,419	AGF	2002	
4.144	P	9	SANTA FE	23	12,187	11,968	6,419	AGF	2002	LOS ALAMOS/SANTA FE COUNTY LINE
5.619	M	9		4	6,051	5,942	3,180	AGF	2002	
5.619	P	9		4	6,136	6,026	3,239	AGF	2002	
5.760	M	9		3	6,051	5,942	3,180	AGF	2002	
5.760	P	9		3	6,136	6,026	3,239	AGF	2002	
5.910	M	9		4	6,051	5,942	3,180	AGF	2002	
5.910	P	9		4	6,136	6,026	3,239	AGF	2002	
6.057	M	9	LOS ALAMOS	2	6,051	5,942	3,180	AGF	2002	
6.057	P	9	SANTA FE	2	6,136	6,026	3,239	AGF	2002	
6.110	M	12		11	5,919	5,838	7,070	AGF	2002	JCT NM 4 (66.618)--WHITE ROCK "Y".
6.110	P	12		11	6,053	5,970	8,084	AGF	2002	JCT NM 4 (66.618)--WHITE ROCK "Y".
6.240	M	12		4	5,919	5,838	7,070	AGF	2002	
6.240	P	12		4	6,053	5,970	8,084	AGF	2002	
6.377	M	12		4	5,919	5,838	7,070	AGF	2002	
6.377	P	12		4	6,053	5,970	8,084	AGF	2002	
6.410	M	12		4	5,919	5,838	7,070	AGF	2002	
6.410	P	12		4	6,053	5,970	8,084	AGF	2002	
6.469	M	12		4	5,919	5,838	7,070	AGF	2002	
6.469	P	12		4	6,053	5,970	8,084	AGF	2002	
6.484	M	12		15	5,919	5,838	7,070	AGF	2002	
6.484	P	12		15	6,053	5,970	8,084	AGF	2002	

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS / HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
	7.110	M	12		3	5,919	5,838	7,070	AGF	2002	Request
	7.110	P	12		3	6,053	5,970	8,084	AGF	2002	
	7.960	P	12		3	11,972	11,808	15,154	AGF	2002	
	8.150	P	12		4	11,972	11,808	15,154	AGF	2002	

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS / HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
NM0502	8.264	M	PRAR 12	SANTA FE	4	5,919	5,838	7,070	AGF	2002	
	8.264	P	12		4	6,053	5,970	8,084	AGF	2002	
	8.423	M	12		15	5,919	5,838	7,070	AGF	2002	
	8.423	P	12		15	6,053	5,970	8,084	AGF	2002	
	8.802	M	12		15	5,919	5,838	7,070	AGF	2002	
	8.802	P	12		15	6,053	5,970	8,084	AGF	2002	
	9.451	M	12		15	5,919	5,838	7,070	AGF	2002	
	9.451	P	12		15	6,053	5,970	8,084	AGF	2002	
	9.812	M	12		4	5,919	5,838	7,070	AGF	2002	
	9.812	P	12		4	6,053	5,970	8,084	AGF	2002	
	9.965	M	12		2	5,919	5,838	7,070	AGF	2002	
	9.965	P	12		2	6,053	5,970	8,084	AGF	2002	
	10.010	M	12		4	5,919	5,838	7,070	AGF	2002	

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10.010 P	12	4	6,053	Request 5,970	8,084 AGF	2002		
10.088 M	6	11	5,793	5,602	5,241 ATR	2003	JCT NM 30 TO ESPANOLA.
10.088 P	6	11	5,704	5,505	5,342 ATR	2003	JCT NM 30 TO ESPANOLA.
10.110 M	6	4	5,793	5,602	5,241 ATR	2003	
10.110 P	6	4	5,704	5,505	5,342 ATR	2003	
10.153 M	6	2	5,793	5,602	5,241 ATR	2003	
10.153 P	6	2	5,704	5,505	5,342 ATR	2003	
10.362 M	6	4	5,793	5,602	5,241 ATR	2003	
10.362 P	6	4	5,704	5,505	5,342 ATR	2003	
10.508 M	6	4	5,793	5,602	5,241 ATR	2003	
10.508 P	6	4	5,704	5,505	5,342 ATR	2003	
10.521 M	6	4	5,793	5,602	5,241 ATR	2003	
10.521 P	6	4	5,704	5,505	5,342 ATR	2003	
10.643 M	6	4	5,793	5,602	5,241 ATR	2003	
10.643 P	6	4	5,704	5,505	5,342 ATR	2003	
10.800 M	6	4	5,793	5,602	5,241 ATR	2003	
10.800 P	6	4	5,704	5,505	5,342 ATR	2003	
10.968 M	6	4	5,793	5,602	5,241 ATR	2003	
10.968 P	6	4	5,704	5,505	5,342 ATR	2003	
11.879 M	6	4	5,793	5,602	5,241 ATR	2003	
11.879 P	6	4	5,704	5,505	5,342 ATR	2003	
12.384 M	6	4	5,793	5,602	5,241 ATR	2003	
12.384 P	6	4	5,704	5,505	5,342 ATR	2003	
12.534 M	6	4	5,793	5,602	5,241 ATR	2003	

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
	12.534	P		6		4	5,704	5,505	5,342	ATR	2003	Request
	12.557	M		6		4	5,793	5,602	5,241	ATR	2003	
	12.557	P		6		4	5,704	5,505	5,342	ATR	2003	
	12.693	M		6		4	5,793	5,602	5,241	ATR	2003	
	12.693	P		6		4	5,704	5,505	5,342	ATR	2003	
	14.287	M		6		4	5,793	5,602	5,241	ATR	2003	
	14.287	P		6		4	5,704	5,505	5,342	ATR	2003	
	14.437	M		6		4	5,793	5,602	5,241	ATR	2003	

POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
NM0502	14.437	P	PRAR	6	SANTA FE	4	5,704	5,505	5,342	ATR	2003	
	14.460	M		6		4	5,793	5,602	5,241	ATR	2003	
	14.460	P		6		4	5,704	5,505	5,342	ATR	2003	
	14.596	M		6		4	5,793	5,602	5,241	ATR	2003	
	14.596	P		6		4	5,704	5,505	5,342	ATR	2003	
	15.000	M		6		4	5,793	5,602	5,241	ATR	2003	
	15.000	P		6		4	5,704	5,505	5,342	ATR	2003	
	15.059	M		6		4	5,793	5,602	5,241	ATR	2003	
	15.059	P		6		4	5,704	5,505	5,342	ATR	2003	

				Request					
15.079	M	4	5,793	5,602	5,241	ATR	2003		6
15.079	P	4	5,704	5,505	5,342	ATR	2003		6
15.209	M	11	6,375	6,288	6,177	AGF	1998	JCT SANTA FE CO. RD. 49084D (OLD NM 33).	5
15.209	P	11	6,362	6,275	6,165	AGF	1998	JCT SANTA FE CO. RD. 49084D (OLD NM 33).	5
15.232	M	4	6,375	6,288	6,177	AGF	1998		5
15.232	P	4	6,362	6,275	6,165	AGF	1998		5
15.384	M	4	6,375	6,288	6,177	AGF	1998		5
15.384	P	4	6,362	6,275	6,165	AGF	1998		5
15.579	M	4	6,375	6,288	6,177	AGF	1998		5
15.579	P	4	6,362	6,275	6,165	AGF	1998		5
15.790	M	11	7,819	7,712	6,133	AGF	2002	JCT SANTA FE CO. RD. 49101E (OLD NM 79).	14
15.790	P	11	7,244	7,145	5,851	AGF	2002	JCT SANTA FE CO. RD. 49101E (OLD NM 79).	14
16.750	M	4	7,819	7,712	6,133	AGF	2002		14
16.750	P	4	7,244	7,145	5,851	AGF	2002		14
16.814	M	4	7,819	7,712	6,133	AGF	2002		14
16.814	P	4	7,244	7,145	5,851	AGF	2002		14
16.889	M	11	7,445	7,344	5,274	AGF	2002	JCT SANTA FE CO. RD. 49101G (OLD NM 100).	15
16.889	P	11	8,653	8,535	7,094	AGF	2002	JCT SANTA FE CO. RD. 49101G (OLD NM 100).	15
17.001	M	4	7,445	7,344	5,274	AGF	2002		15
17.001	P	4	8,653	8,535	7,094	AGF	2002		15
17.015	M	4	7,445	7,344	5,274	AGF	2002		15
17.015	P	4	8,653	8,535	7,094	AGF	2002		15
17.200	M	4	7,445	7,344	5,274	AGF	2002		15
17.200	P	4	8,653	8,535	7,094	AGF	2002		15

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	17.422	M	15	4	7,445	7,344	5,274	AGF	2002	
	17.422	P	15	4	8,653	8,535	7,094	AGF	2002	
	17.602	M	15	4	7,445	7,344	5,274	AGF	2002	
	17.602	P	15	4	8,653	8,535	7,094	AGF	2002	
	17.802	M	15	4	7,445	7,344	5,274	AGF	2002	
	17.802	P	15	4	8,653	8,535	7,094	AGF	2002	
	17.822	M	15	4	7,445	7,344	5,274	AGF	2002	0.479 MILE WEST OF JCT US 84.
	17.822	P	15	4	8,653	8,535	7,094	AGF	2002	0.479 MILE WEST OF JCT US 84.
	17.844	M	15	4	7,445	7,344	5,274	AGF	2002	
	17.844	P	15	4	8,653	8,535	7,094	AGF	2002	
END---	18.301									

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	COUNTY	HEAVY COMM	TYP	2003	2002	2001	METH	YEAR	TERMINUS
AIA015	0.000	P	LOC	SANTA FE	0	18	44	44	44	AGF		BIA ACCUMULATOR -- UNPAVED BIA ROADS IN SANTA
END---	45.800											
AIA016	0.000	P			0	18	400	392	384	AGF		BIA ACCUMULATOR -- PAVED BIA ROADS IN SANTA F
END---	12.991											
CE0003	0.000	P			0	88	0	0	0	AGF		GALISTEO DAM PAVED ROADS
END---	1.390											
FL4724	0.000	P	MNAR		0	15	6,010	6,018	6,094	AGF		SHELBY ST, WASH. AV FR.JCT.WATER ST.TO JCT.PA
	0.050	P			0	11	6,010	6,018	6,094	AGF		JCT. SAN FRANCISCO STREET.
	0.100	P			0	11	12,063	12,079	12,231	AGF	2001	JCT. PALACE AVE.
	0.220	P			0	11	10,900	10,915	11,052	AGF	2000	JCT. MARCY ST.
	0.340	P			0	8	10,900	10,915	11,052	AGF	2000	
END---	0.510											
FL4725	0.000	P			0	8	5,507	5,515	5,585	AGF	1989	AGUA FRIA IN SANTA FE FROM ST. FRANCIS DR. TO
	0.075	P			0	8	5,507	5,515	5,585	AGF	1989	
	0.130	P			0	11	4,392	5,747	4,843	COV	2003	JCT. IRVINE ST.
	0.580	P			0	8	4,392	5,747	4,843	COV	2003	
END---	0.601											
FL4726	0.000	M	PRAR		0	11	18,430	18,099	17,700	AGF	1992	AIRPORT ROAD, FROM JCT CERRILLOS ROAD, WEST T
	0.000	P			0	11	17,740	17,422	17,038	AGF	1992	AIRPORT ROAD, FROM JCT CERRILLOS ROAD, WEST T
	0.119	M				11	15,168	14,896	14,567	AGF	2000	JCT CAMINO DE LOS LOPEZ (COUNTY

ROAD 49061E). 0
0.119 P 11 15,630 15,349 15,010 AGF 2000 JCT CAMINO DE LOS LOPEZ (COUNTY
ROAD 49061E). 0
0.167 M 2 15,168 14,896 14,567 AGF 2000
0
0.167 P 2 15,630 15,349 15,010 AGF 2000
0
0.413 M 2 15,168 14,896 14,567 AGF 2000
0
0.413 P 2 15,630 15,349 15,010 AGF 2000
0
0.462 M 11 12,990 13,335 13,653 ATR 2003 JCT ZEPOL ROAD (COUNTY ROAD 49007).
0
0.462 P 11 13,588 13,573 13,615 ATR 2003 JCT ZEPOL ROAD (COUNTY ROAD 49007).
0
0.923 M 11 9,057 16,194 15,837 COV 2003 JCT JEMEZ ROAD (COUNTY ROAD
49061B). 0
0.923 P 11 10,284 16,358 15,997 COV 2003 JCT JEMEZ ROAD (COUNTY ROAD
49061B). 0
1.298 M 11 4,702 4,618 4,516 AGF 1998 JCT PASEO DEL SOL (ENTRANCE TO
CAPITAL HIGH). 0
1.298 P 11 7,096 6,969 6,815 AGF 1998 JCT PASEO DEL SOL (ENTRANCE TO
CAPITAL HIGH). 0
1.519 M 11 7,635 7,498 7,333 AGF 2000 JCT COUNTRY CLUB GARDENS MOBILE
HOME PARK ENT 15
1.519 P 11 7,582 7,446 7,282 AGF 2000 JCT COUNTRY CLUB GARDENS MOBILE
HOME PARK ENT 15
1.602 M 2 7,635 7,498 7,333 AGF 2000
15
1.602 P 2 7,582 7,446 7,282 AGF 2000
15
1.992 M 11 5,757 8,413 8,227 COV 2003 JCT AGUA FRIA ROAD (COUNTY ROAD
49066). 0
1.992 P 11 5,530 6,811 6,661 COV 2003 JCT AGUA FRIA ROAD (COUNTY ROAD
49066). 0
1.998 M 4 5,757 8,413 8,227 COV 2003
0
1.998 P 4 5,530 6,811 6,661 COV 2003
0
2.022 P 4 11,287 15,224 14,888 COV 2003
0

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PAGE: 2

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS / HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
FL4726	2.183	P	PRAR 0	SANTA FE	4	11,287	15,224	14,888	COV	2003	
	2.483	P	0		19	11,287	15,224	14,888	COV	2003	JCT OLD NM 284.
	2.698	M	0		4	5,757	8,413	8,227	COV	2003	
	2.698	P	0		4	5,530	6,811	6,661	COV	2003	
	3.067	M	0		11	2,061	2,064	2,090	AGF	1996	JCT NM 599 (SANTA FE BYPASS).
	3.067	P	0		11	2,051	2,054	2,080	AGF	1996	JCT NM 599 (SANTA FE BYPASS).
	3.177	M	0		11	3,743	3,748	3,795	AGF	1995	JCT SANTA FE COUNTY ROAD 490056.
	3.177	P	0		11	3,885	3,890	3,939	AGF	1995	JCT SANTA FE COUNTY ROAD 490056.
	4.120	P	0		4	7,628	7,638	7,734	AGF	1995	
END---	4.372										
FL4727 EAST TO JC	0.000	M	6		11	9,947	9,768	14,504	AGF	2002	RODEO ROAD, FROM NM 14 (CERRILLOS)
EAST TO JC	0.000	P	6		11	9,844	9,667	12,551	AGF	2002	RODEO ROAD, FROM NM 14 (CERRILLOS)
	0.156	M	6		19	9,947	9,768	14,504	AGF	2002	MALL ENTRANCE
	0.156	P	6		19	9,844	9,667	12,551	AGF	2002	MALL ENTRANCE
	0.332	M	6		11	13,060	15,231	14,895	COV	2003	JCT. ENTRANCE TO VILLA LINDA MALL
	0.332	P	6		11	17,754	20,711	20,254	COV	2003	JCT. ENTRANCE TO VILLA LINDA MALL
	0.963	M	6		11	16,391	16,538	15,123	ATR	2003	JCT. RICHARDS AVE.
	0.963	P	6		11	16,343	16,529	15,016	ATR	2003	JCT. RICHARDS AVE.
	1.041	M	6		2	16,391	16,538	15,123	ATR	2003	JCT. RICHARDS AVENUE.
	1.041	P	6		2	16,343	16,529	15,016	ATR	2003	
	1.472	M	6		8	16,391	16,538	15,123	ATR	2003	

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	1.472	P	6	8	16,343	16,529	15,016	ATR	2003	
	1.720	M	6	8	16,391	16,538	15,123	ATR	2003	
	1.720	P	6	8	16,343	16,529	15,016	ATR	2003	
	1.755	M	6	11	11,269	6,269	6,131	COV	2003	JCT ZIA ROAD (FL5733).
	1.755	P	6	11	11,173	5,773	5,646	COV	2003	JCT ZIA ROAD (FL5733).
	1.932	M	6	2	11,269	6,269	6,131	COV	2003	JCT. CAMINO CARLOS REY.
	1.932	P	6	2	11,173	5,773	5,646	COV	2003	
	1.971	M	6	11	6,352	6,238	7,986	AGF	2002	JCT. CAMINO CARLOS REY
	1.971	P	6	11	6,398	6,283	5,729	AGF	2002	JCT. CAMINO CARLOS REY
	2.472	M	6	11	4,355	4,753	2,728	COV	2003	JCT. YUCCA ST.
	2.472	P	6	11	4,561	4,982	3,103	COV	2003	JCT. YUCCA ST.
	3.000	P	6	8	8,916	9,735	5,831	COV	2003	
	3.295	P	6	2	8,916	9,735	5,831	COV	2003	
	3.357	P	8	11	6,470	6,353	7,502	AGF	2002	JCT. SAWMILL RD.
	3.520	P	8	8	6,470	6,353	7,502	AGF	2002	
	4.793	M	8	8	3,320	3,260	3,699	AGF	2002	
	4.793	P	8	8	3,150	3,093	3,803	AGF	2002	
END---	5.016									
FL4728	0.000	M MNAR		11	11,191	11,206	11,346	AGF	2001	CORDOVA RD.; FROM CERRILLOS RD.,
EAST TO OLD			6							
	0.000	P		11	9,520	9,532	9,651	AGF	2001	CORDOVA RD.; FROM CERRILLOS RD.,
EAST TO OLD			6							
	0.210	M	6	11	4,432	3,584	3,629	COV	2003	JCT. PEN ROAD.
	0.210	P	6	11	3,482	5,726	5,798	COV	2003	JCT. PEN ROAD.

POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
FL4728	0.245	M	MNAR 6	SANTA FE	8	4,432	3,584	3,629	COV	2003	
	0.245	P	6		8	3,482	5,726	5,798	COV	2003	
	0.270	M	6		11	7,207	7,216	7,306	AGF	2001	JCT. ST. FRANCIS DR.
	0.270	P	6		11	5,853	5,861	5,934	AGF	2001	JCT. ST. FRANCIS DR.
	0.514	M	6		11	5,813	5,182	5,247	COV	2003	JCT. DON DIEGO STREET.
	0.514	P	6		11	4,737	5,835	5,908	COV	2003	JCT. DON DIEGO STREET.
	0.748	M	6		11	6,816	6,825	6,910	AGF	1991	JCT. GALISTEO STREET.
	0.748	P	6		11	6,536	6,545	6,627	AGF	1991	JCT. GALISTEO STREET.
	0.910	M	6		11	4,893	5,592	5,662	COV	2003	JCT. DON GASPAR
	0.910	P	6		11	4,584	5,307	5,373	COV	2003	JCT. DON GASPAR
	0.998	M	6		8	4,893	5,592	5,662	COV	2003	
	0.998	P	6		8	4,584	5,307	5,373	COV	2003	
END---	1.321										
FL4731 (PASEO DE PERA	0.000	P	6		8	5,274	5,280	5,346	AGF	1991	OLD TAOS HIGHWAY - JCT. NM 475
	0.367	P	6		11	5,497	5,504	5,573	AGF	1997	JCT. MURALES
	0.835	P	6		11	5,274	5,280	5,346	AGF	1991	JCT. CALLE ESTADO
END---	1.547										
FL4732 MICHAELS	0.000	M	PRAR 9		11	11,448	11,242	10,994	AGF	1992	OLD PECOS TR. & WATER ST., FROM ST. MICHAELS
	0.000	P	9		11	11,448	11,242	10,994	AGF	1992	OLD PECOS TR. & WATER ST., FROM ST. MICHAELS
	0.190	M	9		8	11,448	11,242	10,994	AGF	1992	
	0.190	P			8	11,448	11,242	10,994	AGF	1992	

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	9									
	0.214 M		11	11,448	11,242	10,994	AGF			
	9									
	0.214 P		11	11,448	11,242	10,994	AGF		JCT. ARROYO CHAMISO	
	9									
	0.246 M		8	11,448	11,242	10,994	AGF		JCT. ARROYO CHAMISO	
	9									
	0.246 P		8	11,448	11,242	10,994	AGF			
	9									
	0.494 P		8	22,896	22,484	21,988	AGF			
	9									
	0.630 P		8	22,896	22,484	21,988	AGF			
	9									
	0.723 P		11	15,180	16,187	15,830	COV	2003	JCT. SAN MATEO	
	0									
	0.866 P		8	15,180	16,187	15,830	COV	2003		
	0									
	1.166 P		11	14,575	14,313	13,997	AGF	2001	JCT. CORDOVA RD.	
	0									
	1.583 P		11	14,148	13,154	12,864	COV	2003	JCT. OLD SANTA FE TRAIL.	
	0									
	1.945 P		11	9,481	9,311	9,106	AGF	1996	JCT. PASEO DE PERATLA.	
	9									
	2.177 P		11	10,925	10,729	10,493	AGF		JCT. ALAMEDA	
	9									
	2.198 P		8	10,925	10,729	10,493	AGF			
	9									
END---	2.284									
FL4734	0.000 P	MNAR	15	14,171	14,189	14,367	AGF	1992	OLD SANTA FE TRAIL FR. JCT. OLD	
PECOS TRAIL S		6								
	0.511 P		11	2,502	14,189	14,367	COV	2003	JCT. CAM. CORRALES	
	6									
	0.874 P		11	9,129	9,141	9,256	AGF	2001	JCT. ROAD RIGHT TO MUSEUM OF NAVAJO	
ARTS.	6									
	1.040 P		15	9,129	9,141	9,256	AGF	2001	JCT. CAM. DEL MONTE SOL	
	6									
	1.460 P		11	2,502	2,686	2,719	COV	2003	JCT. MOUNTAIN DR.	
	6									
	2.110 P		15	2,502	2,686	2,719	COV	2003		
	6									
END---	2.473									

POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
FL4735 SANTA FE WEST	0.000	P	MNAR	0	SANTA FE	11	15,927	15,947	16,147	AGF	1991	JCT US 84 (ST. FRANCIS) WEST TO
	0.501	P		0		11	20,483	20,510	20,767	AGF	2000	JCT CAMINO ALIRE.
	0.638	P		0		4	20,483	20,510	20,767	AGF	2000	
	0.665	P		0		11	11,342	13,314	16,147	COV	2003	JCT HICKOX STREET.
	1.263	P		0		4	11,342	13,314	16,147	COV	2003	
	1.323	P		0		11	14,377	14,396	18,440	AGF	2002	JCT VELARDE STREET.
	1.680	P		0		4	14,377	14,396	18,440	AGF	2002	
	1.725	P		6		11	15,877	15,898	16,097	AGF	1996	JCT OSAGE AVENUE.
	2.100	P		6		4	15,877	15,898	16,097	AGF	1996	
	2.238	P		6		11	16,956	12,903	14,469	ATR	2003	JCT. MAEZ
	2.800	P		6		4	16,956	12,903	14,469	ATR	2003	
	2.815	P		0		11	8,183	11,015	11,153	COV	2003	JCT SILER ROAD.
	2.937	P		0		4	8,183	11,015	11,153	COV	2003	
END---	3.025											
FL4740 AGUA FRIA S	0.000	M		6		11	5,543	5,550	5,620	AGF	2000	SILER ROAD FROM CERRILLOS ROAD TO
AGUA FRIA S	0.000	P		6		11	6,487	6,496	6,577	AGF	2000	SILER ROAD FROM CERRILLOS ROAD TO
	0.170	M		6		11	5,698	5,680	5,751	COV	2003	JCT. RUFINA
	0.170	P		6		11	5,363	5,332	5,399	COV	2003	JCT. RUFINA
END---	0.640											
FL4750 TO CANYON R	0.000	P	COLL	6		15	5,583	5,449	5,437	AGF		PALACE AVE. FROM PASEO DE PERALTA
	0.200	P		6		11	4,705	4,592	5,200	AGF	2002	JCT. DELGADO
	0.540	P				11	4,942	4,824	4,814	AGF	1993	JCT. LA VEREDA

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                      6
        0.712 P                  11   3,724   3,634   3,626 AGF  1991 JCT. CERRO GORDO
                      6
        0.780 P                  11   3,403   2,631   2,625 COV  2003 JCT. ALAMEDA.
                      0
        0.800 P                   8   3,403   2,631   2,625 COV  2003
                      0
END---  0.830
FL4777  0.000 M PRAR             11   8,238   8,090   7,912 AGF  1997 GUADALUPE ST., FROM CERRILLOS RD.
TO ST. FRAN             6
        0.000 P                  11   9,363   9,195   8,992 AGF  1997 GUADALUPE ST., FROM CERRILLOS RD.
TO ST. FRAN             6
        0.110 M                  11   7,412   7,279   7,118 AGF  1999 JCT. PASEO DE PERALTA.
                      0
        0.110 P                  11  10,522  10,333  10,105 AGF  1999 JCT. PASEO DE PERALTA.
                      0
        0.220 M                  11  11,429   7,714   7,544 COV  2003 JCT. MANHATTAN STREET.
                      6
        0.220 P                  11   8,395  10,566  10,333 COV  2003 JCT. MANHATTAN STREET.
                      6
        0.490 M                  11   7,105   6,977   6,823 AGF  2001 JCT. MONTEZUMA STREET.
                      0
        0.490 P                  11   6,659   6,539   6,395 AGF  2001 JCT. MONTEZUMA STREET.
                      0
        0.510 M                  11   9,693   9,519   9,309 AGF  1992 JCT. AGUA FRIA.
                      0
        0.510 P                  11  11,044  10,846  10,607 AGF  1992 JCT. AGUA FRIA STREET.
                      0
        0.582 M                  11  11,908  11,694  11,436 AGF  1992 JCT ALAMEDA STREET.
                      0
        0.582 P                  11  10,048   9,868   9,650 AGF  1992 JCT ALAMEDA STREET.
                      0
        0.612 M                  11   4,465   4,385   4,288 AGF       JCT. WATER STREET.
                      0
        0.612 P                  11  15,052  14,782  14,456 AGF       JCT. WATER STREET.
                      0
        0.680 M                  11   4,465   4,385   4,288 AGF       JCT. SAN FRANCISCO
                      0
        0.680 P                  11  15,052  14,782  14,456 AGF       JCT. SAN FRANCISCO
                      0
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POSTED ROUTE	BEGIN MPNT	I R	FUNC CLS	HEAVY COMM	COUNTY	Y P	2003	2002	2001	METH	YEAR	TERMINUS
FL4777	0.729	M	PRAR	0	SANTA FE	11	4,465	4,385	4,288	AGF		JCT. JOHNSON ST
	0.729	P		0		11	15,052	14,782	14,456	AGF		JCT. JOHNSON ST
	0.776	M		0		11	4,465	4,385	4,288	AGF		JCT. JEFFERSON ST
	0.776	P		0		11	15,052	14,782	14,456	AGF		JCT. JEFFERSON ST
	0.854	M		0		11	8,791	8,633	8,443	AGF	1997	JCT. PARK AVE/CATRON AVE.
	0.854	P		0		11	9,693	9,519	9,309	AGF	1997	JCT. PARK AVE/CATRON AVE.
	0.988	M		0		4	8,791	8,633	8,443	AGF	1997	
	0.988	P		0		4	9,693	9,519	9,309	AGF	1997	
	1.031	M		0		11	9,233	9,067	4,962	AGF	2002	JCT. PASEO DE PERALTA
	1.031	P		0		11	7,392	7,259	5,366	AGF	2002	JCT. PASEO DE PERALTA
	1.229	M		0		8	9,233	9,067	4,962	AGF	2002	
	1.229	P		0		8	7,392	7,259	5,366	AGF	2002	
	1.422	M		0		11	4,957	4,868	4,761	AGF	2000	JCT. ALAMO DRIVE
	1.422	P		0		11	5,379	5,282	5,165	AGF	2000	JCT. ALAMO DRIVE
	1.512	P		0		8	10,336	10,150	9,926	AGF	2000	
END---	1.691											
FL4797 ST FRANCIS	0.000	M		6		11	15,864	15,579	15,235	AGF	1997	CERRILLOS & SANDOVAL ST. FROM JCT.
ST FRANCIS	0.000	P		6		11	15,606	15,326	14,988	AGF	1997	CERRILLOS & SANDOVAL ST. FROM JCT.
	0.324	M		6		11	13,928	13,678	13,376	AGF	1993	JCT. GUADALUPE ST.
	0.324	P		6		11	13,920	13,670	13,368	AGF	1993	JCT. GUADALUPE ST.
	0.345	M		6		8	13,928	13,678	13,376	AGF	1993	
	0.345	P		6		8	13,920	13,670	13,368	AGF	1993	

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	0.350	M		6	8	13,928	13,678	13,376	AGF	1993	JCT. PASEO DE PERALTA.
	0.350	P		6	8	13,920	13,670	13,368	AGF	1993	
	0.510	M	MNAR	6	11	11,775	9,280	9,075	COV	2003	JCT. PASEO DE PERALTA
	0.510	P		0	11	16,007	13,216	12,924	COV	2003	JCT. PASEO DE PERALTA
	0.607	M		0	11	8,613	6,966	6,812	COV	2003	JCT. CERRILLOS ON SANDOVAL.
	0.607	P		6	11	12,036	5,764	5,637	COV	2003	JCT. CERRILLOS ON SANDOVAL.
	0.787	M		6	8	8,613	6,966	6,812	COV	2003	
	0.787	P		6	8	12,036	5,764	5,637	COV	2003	
	0.867	M		6	11	2,630	2,583	2,526	AGF	2001	JCT. DE VARGAS ST.
	0.867	P		0	11	5,484	5,386	5,267	AGF	2001	JCT. DE VARGAS ST.
END---	0.919			0							
FL4798	0.000	P			11	3,229	3,233	3,273	AGF		GALISTEO ST. IN SANTA FE FROM JCT.
CORDOVA RD	0.100	P		6	11	1,429	5,387	5,454	COV	2003	JCT. WEST BARCELONA
	0.200	P		6	8	1,429	5,387	5,454	COV	2003	
	0.300	P		6	11	4,973	4,980	5,042	AGF		JCT. CORONADO ROAD.
	0.400	P		7	11	4,186	12,716	12,875	COV	2003	JCT. BERGER ST.
	0.600	P		7	8	4,186	12,716	12,875	COV	2003	
	0.700	P		7	11	1,019	4,982	5,044	COV	2003	JCT. PASEO DE PERALTA.
	0.800	P		0	8	1,019	4,982	5,044	COV	2003	
	0.900	P		0	11	4,973	4,980	5,042	AGF		JCT. SOUTH CAPITAL.
END---	1.000			7							

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
FL4799 ST., SOUTH TO	0.000	P	MNAR	0	SANTA FE	11	3,078	3,082	3,120	AGF		DON GASPAR AVE., FROM JCT WATER
	0.100	P		0		11	3,405	3,409	3,451	AGF		JCT ALAMEDA STREET.
	0.124	P		6		11	3,254	3,548	3,592	COV	2003	JCT WEST DE VARGAS STREET.
	0.160	P		6		8	3,254	3,548	3,592	COV	2003	
	0.260	P		6		11	3,399	3,403	3,446	AGF		JCT CAPITOL STREET.
	0.337	P		6		11	3,738	3,743	2,438	AGF	2002	JCT PASEO DE PERALTA.
	0.780	P		6		11	4,135	4,140	4,192	AGF		JCT CORONADO ROAD.
	1.120	P		6		11	4,134	4,140	4,192	AGF		JCT CORDOVA ROAD.
END---	1.620											
FL4801 NORTH TO THE	0.000	P		6		11	6,420	6,428	6,509	AGF	1999	BISHOPS LODGE RD. FROM JCT.NM475
	0.342	P		6		11	5,454	3,811	3,858	COV	2003	JCT. VALLEY DRIVE.
	0.846	P		6		11	3,554	3,454	3,498	COV	2003	JCT. MANSION DRIVE.
	1.290	P		6		4	3,554	3,454	3,498	COV	2003	
	1.619	P		6		11	3,767	3,161	3,013	ATR	2003	JCT. CAMINO ENCANTADO
	2.232	P		0		11	3,318	4,021	4,071	COV	2003	JCT. BARRANCA RD.
	2.472	P		0		4	3,318	4,021	4,071	COV	2003	
END---	2.742											
FL4803 RD. EAST TO	0.000	P	COLL	0		11	2,078	2,028	2,024	AGF		ZIA ROAD FROM OLD ARROYO CHAMISO
	0.095	P		0		11	1,170	1,142	1,140	AGF	1993	JCT. CALLE COLIBRI
	0.265	P		6		11	2,078	2,028	2,024	AGF		JCT. GEN. SAGE DRIVE
	0.436	P		6		11	2,566	2,505	2,499	AGF	1997	JCT. CALLE HALCON
	0.663	P				11	2,078	2,028	2,024	AGF		JCT. NM466 (OLD PECOS TRAIL)

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
	0.763	P		6		11	2,711	2,645	2,822	ATR	2003	JCT. CALLE DE SEBASTIAN
	0.883	P		6		15	2,711	2,645	2,822	ATR	2003	END OF PAVEMENT
	1.033	P		6		11	1,479	1,444	1,353	AGF	2002	JCT. CONEJO DR.
END---	1.573											
FL4804 TO JCT.ALA	0.000	P	MNAR	6		15	10,078	9,837	10,705	AGF	2002	CAMINO ALIRE FROM AGUA FRIA NORTH
	0.182	P		6		11	3,189	3,113	3,106	AGF	2001	JCT. ALTO STREET.
	0.360	P		6		15	3,189	3,113	3,106	AGF	2001	
END---	0.370											
FL4805 CAMINO ALIRE, E	0.000	P	PRAR	6		11	10,851	10,591	10,568	AGF	2000	ALAMEDA IN SANTA FE, FROM JCT
	0.405	P		6		11	10,802	10,811	10,462	ATR	2003	JCT. SOLANA DRIVE.
	0.780	P		0		11	6,497	13,966	14,141	COV	2003	JCT. US84 (ST. FRANCIS DRIVE)
	1.407	M	MNAR	0		11	3,080	3,084	3,123	AGF	1998	
	1.407	P		0		11	3,286	3,290	3,331	AGF	1998	JCT. GUADALUPE STREET.
	1.497	P		0		11	14,371	14,389	14,569	AGF		JCT. SANDOVAL STREET.
	1.589	P		0		11	16,343	16,365	16,569	AGF	1991	JCT. GALISTEO.
	1.689	P		0		11	6,126	14,590	14,772	COV	2003	JCT. DON GASPAR.
	1.897	P		0		15	6,126	14,590	14,772	COV	2003	
	2.039	P		0		11	8,933	8,945	9,057	AGF	1992	JCT. PASEO DE PERALTA.
	2.199	P		0		11	3,557	3,561	3,606	AGF	1997	JCT. DELGADO STREET.

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS

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			COMM								
FL4805	2.779	P	MNAR 0	SANTA FE	11	2,956	2,960	3,980	AGF	2002	JT. PALACE AVE.
	2.838	P	0		11	2,987	5,011	6,688	COV	2003	JCT. GONZALES RD.
	3.129	P	0		8	2,987	5,011	6,688	COV	2003	
END---	3.169										
FL4807 FRANCIS DR.	0.000	P	6		11	8,488	8,335	8,152	AGF	2001	HICKOX/PASEO DE PERALTA; FROM ST.
	0.105	P	6		11	4,858	4,771	4,666	AGF	2000	JCT. ALARID STREET.
	0.215	P	0		11	3,694	3,627	3,547	AGF	1999	JCT. GUADALUPE STREET.
	0.505	M	0		11	4,068	3,995	4,503	AGF	2002	JCT. CERRILLOS ROAD.
	0.505	P	0		11	5,312	5,217	3,935	AGF	2002	JCT. CERRILLOS ROAD.
	0.664	M	0		11	7,743	7,604	7,185	AGF	2002	JCT. GALISTEO
	0.664	P	0		11	7,145	7,017	5,143	AGF	2002	JCT. GALISTEO
	0.831	M	0		11	5,289	6,003	5,871	COV	2003	JCT. DON GASPAR
	0.831	P	0		11	6,265	5,564	5,441	COV	2003	JCT. DON GASPAR
	0.978	M	0		11	6,414	5,394	7,213	COV	2003	JCT OLD PECOS TRAIL (FL4732).
	0.978	P	0		11	6,202	7,546	7,060	COV	2003	JCT OLD PECOS TRAIL (FL4732).
	1.096	M	0		8	6,414	5,394	7,213	COV	2003	JCT. GALISTEO STREET.
	1.096	P	0		8	6,202	7,546	7,060	COV	2003	
	1.263	P	0		8	12,616	12,940	14,273	COV	2003	
	1.308	P	0		11	13,460	13,219	12,927	AGF	2001	JCT. CANYON RD.
	1.410	P	6		11	10,900	10,704	10,467	AGF	2001	JCT. ALAMEDA
	1.560	P	6		11	8,462	8,310	8,127	AGF	2001	JCT. PALACE AVE.
	1.658	P	6		11	7,184	7,055	4,359	AGF	2002	JCT. MARCY STREET/HILLSIDE.
	1.660	P	6		8	7,184	7,055	4,359	AGF	2002	

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END---     1.918
FL4808     0.000 M COLL                 11  11,125  10,858   5,544 AGF  2002 SANDOVAL & PALACE AVE.; FROM
ALAMEDA ST., NOR              6
           0.000 P                      11   6,389   6,236   5,544 AGF  2002 SANDOVAL & PALACE AVE.; FROM
ALAMEDA ST., NOR              6
           0.052 P                      11  13,402  13,081  13,052 AGF  1996 JCT. WATER STREET.
                  6
           0.109 P                      11  16,726  16,326  16,290 AGF       JCT. SAN FRANCISCO STREET.
                  6
           0.199 P                      11  16,726  16,326  16,290 AGF       JCT. GRANT AVE.
                  6
           0.270 P                      11  10,295  10,049  10,027 AGF       JCT. SHERIDAN AVE.
                  6
           0.379 P LOC                  11   5,115   5,014   4,915 AGF  1995 JCT. WASHINGTON AVE.
                  0
           0.493 P                      11   4,470   4,382   4,296 AGF  2000 JCT. OTERO STREET.
                  0
END---     0.625
FL4809     0.000 P COLL                  8   3,778   3,050   3,044 COV  2003 WATER ST. FR.JCT.SANDOVAL ST.TO
JCT.OLD SANTA               6
           0.040 P                      15   3,778   3,050   3,044 COV  2003
                  6
           0.081 P                      11   1,923   1,877   1,873 AGF       JCT. GALISTEO
                  6
           0.140 P                       8   1,923   1,877   1,873 AGF
                  6
           0.156 P                      11   1,920   1,874   1,870 AGF       JCT. DON GASPAR
                  0
           0.230 P                      11       0       0       0 AGF       JCT. SHELBY ST.
                  0
END---     0.264
FL4811     0.000 P MNAR                  8   9,757   9,769   9,891 AGF  1989 CERRILLOS & GALISTEO; FROM
SANDOVAL, NORTH TO             6

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                D                       T
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ROUTE    MPNT   R CLS   COUNTY          P    2003    2002    2001 METH YEAR TERMINUS
                  COMM
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FL4811     0.129 P MNAR  SANTA FE       11   9,757   9,769   9,891 AGF  1989 JCT. GALISTEO ST.
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                      6
          0.190 P               11   9,757    9,769    9,891 AGF  1990 JCT. DE VARGAS ST.
                      0
          0.280 P               11   5,080    5,086    5,150 AGF       JCT. ALAMEDA ST.
                      0
END---    0.360
FL5670    0.000 P LOC            8       0        0        0 AGF       RICHARD AVE FROM S. OF SIRINGO RD.
NORTH TO J             0
          0.025 P               11       0        0        0 AGF       JCT. EAST SIRINGO RD.
                      0
          0.044 P               11       0        0        0 AGF       JCT. WEST SIRINGO RD.
                      0
          0.142 P               11   2,175    2,132    2,090 AGF  2000 JCT. LOURAINE STREET
                      0
          0.192 P               11   5,795    2,438    2,390 COV  2003 JCT. JAMES ST.
                      0
          0.306 P               11       0        0        0 AGF       JCT. CERRILLOS RD.
                      0
END---    0.372
FL5671    0.000 P                8       0        0        0 AGF       CALLE DEL CIELO FROM JCT. FL5738
NORTH TO RUF             0
          0.072 P               11       0        0        0 AGF       JCT. CALLE QUIETA
                      0
          0.118 P               11       0        0        0 AGF       JCT. CALLE CODORNIZ
                      0
          0.163 P               11       0        0        0 AGF       JCT. CIELO COURT
                      0
          0.256 P                8       0        0        0 AGF       JCT NM14 (CERRILLOS)
                      0
END---    0.320
FL5672    0.000 P MNAR           8   6,445    6,291    6,277 AGF  1993 OSAGE AVE. FROM JCT. CERRILLOS RD.
NORTH TO J             0
          0.085 P               11   7,524    7,344   10,352 AGF  2002 JCT. ROSINA STREET
                      0
          0.189 P               11   5,841        0        0 COV  2003 JCT. HOPI ST.
                      0
          0.312 P               11   9,522    9,293    9,273 AGF  2001 JCT. OTOWI ST.
                      0
END---    0.663
FL5673    0.000 P LOC            8   2,695    2,642    2,590 AGF  1999 LUJAN ST IN SANTA FE FROM JCT. NM14
(CERRILLO             0
          0.198 P               11     597      585      573 AGF  1998 JCT. ROSINA ST. ON LUJAN ST. IN
SANTA FE.                 0
END---    0.381
FL5674    0.000 P MNAR           8   6,096   10,928   10,904 COV  2003 BACA ST.--SANTA FE, FROM JCT NM 14
(CERRILLOS             0
          0.294 P               11   6,868    6,703    6,688 AGF  1996 JCT. POTENCIA ST.
                      0
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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
	0.427	P		0		11	6,768	6,606	6,592	AGF		JCT. CAMINO SIERRA VISTA
	0.474	P		0		8	6,768	6,606	6,592	AGF		
END---	0.561											
FL5675 ROAD NORT	0.000	P	LOC	0		8	0	0	0	AGF		MONTEREY DRIVE FORM JCT. SANTA ROSA
	0.154	P		0		11	0	0	0	AGF		JCT. SANTA CRUZ ST.
	0.241	P		0		11	0	0	0	AGF		JCT. SAN JUAN ST.
END---	0.294											
FL5676 N. OLD S.F	0.000	P		0		8	0	0	0	AGF		SUN MOUNTAIN DR. IN S.F. FROM JCT.
	0.114	P		0		11	296	290	284	AGF	1991	JCT. CIRCLE DR.
END---	0.436											

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FL5677 US84/US285	0.000	P	PRAR	0	SANTA FE	8	3,810	3,719	3,711	AGF	1995	CAMINO LA TIERRA IN SANTA FE FROM
	3.270	P		0		8	3,810	3,719	3,711	AGF	1995	
	4.540	P		0		8	3,810	3,719	3,711	AGF	1995	
END---	6.550											
FL5678 OLD PECOS	0.000	P	LOC	0		8	603	591	579	AGF	1998	CALLE ESPEJO IN SANTA FE FROM JCT.
	0.095	P		0		11	952	934	916	AGF		JCT. CALLE ALVARADO
END---	0.303											
FL5679 AVE. EAST	0.000	P		0		8	0	0	0	AGF		MARCY STREET IN SANTA FE FROM GRANT
	0.066	P		0		11	0	0	0	AGF		JUNCTION SHERIDAN AVENUE
	0.120	P				11	0	0	0	AGF		JUNCTION LINCOLN AVENUE

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			0							
	0.188 P			11	5,054	6,059	5,940	COV	2003	JUNCTION WASHINGTON STREET
			0							
	0.299 P			11	0	0	0	AGF		JUNCTION OTERO STREET
			0							
END---	0.398									
FL5680	0.000 P			8	2,506	2,456	2,408	AGF		CAMINO LAS CRUCITAS FROM JCT. ST.
FRANCIS DR.			0							
	0.114 P			11	2,633	2,581	2,530	AGF	1997	JCT. RIO VISTA
			0							
	0.445 P			11	2,790	2,735	2,011	AGF	2002	JCT. ALAMO DRIVE
			0							
	0.751 P			11	2,093	2,051	2,011	AGF	1991	JCT. PASEO DEL VISTA
			0							
END---	0.909									
FL5681	0.000 P			8	5,012	4,914	4,817	AGF	1997	CAMINO DE LOS MARQUEZ, FROM JCT
FL4728 EASTWA			0							
	0.265 P			8	5,012	4,914	4,817	AGF	1997	JCT DON DIEGO AVE
			0							
END---	0.420									
FL5682	0.000 P			8	4,677	4,586	4,496	AGF	1999	EARLY ST. FROM CERRILLOS RD.SOUTH
TO MARQUEZ			0							
END---	0.208									
FL5683	0.000 P			8	579	567	555	AGF	1992	CRISTO REY STREET - JUNCTION CAMINO
DELORA			0							
END---	0.114									
FL5684	0.000 P			8	0	0	0	AGF		CAMINO SAN ACACIO FROM JCT. CAMINO
SAN MIGUEL			0							
	0.200 P			11	1,439	1,411	1,383	AGF	1998	JCT. CAMINO CERRITO
			0							
	0.257 P			11	176	172	168	AGF	1997	JCT. CAMINO DELORA
			0							
END---	0.371									
FL5685	0.000 P			8	503	493	483	AGF	1992	CAMINO DE LORA FROM JCT. CAMINO
CABRA N. TO J			0							
	0.200 P			11	280	274	268	AGF	1992	JCT. CAMINO SAN ACACIO
			0							
	0.257 P			11	1,583	1,552	1,522	AGF	1998	JCT. CAMINO CRISTO REY
			0							
END---	0.332									
FL5686	0.000 P	MNAR		11	860	840	0	AGF	2002	CAMINO ENCANTADO FROM JCT. US84
EAST TO JCT.			0							
	0.453 P			11	2,357	2,300	2,295	AGF	1997	JCT. MANSION RIDGE
			0							
END---	1.010									

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FL5687	0.000	P	COLL	0	SANTA FE	11	0	0	0	AGF		FIESTA ST., FROM JCT PASEO DE PERALTA TO END
END---	0.361											
FL5688	0.000	P		0		11	932	909	907	AGF		CAMINO CONSUELO, FROM CERRILLOS RD., EAST TO
END---	0.292											
FL5689	0.000	P		0		11	0	0	0	AGF		MERCER ST., FROM JCT ST FRANCIS DR., WEST TO
END---	0.092											
FL5726	0.000	P		0		8	1,424	3,172	3,166	COV	2003	ARROYO CHAMISO RD IN SF FROM JCT. BOTULPH N.
	0.568	P	PRAR	0		11	10,584	10,330	10,308	AGF	1992	JCT. ST. MICHAELS DRIVE.
END---	0.720											
FL5727	0.000	P	LOC	0		8	900	882	864	AGF	1998	FROM JCT FRONTAGE RD. TO JCT. OLD SANTA FE TR
END---	0.241											
FL5728	0.000	P	COLL	0		8	4,014	3,936	3,858	AGF	1991	AVENIDA DE LAS CAMPANAS IN SANTA FE FROM RODE
END---	1.007											
FL5729	0.000	P		0		8	4,294	7,830	7,676	COV	2003	CAMINO DEL MONTE SOL FROM JCT. OLD SF TRAIL N
	0.151	P		0		11	2,315	2,269	2,225	AGF	1992	JCT. CAMINO DE CRUZ BLANCA.
	0.469	P		0		11	2,315	2,269	2,225	AGF		JCT. CAM. SANTENDER
	0.817	P		0		11	1,620	1,588	1,556	AGF	1997	JCT. ACEQUIA MADRE
END---	0.919											
FL5730	0.000	P		0		8	5,131	5,030	4,931	AGF	2001	GARCIA ST. FROM JCT. CAMINO DEL MONTE SOL NOR
	0.436	P		0		11	5,008	2,354	2,308	COV	2003	JCT. CAMINO CORALES.
	0.971	P		0		11	3,382	3,316	3,250	AGF	1993	JCT. ACEQUIA MADRE.
END---	1.160											
FL5731	0.000	P	LOC			8	2,513	2,463	2,415	AGF	1999	AVENIDA CRISTOBAL COLON IN SF FR

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ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
POTENCIA NOR				0								
END---	0.542											
FL5732	0.000	P	COLL			8	3,828	3,736	3,728	AGF	1992	CANYON RD. IN SANTA FE FROM JCT.
PASEO DE PER				0								
	0.089	P		0		11	1,981	1,934	1,929	AGF	2001	JCT. GARCIA ST.
	0.169	P		0		11	0	0	0	AGF		JCT. DELGADO ST.
	0.579	P		0		11	2,636	2,573	2,568	AGF	2000	JCT. CAMINO DEL MONTE SOL
	0.806	P		0		11	3,077	3,003	2,996	AGF	1996	JCT. ACEQUIA MADRE
	0.850	P		0		11	1,182	1,154	1,152	AGF	1997	JCT. CAMINO CERRITO
	0.931	P		0		11	968	944	942	AGF	1992	JCT. CAMINO DELORA
	1.056	P				11	3,158	3,082	3,075	AGF	2000	JCT. EAST ALAMEDA / UPPER CANYON
ROAD				0								
	1.149	P		0		11	950	928	926	AGF	1997	JCT. CRISTO REY ST.
END---	2.465											
FL5733	0.000	M	PRAR			11	9,227	9,061	8,861	AGF	1994	ZIA ROAD IN SANTA FE FROM JCT.
RODEO ROAD EAS					0							

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
FL5733	0.000	P	PRAR		SANTA FE	11	9,066	8,903	8,707	AGF	1994	ZIA ROAD IN SANTA FE FROM JCT.
RODEO ROAD EAS					0							
	0.208	M		0		11	5,412	6,796	6,646	COV	2003	JCT. CAMINO CARLOS REY
	0.208	P		0		11	5,559	6,377	6,236	COV	2003	JCT. CAMINO CARLOS REY
	0.767	M		0		8	5,412	6,796	6,646	COV	2003	
	0.767	P		0		8	5,559	6,377	6,236	COV	2003	
	0.824	M				11	6,303	5,487	5,223	COV	2003	JCT. YUCCA ST.

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				0							
	0.824	P			11	6,348	5,577	5,285	COV	2003	JCT. YUCCA ST.
				0							
	1.289	M			11	7,112	7,037	6,560	ATR	2003	JCT. VO-TECH RD.
				0							
	1.289	P			11	7,133	7,045	6,474	ATR	2003	JCT. VO-TECH RD.
				0							
	1.737	M			11	5,862	5,757	5,630	AGF	1991	JCT. GALISTEO
				0							
	1.737	P			11	7,314	7,183	7,025	AGF	1991	JCT. GALISTEO
				0							
	1.828	M	COLL		11	979	960	941	AGF	2000	JCT. ST. FRANCIS DRIVE
				0							
	1.828	P			11	1,146	1,124	1,102	AGF	2000	JCT. ST. FRANCIS DRIVE
				0							
END---	2.377										
FL5734	0.000	P			8	2,199	2,146	2,141	AGF	2001	BOTULPH RD. FROM JCT. ZIA RD. NORTH
TO JCT. S				0							
	0.227	P			11	3,652	3,565	3,557	AGF	2000	JCT. ARROYO CHAMISO
				0							
	0.436	P	MNAR		11	3,574	0	0	COV	2003	JCT. SIRINGO RD.
				0							
	0.511	P			11	2,673	2,609	2,603	AGF	1997	JCT. CAMINO OJO FELIZ
				0							
END---	0.852										
FL5735	0.000	P	COLL		8	5,630	5,519	5,411	AGF	2000	HOSPITAL DR. FROM JCT. ST. MICHAELS
DR. NORTH				0							
	0.152	P			11	5,561	5,452	5,345	AGF	2001	JCT. HARKLE ROAD
				0							
END---	0.303										
FL5736	0.000	P	LOC		8	5,420	12,576	12,329	COV	2003	SAWMILL RD. IN SANTA FE FROM JCT.
RODEO RD.	N			10							
END---	0.322										
FL5737	0.000	P	MNAR		11	7,122	1,430	1,448	COV	2003	YUCCA ST. IN SANTA FE FROM JCT.
RODEO RD.	NOR			0							
	0.436	P			11	10,434	10,447	10,464	AGF	2002	JCT. ZIA ST.
				0							
END---	1.004										
FL5738	0.000	P	COLL		8	6,818	6,655	4,038	AGF	2002	SIRINGO RD IN SANTA FE JCT.
RICHARDS	AVE EAST			0							
	0.478	P			8	6,818	6,655	4,038	AGF	2002	
				0							
	0.516	P			11	12,751	9,795	9,773	COV	2003	JCT. AVENIDA LAS COMPANAS
				0							
	0.895	P	MNAR		11	9,934	9,947	12,385	AGF	2002	JCT. CAMINO CARLOS REY
				0							
	1.520	P			11	9,115	9,127	22,384	AGF	2002	JCT. YUCCA ST.
				0							

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
	1.652	P		0		11	12,661	15,100	14,308	COV	2003	JCT. LLANO ST.
	1.880	P		0		11	13,802	13,820	13,993	AGF	1996	JCT. 5TH ST.
	2.088	P		0		11	13,216	13,234	15,583	AGF	2002	JCT. CALLE LORCA
	2.391	P		0		11	9,641	9,654	13,577	AGF	2002	JCT. PACHECO ST.
	2.467	P	COLL	0		11	2,622	2,559	2,553	AGF	1997	JCT. ST. FRANCIS DRIVE.
END---	2.921											
FL5739 PECOS TRAIL	0.000	P	LOC	0		8	9,501	10,867	10,653	COV	2003	ARMENTA ST. IN SANTA FE FROM OLD

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
END---	0.166											
FL5740 TO GUADAL	0.000	P	COLL	0	SANTA FE	8	2,840	2,784	2,730	AGF	1995	ALAMO DR., FROM RIO VISTA ST., EAST
	0.482	P		0		11	2,153	2,111	2,029	AGF	2002	CAM. DE LAS CRUCITAS
	0.777	P		0		11	1,733	1,699	1,665	AGF	1993	JCT. ST. FRANCIS DRIVE
END---	0.938											
FL5741 ROAD, NORTHERL	0.000	P	LOC	0		8	1,889	1,852	1,816	AGF	1998	AGGIE ROAD FROM JCT. CERRILLOS
END---	0.190											
FL5742 TO JCT. O	0.000	P	MNAR	0		8	8,162	7,966	6,360	AGF	2002	2ND/SAN MATEO JCT. CERRILLOS EAST
	0.540	P		0		11	7,399	7,221	7,205	AGF	2001	JCT. CALLE LORCA
	0.720	P		0		11	8,017	8,791	8,772	COV	2003	JCT. PACHECO ST.
	0.928	P	COLL	0		11	4,294	3,314	6,870	COV	2003	JCT. ST FRANCIS DRIVE
	1.383	P		0		11	3,576	3,490	3,483	AGF	1997	JCT. GALISTEO ST

Santa Fe

1.669 P 11 3,363 3,283 3,276 AGF 1997 JCT. DON GASPER
0
END--- 2.055
FL5743 0.000 P 8 2,604 3,913 3,905 COV 2003 ALTA VISTA ST. JCT. CERRILLOS ROAD
EAST TO JC 0
0.227 P 11 6,374 6,221 5,758 AGF 2002 JCT. PACHECO ST.
0
0.398 P 11 7,059 6,889 6,874 AGF 2000 JCT. ST. FRANCIS DRIVE
0
END--- 0.890
FL5744 0.000 P 8 5,037 4,916 4,905 AGF 2000 5TH ST. IN SANTA FE, JCT. SIRINGO
RD. NORTH T 0
0.455 M 8 2,400 2,342 2,337 AGF 2000
0
0.455 P 8 2,637 2,574 2,568 AGF 2000 WHERE ROUTE BECOMES A DIVIDED
ROADWAY 0
0.521 P 11 4,997 4,877 4,866 AGF 2000 JCT. ST. MICHAELS DRIVE
0
END--- 0.966
FL5745 0.000 P 8 2,545 2,484 4,277 AGF 2002 CALLE LORCA ST. IN SANTA FE, JCT.
SIRINGO RD. 0
0.511 P 11 2,666 2,602 2,596 AGF 1992 JCT. ST. MICHAELS DRIVE.
0
END--- 0.644
FL5746 0.000 P MNAR 8 10,065 12,180 12,917 COV 2003 PACHECO ST. IN SANTA FE, JCT.
SIRINGO RD. NOR 0
0.502 P 11 9,533 9,304 13,230 AGF 2002 JCT. ST. MICHAELS DRIVE.
0
0.672 P 11 5,314 5,187 5,175 AGF 2000 JCT. SAN MATEO RD.
0
0.956 P 11 8,556 8,351 8,333 AGF 2000 JCT. CAMINO DEL MONTE REY
0
END--- 1.383
FL5747 0.000 P LOC 8 116 114 112 AGF 1993 FT. UNION DRIVE IN SANTA FE JCT.
ZIA RD. NORT 0
0.800 P 11 110 108 106 AGF 1992 JCT. CONEJO ROAD
0
END--- 0.989
FL5748 0.000 P COLL 8 604 590 907 AGF 2002 CALLE DE SEBASTIAN IN SANTA FE,
JCT. ZIA RD. 6
END--- 0.720

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
FL5749	0.000	P	COLL		SANTA FE 0	8	2,830	2,860	2,327	COV	2003	GONZALES ROAD IN SANTA FE JCT.
ALAMEDA ST. EA												
	0.057	P		0		11	1,016	992	990	AGF	1992	JCT. CERRO GORDO ROAD
	0.799	P		0		11	1,492	1,457	1,454	AGF	1996	JCT. CALLE JOYA
END---	1.288											
FL5750	0.000	P			0	8	1,457	0	0	COV	2003	GONZALES RD FROM JCT NM475 (HYDE
PARK RD) NOR												
	0.500	P		0		11	0	0	0	AGF		JCT. PASEO DEL SUR
END---	0.840											
FL5751	0.000	P	MNAR	0		8	2,631	2,579	2,529	AGF	2000	CAMINO CARLOS REY FROM JCT. PASAJE
CORTO NORT												
	0.353	P		0		11	9,679	9,691	9,813	AGF		JCT. RODEO RD.
	0.458	P		0		11	9,679	9,691	9,813	AGF	1992	JCT. ZIA ROAD
	1.141	P		0		11	9,802	9,814	9,936	AGF	1991	JCT. ALAMOSA
	1.311	P		0		11	10,878	10,892	10,818	AGF	2002	JCT. SIRINGO RD.
	1.595	P		0		11	7,076	7,086	7,174	AGF	1993	JCT. "Y"
END---	1.744											
FL5752	0.000	P	LOC	0		8	1,525	1,495	1,465	AGF	1991	HILLSIDE AVE IN SANTA FE JCT. TONY
ST. WEST T												
	0.218	P		0		11	1,156	1,133	1,111	AGF	2000	JCT. MARCY ST. (BEGIN ONE-WAY)
END---	0.291											
FL5753	0.000	P			0	8	2,051	2,010	1,971	AGF	1998	TONY ST. IN SANTA FE JCT. ARMIJO
ST. NORTH TO												
END---	0.027											
FL5754	0.000	P	COLL	6		11	547	534	532	AGF	2001	CORONADO RD. IN S.F. JCT. GALISTEO
ST. EAST T												
	0.142	P		0		11	742	724	722	AGF		JCT. DON GASPAR
	0.451	P		0		11	742	724	722	AGF		JCT. OLD PECOS TRAIL
END---	0.625											
FL5755	0.000	P	MNAR			8	3,312	4,965	4,954	COV	2003	HICKOX ST. IN SANTA FE, JCT. AGUA

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FRIA ST. EA              0
          0.170 P                     11  11,601  11,323  11,298 AGF  2000 JCT. CAMINO ALIRE.
                       0
END---    0.644
FL5756    0.000 P LOC                  8       0       0       0 AGF       DON DIEGO FROM JCT. ALTA VISTA,
NORTH TO JCT.              0
          0.174 P                     11       0       0       0 AGF       JCT. CORDOVA ROAD
                       0
          0.253 P                     11   6,667   7,054   6,472 COV  2003 JCT. CAMINO DE LOS MARQUEZ
                       0
          0.625 P                     11  12,934  12,681  12,433 AGF  2001 JCT. BUENA VISTA ST.
                       0
          0.693 P                     11   9,271   9,089   8,911 AGF  1995 JCT. MERGING LANES FROM DON DIEGO
RAMPS                    0
END---    0.745
FL5757    0.000 P COLL                 8   6,656   6,496   6,481 AGF  2001 ACEQUIA MADRE IN SANTA FE, JCT.
PASEO DE PERA              0
          0.152 P                     11   3,136   6,308   6,295 COV  2003 JCT. GARCIA STREET.
                       0
          0.227 P                     11   1,658   1,618   1,614 AGF  1993 JCT. DELGADO STREET.
                       0
          0.591 P                     11       0       0       0 AGF       JCT. CAMINO DEL MONTE SOL.
                       0
END---    0.852
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                  HEAVY
ROUTE    MPNT   R CLS   COUNTY        P    2003    2002    2001 METH YEAR TERMINUS
                  COMM
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FL5758    0.000 P PRAR  SANTA FE      11   6,682   3,751   3,743 COV  2003 ALAMEDA, FROM WEST URBAN LIMIT,
EAST TO JCT F              0
          0.329 P                      8   6,682   3,751   3,743 COV  2003
                       0
          0.633 P                     11   3,285   3,207   3,199 AGF       JCT. LA JOYA RD.
                       0
          0.756 P                     11   3,323   3,243   3,236 AGF  1996 JCT. EL RANCHO RD. (T INTERSECTION)
                       0
          1.078 P                     11   5,370   4,494   4,484 COV  2003 JCT. DUMP ROAD (T INTERSECTION)
                       0
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END---	1.312										
FL5759	0.000	P	COLL		8	0	0	0	AGF		CAMINO DE CRUZ BLANCA & CABRA
FR.JCT CAMINO M				0							
	0.373	P			11	4,102	4,022	3,943	AGF	1997	JCT. CALLE RUMOLO
				0							
	0.468	P			11	6,208	6,086	5,967	AGF	1997	JCT. CAMINOO DE CRUZ BLANCA (ROUTE
GOES ON CA				0							
END---	1.151										
FL5760	0.000	P			11	0	0	0	AGF		VALLEY DRIVE EAST FROM JCT FL4801
(BISHOP LOD				0							
END---	0.560										
FL5761	0.000	P			11	1,087	1,066	1,045	AGF	2000	VALLECITA DR. FROM JCT. VALLEY DR.
EAST TO JC				0							
END---	0.630										
FL5762	0.000	P	LOC		8	3,490	3,422	3,354	AGF	1990	RICHARDS AVENUE FROM JCT COUNTY RD
64 NORTH T				0							
	0.114	P			11	6,397	6,272	4,511	AGF	2002	JCT. VERDE ALTA
				1							
	0.274	P			11	7,178	7,037	6,899	AGF	2001	JCT. DURANGO DRIVE
				0							
	0.431	M			11	0	0	0	AGF		JCT. RODEO ROAD.
				0							
	0.431	P			11	3,488	3,420	3,353	AGF		JCT. RODEO ROAD.
				0							
END---	0.585										
FL5763	0.000	P			19	5,372	0	0	AGF		RUFINA ST.--SANTA FE, FROM S.
MEADOWS RD. N.-				0							
	0.119	P			11	5,372	0	0	AGF		JCT JEMEZ ROAD.
				0							
	0.490	P			19	5,372	0	0	AGF		JCT CALLE NUEVA VISTA.
				0							
	0.539	P			19	5,372	0	0	AGF		JCT CAMINO DEL GRIEGO.
				0							
	0.692	P			19	5,372	0	0	AGF		JCT LOIS LANE.
				0							
	0.784	P			19	5,372	0	0	AGF		JCT SENIDA DEL VALLE.
				0							
	0.920	P			11	5,372	0	0	AGF		JCT CALLE ATAJO.
				0							
	0.995	P			8	5,372	0	0	AGF		
				0							
	1.031	P			11	5,372	0	0	AGF		JCT LOPEZ LANE.
				0							
	1.087	P			19	5,372	0	0	AGF		JCT CAMINO VISTA AURORA.
				0							
	1.336	P			19	5,372	0	0	AGF		JCT CAMINO POLVOSO.
				0							
	1.391	P			19	5,372	0	0	AGF		JCT PASEO DEL TERCERO.

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
				0								
	1.908	P		0		19	5,372	0	0	AGF		JCT CAMINO ATOCHA.
	2.295	P		0		11	4,542	4,453	4,366	AGF	1999	JCT HENRY LYNCH.
	2.386	P		0		19	4,542	4,453	4,366	AGF	1999	JCT MERCHANTILE ROAD.
	2.489	P		0		19	4,542	4,453	4,366	AGF	1999	JCT PARKWAY DRIVE.
	2.854	P		0		11	3,642	3,570	3,500	AGF	2001	JCT SILER ROAD.
	2.995	P		0		19	3,642	3,570	3,500	AGF	2001	JCT CLARK ROAD.
END---	3.076											

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
FL5764 CERCA NORTH TO	0.000	P	COLL	0	SANTA FE	11	1,011	991	971	AGF	1991	GALISTEO ST., FROM JCT AVE. LA
	0.430	P		0		11	0	0	0	AGF		JCT RODEO ROAD (FL4727).
	0.573	P		0		11	3,031	2,772	3,332	COV	2003	JCT CALLE CAPITAN.
END---	1.164											
FL5765 AVENUE EAST	0.000	P		0		8	0	0	0	AGF		CERRO GORDO ROAD FROM JCT PALACE
	0.095	P		0		11	490	480	470	AGF	1997	JCT. GONZALES ROAD
	0.397	P		0		11	5,290	5,187	2,982	AGF	2002	JCT. LORENZO ROAD
	1.378	P		0		11	408	400	392	AGF	1997	JCT. ESPERANZA LANE
END---	2.189											
FL5766 SOUTH TO	0.000	P		0		8	8,489	8,285	8,267	AGF	1994	GALISTEO ST., FROM JCT CORDOVA RD.,
	0.176	P		0		11	6,714	8,260	8,242	COV	2003	JCT ALTA VISTA STREET.

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0.250 P 0
0.560 P 0
0.964 P LOC 0
END--- 1.400
FL5767 0.000 P COLL 0
CERRILLOS RD N
0.280 P 0
SANTA FE.
END--- 0.680
FL5768 0.000 P MNAR 0
SIRINGO RD. N
0.090 P 0
SANTA FE.
END--- 0.530
FL5769 0.000 P COLL 0
MILES WEST OF
0.066 P 0
LEON IN S
0.200 P 0
LEON IN SANT
0.303 P 0
IN SANTA
END--- 0.331
FL5770 0.000 P 0
JCT. GARCIA
0.137 P 0
CORRALES IN
0.232 P 0
CORRALES I
0.426 P 0
CORRALES IN SAN
0.682 P 0
CORRALES IN SA
END--- 0.862
FL5771 0.000 P LOC 0
SANTA FE (
END--- 68.140
FL5772 0.000 P 0
MILES IN SAN
END--- 159.660

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		Santa Fe				
11	6,801	8,318	8,299	COV	2003	JCT COLUMBIA ST./GALISTEO LANE.
11	10,026	9,786	9,764	AGF	2000	JCT SAN MATEO ROAD.
11	9,923	9,728	9,537	AGF	2000	JCT SAINT MICHAEL'S DRIVE.
8	3,129	5,214	5,112	COV	2003	MAEZ RD. IN SANTA FE FROM JCT.
11	5,215	5,113	5,013	AGF	1996	JCT. ROSINA ST. ON MAEZ ROAD IN
8	9,951	9,713	9,692	AGF	2000	LLANO ST. IN SANTA FE FROM JCT.
11	9,666	9,434	9,413	AGF	2001	JCT. THOMAS AVE. ON LLANO STREET IN
8	4,542	4,453	4,366	AGF	1999	CALLE DE LEON IN S.F. FROM .066
11	852	836	820	AGF	2000	JCT. CALLE DE SEBASTIAN ON CALLE DE
11	278	272	266	AGF		JCT. FT. UNION DRIVE ON CALLE DE
11	278	272	266	AGF		JCT. CONEJO DRIVE ON CALLE DE LEON
8	5,284	5,180	5,078	AGF	2000	CAMINO CORRALES IN SANTA FE FROM
11	4,854	4,758	4,664	AGF		JCT. OLD SANTA FE TRAIL ON CAMINO
11	9,894	9,700	9,510	AGF	1991	JCT. EAST BARCELONA ROAD ON CAMINO
11	898	880	862	AGF	1992	JCT. CAMINO PINONES ON CAMINO
11	4,854	4,758	4,664	AGF		JCT. FT. UNION DRIVE ON CAMINO
17	1,054	1,034	1,014	AGF		ACCUMULATED UNPAVED LOCAL ROADS IN
17	1,054	1,034	1,014	AGF		ACCUMULATED MILES OF PAVED LOCAL

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
FL5773	0.000	P	LOC	0	SANTA FE	8	3,612	3,541	3,471	AGF	2001	HARRISON ROAD IN SANTA FE FROM THE
JCT. CERRI	0.400	P		0		8	3,612	3,541	3,471	AGF	2001	
END---	0.625											
FL5774	0.000	P		0		8	1,284	1,259	1,234	AGF	1999	PASEO DE LA CONQUISTADORA IN SF
FROM CAMINO L												
END---	0.386											
FL5775	0.000	P	COLL	0		8	5,113	5,013	4,915	AGF	1997	CALLE LA RESOLANA IN SANTA FE FROM
ALAMOSA NO												
END---	0.503											
FL5776	0.000	P	LOC	0		8	4,086	4,006	3,928	AGF	1991	CAMINITO MONTANO FROM JCT W.
ALAMEDA ST. SE-W												
END---	0.130											
FL5777	0.000	P		0		8	4,086	4,006	3,928	AGF	1991	AVENIDA DE LAS AMERICAS,FROM JCT
NM14(CERRILL												
END---	0.210											
FL5778	0.000	P	COLL	0		8	9,690	11,126	10,908	COV	2003	LOPEZ LANE (CAMINO DE LOS
LOPEZ),FROM JCT FL4												
END---	0.960											
FL5779	0.000	P	LOC	0		8	4,086	4,006	3,928	AGF	1991	RICARDO ROAD - JCT. NM 588 NORTH
END---	0.580											
FL5780	0.000	P		0		8	4,086	4,006	3,928	AGF	1991	EL RANCHO ROAD,FROM JCT PASEO DE
VISTA SOUTHW												
END---	0.460											
FL5781	0.000	P		0		8	0	0	0	AGF		JOHNSON ST. FROM JCT. OF GUADALUPE
ST. EAST T												
END---	0.178											
FL5782	0.000	P		0		8	2,240	2,196	2,152	AGF	1992	BARCELONA RD. FROM JCT. GALISTEO
EAST TO THE												
	0.151	P		0		11	640	628	616	AGF	1992	JCT. DON GASPAR
	0.549	P		0		11	1,036	1,313	1,287	COV	2003	JCT. OLD PECOS TRAIL
END---	0.917											
FL5783	0.000	P		0		8	2,095	2,054	2,013	AGF	1997	SIXTH ST. FROM JCT. ST. MICHAELS
DRIVE NORTH												
END---	0.348											

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                                                        Santa Fe
FL5784     0.000 P                    8     650      638      626 AGF  1997 DELGADO ST FROM JCT. ACEQUIA MADRE
NORTH TO J              0
           0.189 P                   11     896      878      860 AGF  1997 JCT. CANYON ROAD
                       0
           0.303 P                   11   1,054    1,034    1,014 AGF       JCT. ALAMEDA ST.
                       0
END---     0.379
FL5785     0.000 P COLL               8     287      281      281 AGF       CALLE VIANSON FROM JCT. SIRINGO
RONDO NORTH T              0
END---     0.227
FL5786     0.000 P                   11       0        0        0 AGF       CALLE COLIBRE FROM JCT CALLE SAN
SIMON NORTH               0
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                 D                    T
POSTED   BEGIN   I FUNC               Y
                   HEAVY
ROUTE    MPNT    R CLS    COUNTY      P    2003     2002     2001 METH YEAR TERMINUS
                   COMM
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FL5786     0.284 P COLL   SANTA FE   11       0        0        0 AGF       JCT RIDGE CREST DRIVE
                    0
END---     0.483
FL5787     0.000 P                   11   8,931    8,717    8,698 AGF  2001 SAN FRANCISCO ST. FROM JCT. PASEO
DE PERALTA                0
           0.549 P                   11   4,751    4,637    4,627 AGF       JCT. GUADALUPE ST.
                    0
           0.634 P                   11   4,751    4,637    4,627 AGF       JCT. SANDOVAL ST.
                    0
           0.720 P                   11   4,751    4,637    4,627 AGF       JCT. GALISTEO ST.
                    0
           0.777 P                   11   4,751    4,637    4,627 AGF       JCT. DON GASPAR ST.
                    0
END---     0.928
FL5788     0.000 P                    8   8,612    8,405    8,386 AGF  1997 GRANT AVE IN SANTA FE FROM JCT.
PALACE AVE. N              0
           0.284 P                    8   8,612    8,405    8,386 AGF  1997 JCT. PASEO DE PERALTA
                    0
END---     0.341
FL5789     0.000 P                   17   1,132    1,134    1,148 AGF       STREETS AND PARKING LOTS AT THE
STATE CAPITOL              6
           0.100 P                    4   1,132    1,134    1,148 AGF
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                        6
END---      0.210
FL5802      0.000 P LOC                8       0       0       0 AGF        GOV. MILES RD.--SANTA FE, FROM
RICHARDS AVE.                 0
            0.151 P                   11       0       0       0 AGF        JUNCTION DANCING GROUND
                        0
            0.785 P                   11       0       0       0 AGF        JUNCTION RICHARDS AVE.
                        0
            1.384 P                   11       0       0       0 AGF        JUNCTION CLIFF PALACE
                        0
            1.813 P                   11       0       0       0 AGF        JUNCTION CAMINO CARLOS REY
                        0
END---      2.042
FL5803      0.000 P                   11   5,773       0       0 COV  2003 HENRY LYNCH RD-FR RUFINA ST. N.
NORTHWARD TO                 0
            0.009 P                    8   5,773       0       0 COV  2003 START 12' LANES
                        0
            0.172 P                    8   5,773       0       0 COV  2003 JCT RICHARD LANE.
                        0
END---      0.481
FL5804      0.000 P                    8       0       0       0 AGF        JAGUAR DR.-FR JCT NM 14 (CERRILLOS
RD) W ACRO                0
END---      1.788
FL5805      0.000 P                    8       0       0       0 AGF        PASOE DE VISTA-FR JCT CR 72 (CALLE
NOPAL) NE                 0
END---      1.851
FL5807      0.000 P                    8  11,322       0       0 COV  2003 ZAFARANO-FR JCT NM 300 (RODEO RD)
NORTHWARD T                0
END---      0.281
FR2089      0.000 P MNCL               6     158     133     135 COV  2003 FROM W ROW FENCE E UNDER I25 AT THE
WALDO I/C                0
END---      0.500
FR2090      0.000 P                    6     363     369     373 AGF  1997 FROM JCT FR 2097 ON THE E SIDE OF
EXIT 271 W                 0
END---      0.600

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                 HEAVY
ROUTE    MPNT   R CLS    COUNTY      P    2003    2002    2001 METH YEAR TERMINUS
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FR2097 267 (WALDO	0.000	P	MNCL 0	SANTA FE	11	1,483	1,504	1,517	AGF	1993	I-25 EAST FRONTAGE ROAD, FROM EXIT
	3.068	P	0		6	1,483	1,504	1,517	AGF	1993	
	3.181	P	0		6	1,483	1,504	1,517	AGF	1993	
(OLD NM 586/O	3.455	P	0		11	1,483	1,504	1,517	AGF	1997	JCT SANTA FE COUNTY ROAD 490586
	6.858	P	0		6	1,483	1,504	1,517	AGF	1997	
	7.218	P	0		6	1,483	1,504	1,517	AGF	1997	
END---	9.800										
FR2098 (LA CIENEGA	0.000	P	0		6	2,861	2,903	2,928	AGF	1994	I-25 WEST FR. ROAD, FROM EXIT 271
	0.336	P	0		19	2,861	2,903	2,928	AGF	1994	JCT CAMINO LAGUNITAS.
	1.017	P	0		19	2,861	2,903	2,928	AGF	1994	JCT CAMINO SAN JOSE.
	2.182	P	0		19	2,861	2,903	2,928	AGF	1994	JCT VALLE BONITA.
	2.790	P	0		19	2,861	2,903	2,928	AGF	1994	LA LUNA ROAD.
	3.200	P	0		19	2,861	2,903	2,928	AGF	1994	JCT. ENTRANCE TO SANTA FE DOWNS
	3.801	P	0		19	2,861	2,903	2,928	AGF	1994	JCT LOS PINOS ROAD.
	3.932	P	0		19	2,861	2,903	2,928	AGF	1994	JCT ERICA ROAD.
	4.329	P	0		19	2,861	2,903	2,928	AGF	1994	JCT CAMINO DEBRA.
	4.426	P	0		11	2,861	2,903	2,928	AGF		JCT NM 599.
	5.742	P	0		19	2,861	2,903	2,928	AGF		JCT REATA ROAD.
	6.771	P	0		19	2,861	2,903	2,928	AGF		JCT MUTT-NELSON ROAD.
END---	7.092										
FR2099 NM14 I/C	0.000	P	0		6	0	0	0	AGF		FROM JCT. NM14 ON THE SOUTH SIDE OF
END---	1.100										
FR2100 84/285 ST	0.000	P	0		6	1,751	1,777	1,793	AGF	1997	FROM JCT SOUTH ROW FENCE AT THE US
END---	1.250										
FR2101 US 84/285	0.000	P	0		6	479	326	329	COV	2003	RABBIT RD.; FROM SOUTH ROW FENCE AT
END---	1.800										

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FR2102 0.000 P 6 825 0 0 COV 2003 FROM JCT. NM466 (OLD PECOS TRAIL)
EAST TO THE 0
END--- 0.400
FR2104 0.000 P 6 0 0 0 AGF FROM JCT. NM 300 WEST TO WEST I-25
ROW FENCE, 0
END--- 0.200
FR2105 0.000 P 6 509 517 521 AGF FROM JCT. NM 300 WEST TO WEST I-25
ROW FENCE, 0
END--- 0.200
FR2106 0.000 P 6 0 0 0 AGF FROM JCT. NM 300 WEST TO WEST I-25
ROW FENCE 0
END--- 0.200
FR2107 0.000 P 6 0 0 0 AGF FROM JCT. NM 300 WEST TO WEST I-25
ROW FENCE_ 0
END--- 0.200

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FR2108	0.000	P	MNCL		SANTA FE	6	509	517	521	AGF		FROM JCT. NM300 (BY I-25 EXIT
290)SOUTHERLY T				0								
	2.249	P				11	509	517	521	AGF		JCT. FRONTAGE ROAD FR2109 (TURNOFF
TO ROWE ME				0								
END---	3.515											
FR2109	0.000	P				6	0	0	0	AGF		FROM JCT. FR2108 SOUTH TO THE I-25
ROW FENCE				0								
END---	0.101											
FR2110	0.000	P				6	421	427	431	AGF	1993	FROM R/W FENCE ON S. SIDE OF I-25
NORTH TO JC				0								
END---	0.100											
FR2111	0.000	P				6	112	114	114	AGF	1993	FROM JCT OF FR 2112 NORTH ACROSS
I-25 AT VALE				0								
END---	1.200											
FR2112	0.000	P				6	0	0	0	AGF		FROM JCT OF FR 2111 AT THE VALENCIA
I/C WEST				0								
END---	1.267											
FR2291	0.000	M				6	2,152	2,183	2,202	AGF	1996	FROM JCT. NM 300 WEST TO NORTH
BOUND RAMPS OF				0								

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0.000 P 6 1,996 2,025 2,043 AGF 1996 FROM JCT. NM 300 WEST TO NORTH

BOUND RAMPS OF 0

0.162 M 6 2,152 2,183 2,202 AGF 1996 JCT. SOUTH BOUND RAMPS

0

0.162 P 6 1,996 2,025 2,043 AGF 1996 JCT. SOUTH BOUND RAMPS

0

END--- 0.333

FR4062 0.000 P 6 481 487 491 AGF FROM EXIT 187 W TO EOR - W OF THE

EDGEWOOD I/ 0

END--- 1.500

FR4063 0.000 P 6 0 0 0 AGF FROM JCT. NM 333 N OVER I-40 THEN W

ON THE N 0

END--- 0.930

FR4064 0.000 P 6 0 0 0 AGF FROM JCT. FR4063 E ON THE N SIDE OF

I40 TO RO 0

END--- 1.600

FR599A 0.000 P 6 0 0 0 AGF FRONTAGE ROAD 599A, FROM CAMIMO LA

TIERRA SOU 0

2.338 P 6 0 0 0 AGF JCT SIERRA AZUL

0

2.642 P 6 0 0 0 AGF JCT CALLE SIN SONTE

0

2.808 P 6 0 0 0 AGF JCT ENTRADA

0

3.612 P 6 0 0 0 AGF JCT NORTH CALLE DEL ORO GRANT

0

4.443 P 6 0 0 0 AGF JCT AVENIDA ANGELES

0

4.489 P 6 0 0 0 AGF JCT CAMINO DON FIDEL

0

4.665 P 6 0 0 0 AGF JCT NORTH HORIZON LANE

0

5.280 P 6 0 0 0 AGF JCT CAJA DEL RIO

0

END--- 6.255

FR599B 0.000 P 6 0 0 0 AGF FRONTAGE ROAD 599B, FROM JCT

FR599A, SOUTH & 0

0.156 P 19 0 0 0 AGF JCT FR599C AND LEFT-TURN ONTO WEST

ALAMEDA ST 0

END--- 0.169

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POSTED ROUTE	BEGIN MPNT	I R	FUNC CLS	HEAVY COMM	COUNTY	Y P	2003	2002	2001	METH	YEAR	TERMINUS
FR599C	0.000	P	MNCL		SANTA FE	6	0	0	0	AGF		FRONTAGE ROAD 599C, FROM JCT
FR599B, SOUTHWES				0								
END---	1.062											
FR599D	0.000	P				6	0	0	0			FRONTAGE ROAD 599D, FROM JCT FR599A
S-EASTWAR				0								
END---	0.684											
FR599E	0.000	P				6	0	0	0			FRONTAGE ROAD 599E, FROM JCT FR599A
S-EASTWAR				0								
END---	0.230											
FR599F	0.000	P				6	0	0	0			FRONTAGE ROAD 599F,FROM JCT SF
CR77C NW-WARD				0								
	0.150	P				6	0	0	0			JCT FR599G (BUCKMAN ROAD).
				0								
	0.357	P				6	0	0	0			JCT FR599A.
				0								
END---	0.383											
FR599G	0.000	P				6	0	0	0			FRONTAGE ROAD 599G,FROM JCT DEAD
END (END OF				0								
	0.267	P				6	0	0	0			JCT PASEO NOPAL.
				0								
END---	0.661											
FR8401	0.000	P	PRAR			19	6,024	5,942	5,838	AGF	1997	FR. 8401 JCT US 84 IN POJOAQUE
NORTH VIA BUS.				0								
	0.340	P				19	6,024	5,942	5,838	AGF	1997	JCT PUEBLO PLAZA RD
				0								
	0.400	P				19	6,024	5,942	5,838	AGF	1997	JCT MALL ENTRANCE
				0								
	0.710	P				19	6,024	5,942	5,838	AGF	1997	JCT ENTRANCE TO KOKOMAN
				0								
	0.900	P				19	6,024	5,942	5,838	AGF	1997	JCT NM 502 RAMP G
				0								
END---	1.110											
IA2264	0.000	P	INTS			16	96	198	193	COV	2003	COCHITI/NM 16 OFF-RAMP
				0								
END---	0.055											
IA2267	0.000	P				16	164	59	58	COV	2003	WALDO OFF-RAMP
				0								
END---	0.055											
IA2271	0.000	P				16	485	460	448	COV	2003	LA CIENEGA OFF-RAMP
				0								
END---	0.055											
IA2276	0.000	P				16	626	561	557	COV	2003	EXIT 276 FIRST OFF-RAMP FROM JCT.

I-25 NORTHB 0
END--- 0.225
IA2278 0.000 P 16 4,008 1,890 1,876 COV 2003 NM 14, CERRILLOS ROAD (SANTA FE)
OFF-RAMP 8
END--- 0.936
IA2282 0.000 P 16 7,518 8,194 8,131 COV 2003 US 84-285/ST. FRANCIS DR. OFF-RAMP
9
0.341 P 16 7,518 8,194 8,131 COV 2003 US 84/285-ST. FRANCIS DR.
9
END--- 0.952
IA2284 0.000 P 16 2,235 2,307 2,249 COV 2003 OLD PECOS TRAIL INTCH./I-25 OFF
RAMP 0

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END---	0.371										
IA2290	0.000	P	INTS	SANTA FE 0	16	6,520	6,374	6,214	AGF	2000	US 285 SOUTH INTCH./I-25 NBD
OFF-RAMP											
END---	0.323										
IA2294	0.000	P	0		16	118	143	139	COV	2003	CANONCITO OFF-RAMP
END---	0.055										
IA2297	0.000	P	0		16	73	72	96	COV	2003	VALENCIA OFF-RAMP
END---	0.055										
IA2299	0.000	P	0		16	2,472	1,745	2,492	COV	2003	GLORIETA OFF-RAMP
END---	0.055										
IA4187	0.000	P	0		16	3,298	3,224	3,143	AGF	2001	EDGEWOOD OFF-RAMP
END---	0.055										
IB2276	0.000	P			16	3,535	2,820	2,798	COV	2003	EXIT 276 SECOND OFF-RAMP FROM JCT.
I-25 NORTH			0								
END---	0.707										
IB2278	0.000	P			16	211	952	945	COV	2003	NM 14, CERRILLOS ROAD (SANTA FE)
OFF-RAMP			12								
END---	0.211										

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				Santa Fe							
IB2282	0.000	P	10		16	146	46	45	COV	2003	US 84/285-ST. FRANCIS DR. OFF-RAM
END---	0.272										
IG2264	0.000	P	0		16	605	197	192	COV	2003	COCHITI/NM 16 ON-RAMP
END---	0.055										
IG2267	0.000	P	0		16	199	150	146	COV	2003	WALDO ON-RAMP
END---	0.055										
IG2271	0.000	P	0		16	644	585	570	COV	2003	LA CIENEGA ON-RAMP
END---	0.055										
IG2276	0.000	P	0		16	1,787	1,721	1,708	COV	2003	NM 599 INTCH./ I-25 NBD ON-RAMP
END---	0.578										
IG2278 ON-RAMP	0.000	P	6		16	2,839	4,859	4,737	COV	2003	NM14, CERRILLOS ROAD (SANTA FE)
END---	0.582										
IG2282	0.000	P	8		16	3,612	3,709	3,616	COV	2003	US 84-285/ST. FRANCIS DR. ON-RAMP
END---	0.313										
IG2284 ON-RAMP	0.000	P	0		16	259	5,979	5,829	COV	2003	OLD PECOS TRAIL INTCH./I-25 NBD

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS / HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
END---	0.334										
IG2290	0.000	P	INTS 0	SANTA FE	16	558	651	635	COV	2003	US 285 S. INTCH./I-25 NBD ON-RAMP
END---	0.233										
IG2294	0.000	P	0		16	453	391	381	COV	2003	CANONCITO ON-RAMP
END---	0.055										
IG2297	0.000	P	0		16	44	30	57	COV	2003	VALENCIA ON-RAMP
END---	0.055										
IG2299	0.000	P			16	107	68	101	COV	2003	GLORIETA ON-RAMP

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                               0
END---       0.055
IG4187       0.000 P                      16   1,346   1,316   1,283 AGF  2001 EDGEWOOD ON-RAMP
                               0
END---       0.055
IH2278       0.000 P                      16   1,457   1,656   1,615 COV  2003 NM14, CERRILLOS ROAD (SANTA FE)
ON-RAMP                              13
END---       0.088
IH2282       0.000 P                      16      68      89      88 COV  2003 US 84-285/ST. FRANCIS DR. ON-RAMP
                              19
END---       0.537
IH2284       0.000 P                      16   4,263     484     472 COV  2003 OLD PECOS TRAIL INTCH./I-25 NBD
ON-RAMP                               0
END---       0.205
IN2264       0.000 P                      16   1,206     112     109 COV  2003 COCHITI/NM 16  OFF-RAMP
                               0
END---       0.055
IN2267       0.000 P                      16     407     188     183 COV  2003 WALDO  OFF-RAMP
                               0
END---       0.055
IN2271       0.000 P                      16     890     655     639 COV  2003 LA CIENEGA  OFF-RAMP
                               0
END---       0.055
IN2276       0.000 P                      16   1,323   1,215   1,206 COV  2003 NM 599 INTCH./I-25 SBD OFF-RAMP
                               0
             0.101 P                      16   1,323   1,215   1,206 COV  2003 JCT. IO2276 (I-25 SECOND OFF-RAMP)
                               0
END---       0.246
IN2278       0.000 P                      16   1,924   4,808   4,688 COV  2003 NM14, CERRILLOS ROAD (SANTA FE)
OFF-RAMP                             13
END---       0.287
IN2282       0.000 P                      16   2,945   4,638   4,603 COV  2003 US 84-285/ST. FRANCIS DR. OFF-RAMP
                               6
END---       0.289
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                   HEAVY
ROUTE    MPNT    R CLS     COUNTY      P    2003     2002     2001 METH YEAR TERMINUS
                   COMM
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IN2284	0.000	P	INTS 0	SANTA FE	16	502	4,712	4,594	COV	2003	OLD PECOS TRAIL/I-25 SBD OFF-RAMP
END---	0.081										
IN2290	0.000	P	0		16	452	560	546	COV	2003	US 285 S. INTCH./I-25 SBD OFF-RAMP
END---	0.280										
IN2294	0.000	P	0		16	177	490	478	COV	2003	CANONCITO OFF-RAMP
END---	0.055										
IN2297	0.000	P	0		16	62	46	35	COV	2003	VALENCIA OFF-RAMP
END---	0.055										
IN2299	0.000	P	0		16	100	55	130	COV	2003	GLORIETA OFF-RAMP
END---	0.055										
IN4187	0.000	P	0		16	1,132	1,107	1,079	AGF	2001	EDGEWOOD OFF-RAMP
END---	0.055										
IO2276 IN2276 TO	0.000	P	0		16	538	518	514	COV	2003	EXIT 276 SECOND OFF-RAMP FROM JCT.
END---	0.364										
IO2278 OFF-RAMP	0.000	P	7		16	1,848	3,403	3,318	COV	2003	NM14, CERRILLOS ROAD (SANTA FE)
END---	0.351										
IO2282	0.000	P	0		16	41	41	40	COV	2003	US 84-285/ST. FRANCIS DR. OFF-RAMP
END---	0.324										
IO2284	0.000	P	0		16	5,109	4,639	4,523	COV	2003	OLD PECOS TRAIL INTCH.
END---	0.035										
IR2267 FE.	0.000	P	0		9	676	760	741	COV	2003	LA BAJADA REST AREA SOUTH OF SANTA
END---	0.200										
IT2264	0.000	P	0		16	99	161	157	COV	2003	COCHITI/NM 16 ON-RAMP
END---	0.055										
IT2267	0.000	P	0		16	431	259	253	COV	2003	WALDO ON-RAMP
END---	0.055										
IT2271	0.000	P	0		16	495	467	455	COV	2003	LA CIENEGA ON-RAMP
END---	0.055										
IT2276	0.000	P	0		16	3,470	3,286	3,261	AGF	2001	EXIT 276 FIRST ON-RAMP FROM JCT.
NM599 TO JCT	0.191	P	0		16	3,470	3,286	3,261	AGF	2001	JCT. IU2276 (SECOND ON-RAMP)
END---	0.300										

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IT2278 ON-RAMP	0.000	P	INTS	17	SANTA FE	16	3,796	3,566	3,477	COV	2003	NM14, CERRILLOS ROAD (SANTA FE)
END---	0.684											
IT2282	0.000	P		9		16	7,764	7,758	7,699	COV	2003	US 84/285-ST. FRANCIS DR. ON-RAMP
END---	0.579											
IT2284	0.000	P		0		16	2,993	2,926	2,853	AGF	2000	OLD PECOS TRAIL/I-25 SBD ON-RAMP
	0.230	P		0		16	2,993	2,926	2,853	AGF	2000	
END---	0.236											
IT2290	0.000	P		0		16	6,027	6,774	6,604	COV	2003	US 285 S. INTCH./I-25 SBD ON-RAMP
END---	0.200											
IT2294	0.000	P		0		16	119	170	166	COV	2003	CANONCITO ON-RAMP
END---	0.055											
IT2297	0.000	P		0		16	119	74	99	COV	2003	VALENCIA ON-RAMP
END---	0.055											
IT2299	0.000	P		0		16	2,465	1,790	2,311	COV	2003	GLORIETA ON-RAMP
END---	0.055											
IT4187	0.000	P		0		16	3,091	3,022	2,946	AGF	2001	EDGEWOOD ON-RAMP
END---	0.055											
IU2276 NM599 TO JC	0.000	P		0		16	579	491	487	COV	2003	EXIT 276 SECOND ON-RAMP FROM JCT.
END---	0.407											
IU2278 ON-RAMP	0.000	P		17		16	144	376	367	COV	2003	NM14, CERRILLOS ROAD (SANTA FE)
END---	0.102											
IU2282	0.000	P		11		16	135	145	141	COV	2003	US 84-285/ST. FRANCIS DR. ON-RAMP
END---	0.078											

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IU2284	0.000	P		0		16	155	152	148	AGF	2000 OLD PECOS TRAIL ON-RAMP
END---	0.035										
I00025	264.504	M		8		23	18,043	14,424	14,063	ATR	2003 SANDOVAL/SANTA FE COUNTY LINE
	264.504	P		8		23	17,867	14,200	13,844	ATR	2003 SANDOVAL/SANTA FE COUNTY LINE
	264.524	M		8		1	18,043	14,424	14,063	ATR	2003
	264.524	P		8		1	17,867	14,200	13,844	ATR	2003
	264.952	M		8		1	18,043	14,424	14,063	ATR	2003
	264.952	P		8		1	17,867	14,200	13,844	ATR	2003
	265.171	M		8		1	18,043	14,424	14,063	ATR	2003
	265.171	P		8		1	17,867	14,200	13,844	ATR	2003

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I00025	265.181	M	INTS	8	SANTA FE	1	18,043	14,424	14,063	ATR	2003	
	265.181	P		8		1	17,867	14,200	13,844	ATR	2003	
	265.786	M		10		12	10,570	10,334	10,075	AGF	1995	NM16 COCHITI LAKE INTERCHANGE
	265.786	P		10		12	11,913	11,647	11,355	AGF	1995	NM16 COCHITI LAKE INTERCHANGE
	266.146	M		28		12	18,177	17,771	13,359	AGF	2002	NM16 COCHITI LAKE INTERCHANGE
	266.146	P		28		12	15,174	14,835	13,326	AGF	2002	NM16 COCHITI LAKE INTERCHANGE.
	266.210	M		10		12	15,082	15,472	15,085	COV	2003	NM16 COCHITI LAKE INTERCHANGE
	266.210	P				12	15,622	15,233	14,852	COV	2003	NM16 COCHITI LAKE INTERCHANGE

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266.230 M	10	1	15,082	15,472	15,085	COV	2003	
266.230 P	10	1	15,622	15,233	14,852	COV	2003	
267.652 M	10	1	15,082	15,472	15,085	COV	2003	
267.652 P	10	1	15,622	15,233	14,852	COV	2003	
268.100 M	10	1	15,082	15,472	15,085	COV	2003	
268.100 P	10	1	15,622	15,233	14,852	COV	2003	
268.348 M	10	1	15,082	15,472	15,085	COV	2003	
268.348 P	10	1	15,622	15,233	14,852	COV	2003	
268.358 M	10	1	15,082	15,472	15,085	COV	2003	
268.358 P	10	1	15,622	15,233	14,852	COV	2003	
268.730 M	10	12	17,876	16,928	16,534	ATR	2003	WALDO INTERCHANGE
268.730 P	19	12	17,670	16,802	16,311	ATR	2003	WALDO INTERCHANGE
268.930 M	19	1	17,876	16,928	16,534	ATR	2003	
268.930 P	19	1	17,670	16,802	16,311	ATR	2003	
269.204 M	19	1	17,876	16,928	16,534	ATR	2003	
269.204 P	19	1	17,670	16,802	16,311	ATR	2003	
271.332 M	19	1	17,876	16,928	16,534	ATR	2003	
271.332 P	19	1	17,670	16,802	16,311	ATR	2003	
271.931 M	19	1	17,876	16,928	16,534	ATR	2003	
271.931 P	19	1	17,670	16,802	16,311	ATR	2003	
272.930 M	19	12	15,895	15,540	15,151	AGF	1999	NM587 LA CIENEGA INTERCHANGE
272.930 P	21	12	15,195	14,855	14,483	AGF	1999	NM587 LA CIENEGA INTERCHANGE
273.130 M	21	12	15,709	17,865	12,712	COV	2003	NM587 LA CIENEGA INTERCHANGE
273.130 P	22	12	12,766	17,764	13,490	COV	2003	NM587 LA CIENEGA INTERCHANGE.

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	276.700 M	22		1	15,709	17,865	12,712	COV	2003	
	276.700 P	22		1	12,766	17,764	13,490	COV	2003	
	276.796 M	22		1	15,709	17,865	12,712	COV	2003	
	276.796 P	22		1	12,766	17,764	13,490	COV	2003	
	277.070 M	18		12	15,687	14,853	14,740	AGF	2000	NM599 INTERCHANGE
	277.070 P	18		12	15,164	14,358	14,248	AGF	2000	NM599 INTERCHANGE
	277.307 M	18		1	15,687	14,853	14,740	AGF	2000	
	277.307 P	18		1	15,164	14,358	14,248	AGF	2000	
	277.703 M	18		1	15,687	14,853	14,740	AGF	2000	
	277.703 P	18		1	15,164	14,358	14,248	AGF	2000	
	278.910 M	17		12	12,018	11,379	12,232	AGF	2002	NM14, CERRILLOS ROAD INTERCHANGE
	278.910 P	17		12	12,285	11,632	11,405	AGF	2002	NM14, CERRILLOS ROAD INTERCHANGE
	278.926 M	10		12	14,002	13,258	12,275	AGF	2002	NM14, CERRILLOS ROAD INTERCHANGE.

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POSTED ROUTE	BEGIN MPNT DIR	FUNC CLS HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
I00025	278.926 P	INTS 10	SANTA FE	12	14,522	13,750	11,667	AGF	2002	NM14, CERRILLOS ROAD INTERCHANGE.
	279.110 M	10		1	14,002	13,258	12,275	AGF	2002	
	279.110 P	10		1	14,522	13,750	11,667	AGF	2002	
	281.978 M			1	14,002	13,258	12,275	AGF	2002	

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281.978	P		10		1	14,522	13,750	11,667	AGF	2002	
283.000	M		10		1	14,002	13,258	12,275	AGF	2002	
283.000	P		10		1	14,522	13,750	11,667	AGF	2002	
283.800	M	INTERCHANGE	10		12	5,753	5,447	11,991	AGF	2002	US84 SAINT FRANCIS DRIVE
283.800	P	INTERCHANGE		10	12	10,397	9,844	12,216	AGF	2002	US84 SAINT FRANCIS DRIVE
283.810	M	INTERCHANGE		10	12	16,745	15,855	15,734	AGF	1998	US84 SAINT FRANCIS DRIVE
283.810	P	INTERCHANGE		10	12	16,176	15,316	15,199	AGF	1998	US84 SAINT FRANCIS DRIVE
283.831	M	INTERCHANGE		10	12	9,880	9,355	9,284	AGF		US84 SAINT FRANCIS DRIVE
283.831	P	INTERCHANGE		10	12	9,880	9,355	9,284	AGF		US84 SAINT FRANCIS DRIVE
283.833	M	INTERCHANGE.		10	12	9,852	9,328	9,257	AGF	2000	US84 SAINT FRANCIS DRIVE
283.833	P	INTERCHANGE.		10	12	11,272	10,673	10,592	AGF	2000	US84 SAINT FRANCIS DRIVE
283.931	M	INTERCHANGE		10	12	9,637	9,125	9,055	AGF	2000	US84 SAINT FRANCIS DRIVE
283.931	P	INTERCHANGE		23	12	11,373	10,769	10,687	AGF	2000	US84 SAINT FRANCIS DRIVE
284.010	M			23	1	9,637	9,125	9,055	AGF	2000	
284.010	P		23		1	11,373	10,769	10,687	AGF	2000	
284.313	M		23		1	9,637	9,125	9,055	AGF	2000	
284.313	P		23		1	11,373	10,769	10,687	AGF	2000	
284.504	M		23		1	9,637	9,125	9,055	AGF	2000	
284.504	P		23		1	11,373	10,769	10,687	AGF	2000	
285.230	M	INTERCHANGE	23		12	10,798	10,224	10,146	AGF	1997	NM466, US285, OLD PECOS TRAIL
285.230	P	INTERCHANGE		10	12	10,136	9,597	9,524	AGF	1997	NM466, US285, OLD PECOS TRAIL
285.332	M	INTERCHANGE		10	12	13,107	12,896	12,599	ATR	2003	NM466, US285, OLD PECOS TRAIL
285.332	P	INTERCHANGE		8	12	12,448	12,254	11,752	ATR	2003	NM466, US285, OLD PECOS TRAIL
285.430	M			8	1	13,107	12,896	12,599	ATR	2003	

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8
285.430 P 1 12,448 12,254 11,752 ATR 2003
8
285.915 M 1 13,107 12,896 12,599 ATR 2003
8
285.915 P 1 12,448 12,254 11,752 ATR 2003
8
290.490 M 1 13,107 12,896 12,599 ATR 2003
8
290.490 P 1 12,448 12,254 11,752 ATR 2003
8
290.980 M 1 13,107 12,896 12,599 ATR 2003
8
290.980 P 1 12,448 12,254 11,752 ATR 2003
8
291.449 M 1 13,107 12,896 12,599 ATR 2003
8
291.449 P 1 12,448 12,254 11,752 ATR 2003
8
291.670 M 1 13,107 12,896 12,599 ATR 2003
8
291.670 P 1 12,448 12,254 11,752 ATR 2003
8
291.700 M 12 7,448 7,282 10,125 AGF 2002 US 285 EXIT 290 (SOUTH TO CLINES
CORNERS). 15
291.700 P 12 7,466 7,299 10,125 AGF 2002 US 285 EXIT 290 (SOUTH TO CLINES
CORNERS). 15
291.773 M 12 6,794 6,206 6,051 COV 2003 US285 LAMY INTERCHANGE
29
291.773 P 12 6,584 5,143 5,014 COV 2003 US285 LAMY INTERCHANGE
29
291.870 M 1 6,794 6,206 6,051 COV 2003
29
291.870 P 1 6,584 5,143 5,014 COV 2003
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I00025	292.086 M	INTS 29	SANTA FE	1	6,794	6,206	6,051	COV	2003	
	292.086 P	29		1	6,584	5,143	5,014	COV	2003	
	292.100 M	29		1	6,794	6,206	6,051	COV	2003	
	292.100 P	29		1	6,584	5,143	5,014	COV	2003	
	292.788 M	29		1	6,794	6,206	6,051	COV	2003	
	292.788 P	29		1	6,584	5,143	5,014	COV	2003	
	294.136 M	29		1	6,794	6,206	6,051	COV	2003	
	294.136 P	29		1	6,584	5,143	5,014	COV	2003	
	295.270 M	29		1	6,794	6,206	6,051	COV	2003	
	295.270 P	29		1	6,584	5,143	5,014	COV	2003	
	295.470 M	15		12	7,448	7,282	7,694	AGF	2002	CANONCITO INTERCHANGE
	295.470 P	15		12	7,559	7,390	6,986	AGF	2002	CANONCITO INTERCHANGE
	295.596 M	15		12	6,607	7,211	6,871	COV	2003	CANONCITO INTERCHANGE
	295.596 P	15		12	6,750	7,423	6,807	COV	2003	CANONCITO INTERCHANGE
	296.147 M	15		1	6,607	7,211	6,871	COV	2003	
	296.147 P	15		1	6,750	7,423	6,807	COV	2003	
	296.568 M	15		4	6,607	7,211	6,871	COV	2003	
	296.568 P	15		4	6,750	7,423	6,807	COV	2003	
	297.020 M	15		1	6,607	7,211	6,871	COV	2003	
	297.020 P	15		1	6,750	7,423	6,807	COV	2003	
	297.794 M	15		1	6,607	7,211	6,871	COV	2003	
	297.794 P	15		1	6,750	7,423	6,807	COV	2003	
	298.270 M	14		12	7,312	7,149	7,648	AGF	2002	VALENCIAL INTERCHANGE
	298.270 P			12	7,503	7,335	6,404	AGF	2002	VALENCIA INTERCHANGE

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		14						
298.470	M	14	12	7,204	7,043	6,375 AGF	2002	VALENCIA INTERCHANGE
298.470	P	14	12	7,581	7,412	6,366 AGF	2002	VALENCIA INTERCHANGE
300.000	M	14	1	7,204	7,043	6,375 AGF	2002	
300.000	P	14	1	7,581	7,412	6,366 AGF	2002	
300.370	M	14	1	7,204	7,043	6,375 AGF	2002	
300.370	P	14	1	7,581	7,412	6,366 AGF	2002	
300.400	M	10	12	4,568	4,466	4,354 AGF	1996	NM50 GLORIETA INTERCHANGE
300.400	P	10	12	3,947	3,859	3,762 AGF	1996	NM50 GLORIETA INTERCHANGE
300.500	M	19	12	4,899	4,790	4,706 AGF	2002	NM50 GLORIETA INTERCHANGE
300.500	P	19	12	4,782	4,675	4,705 AGF	2002	NM50 GLORIETA INTERCHANGE
300.570	M	19	1	4,899	4,790	4,706 AGF	2002	
300.570	P	19	1	4,782	4,675	4,705 AGF	2002	
300.800	M	19	1	4,899	4,790	4,706 AGF	2002	
300.800	P	19	1	4,782	4,675	4,705 AGF	2002	
300.900	M	19	1	4,899	4,790	4,706 AGF	2002	
300.900	P	19	1	4,782	4,675	4,705 AGF	2002	
303.154	M	19	1	4,899	4,790	4,706 AGF	2002	
303.154	P	19	1	4,782	4,675	4,705 AGF	2002	
304.100	M	19	1	4,899	4,790	4,706 AGF	2002	
304.100	P	19	1	4,782	4,675	4,705 AGF	2002	
END--- 304.200								

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
I00040	183.863	M	INTS	27	SANTA FE	23	10,971	10,726	14,445	AGF	2002	BERNALILLO/SANTA FE COUNTY LINE
	183.863	P		27		23	11,889	11,623	13,138	AGF	2002	BERNALILLO/SANTA FE COUNTY LINE
	183.883	M		27		1	10,971	10,726	14,445	AGF	2002	
	183.883	P		27		1	11,889	11,623	13,138	AGF	2002	
	187.040	M		27		1	10,971	10,726	14,445	AGF	2002	
	187.040	P		27		1	11,889	11,623	13,138	AGF	2002	
	187.200	M		32		12	11,272	11,848	11,551	COV	2003	NM344 EDGEWOOD INTERCHANGE
	187.200	P		32		12	10,932	10,364	10,105	COV	2003	NM344 EDGEWOOD INTERCHANGE
	187.910	M		32		1	11,272	11,848	11,551	COV	2003	
	187.910	P		32		1	10,932	10,364	10,105	COV	2003	
END---	190.871											
NM0004	64.059	P	MNAR	9		23	2,569	2,573	7,656	AGF	2002	LOS ALAMOS/SANTA FE COUNTY LINE.
	64.090	P		9		4	2,569	2,573	7,656	AGF	2002	
	64.159	P		9		4	2,569	2,573	7,656	AGF	2002	
	66.348	P		9		4	2,569	2,573	7,656	AGF	2002	
	66.558	P		9		15	2,569	2,573	7,656	AGF	2002	
	66.735	P		12		11	9,140	9,134	9,176	AGF	2000	JCT JEMEZ RD.
	66.793	P		12		4	9,140	9,134	9,176	AGF	2000	
	67.298	P		12		4	9,140	9,134	9,176	AGF	2000	
END---	67.946											
NM0014	14.213	P	MJCL	14		23	2,934	1,152	2,242	COV	2003	SANDOVAL/SANTA FE COUNTY LINE.

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				Santa Fe				
15.748 P	7	11	1,156	1,085	1,090	COV	2003	JCT. NM 344
16.911 P	7	15	1,156	1,085	1,090	COV	2003	
22.400 P	6	11	2,348	2,346	2,357	AGF	2000	JCT SANTA FE CO. RD. 4057A (OLD NM301)
24.532 P	6	4	2,348	2,346	2,357	AGF	2000	
28.324 P	6	15	2,348	2,346	2,357	AGF	2000	MADRID
28.824 P	6	4	2,348	2,346	2,357	AGF	2000	
28.950 P	6	19	2,348	2,346	2,357	AGF	2000	MADRID BALLPARK
30.854 P	6	4	2,348	2,346	2,357	AGF	2000	
31.120 P	6	19	2,348	2,346	2,357	AGF	2000	JCT CO. ROAD 55
31.555 P	6	4	2,348	2,346	2,357	AGF	2000	CERRILLOS
31.990 P	6	4	2,348	2,346	2,357	AGF	2000	
35.142 P	6	4	2,348	2,346	2,357	AGF	2000	
37.165 P	6	4	2,348	2,346	2,357	AGF	2000	
37.686 P	6	4	2,348	2,346	2,357	AGF	2000	
38.265 P	0	11	7,055	7,051	7,084	AGF	1996	JCT. 490586
38.365 P	0	4	7,055	7,051	7,084	AGF	1996	
40.886 M	0	4	3,557	3,555	3,572	AGF	1996	
40.886 P	0	4	3,498	3,496	3,512	AGF	1996	
41.111 P	0	4	7,055	7,051	7,084	AGF	1996	
42.065 P	0	4	7,055	7,051	7,084	AGF	1996	
42.665 P	0	4	7,055	7,051	7,084	AGF	1996	
43.165 P COLL	9	11	7,689	7,685	7,546	AGF	2002	JCT. COUNTY ROAD TO NM STATE PEN.

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
NM0014	43.811	M	COLL	9	SANTA FE	4	3,665	3,663	3,847	AGF	2002	
	43.811	P		9		4	4,024	4,022	3,699	AGF	2002	
	44.565	M		9		4	3,665	3,663	3,847	AGF	2002	
	44.565	P		9		4	4,024	4,022	3,699	AGF	2002	
	44.600	P		9		4	7,689	7,685	7,546	AGF	2002	
	44.900	P	PRAR	4		11	10,361	5,708	5,735	ATR	2003	JCT NM 599 (SANTA FE BYPASS).
	45.041	P		4		4	10,361	5,708	5,735	ATR	2003	
	45.140	M		4		4	5,184	2,534	2,546	ATR	2003	
	45.140	P		4		4	5,177	3,174	3,189	ATR	2003	
	45.165	M		4		4	5,184	2,534	2,546	ATR	2003	
	45.165	P		4		4	5,177	3,174	3,189	ATR	2003	
	45.189	M		4		4	5,184	2,534	2,546	ATR	2003	
	45.189	P		4		4	5,177	3,174	3,189	ATR	2003	
	45.565	M		4		2	5,184	2,534	2,546	ATR	2003	
	45.565	P		4		2	5,177	3,174	3,189	ATR	2003	
	45.680	M		6		11	4,978	4,975	4,066	AGF	2002	JCT. FRONTAGE ROAD.
	45.680	P		6		11	4,928	4,925	4,421	AGF	2002	JCT. FRONTAGE ROAD.
	45.900	M		6		4	4,978	4,975	4,066	AGF	2002	
	45.900	P		6		4	4,928	4,925	4,421	AGF	2002	

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46.110 M 4 4,978 4,975 4,066 AGF 2002
6
46.110 P 4 4,928 4,925 4,421 AGF 2002
6
46.605 M 11 4,622 4,539 4,439 AGF 2001 JCT. IB2278 (SECOND OFF-RAMP FROM
NORTHBOUND 6
46.605 P 11 4,650 4,567 4,466 AGF 2001 JCT. IB2278 (SECOND OFF-RAMP FROM
NORTHBOUND 6
46.675 M 11 4,771 4,685 4,582 AGF 2001 JCT. FIRST I-25 ON RAMP (NORTH
BOUND ON I-25) 6
46.675 P 11 4,799 4,713 4,609 AGF 2001 JCT. FIRST I-25 ON RAMP (NORTH
BOUND ON I-25) 6
46.750 M 4 4,771 4,685 4,582 AGF 2001
6
46.750 P 4 4,799 4,713 4,609 AGF 2001
6
46.755 M 11 5,139 5,047 4,936 AGF 2001 JCT. SECOND I-25 ON RAMP (NORTH
BOUND ON I-25 6
46.755 P 11 4,284 4,207 4,114 AGF 2001 JCT. SECOND I-25 ON RAMP (NORTH
BOUND ON I-25 6
46.977 M 11 5,308 5,213 5,098 AGF 2001 JCT. SECOND I-25 ON RAMP (SOUTH
BOUND ON I-25 6
46.977 P 11 5,261 5,167 5,053 AGF 2001 JCT. SECOND I-25 ON RAMP (SOUTH
BOUND ON I-25 6
47.127 M 11 6,289 6,176 6,040 AGF 2001 JCT FIRST I-25 ON RAMP (SOUTH BOUND
ON I-25). 6
47.127 P 11 2,620 2,573 2,516 AGF 2001 JCT FIRST I-25 ON RAMP (SOUTH BOUND
ON I-25). 6
47.352 M 11 4,708 4,623 4,521 AGF 2001 JCT. I-25 OFF RAMP FROM I-25
SOUTHBOUND AND N 6
47.352 P 11 3,371 3,310 3,237 AGF 2001 JCT. I-25 OFF RAMP FROM I-25
SOUTHBOUND AND N 6
47.397 M 11 9,908 9,730 9,515 AGF 2001 JCT 2ND EXIT TO FR. ROAD THAT GOES
TO S.F.DOW 6
47.397 P 11 10,095 9,914 9,695 AGF 2001 JCT 2ND EXIT TO FR. ROAD THAT GOES
TO S.F.DOW 6
47.477 M 11 11,186 9,436 9,862 COV 2003 JCT FIRST EXIT TO FRONTAGE THAT
GOES TO TRACK 6
47.477 P 11 11,321 9,528 9,885 COV 2003 JCT FIRST EXIT TO FRONTAGE THAT
GOES TO TRACK 6
48.051 M 4 11,186 9,436 9,862 COV 2003
6
48.051 P 4 11,321 9,528 9,885 COV 2003
6
48.339 M 2 11,186 9,436 9,862 COV 2003
6
48.339 P 2 11,321 9,528 9,885 COV 2003
6

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48.589 M	0	11	10,573	10,383	13,846	AGF	2002	JCT. TRAINING ACADEMY ROAD.
48.589 P	0	11	11,468	11,262	13,607	AGF	2002	JCT. TRAINING ACADEMY ROAD.

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NM0014	49.134	M	PRAR	0	SANTA FE	11	16,667	16,368	16,007	AGF		JCT. CAM. ENTRADA
	49.134	P		0		11	14,987	14,718	14,393	AGF		JCT. CAM. ENTRADA
	49.332	M		0		2	16,667	16,368	16,007	AGF		
	49.332	P		0		2	14,987	14,718	14,393	AGF		
	49.499	M		6		11	23,080	22,666	22,166	AGF	2000	JCT RODEO ROAD EAST AND AIRPORT ROAD WEST.
	49.499	P		6		11	26,926	26,443	25,860	AGF	2000	JCT RODEO ROAD EAST AND AIRPORT ROAD WEST.
	49.989	M		6		2	23,080	22,666	22,166	AGF	2000	
	49.989	P		6		2	26,926	26,443	25,860	AGF	2000	
	50.625	M		0		11	18,055	20,442	24,964	COV	2003	JCT. RICHARDS AVENUE
	50.625	P		0		11	17,354	20,641	26,145	COV	2003	JCT. RICHARDS AVENUE
	50.904	M		0		11	25,999	25,532	24,969	AGF	1999	JCT CAMINO CONSUELO (FL5688).
	50.904	P		0		11	32,490	31,907	31,203	AGF	1999	JCT CAMINO CONSUELO (FL5688).
	51.034	M		0		11	26,361	25,888	25,317	AGF	1996	JCT CALLE DEL CIELO.
	51.034	P		0		11	27,565	27,070	26,473	AGF	1996	JCT CALLE DEL CIELO.
	51.245	M		0		11	25,709	25,247	24,690	AGF	2000	JCT. CALLE LA RESOLANA

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	51.245	P		0	11	31,784	31,213	30,524	AGF	2000	JCT. CALLE LA RESOLANA
	51.347	M		0	11	23,170	22,754	22,252	AGF	2000	JCT. SILER ROAD
	51.347	P		0	11	23,920	23,491	22,973	AGF	2000	JCT. SILER ROAD
	51.647	M		6	11	25,509	25,051	36,077	AGF	2002	JCT. CAMINO CARLOS REY.
	51.647	P		6	11	27,601	27,106	35,860	AGF	2002	JCT. CAMINO CARLOS REY.
	51.707	M		6	4	25,509	25,051	36,077	AGF	2002	
	51.707	P		6	4	27,601	27,106	35,860	AGF	2002	
	51.997	M		6	11	22,840	22,430	21,935	AGF	2000	JCT. LUANA STREET.
	51.997	P		6	11	23,848	23,420	22,903	AGF	2000	JCT. LUANA STREET.
	52.252	M		6	11	19,706	19,352	13,211	AGF	2002	JCT. ST. MICHAELS_DRIVE (NM 466).
	52.252	P		6	11	20,634	20,264	19,125	AGF	2002	JCT. ST. MICHAELS_DRIVE (NM 466).
	52.592	M		0	11	18,145	21,900	21,417	COV	2003	JCT. 5TH ST.
	52.592	P		0	11	18,974	28,444	27,816	COV	2003	JCT. 5TH ST.
	52.782	M		6	11	22,765	22,356	21,863	AGF	1996	JCT. 2ND STREET.
	52.782	P		6	11	23,944	23,514	22,995	AGF	1996	JCT. 2ND STREET.
	53.338	M		6	11	21,601	21,213	20,745	AGF	1996	JCT. BACA ST.
	53.338	P		6	11	23,271	22,853	22,349	AGF	1996	JCT. BACA ST.
	53.399	M		6	11	15,969	16,848	18,048	ATR	2003	JCT. ALTA VISTA
	53.399	P		6	11	16,336	16,931	18,049	ATR	2003	JCT. ALTA VISTA
	53.662	M		6	11	12,956	13,979	13,671	COV	2003	JCT. CORDOVA ROAD.
	53.662	P		6	11	15,946	22,115	21,627	COV	2003	JCT. CORDOVA ROAD.
US 84-285	53.952	M		6	4	12,956	13,979	13,671	COV	2003	0.005 MILE FROM END OF ROUTE AT JCT
US 84-285	53.952	P		6	4	15,946	22,115	21,627	COV	2003	0.005 MILE FROM END OF ROUTE AT JCT
END---	53.957										
NM0016	6.396	P	MJCL		23	1,252	992	996	COV	2003	SANDOVAL/SANTA FE COUNTY LINE.

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13
8.250 P MNCL 11 1,276 1,294 1,306 AGF 1999 JCT I-25 (EXIT 264/COCHITI
INTERCHANGE AT LA 0
END--- 10.010
NM0030 0.000 P MNAR 11 7,979 7,960 7,859 AGF 2000 JCT NM 502, NORTH TO JCT US 84/285
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CHDB ROAD SEGMENTS BY POSTED ROUTE/POINT WITH AADT INFO

POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
NM0030	0.026	P	MNAR 14	SANTA FE	4	7,979	7,960	7,859	AGF	2000	
	0.296	P	14		4	7,979	7,960	7,859	AGF	2000	
END---	3.808										
NM0041	30.625	P	MJCL 17		23	5,401	5,399	5,425	AGF	1992	TORRANCE/SANTA FE COUNTY LINE
	30.833	P	17		4	5,401	5,399	5,425	AGF	1992	
	30.834	P	17		4	5,401	5,399	5,425	AGF	1992	
	31.338	P	17		4	5,401	5,399	5,425	AGF	1992	
	31.339	P	17		4	5,401	5,399	5,425	AGF	1992	
	31.622	P	17		4	5,401	5,399	5,425	AGF	1992	
	31.623	P	17		4	5,401	5,399	5,425	AGF	1992	
	33.895	P	17		4	5,401	5,399	5,425	AGF	1992	
	33.896	P	17		4	5,401	5,399	5,425	AGF	1992	
	34.131	P	17		4	5,401	5,399	5,425	AGF	1992	
	35.031	P	17		4	5,401	5,399	5,425	AGF	1992	
	35.599	P			4	5,401	5,399	5,425	AGF	1992	

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35.713	P	17	4	5,401	5,399	5,425	AGF	1992
36.110	P	17	4	5,401	5,399	5,425	AGF	1992
36.281	P	17	4	5,401	5,399	5,425	AGF	1992
36.754	P	17	4	5,401	5,399	5,425	AGF	1992
37.038	P	17	4	5,401	5,399	5,425	AGF	1992
37.446	P	17	4	5,401	5,399	5,425	AGF	1992
38.208	P	17	11	1,268	957	5,425	COV	2003 JCT NM 472 IN STANLEY.
38.300	P	16	11	1,283	1,283	1,082	AGF	2002 JCT.CO RD. 26 WEST TO JCT. NM 344.
38.648	P	12	4	1,283	1,283	1,082	AGF	2002
38.771	P	12	4	1,283	1,283	1,082	AGF	2002
40.050	P	12	4	1,283	1,283	1,082	AGF	2002
40.833	P	12	4	1,283	1,283	1,082	AGF	2002
44.810	P	12	4	1,283	1,283	1,082	AGF	2002
45.987	P	12	4	1,283	1,283	1,082	AGF	2002
46.169	P	12	4	1,283	1,283	1,082	AGF	2002
46.180	P	12	4	1,283	1,283	1,082	AGF	2002
46.957	P	12	4	1,283	1,283	1,082	AGF	2002
49.215	P	12	4	1,283	1,283	1,082	AGF	2002
50.407	P	12	4	1,283	1,283	1,082	AGF	2002
50.634	P	12	4	1,283	1,283	1,082	AGF	2002
50.726	P	12	4	1,283	1,283	1,082	AGF	2002
50.939	P	12	4	1,283	1,283	1,082	AGF	2002
53.541	P	12	4	1,283	1,283	1,082	AGF	2002
53.673	P	12	4	1,283	1,283	1,082	AGF	2002

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			12								
	55.726	P	12		4	1,283	1,283	1,082	AGF	2002	
	56.362	P	12		4	1,283	1,283	1,082	AGF	2002	
	61.821	P	12		4	1,283	1,283	1,082	AGF	2002	
	61.827	P	12		4	1,283	1,283	1,082	AGF	2002	
	62.044	P	12		4	1,283	1,283	1,082	AGF	2002	

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS / HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
END---	62.091										
NM0050	0.000	P	MJCL 5	SANTA FE	11	4,018	4,016	4,625	AGF	2002	JCT.I-25 EAST TO JCT.NM 63 PECOS.
	0.060	P		5	4	4,018	4,016	4,625	AGF	2002	JCT FR2113 TO GLORIETA BAPTIST ASSEMBLY.
	0.320	P	5		4	4,018	4,016	4,625	AGF	2002	
	2.014	P	5		4	4,018	4,016	4,625	AGF	2002	
	2.112	P	5		4	4,018	4,016	4,625	AGF	2002	
	2.188	P	5		4	4,018	4,016	4,625	AGF	2002	LEAVE SANTA FE NATIONAL FOREST
	3.360	P	5		4	4,018	4,016	4,625	AGF	2002	
END---	3.450										
NM0068	0.633	M	PRAR 6		23	14,866	14,885	15,071	AGF	1998	RIO ARRIBA/SANTA FE COUNTY LINE.
	0.633	P	6		23	13,305	13,322	13,489	AGF	1998	RIO ARRIBA/SANTA FE COUNTY LINE.
	0.733	M	6		4	14,866	14,885	15,071	AGF	1998	
	0.733	P			4	13,305	13,322	13,489	AGF	1998	

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	0.751	M		6	11	19,727	19,753	20,000	AGF	2001	JCT NM 76.
	0.751	P		6	11	19,806	19,832	20,080	AGF	2001	JCT NM 76.
END---	1.193			6							
NM0076	0.812	P	MNAR		23	7,615	7,432	7,945	AGF	2002	RIO ARRIBA/SANTA FE COUNTY LINE.
	1.001	P		10	4	7,615	7,432	7,945	AGF	2002	
	1.140	P		10	4	7,615	7,432	7,945	AGF	2002	
	1.190	P		10	11	11,747	11,465	11,440	AGF	2001	JCT NM 583.
	1.551	P		0	4	11,747	11,465	11,440	AGF	2001	
	1.584	P		0	4	11,747	11,465	11,440	AGF	2001	
	1.629	P		0	4	11,747	11,465	11,440	AGF	2001	
	1.674	P		0	4	11,747	11,465	11,440	AGF	2001	
	1.819	P		0	11	6,144	6,140	6,168	AGF	2000	JCT NM 106 AT SANTA CRUZ.
	3.319	P		21	4	6,144	6,140	6,168	AGF	2000	
	3.500	P		21	4	6,144	6,140	6,168	AGF	2000	
	4.650	P		21	4	6,144	6,140	6,168	AGF	2000	
	4.998	P		21	4	6,144	6,140	6,168	AGF	2000	
	5.104	P		21	4	6,144	6,140	6,168	AGF	2000	
	5.299	P	COLL	21	4	6,144	6,140	6,168	AGF	2000	
END---	5.359			21							
NM0106	0.000	P	MJCL		11	3,607	6,617	6,675	COV	2003	FROM US 84-285 SOUTHEAST OF
ESPANOLA NORTHWAR				7							
	0.208	P			4	3,607	6,617	6,675	COV	2003	
	0.214	P		7	4	3,607	6,617	6,675	COV	2003	
END---	0.752			7							
NM0291	0.000	P	MNAR		11	3,220	3,143	3,136	AGF	2001	JCT.NM583 (EL LLANO ROAD) NORTH TO
JCT. NM 68				4							
END---	0.900										
NM0300	0.000	M			11	5,288	5,189	5,089	ATR	2003	FROM JCT.NM466 (OLD PECOS TRAIL)

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CHDB ROAD SEGMENTS BY POSTED ROUTE/POINT WITH AADT INFO

POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
NM0300 SOUTH TO JCT	0.000	P	MNAR		SANTA FE 3	11	4,983	4,886	4,711	ATR	2003	FROM JCT.NM466 (OLD PECOS TRAIL)
	0.205	P		3		4	10,271	10,075	9,800	ATR	2003	
	0.500	P		3		19	10,271	10,075	9,800	ATR	2003	SUNSET SPIRITS
	1.448	P		7		11	5,932	5,928	5,628	AGF	2002	JCT. ARROYO HONDO ROAD
	2.513	P	MJCL	6		11	5,417	5,414	5,312	AGF	2002	JCT. SETON VILLAGE ROAD
	2.855	P		10		11	5,312	5,309	5,566	AGF	2002	JCT. COUNTY ROAD 60 (9 MILE ROAD)
	3.018	P			39	11	4,442	4,933	4,956	COV	2003	JCT. FOREST ROAD 79 (CANADA LOS ALAMOS)
	4.402	P			5	11	4,056	4,054	4,163	AGF	2002	JCT. BOB CAT CROSSING (JUST PAST BOB CAT BITE
	6.363	M		7		11	2,222	2,221	1,440	AGF	2002	JCT. FRONTAGE ROAD EAST OF I-25
	6.363	P		7		11	1,804	1,803	1,662	AGF	2002	JCT. FRONTAGE ROAD EAST OF I-25
END---	6.605											
NM0333	16.415	P		0		23	5,206	4,441	5,403	COV	2003	BERNALILLO/SANTA FE COUNTY LINE.
	19.187	P		0		4	5,206	4,441	5,403	COV	2003	
	19.737	P		9		11	6,220	4,717	4,759	COV	2003	JCT. N.M. 344
	21.355	P		10		11	4,242	2,442	2,463	COV	2003	JCT. SKYLINE RD.
	23.012	P		10		23	4,242	2,442	2,463	COV	2003	SANTA FE/TORRANCE COUNTY LINE
END---	23.059											
NM0344	0.000	P	MNCL			11	5,967	6,054	9,463	AGF	2002	JCT.NM 333 AT EDGEWOOD NORTH TO

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JCT.NM 14.			25							
	0.061 P	25		4	5,967	6,054	9,463	AGF	2002	
	0.190 P	14		12	7,396	7,504	7,570	AGF	2000	JCT. I-40 (EDGEWOOD)
	1.610 P	14		4	7,396	7,504	7,570	AGF	2000	
	1.904 P	14		4	7,396	7,504	7,570	AGF	2000	
	5.320 P	3		11	1,689	1,714	1,729	AGF	1999	JCT NM 472.
	6.334 P	3		15	1,689	1,714	1,729	AGF	1999	
	9.233 P	3		15	1,689	1,714	1,729	AGF	1999	
	12.565 P	3		15	1,689	1,714	1,729	AGF	1999	
	16.565 P	3		4	1,689	1,714	1,729	AGF	1999	.807 MILES SOUTH OF JCT. NM14.
END---	17.372									
NM0399	0.000 P		6	11	4,627	4,647	4,688	COV	2003	JCT US 84/285 EAST OF ESPANOLA,
SOUTH TO JCT	0.146 P	6		4	4,627	4,647	4,688	COV	2003	
	0.604 P	6		23	4,627	4,647	4,688	COV	2003	SANTA FE/RIQ ARRIBA COUNTY LINE
	0.631 P	6		4	4,627	4,647	4,688	COV	2003	
	0.685 P	6		4	4,627	4,647	4,688	COV	2003	
	0.688 P	6		4	4,627	4,647	4,688	COV	2003	
END---	0.791									
NM0466	0.000 M PRAR		6	11	11,781	11,310	11,553	COV	2003	JCT. NM14 (CERRILLOS) EAST &
SOUTHEAST TO R.O	0.000 P		6	11	12,699	11,805	12,432	COV	2003	JCT. NM14 (CERRILLOS) EAST &
SOUTHEAST TO R.O	0.135 M	6		3	11,781	11,310	11,553	COV	2003	
	0.135 P	6		3	12,699	11,805	12,432	COV	2003	
	0.260 M	6		2	11,781	11,310	11,553	COV	2003	
	0.260 P	6		2	12,699	11,805	12,432	COV	2003	

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CHDB ROAD SEGMENTS BY POSTED ROUTE/POINT WITH AADT INFO

POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
NM0466	0.343	M	PRAR	6	SANTA FE	2	11,781	11,310	11,553	COV	2003	
	0.343	P		6		2	12,699	11,805	12,432	COV	2003	
	0.364	M		6		11	17,929	17,607	17,219	AGF	2000	JCT. LLANO STREET
	0.364	P		6		11	21,102	20,723	20,266	AGF	2000	JCT. LLANO STREET
	0.523	M		6		2	17,929	17,607	17,219	AGF	2000	
	0.523	P		6		2	21,102	20,723	20,266	AGF	2000	
	0.548	M		6		11	17,929	17,607	17,219	AGF	2000	JCT. 5TH STREET
	0.548	P		6		11	21,102	20,723	20,266	AGF	2000	JCT. 5TH STREET
	0.853	M		6		2	17,929	17,607	17,219	AGF	2000	
	0.853	P		6		2	21,102	20,723	20,266	AGF	2000	
	0.881	M		6		11	14,464	14,039	13,729	COV	2003	JCT. CALLE LORCA
	0.881	P		6		11	14,091	14,089	13,778	COV	2003	JCT. CALLE LORCA
	1.087	M		6		2	14,464	14,039	13,729	COV	2003	
	1.087	P		6		2	14,091	14,089	13,778	COV	2003	
	1.090	M		6		2	14,464	14,039	13,729	COV	2003	
	1.090	P		6		2	14,091	14,089	13,778	COV	2003	
	1.123	M		0		11	14,191	13,936	13,629	AGF	2000	JCT. PACHECO ST.
	1.123	P		0		11	12,468	12,244	11,974	AGF	2000	JCT. PACHECO ST.
	1.155	M				2	14,191	13,936	13,629	AGF	2000	

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1.155 P	0	2	12,468	12,244	11,974	AGF	2000	
1.227 M	0	11	14,035	13,783	13,479	AGF	1992	JCT. US84 WEST RAMPS
1.227 P	0	11	17,117	16,810	16,439	AGF	1992	JCT. US84 WEST RAMPS
1.263 M	0	4	14,035	13,783	13,479	AGF	1992	
1.263 P	0	4	17,117	16,810	16,439	AGF	1992	
1.275 M	0	11	14,260	14,004	13,695	AGF	1998	JCT. ST. FRANCIS DRIVE (US 84/285)
1.275 P	0	11	12,249	12,029	11,764	AGF	1998	JCT. ST. FRANCIS DRIVE (US 84/285)
1.285 M	0	2	14,260	14,004	13,695	AGF	1998	
1.285 P	0	2	12,249	12,029	11,764	AGF	1998	
1.407 M	0	11	13,313	13,074	12,786	AGF	2000	JCT. US 84 EAST RAMPS
1.407 P	0	11	12,869	12,638	12,359	AGF	2000	JCT. US 84 EAST RAMPS
1.433 M	0	2	13,313	13,074	12,786	AGF	2000	
1.433 P	0	2	12,869	12,638	12,359	AGF	2000	
1.505 M	0	3	13,313	13,074	12,786	AGF	2000	
1.505 P	0	3	12,869	12,638	12,359	AGF	2000	
1.552 M	0	11	8,844	13,148	12,858	COV	2003	JCT. GALISTEO STREET
1.552 P	0	11	7,552	10,579	10,346	COV	2003	JCT. GALISTEO STREET
1.583 M	0	15	8,844	13,148	12,858	COV	2003	
1.583 P	0	15	7,552	10,579	10,346	COV	2003	
1.718 M	0	2	8,844	13,148	12,858	COV	2003	
1.718 P	0	2	7,552	10,579	10,346	COV	2003	
1.752 M	0	11	13,388	13,148	12,858	AGF	2000	JCT. HOSPITAL ROAD
1.752 P	7	11	10,772	10,579	10,346	AGF	2000	JCT. HOSPITAL ROAD
1.999 M	7	3	13,388	13,148	12,858	AGF	2000	

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			7							
	1.999 P		7		3	10,772	10,579	10,346 AGF	2000	
	2.166 M		7		11	6,871	6,748	6,599 AGF	1999	JCT. ARROYO CHAMISO

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CHDB ROAD SEGMENTS BY POSTED ROUTE/POINT WITH AADT INFO

POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001 METH	YEAR	TERMINUS
NM0466	2.166	P	PRAR	7	SANTA FE	11	4,909	4,821	4,715 AGF	1999	JCT. ARROYO CHAMISO
	2.249	M		7		4	6,871	6,748	6,599 AGF	1999	
	2.249	P		7		4	4,909	4,821	4,715 AGF	1999	
	2.347	M		7		11	10,233	10,049	9,827 AGF	2001	JCT. OLD PECOS TRAIL
	2.347	P		7		11	9,430	9,261	9,057 AGF	2001	JCT. OLD PECOS TRAIL
	2.449	M		7		15	10,233	10,049	9,827 AGF	2001	
	2.449	P		7		15	9,430	9,261	9,057 AGF	2001	
	2.546	M		7		2	10,233	10,049	9,827 AGF	2001	
	2.546	P		7		2	9,430	9,261	9,057 AGF	2001	
	2.609	M		7		11	10,901	10,705	10,469 AGF	1998	JCT. ZIA ROAD
	2.609	P		7		11	12,089	11,872	11,610 AGF	1998	JCT. ZIA ROAD
	2.628	M		7		2	10,901	10,705	10,469 AGF	1998	
	2.628	P		7		2	12,089	11,872	11,610 AGF	1998	
	2.927	M		7		11	9,565	8,124	9,647 COV	2003	JCT. CALLE ESPEJO
	2.927	P		7		11	10,400	8,079	10,463 COV	2003	JCT. CALLE ESPEJO

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	3.316 M	7		3	9,565	8,124	9,647	COV	2003	
	3.316 P	7		3	10,400	8,079	10,463	COV	2003	
	3.406 M	7		2	9,565	8,124	9,647	COV	2003	
	3.406 P	7		2	10,400	8,079	10,463	COV	2003	
	3.547 M	7		11	11,656	11,447	11,194	AGF	1992	JCT. RODEO ROAD/OLD LAS VEGAS
HIGHWAY	3.547 P		0	11	12,022	11,806	11,546	AGF	1992	JCT. RODEO ROAD/OLD LAS VEGAS
HIGHWAY	3.641 M		0	2	11,656	11,447	11,194	AGF	1992	
	3.641 P	0		2	12,022	11,806	11,546	AGF	1992	
	3.668 M	0		11	11,656	11,447	11,194	AGF		I-25 N RAMPS
	3.668 P	0		11	12,022	11,806	11,546	AGF		I-25 N RAMPS
	3.678 M	0		2	11,656	11,447	11,194	AGF		
	3.678 P	0		2	12,022	11,806	11,546	AGF		
	3.729 M	0		11	11,656	11,447	11,194	AGF		JCT. I-25
	3.729 P	9		11	12,022	11,806	11,546	AGF		JCT. I-25
	3.843 M	9		3	11,656	11,447	11,194	AGF		
	3.843 P	9		3	12,022	11,806	11,546	AGF		
	3.863 M	9		11	11,498	11,341	11,142	AGF		I-25 S RAMPS
	3.863 P	9		11	11,860	11,698	11,492	AGF		I-25 S RAMPS
	3.984 M	9		11	11,498	11,341	11,142	AGF		JCT. RABBIT ROAD
	3.984 P	9		11	11,860	11,698	11,492	AGF		JCT. RABBIT ROAD
END--- NM0472	4.000 0.000 P LOC	9		11	555	544	819	AGF	2002	JCT NM 344 EAST TO JCT NM 41.
	9.550 P	15		11	1,282	517	674	COV	2003	JCT. FEED LOT ROAD (STANLEY)
END--- NM0475	11.975 0.000 M PRAR	15		11	9,847	9,670	9,457	AGF	1991	JCT US 84, E. THEN N. ON

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WASHINGTON, THEN E. 6

0.000 P		11	11,394	11,189	10,942	AGF	1991	JCT US 84, E. THEN N. ON WASHINGTON, THEN E.	6
0.055 M	6	19	9,847	9,670	9,457	AGF	1991	JCT FIESTA STREET.	
0.055 P	6	19	11,394	11,189	10,942	AGF	1991	JCT FIESTA STREET.	

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
NM0475	0.390	M	PRAR	6	SANTA FE	11	7,016	6,890	6,738	AGF	2000	JCT GUADALUPE STREET.
	0.390	P		6		11	8,068	7,923	7,748	AGF	2000	JCT GUADALUPE STREET.
	0.691	M		6		4	7,016	6,890	6,738	AGF	2000	
	0.691	P		6		4	8,068	7,923	7,748	AGF	2000	
	0.821	M		6		4	7,016	6,890	6,738	AGF	2000	
	0.821	P		6		4	8,068	7,923	7,748	AGF	2000	
	0.935	M		6		11	12,010	11,794	11,534	AGF	1991	JCT OLD TAOS HIGHWAY.
	0.935	P		6		11	10,119	9,937	9,718	AGF	1991	JCT OLD TAOS HIGHWAY.
	1.068	P	MNAR	6		11	13,740	13,758	13,931	AGF	2001	JCT WASHINGTON AVENUE.
	1.276	P		3		11	3,687	3,691	3,822	AGF	2002	JCT ARTIST ROAD/BISHOPS LODGE ROAD.
	1.462	P		3		4	3,687	3,691	3,822	AGF	2002	
	1.685	P		6		11	3,073	3,077	3,116	AGF	1999	JCT PRINCE AVENUE.
	2.708	P		6		11	3,336	3,340	3,382	AGF	2001	JCT GONZALES ROAD.
	3.821	P				11	2,415	2,419	1,143	AGF	2002	JCT SIERRA DEL NORTE.

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	4	4.215 P MJCL	4	2,415	2,419	1,143 AGF	2002	
	4	4.795 P	11	790	790	859 AGF	2002	JCT HYDE PARK ESTATES ROAD.
	5	6.718 P	4	790	790	859 AGF	2002	
	5	8.710 P	11	590	590	678 AGF	2002	HYDE PARK
	29	9.860 P	4	590	590	678 AGF	2002	
	29	12.332 P	4	590	590	678 AGF	2002	
	29	16.401 P	4	590	590	678 AGF	2002	
END---	29	16.907						
NM0502		4.144 P PRAR	23	12,187	11,968	6,419 AGF	2002	LOS ALAMOS/SANTA FE COUNTY LINE
	9	5.619 M	4	6,051	5,942	3,180 AGF	2002	
	9	5.619 P	4	6,136	6,026	3,239 AGF	2002	
	9	5.760 M	3	6,051	5,942	3,180 AGF	2002	
	9	5.760 P	3	6,136	6,026	3,239 AGF	2002	
	9	5.910 M	4	6,051	5,942	3,180 AGF	2002	
	9	5.910 P	4	6,136	6,026	3,239 AGF	2002	
	9	6.057 P	2	6,136	6,026	3,239 AGF	2002	
	9	6.110 M	11	5,919	5,838	7,070 AGF	2002	JCT NM 4 (66.618)--WHITE ROCK "Y".
	12	6.110 P	11	6,053	5,970	8,084 AGF	2002	JCT NM 4 (66.618)--WHITE ROCK "Y".
	12	6.240 M	4	5,919	5,838	7,070 AGF	2002	
	12	6.240 P	4	6,053	5,970	8,084 AGF	2002	
	12	6.377 M	4	5,919	5,838	7,070 AGF	2002	
	12	6.377 P	4	6,053	5,970	8,084 AGF	2002	
	12	6.410 M	4	5,919	5,838	7,070 AGF	2002	
	12	6.410 P	4	6,053	5,970	8,084 AGF	2002	
	12							

POSTED ROUTE	BEGIN MPNT	DIR	FUNC HEAVY CLS COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
								Santa Fe			
	6.469	M	12		4	5,919	5,838	7,070	AGF	2002	
	6.469	P	12		4	6,053	5,970	8,084	AGF	2002	
	6.484	M	12		15	5,919	5,838	7,070	AGF	2002	
	6.484	P	12		15	6,053	5,970	8,084	AGF	2002	
	7.110	M	12		3	5,919	5,838	7,070	AGF	2002	
	7.110	P	12		3	6,053	5,970	8,084	AGF	2002	

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC HEAVY CLS COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
NM0502	7.960	P	PRAR 12	SANTA FE	3	11,972	11,808	15,154	AGF	2002	
	8.150	P	12		4	11,972	11,808	15,154	AGF	2002	
	8.264	M	12		4	5,919	5,838	7,070	AGF	2002	
	8.264	P	12		4	6,053	5,970	8,084	AGF	2002	
	8.423	M	12		15	5,919	5,838	7,070	AGF	2002	
	8.423	P	12		15	6,053	5,970	8,084	AGF	2002	
	8.802	M	12		15	5,919	5,838	7,070	AGF	2002	
	8.802	P	12		15	6,053	5,970	8,084	AGF	2002	
	9.451	M	12		15	5,919	5,838	7,070	AGF	2002	
	9.451	P	12		15	6,053	5,970	8,084	AGF	2002	
	9.812	M	12		4	5,919	5,838	7,070	AGF	2002	

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9.812 P	12	4	6,053	5,970	8,084 AGF	2002	
9.965 M	12	2	5,919	5,838	7,070 AGF	2002	
9.965 P	12	2	6,053	5,970	8,084 AGF	2002	
10.010 M	12	4	5,919	5,838	7,070 AGF	2002	
10.010 P	12	4	6,053	5,970	8,084 AGF	2002	
10.088 M	6	11	5,793	5,602	5,241 ATR	2003	JCT NM 30 TO ESPANOLA.
10.088 P	6	11	5,704	5,505	5,342 ATR	2003	JCT NM 30 TO ESPANOLA.
10.110 M	6	4	5,793	5,602	5,241 ATR	2003	
10.110 P	6	4	5,704	5,505	5,342 ATR	2003	
10.153 M	6	2	5,793	5,602	5,241 ATR	2003	
10.153 P	6	2	5,704	5,505	5,342 ATR	2003	
10.362 M	6	4	5,793	5,602	5,241 ATR	2003	
10.362 P	6	4	5,704	5,505	5,342 ATR	2003	
10.508 M	6	4	5,793	5,602	5,241 ATR	2003	
10.508 P	6	4	5,704	5,505	5,342 ATR	2003	
10.521 M	6	4	5,793	5,602	5,241 ATR	2003	
10.521 P	6	4	5,704	5,505	5,342 ATR	2003	
10.643 M	6	4	5,793	5,602	5,241 ATR	2003	
10.643 P	6	4	5,704	5,505	5,342 ATR	2003	
10.800 M	6	4	5,793	5,602	5,241 ATR	2003	
10.800 P	6	4	5,704	5,505	5,342 ATR	2003	
10.968 M	6	4	5,793	5,602	5,241 ATR	2003	
10.968 P	6	4	5,704	5,505	5,342 ATR	2003	
11.879 M	6	4	5,793	5,602	5,241 ATR	2003	

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							Santa Fe				
	11.879	P	6		4	5,704	5,505	5,342	ATR	2003	
	12.384	M	6		4	5,793	5,602	5,241	ATR	2003	
	12.384	P	6		4	5,704	5,505	5,342	ATR	2003	
	12.534	M	6		4	5,793	5,602	5,241	ATR	2003	
	12.534	P	6		4	5,704	5,505	5,342	ATR	2003	
	12.557	M	6		4	5,793	5,602	5,241	ATR	2003	
	12.557	P	6		4	5,704	5,505	5,342	ATR	2003	
	12.693	M	6		4	5,793	5,602	5,241	ATR	2003	
	12.693	P	6		4	5,704	5,505	5,342	ATR	2003	
	14.287	M	6		4	5,793	5,602	5,241	ATR	2003	

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
NM0502	14.287	P	PRAR 6	SANTA FE	4	5,704	5,505	5,342	ATR	2003	
	14.437	M	6		4	5,793	5,602	5,241	ATR	2003	
	14.437	P	6		4	5,704	5,505	5,342	ATR	2003	
	14.460	M	6		4	5,793	5,602	5,241	ATR	2003	
	14.460	P	6		4	5,704	5,505	5,342	ATR	2003	
	14.596	M	6		4	5,793	5,602	5,241	ATR	2003	
	14.596	P	6		4	5,704	5,505	5,342	ATR	2003	

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					Santa Fe				
	15.000 M	6	4	5,793	5,602	5,241	ATR	2003	
	15.000 P	6	4	5,704	5,505	5,342	ATR	2003	
	15.059 M	6	4	5,793	5,602	5,241	ATR	2003	
	15.059 P	6	4	5,704	5,505	5,342	ATR	2003	
	15.079 M	6	4	5,793	5,602	5,241	ATR	2003	
	15.079 P	6	4	5,704	5,505	5,342	ATR	2003	
33).	15.209 M	5	11	6,375	6,288	6,177	AGF	1998	JCT SANTA FE CO. RD. 49084D (OLD NM
33).	15.209 P	5	11	6,362	6,275	6,165	AGF	1998	JCT SANTA FE CO. RD. 49084D (OLD NM
	15.232 M	5	4	6,375	6,288	6,177	AGF	1998	
	15.232 P	5	4	6,362	6,275	6,165	AGF	1998	
	15.384 M	5	4	6,375	6,288	6,177	AGF	1998	
	15.384 P	5	4	6,362	6,275	6,165	AGF	1998	
	15.579 M	5	4	6,375	6,288	6,177	AGF	1998	
	15.579 P	5	4	6,362	6,275	6,165	AGF	1998	
79).	15.790 M	14	11	7,819	7,712	6,133	AGF	2002	JCT SANTA FE CO. RD. 49101E (OLD NM
79).	15.790 P	14	11	7,244	7,145	5,851	AGF	2002	JCT SANTA FE CO. RD. 49101E (OLD NM
	16.750 M	14	4	7,819	7,712	6,133	AGF	2002	
	16.750 P	14	4	7,244	7,145	5,851	AGF	2002	
	16.814 M	14	4	7,819	7,712	6,133	AGF	2002	
	16.814 P	14	4	7,244	7,145	5,851	AGF	2002	
100).	16.889 M	15	11	7,445	7,344	5,274	AGF	2002	JCT SANTA FE CO. RD. 49101G (OLD NM
100).	16.889 P	15	11	8,653	8,535	7,094	AGF	2002	JCT SANTA FE CO. RD. 49101G (OLD NM
	17.001 M	15	4	7,445	7,344	5,274	AGF	2002	
	17.001 P	15	4	8,653	8,535	7,094	AGF	2002	

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	17.015	M	15		4	7,445	7,344	5,274	AGF	2002	
	17.015	P	15		4	8,653	8,535	7,094	AGF	2002	
	17.200	M	15		4	7,445	7,344	5,274	AGF	2002	
	17.200	P	15		4	8,653	8,535	7,094	AGF	2002	
	17.422	M	15		4	7,445	7,344	5,274	AGF	2002	
	17.422	P	15		4	8,653	8,535	7,094	AGF	2002	
	17.602	M	15		4	7,445	7,344	5,274	AGF	2002	
	17.602	P	15		4	8,653	8,535	7,094	AGF	2002	
	17.802	M	15		4	7,445	7,344	5,274	AGF	2002	
	17.802	P	15		4	8,653	8,535	7,094	AGF	2002	
	17.822	M	15		4	7,445	7,344	5,274	AGF	2002	0.479 MILE WEST OF JCT US 84.
	17.822	P	15		4	8,653	8,535	7,094	AGF	2002	0.479 MILE WEST OF JCT US 84.
	17.844	M	15		4	7,445	7,344	5,274	AGF	2002	
	17.844	P	15		4	8,653	8,535	7,094	AGF	2002	

POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
END---	18.301										
NM0503 TO JCT NM	0.000	P	MJCL 30	SANTA FE	11	5,482	3,229	3,244	COV	2003	JCT US 84 AT POJOAQUE, NORTH & EAST
	0.111	P	30		4	5,482	3,229	3,244	COV	2003	
	1.254	P			19	5,482	3,229	3,244	COV	2003	CO. ROAD 113

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	1.700	P		30	4	5,482	3,229	3,244	COV	2003	
	2.547	P		30	15	5,482	3,229	3,244	COV	2003	
	2.549	P		30	4	5,482	3,229	3,244	COV	2003	
	3.180	P		30	11	2,197	1,572	1,580	COV	2003	JCT. ROAD TO NAMBE RESERVATION.
	6.050	P	MNCL	3	4	2,197	1,572	1,580	COV	2003	
	7.336	P		3	4	2,197	1,572	1,580	COV	2003	
	7.370	P		3	4	2,197	1,572	1,580	COV	2003	
	7.570	P		3	11	1,925	265	267	COV	2003	JCT OLD NM 520 TO CHIMAYO.
	8.010	P		37	4	1,925	265	267	COV	2003	
	10.010	P		37	4	1,925	265	267	COV	2003	
	11.290	P		37	4	1,925	265	267	COV	2003	
	13.180	P		37	11	275	279	281	AGF	2000	JCT NM 596.
	14.283	P		9	4	275	279	281	AGF	2000	
END---	14.570			9							
NM0583	0.000	P	COLL		11	4,383	4,278	6,979	AGF	2002	FROM NM 76 (SANTA CRUZ RD.) NORTH &
WEST ON F	0.108	P		9	11	4,883	4,766	3,952	AGF	2002	JCT NM 291.
END---	1.048			47							
NM0592	0.000	P	MJCL		11	1,171	1,171	1,177	AGF	1999	JCT SANTA FE CO.RD.73 (OLD NM 591)
IN TESUQUE	3.316	P		6	15	1,171	1,171	1,177	AGF	1999	
	4.516	P		6	15	1,171	1,171	1,177	AGF	1999	JCT SANTA FE CO. RD. 78.
	4.545	P		6	15	1,171	1,171	1,177	AGF	1999	
	5.226	P		6	15	1,171	1,171	1,177	AGF	1999	
END---	5.345			6							
NM0594	0.000	P	PRAR		25	0	0	0	AGF		FROM JUNCTION NM599 NORTHWESTERLY
(EVENTUALLY				0							
END---	1.000										
NM0599	0.000	M			11	2,936	2,896	2,246	AGF	2002	SANTA FE RELIEF ROUTE; FROM NM 14,

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NORTH VIA	0.000	P	0		11	2,964	2,924	2,416	AGF	2002	SANTA FE RELIEF ROUTE; FROM NM 14,
NORTH VIA	0.116	M	0		11	3,398	3,337	3,263	AGF	2000	JCT. EAST FRONTAGE ROAD FR2097 &
IG2276 (ON-R	0.116	P	23		11	1,716	1,685	1,648	AGF	2000	JCT. EAST FRONTAGE ROAD FR2097 &
IG2276 (ON-R	0.449	M	23		11	3,232	3,174	2,307	AGF	2002	JCT. IB2276 (I-25 NORTH BOUND
SECOND OFF-RAMP	0.449	P	0		11	5,429	5,332	1,620	AGF	2002	JCT. IB2276 (I-25 NORTH BOUND
SECOND OFF-RAMP	0.498	M	0		11	3,323	4,685	4,582	COV	2003	JCT. IA2276 (I-25 NORTH BOUND FIRST
OFF-RAMP	0.498	P	0		11	5,985	4,333	4,237	COV	2003	JCT. IA2276 (I-25 NORTH BOUND FIRST
OFF-RAMP	0.540	M	0		4	3,323	4,685	4,582	COV	2003	I-25 OVERPASS
	0.540	P	0		4	5,985	4,333	4,237	COV	2003	I-25 OVERPASS
	0.581	M	0		11	2,662	2,614	3,068	AGF	2002	JCT. IO2276 & IU2276 (I-25 SECOND
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NM0599	0.581	P	PRAR		SANTA FE	11	4,635	4,552	1,820	AGF	2002	JCT. IO2276 & IU2276 (I-25 SECOND
OFF-RAMP &	0.756	M		0		11	6,698	6,578	2,569	AGF	2002	JCT. IN2276 (I-25 SOUTHBOUND FIRST
OFF-RAMP T	0.756	P		0		11	6,311	6,198	2,529	AGF	2002	JCT. IN2276 (I-25 SOUTHBOUND FIRST
OFF-RAMP T	0.765	M		0		11	6,587	6,469	4,732	AGF	2002	JCT. IT2276 (FIRST ON-RAMP ONTO
SOUTHBOUND I-	0.765	P		0		11	6,004	5,896	4,013	AGF	2002	JCT. IT2276 (FIRST ON-RAMP ONTO
SOUTHBOUND I-	0.849	M		0		4	6,587	6,469	4,732	AGF	2002	
	0.849	P		0		4	6,004	5,896	4,013	AGF	2002	

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	0.973 M	0	4	6,587	6,469	4,732 AGF	2002		
	0.973 P	0	4	6,004	5,896	4,013 AGF	2002		
	0.987 M	0	11	7,042	6,370	5,536 ATR	2003	JCT. WEST FRONTAGE ROAD FR2098.	
	0.987 P	0	11	6,443	5,772	5,060 ATR	2003	JCT. WEST FRONTAGE ROAD FR2098.	
	1.050 M	0	4	7,042	6,370	5,536 ATR	2003		
	1.050 P	0	4	6,443	5,772	5,060 ATR	2003		
	3.300 M	0	4	7,042	6,370	5,536 ATR	2003		
	3.300 P	0	4	6,443	5,772	5,060 ATR	2003		
	3.581 M	0	11	5,570	5,470	4,384 AGF	2002	JCT AIRPORT ROAD (FL4726 -- OLD NM	
284).	3.581 P	11	11	5,510	5,411	4,268 AGF	2002	JCT AIRPORT ROAD (FL4726 -- OLD NM	
284).	3.603 M	11	4	5,570	5,470	4,384 AGF	2002		
	3.603 P	11	4	5,510	5,411	4,268 AGF	2002		
	4.500 M	11	4	5,570	5,470	4,384 AGF	2002		
	4.500 P	11	4	5,510	5,411	4,268 AGF	2002		
	5.780 M	11	4	5,570	5,470	4,384 AGF	2002		
	5.780 P	11	4	5,510	5,411	4,268 AGF	2002		
	6.300 M	11	11	5,466	5,368	4,384 AGF	2002	JCT SANTA FE COUNTY ROAD 62 (CAJA	
DEL ORO ROA	6.300 P	10	11	5,354	5,258	4,268 AGF	2002	JCT SANTA FE COUNTY ROAD 62 (CAJA	
DEL ORO ROA	8.130 M	10	19	5,466	5,368	4,384 AGF	2002	JCT SANTA FE COUNTY ROAD 70.	
	8.130 P	10	19	5,354	5,258	4,268 AGF	2002	JCT SANTA FE COUNTY ROAD 70.	
	9.780 M	10	12	4,985	4,896	4,384 AGF	2002	INTERCHANGE RAMPS--CAMINO LA	
TIERRA.	9.780 P		12	4,865	4,778	4,268 AGF	2002	INTERCHANGE RAMPS--CAMINO LA	16
TIERRA.	10.030 M		4	4,985	4,896	4,384 AGF	2002	CENTER LINE BRIDGE #9091 (CAMINO LA	16
TIERRA)	10.030 P	16	4	4,865	4,778	4,268 AGF	2002	CENTER LINE BRIDGE #9091 (CAMINO LA	

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TIERRA) 16
10.230 M 12 5,799 5,695 4,384 AGF 2002 INTERCHANGE RAMPS--CAMINO LA TIERRA
16
10.230 P 12 5,107 5,015 4,268 AGF 2002 INTERCHANGE RAMPS--CAMINO LA TIERRA
16
11.670 M 19 5,799 5,695 4,384 AGF 2002 JCT CAMINO DEL LOS MONTOYAS (COUNTY
ROAD 85) 16
11.670 P 19 5,107 5,015 4,268 AGF 2002 JCT CAMINO DEL LOS MONTOYAS (COUNTY
ROAD 85) 16
12.580 M 12 6,748 4,483 4,384 COV 2003 INTERCHANGE RAMPS
16
12.580 P 12 6,918 4,364 4,268 COV 2003 INTERCHANGE RAMPS
16
13.040 M 12 4,565 4,483 4,384 AGF INTERCHANGE RAMPS 8Y interchange
16
13.040 P 12 4,444 4,364 4,268 AGF INTERCHANGE RAMPS
16
END--- 14.019
SP5003 0.000 P LOC 17 382 0 0 COV 2003 HYDE MEMORIAL STATE PARK; ACCESS TO
PICNIC AR 0
0.200 P 4 382 0 0 COV 2003
0
END--- 2.000

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
UA8401 TO NM 502	0.000	P	PRAR 42	SANTA FE	16	1,118	1,103	0	AGF	2002	NORTHBOUND OFF-RAMP FROM US 84/285
END---	0.280										
UG8401 US 84/285	0.000	P I	3		16	1,035	1,021	0	AGF	2002	NORTHBOUND ON-RAMP FROM NM 502 TO
END---	0.197										
UN8401 TO NM 502	0.000	P	0		16	0	0	0	AGF		SOUTHBOUND OFF-RAMP FROM US 84/285
END---	0.246										
UO8401 TO NM 502	0.000	P	0		16	0	0	0	AGF		SOUTHBOUND OFF-RAMP FROM US 84/285

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END---	0.095								
US0084	161.806 M	8	11	1,126	1,111	1,091	AGF	1995	JCT RABBIT ROAD IN SANTA FE.
	161.806 P	8	11	900	888	872	AGF	1995	JCT RABBIT ROAD IN SANTA FE.
	162.033 M	8	11	1,187	1,166	1,140	AGF	1997	I-25 SOUTH RAMPS.
	162.033 P	8	11	1,162	1,141	1,116	AGF	1997	I-25 SOUTH RAMPS.
	162.137 M	8	2	1,187	1,166	1,140	AGF	1997	
	162.137 P	8	2	1,162	1,141	1,116	AGF	1997	
SOUTHBOUND OVE	162.281 M	8	12	11,979	11,764	11,504	AGF	2000	BETWEEN I-25 NORTHBOUND & I-25
SOUTHBOUND OVE	162.281 P	8	12	11,270	11,068	10,824	AGF	2000	BETWEEN I-25 NORTHBOUND & I-25
	162.556 M	8	11	27,462	26,969	26,374	AGF	1997	I-25 NORTH RAMPS.
	162.556 P	8	11	24,660	24,217	23,683	AGF	1997	I-25 NORTH RAMPS.
	162.561 M	8	2	27,462	26,969	26,374	AGF	1997	
	162.561 P	8	2	24,660	24,217	23,683	AGF	1997	
	162.694 M	8	2	27,462	26,969	26,374	AGF	1997	
	162.694 P	8	2	24,660	24,217	23,683	AGF	1997	
	162.751 M	8	2	27,462	26,969	26,374	AGF	1997	
	162.751 P	8	2	24,660	24,217	23,683	AGF	1997	
	162.798 M	8	11	25,389	24,933	24,383	AGF		JCT. SAWMILL RD.
	162.798 P	8	11	24,580	24,139	23,606	AGF		JCT. SAWMILL RD.
	162.841 M	8	2	25,389	24,933	24,383	AGF		
	162.841 P	8	2	24,580	24,139	23,606	AGF		
	163.071 M	8	2	25,389	24,933	24,383	AGF		
	163.071 P	8	2	24,580	24,139	23,606	AGF		
	163.132 M	6	11	21,890	20,907	20,230	ATR	2003	JCT. ZIA RD.
	163.132 P		11	21,040	20,155	19,568	ATR	2003	JCT. ZIA RD.

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Posted Route	Begin MPNT	DIR	Func Cls / Heavy Comm	County	TYP	2003	2002	2001	Meth	Year	Terminus
	163.482	M	6		11	25,256	24,803	24,256	AGF	1998	JCT SIRINGO ROAD.
	163.482	P	6		11	23,495	23,073	22,564	AGF	1998	JCT SIRINGO ROAD.
	163.691	M	6		2	25,256	24,803	24,256	AGF	1998	
	163.691	P	6		2	23,495	23,073	22,564	AGF	1998	
	163.709	M	6		11	25,435	24,978	24,427	AGF	1998	JCT ST. MICHAEL'S DR. SOUTH RAMPS
	163.709	P	6		11	22,942	22,530	22,033	AGF	1998	JCT ST. MICHAEL'S DR. SOUTH RAMPS
	163.851	M	6		2	25,435	24,978	24,427	AGF	1998	
	163.851	P	6		2	22,942	22,530	22,033	AGF	1998	
	163.957	M	6		2	25,435	24,978	24,427	AGF	1998	

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS / HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
US0084	163.957	P	PRAR 6	SANTA FE	2	22,942	22,530	22,033	AGF	1998	
	163.964	M	0		11	20,815	20,441	19,990	AGF		NM 466 (ST. MICHAEL'S DRIVE).
	163.964	P	0		11	18,873	18,534	18,125	AGF		NM 466 (ST. MICHAEL'S DRIVE).
	164.162	M	0		11	29,808	29,273	28,627	AGF		JCT ST. MICHAEL'S DR. NORTH RAMPS.
	164.162	P	0		11	28,343	27,834	27,220	AGF		JCT ST. MICHAEL'S DR. NORTH RAMPS.
	164.177	M	0		11	19,650	19,297	23,327	AGF	2002	JCT SAN MATEO ROAD.
	164.177	P	0		11	24,416	23,978	26,742	AGF	2002	JCT SAN MATEO ROAD.
	164.569	M			2	19,650	19,297	23,327	AGF	2002	

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164.569 P	0	2	24,416	23,978	26,742	AGF	2002	
164.797 M	0	11	21,569	21,978	21,552	ATR	2003	JCT ALTA VISTA ST.
164.797 P	6	11	21,528	21,720	21,170	ATR	2003	JCT ALTA VISTA ST.
164.836 M	6	2	21,569	21,978	21,552	ATR	2003	
164.836 P	6	2	21,528	21,720	21,170	ATR	2003	
164.859 M	6	2	21,569	21,978	21,552	ATR	2003	
164.859 P	6	2	21,528	21,720	21,170	ATR	2003	
164.924 M	6	2	21,569	21,978	21,552	ATR	2003	
164.924 P	6	2	21,528	21,720	21,170	ATR	2003	
164.931 M	6	2	21,569	21,978	21,552	ATR	2003	
164.931 P	6	2	21,528	21,720	21,170	ATR	2003	
164.996 M	6	2	21,569	21,978	21,552	ATR	2003	
164.996 P	6	2	21,528	21,720	21,170	ATR	2003	
165.022 M	6	11	19,978	19,619	20,054	AGF	2002	JCT. CORDOVA RD.
165.022 P	6	11	19,051	18,709	19,537	AGF	2002	JCT. CORDOVA RD.
165.138 M	6	2	19,978	19,619	20,054	AGF	2002	
165.138 P	6	2	19,051	18,709	19,537	AGF	2002	
165.273 M	6	11	17,249	20,030	25,548	COV	2003	JCT CERRILLOS ROAD.
165.273 P	6	11	18,057	19,230	26,849	COV	2003	JCT CERRILLOS ROAD.
165.311 M	6	2	17,249	20,030	25,548	COV	2003	
165.311 P	6	2	18,057	19,230	26,849	COV	2003	
165.330 M	6	2	17,249	20,030	25,548	COV	2003	
165.330 P	6	2	18,057	19,230	26,849	COV	2003	
165.356 M	6	2	17,249	20,030	25,548	COV	2003	

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
				6								
	165.356	P		6		2	18,057	19,230	26,849	COV	2003	
	165.381	M		6		19	17,249	20,030	25,548	COV	2003	JCT MERCER STREET (FL5689).
	165.381	P		6		19	18,057	19,230	26,849	COV	2003	JCT MERCER STREET (FL5689).
	165.418	M		6		2	17,249	20,030	25,548	COV	2003	
	165.418	P		6		2	18,057	19,230	26,849	COV	2003	
	165.455	M		6		2	17,249	20,030	25,548	COV	2003	
	165.455	P		6		2	18,057	19,230	26,849	COV	2003	
	165.543	M		6		11	22,118	21,721	21,242	AGF	2000	JCT HICKOX STREET (FL4807).
	165.543	P		6		11	21,240	20,859	20,399	AGF	2000	JCT HICKOX STREET (FL4807).
	165.581	M		6		2	22,118	21,721	21,242	AGF	2000	
	165.581	P		6		2	21,240	20,859	20,399	AGF	2000	
	165.733	M		6		11	18,835	27,049	26,452	COV	2003	JCT AGUA FRIA ST.
	165.733	P		6		11	19,235	27,927	27,311	COV	2003	JCT AGUA FRIA ST.

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
US0084	165.944	M	PRAR	6	SANTA FE	2	18,835	27,049	26,452	COV	2003	
	165.944	P		6		2	19,235	27,927	27,311	COV	2003	
	166.040	M		6		11	25,568	25,109	24,555	AGF		JCT WEST ALAMEDA ST.
	166.040	P				11	29,621	29,089	28,447	AGF		JCT WEST ALAMEDA ST.

166.091 M	6	2	25,568	25,109	24,555	AGF		
166.091 P	6	2	29,621	29,089	28,447	AGF		
166.177 M	6	11	12,872	12,641	13,468	AGF	2002	JCT PASEO DE PERALTA
166.177 P	0	11	13,722	13,476	14,009	AGF	2002	JCT PASEO DE PERALTA
166.565 M	0	2	12,872	12,641	13,468	AGF	2002	
166.565 P	0	2	13,722	13,476	14,009	AGF	2002	
166.576 M	0	11	14,487	14,227	12,928	AGF	2002	JCT ALAMO DRIVE
166.576 P	17	11	13,066	12,831	12,266	AGF	2002	JCT ALAMO DRIVE
166.901 M	17	11	14,761	14,496	14,176	AGF	2001	JCT GUADALUPE STREET.
166.901 P	0	11	15,320	15,045	14,713	AGF	2001	JCT GUADALUPE STREET.
166.994 M	0	2	14,761	14,496	14,176	AGF	2001	
166.994 P	0	2	15,320	15,045	14,713	AGF	2001	
167.500 M	0	3	14,761	14,496	14,176	AGF	2001	
167.500 P	0	3	15,320	15,045	14,713	AGF	2001	
167.698 M	0	2	14,761	14,496	14,176	AGF	2001	
167.698 P	0	2	15,320	15,045	14,713	AGF	2001	
167.870 M	0	11	16,097	15,808	15,459	AGF		JCT NM 599 (SANTA FE BYPASS).
167.870 P	0	11	18,233	17,906	17,511	AGF		JCT NM 599 (SANTA FE BYPASS).
167.908 M	0	11	30,549	30,001	29,339	AGF		JCT CAMINO LA TIERRA.
167.908 P	0	11	30,635	30,085	29,421	AGF		JCT CAMINO LA TIERRA.
167.980 M	0	2	30,549	30,001	29,339	AGF		
167.980 P	0	2	30,635	30,085	29,421	AGF		
168.186 M	0	11	19,975	19,616	18,991	AGF	2002	JCT OLD TAOS HIGHWAY.
168.186 P	0	11	20,346	19,981	19,317	AGF	2002	JCT OLD TAOS HIGHWAY.

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168.275 M	0	2	19,975	19,616	18,991	AGF	2002	
168.275 P	0	2	20,346	19,981	19,317	AGF	2002	
168.441 M	0	2	19,975	19,616	18,991	AGF	2002	
168.441 P	0	2	20,346	19,981	19,317	AGF	2002	
168.691 M	0	11	19,982	19,623	19,190	AGF		JCT. CAMINO ENCANTADO
168.691 P	0	11	19,667	19,314	18,888	AGF		JCT. CAMINO ENCANTADO
168.701 M	0	2	19,982	19,623	19,190	AGF		
168.701 P	0	2	19,667	19,314	18,888	AGF		
168.719 M	0	11	16,128	15,838	19,190	AGF	2002	JCT. TANO ROAD
168.719 P	18	11	16,169	15,879	18,888	AGF	2002	JCT. TANO ROAD
168.749 M	18	2	16,128	15,838	19,190	AGF	2002	
168.749 P	18	2	16,169	15,879	18,888	AGF	2002	
168.771 M	18	11	17,301	18,990	19,233	ATR	2003	JCT CIRCLE DRIVE
168.771 P	6	11	17,161	19,149	19,637	ATR	2003	JCT CIRCLE DRIVE
169.024 M	6	2	17,301	18,990	19,233	ATR	2003	
169.024 P	6	2	17,161	19,149	19,637	ATR	2003	
169.081 M	6	2	17,301	18,990	19,233	ATR	2003	
	6							

POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS

US0084	169.081	P	PRAR 6	SANTA FE	2	17,161	19,149	19,637	ATR	2003	
	169.809	M	6		2	17,301	18,990	19,233	ATR	2003	
	169.809	P	6		2	17,161	19,149	19,637	ATR	2003	
	170.000	M	6		2	17,301	18,990	19,233	ATR	2003	
	170.000	P	6		2	17,161	19,149	19,637	ATR	2003	
	170.137	M	6		2	17,301	18,990	19,233	ATR	2003	
	170.137	P	6		2	17,161	19,149	19,637	ATR	2003	
	170.170	M	18		11	16,633	16,406	16,808	AGF	2002	JCT CO. RD. 73/OLD NM 591.
	170.170	P	18		11	16,937	16,706	13,557	AGF	2002	JCT CO. RD. 73/OLD NM 591.
	170.557	M	18		2	16,633	16,406	16,808	AGF	2002	
	170.557	P	18		2	16,937	16,706	13,557	AGF	2002	
	171.947	M	18		2	16,633	16,406	16,808	AGF	2002	
	171.947	P	18		2	16,937	16,706	13,557	AGF	2002	
	172.639	M	18		3	16,633	16,406	16,808	AGF	2002	
	172.639	P	18		3	16,937	16,706	13,557	AGF	2002	
	173.056	M	18		11	15,757	15,542	15,040	AGF	2002	JCT. CO RD 73/OLD NM 591
	173.056	P	18		11	15,604	15,391	11,960	AGF	2002	JCT. CO RD 73/OLD NM 591
	173.081	M	18		2	15,757	15,542	15,040	AGF	2002	
	173.081	P	18		2	15,604	15,391	11,960	AGF	2002	
	173.397	M	18		2	15,757	15,542	15,040	AGF	2002	
	173.397	P	18		2	15,604	15,391	11,960	AGF	2002	
	174.722	M	18		2	15,757	15,542	15,040	AGF	2002	
	174.722	P	18		2	15,604	15,391	11,960	AGF	2002	
	175.085	M			11	15,537	15,419	15,148	COV	2003	JCT ROAD TO TESUQUE PUEBLO.

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	9								
175.085 P	9	11	15,713	16,041	15,759	COV	2003	JCT ROAD TO TESUQUE PUEBLO.
175.471 M	9	2	15,537	15,419	15,148	COV	2003	
175.471 P	9	2	15,713	16,041	15,759	COV	2003	
175.509 M	9	2	15,537	15,419	15,148	COV	2003	
175.509 P	9	2	15,713	16,041	15,759	COV	2003	
177.658 M	9	2	15,537	15,419	15,148	COV	2003	
177.658 P	9	2	15,713	16,041	15,759	COV	2003	
178.700 M	9	3	15,537	15,419	15,148	COV	2003	
178.700 P	9	3	15,713	16,041	15,759	COV	2003	
178.912 M	9	2	15,537	15,419	15,148	COV	2003	
178.912 P	9	2	15,713	16,041	15,759	COV	2003	
179.709 M	9	2	15,537	15,419	15,148	COV	2003	
179.709 P	9	2	15,713	16,041	15,759	COV	2003	
180.329 M	9	2	15,537	15,419	15,148	COV	2003	
180.329 P	9	2	15,713	16,041	15,759	COV	2003	
180.391 M	9	19	15,537	15,419	15,148	COV	2003	JCT FRONTAGE RD. 8401--POJOAQUE.
180.391 P	9	19	15,713	16,041	15,759	COV	2003	JCT FRONTAGE RD. 8401--POJOAQUE.
180.478 M	9	2	15,537	15,419	15,148	COV	2003	
180.478 P	9	2	15,713	16,041	15,759	COV	2003	
180.479 M	9	2	15,537	15,419	15,148	COV	2003	
180.479 P	9	2	15,713	16,041	15,759	COV	2003	
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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
US0084	180.550	M	PRAR	9	SANTA FE	3	15,537	15,419	15,148	COV	2003	
	180.550	P		9		3	15,713	16,041	15,759	COV	2003	
	180.731	M		9		19	15,537	15,419	15,148	COV	2003	JCT PUEBLO PLAZA RD.
	180.731	P		9		19	15,713	16,041	15,759	COV	2003	JCT PUEBLO PLAZA RD.
	181.101	M		9		19	15,537	15,419	15,148	COV	2003	JCT ACCESS TO FRONTAGE RD. FR8401 (NEAR KOKOM
	181.101	P		9		19	15,713	16,041	15,759	COV	2003	JCT ACCESS TO FRONTAGE RD. FR8401 (NEAR KOKOM
	181.226	M		9		2	15,537	15,419	15,148	COV	2003	
	181.226	P		9		2	15,713	16,041	15,759	COV	2003	
	181.291	M		9		19	15,537	15,419	15,148	COV	2003	JCT RAMP G NM 502 & JCT ACCESS FRONTAGE RD. F
	181.291	P		9		19	15,713	16,041	15,759	COV	2003	JCT RAMP G NM 502 & JCT ACCESS FRONTAGE RD. F
	181.381	M		9		2	15,537	15,419	15,148	COV	2003	
	181.381	P		9		2	15,713	16,041	15,759	COV	2003	
	181.460	M		9		3	15,537	15,419	15,148	COV	2003	
	181.460	P		9		3	15,713	16,041	15,759	COV	2003	
	181.501	M		9		19	15,537	15,419	15,148	COV	2003	JCT FRONTAGE RD. FR8401--POJOAQUE.
	181.501	P		9		19	15,713	16,041	15,759	COV	2003	JCT FRONTAGE RD. FR8401--POJOAQUE.
	181.544	M		9		2	15,537	15,419	15,148	COV	2003	
	181.544	P		9		2	15,713	16,041	15,759	COV	2003	
	181.565	M		26		11	11,085	10,934	12,367	AGF	2002	JCT NM 502.
	181.565	P				11	10,761	10,614	13,514	AGF	2002	JCT NM 502.

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181.581	M	26	2	11,085	10,934	12,367	AGF	2002	
181.581	P	26	2	10,761	10,614	13,514	AGF	2002	
181.602	M	26	2	11,085	10,934	12,367	AGF	2002	
181.602	P	26	2	10,761	10,614	13,514	AGF	2002	
181.980	M	26	2	11,085	10,934	12,367	AGF	2002	
181.980	P	26	2	10,761	10,614	13,514	AGF	2002	
181.992	M	26	2	11,085	10,934	12,367	AGF	2002	
181.992	P	26	2	10,761	10,614	13,514	AGF	2002	
182.157	M	26	11	11,604	11,446	11,245	AGF	2001	JCT NM 503--POJOAQUE.
182.157	P	17	11	11,722	11,562	11,359	AGF	2001	JCT NM 503--POJOAQUE.
182.264	M	17	2	11,604	11,446	11,245	AGF	2001	
182.264	P	17	2	11,722	11,562	11,359	AGF	2001	
182.313	M	17	2	11,604	11,446	11,245	AGF	2001	
182.313	P	17	2	11,722	11,562	11,359	AGF	2001	
182.341	M	17	2	11,604	11,446	11,245	AGF	2001	
182.341	P	17	2	11,722	11,562	11,359	AGF	2001	
183.202	M	17	2	11,604	11,446	11,245	AGF	2001	
183.202	P	17	2	11,722	11,562	11,359	AGF	2001	
183.226	M	17	2	11,604	11,446	11,245	AGF	2001	
183.226	P	17	2	11,722	11,562	11,359	AGF	2001	
184.582	M	17	2	11,604	11,446	11,245	AGF	2001	
184.582	P	17	2	11,722	11,562	11,359	AGF	2001	
185.850	M	17	3	11,604	11,446	11,245	AGF	2001	
185.850	P	17	3	11,722	11,562	11,359	AGF	2001	

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	187.605	M	17		2	11,604	11,446	11,245	AGF	2001	
			17								

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS / HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
US0084	187.605	P	PRAR 17	SANTA FE	2	11,722	11,562	11,359	AGF	2001	
	187.894	M	17		2	11,604	11,446	11,245	AGF	2001	
	187.894	P	17		2	11,722	11,562	11,359	AGF	2001	
	188.197	M	8		11	12,407	12,238	12,023	AGF	1997	JCT NM 106/NM 399 (TO SOMBRILLO AND LA MESILL
	188.197	P	8		11	11,816	11,655	11,450	AGF	1997	JCT NM 106/NM 399 (TO SOMBRILLO AND LA MESILL
	188.386	M	8		3	12,407	12,238	12,023	AGF	1997	
	188.386	P	8		3	11,816	11,655	11,450	AGF	1997	
	188.486	M	8		2	12,407	12,238	12,023	AGF	1997	
	188.486	P	8		2	11,816	11,655	11,450	AGF	1997	
	188.602	M	8		2	12,407	12,238	12,023	AGF	1997	
	188.602	P	8		2	11,816	11,655	11,450	AGF	1997	
	188.819	M	8		3	12,407	12,238	12,023	AGF	1997	
	188.819	P	8		3	11,816	11,655	11,450	AGF	1997	
	189.002	M	8		2	12,407	12,238	12,023	AGF	1997	
	189.002	P	8		2	11,816	11,655	11,450	AGF	1997	
END---	189.027										

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Santa Fe

US0285	261.403	P	16	23	1,590	1,752	1,721	COV	2003	SAN MIGUEL/SANTA FE COUNTY LINE.
	261.443	P	16	2	1,590	1,752	1,721	COV	2003	
	261.662	P	16	15	1,590	1,752	1,721	COV	2003	
	262.025	P	16	3	1,590	1,752	1,721	COV	2003	
	262.783	P	16	3	1,590	1,752	1,721	COV	2003	
	265.113	P	16	15	1,590	1,752	1,721	COV	2003	
	265.246	P	16	2	1,590	1,752	1,721	COV	2003	
	265.717	P	16	3	1,590	1,752	1,721	COV	2003	4.314 MILES NORTH OF SAN MIGUEL/SANTA FE COUN
	268.568	P	16	3	1,590	1,752	1,721	COV	2003	
	269.262	P	16	15	1,590	1,752	1,721	COV	2003	
	269.450	P	16	3	1,590	1,752	1,721	COV	2003	
	269.979	P	16	3	1,590	1,752	1,721	COV	2003	8.576 MILES NORTH OF SAN MIGUEL/SANTA FE COUN
	270.153	P	16	3	1,590	1,752	1,721	COV	2003	
	270.286	P	16	3	1,590	1,752	1,721	COV	2003	
	270.403	P	16	2	1,590	1,752	1,721	COV	2003	
	270.683	P	26	11	2,557	2,522	2,478	AGF	2001	JCT SANTA FE COUNTY RD 34 NORTH TO ROWE AND I
	272.104	P	26	3	2,557	2,522	2,478	AGF	2001	
	273.293	P	26	3	2,557	2,522	2,478	AGF	2001	
	276.327	P	26	3	2,557	2,522	2,478	AGF	2001	
	276.460	P	26	3	2,557	2,522	2,478	AGF	2001	
	277.331	P	26	4	2,557	2,522	2,478	AGF	2001	
	278.862	P	26	3	2,557	2,522	2,478	AGF	2001	
	279.518	P	26	3	2,557	2,522	2,478	AGF	2001	
	279.627	P	26	3	2,557	2,522	2,478	AGF	2001	

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS / HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
	279.651	P	26	Santa Fe	3	2,557	2,522	2,478	AGF	2001	
	281.532	P	26		3	2,557	2,522	2,478	AGF	2001	10.849 MILES NORTH OF COUNTY ROAD 34.
	282.051	P	26		3	2,557	2,522	2,478	AGF	2001	
	282.894	P	26		3	2,557	2,522	2,478	AGF	2001	

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US0285	283.614	P	PRAR 26	SANTA FE	3	2,557	2,522	2,478	AGF	2001	
	284.154	P	26		3	2,557	2,522	2,478	AGF	2001	
	284.662	P	26		3	2,557	2,522	2,478	AGF	2001	
	284.729	P	26		15	2,557	2,522	2,478	AGF	2001	
	284.973	P	26		3	2,557	2,522	2,478	AGF	2001	
	285.025	P	26		15	2,557	2,522	2,478	AGF	2001	
	285.134	P	26		3	2,557	2,522	2,478	AGF	2001	
	285.158	P	26		3	2,557	2,522	2,478	AGF	2001	
	287.748	P	26		15	2,557	2,522	2,478	AGF	2001	
	288.505	P	26		15	2,557	2,522	2,478	AGF	2001	
	288.637	P	26		3	2,557	2,522	2,478	AGF	2001	
	288.746	P	26		3	2,557	2,522	2,478	AGF	2001	
	288.932	P	26		3	2,557	2,522	2,478	AGF	2001	

Santa Fe
288.979 P 2 2,557 2,522 2,478 AGF 2001
26
289.029 M 11 3,799 3,747 1,618 AGF 2002 JCT NM 41 SOUTH TO I-40 AT
MORIARTY. 13
289.029 P 11 3,992 3,938 1,737 AGF 2002 JCT NM 41 SOUTH TO I-40 AT
MORIARTY. 13
289.262 M 15 3,799 3,747 1,618 AGF 2002
13
289.262 P 15 3,992 3,938 1,737 AGF 2002
13
289.338 M 11 5,602 5,526 5,429 AGF 2001 JCT SANTA FE COUNTY RD. 33 EAST TO
LAMY. 10
289.338 P 11 5,725 5,647 5,548 AGF 2001 JCT SANTA FE COUNTY RD. 33 EAST TO
LAMY. 10
289.394 M 3 5,602 5,526 5,429 AGF 2001
10
289.394 P 3 5,725 5,647 5,548 AGF 2001
10
289.553 M 3 5,602 5,526 5,429 AGF 2001
10
289.553 P 3 5,725 5,647 5,548 AGF 2001
10
289.611 M 3 5,602 5,526 5,429 AGF 2001
10
289.611 P 3 5,725 5,647 5,548 AGF 2001
10
289.777 M 3 5,602 5,526 5,429 AGF 2001
10
289.777 P 3 5,725 5,647 5,548 AGF 2001
10
289.910 M 3 5,602 5,526 5,429 AGF 2001
10
289.910 P 3 5,725 5,647 5,548 AGF 2001
10
291.446 M 3 5,602 5,526 5,429 AGF 2001
10
291.446 P 3 5,725 5,647 5,548 AGF 2001
10
291.622 M 1 5,602 5,526 5,429 AGF 2001
10
291.622 P 1 5,725 5,647 5,548 AGF 2001
10
294.512 M 11 6,561 6,472 6,011 AGF 2002 JCT AVENIDA VISTA GRANDE AT EL
DORADO. 13
294.512 P 11 6,371 6,284 6,151 AGF 2002 JCT AVENIDA VISTA GRANDE AT EL
DORADO. 13
294.970 M 4 6,561 6,472 6,011 AGF 2002
13

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					Santa Fe							
	294.970	P		13		4	6,371	6,284	6,151	AGF	2002	
	295.481	M		13		2	6,561	6,472	6,011	AGF	2002	
	295.481	P		13		2	6,371	6,284	6,151	AGF	2002	
	295.762	M		13		2	6,561	6,472	6,011	AGF	2002	
	295.762	P		13		2	6,371	6,284	6,151	AGF	2002	
	295.808	M		13		11	1,962	1,935	1,901	AGF		JCT I-25 EXIT 290 (SOUTH TO CLINES CORNERS).
	295.808	P		10		11	1,978	1,951	1,917	AGF		JCT I-25 EXIT 290 (SOUTH TO CLINES CORNERS).
	295.854	M		10		3	1,962	1,935	1,901	AGF		0.201 MILE SOUTH OF JCT NM 300.
				10								

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US0285	295.854	P	PRAR	10	SANTA FE	3	1,978	1,951	1,917	AGF		0.201 MILE SOUTH OF JCT NM 300.
END---	296.055											
UT8401 TO US 84/28	0.000	P		0		16	0	0	0	AGF		SOUTHBOUND ON-RAMP FROM NM 502 WB
END---	0.265											
UU8401 TO US 84/28	0.000	P		0		16	0	0	0	AGF		SOUTHBOUND ON-RAMP FROM NM 502 EB
END---	0.114											
XX0150	0.000	P	LOC	0		88	325	319	313	AGF		FAI 25 FR
	1.990	P		0		88	325	319	313	AGF		
	2.016	P		0		88	325	319	313	AGF		FAS 1504
END---	2.298											
XX0600	0.000	P		0		88	572	560	549	AGF		AGUA FRIA

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						Santa Fe			
	0.200	P	0	88	572	560	549	AGF	
END---	0.595								
XX0605	0.000	P	0	88	572	560	549	AGF	FAP 51
END---	0.990								
XX0630	0.000	P	0	88	572	560	549	AGF	CORDOVA R
	0.185	P	0	88	572	560	549	AGF	
	0.569	P	0	88	572	560	549	AGF	ST MICHAL
END---	0.989								
XX0680	0.000	P	0	88	572	560	549	AGF	
END---	0.240								
XX0755	0.000	P	0	88	572	560	549	AGF	BISHOPS L
END---	0.227								
XX0885	23.800	P	0	88	325	319	313	AGF	
	44.900	P	0	88	325	319	313	AGF	
	62.700	P	0	88	325	319	313	AGF	
END---	74.400								
XX0955	0.000	P	0	88	325	319	313	AGF	
	0.700	P	0	88	325	319	313	AGF	
	3.000	P	0	88	325	319	313	AGF	
END---	4.400								
XX1470	400.100	P	0	88	325	319	313	AGF	
	655.000	P	0	88	325	319	313	AGF	
	886.100	P	0	88	325	319	313	AGF	

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ROUTE	MPNT	R	HEAVY CLS	COMM	COUNTY	P	2003	2002	2001	METH	YEAR	TERMINUS
END---	999.400											
XX1475	0.000	P	LOC	0	SANTA FE	88	325	319	313	AGF		
	3.700	P		0		88	325	319	313	AGF		
	4.200	P		0		88	325	319	313	AGF		
	5.300	P		0		88	325	319	313	AGF		
END---	37.900											
XX1920	18.200	P		0		88	572	560	549	AGF		
	51.700	P		0		88	572	560	549	AGF		
	71.400	P		0		88	572	560	549	AGF		
	153.500	P		0		88	572	560	549	AGF		
	159.500	P		0		88	572	560	549	AGF		
	171.900	P		0		88	572	560	549	AGF		
	180.100	P		0		88	572	560	549	AGF		
	246.900	P		0		88	572	560	549	AGF		
	255.600	P		0		88	572	560	549	AGF		
END---	255.700											
49P001	0.000	P		0		5	1,591	1,560	1,529	AGF	1995	JCT. AIRPORT ROAD SOUTH TO THE END OF PAVEMEN
	0.062	P		0		5	1,591	1,560	1,529	AGF	1995	JCT. CALLE VENCENJO
END---	0.280											
49P002	0.000	P	COLL	0		5	2,789	2,734	2,680	AGF	1995	JCT. AIRPORT ROAD SOUTH TO THE ENTRANCE TO JE
END---	0.196											
49P003	0.000	P	MNAR	0		5	10,918	10,703	10,494	AGF	1995	MEADOWS RD. IN SANTA FE FROM AIRPORT RD. SOUT
	0.037	P		0		19	10,918	10,703	10,494	AGF	1995	JCT. ENTRANCE TO SWEENEY ELEMENTARY SCHOOL
	0.209	P		0		19	10,918	10,703	10,494	AGF	1995	JCT. ENTRANCE TO MEADOWS APPARTMENTS

Santa Fe

0.568 P 19 10,918 10,703 10,494 AGF 1995 JCT. ENTRANCE TO EDWARD ORTIZ
ELEMENTARY SCHO 0
END--- 0.642
49P004 0.000 P COLL 5 4,991 3,916 3,839 COV 2003 PASEO DEL SOL IN SANTA FE FROM
AIRPORT RD. SO 0
0.738 P 19 4,991 3,916 3,839 COV 2003 JCT. JAGUAR ESTATES
0
END--- 0.889
49P005 0.000 P MNAR 5 12,346 12,104 11,867 AGF 1995 CAMINO ENTRADA IN SANTA FE FROM THE
JCT. OF A 0
END--- 0.270
49P006 0.000 P COLL 11 8,600 8,432 8,267 AGF 2001 CAMINO ATAJO FROM THE JCT. OF
AIRPORT RD. NOR 0
0.245 P 11 0 0 0 AGF JCT. AVENIDA DE LAS ACEQUIAS
0
0.527 P 11 0 0 0 AGF JCT. RUFINA STREET
0
0.615 P 11 0 0 0 AGF JCT. CALLE AMANDA
0
0.798 P 19 0 0 0 AGF JCT. AVENIDA LINDA
0
0.915 P 19 0 0 0 AGF JCT. CALLE DON ROBERTO
0

POSTED ROUTE | BEGIN MPNT | DIR | FUNC CLS / HEAVY COMM | COUNTY | TYP | 2003 | 2002 | 2001 | METH | YEAR | TERMINUS

49P006 1.021 P COLL SANTA FE 19 0 0 0 AGF JCT. PASEO DE LA ACEQUIA
0
END--- 1.073
49P007 0.000 P LOC 11 12,231 11,991 11,756 AGF 1995 ZEPOL ROAD FROM JCT OF AIRPORT RD.
NORTH TO E 0
END--- 0.231
49P008 0.000 P COLL 11 4,884 4,788 4,694 AGF 1995 LA CARERA RD. FROM THE JCT. OF
AIRPORT RD. S. 0
0.111 P 19 4,884 4,788 4,694 AGF 1995 JCT. APACHE PLUME ROAD.
0
0.143 P 19 4,884 4,788 4,694 AGF 1995 JCT. SARATOGA LANE.

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0
END--- 0.258
49P009 0.000 P LOC 11 0 0 0 AGF CR-P009 (AVE. CASA DEL ORO)FROM
AVE.VISTA GRA 0
END--- 1.710
49P010 0.000 P 11 0 0 0 AGF CR-P010 (AVE. DE MONTE ALTO) FR US
285 NW,SW 0
1.470 P 5 0 0 0 AGF END OF PAVEMENT
0
END--- 1.960
49P011 0.000 P 11 0 0 0 AGF CR-P011 (AVE. DE COMPADRES) FR AVE.
ELDORADO 0
0.420 P 5 0 0 0 AGF END GRAVEL, START PAVEMENT
0
1.790 P 5 0 0 0 AGF END PAVEMENT, START GRAVEL
0
END--- 2.420
49P012 0.000 P 11 0 0 0 AGF CR-P012 (AVE. CASA DEL ORO) FR US
285 SW TO J 0
END--- 3.480
49P013 0.000 P 11 0 0 0 AGF CR-P013 (AVE. CONDESA RD) FR AVE.
VISTA GRAND 0
END--- 1.100
49P014 0.000 P 11 0 0 0 AGF CR-P014 (AVE. VISTA GRANDE)FROM US
285 NW & S 0
END--- 4.820
49P015 0.000 P 5 0 0 0 AGF ESTRADA CALABASA (CR-15)FROM PASEO
DE LA TIER 0
END--- 1.000
49P016 0.000 P 5 0 0 0 AGF FIN DEL SENDERO (CR-P016) FROM CAM
LA TIERRA 0
END--- 1.200
49P017 0.000 P 11 0 0 0 AGF CR-P017 (CAJA DEL RIO) FROM SR599
N-WESTWARD 0
END--- 3.710
49P018 0.000 P 11 0 0 0 AGF CR-P018 (AVE. DEL SUR) FROM
RICHARDS AVE SW T 0
END--- 1.450
49RR01 0.000 P 2 0 0 0 AGF REATA RD. FROM JCT. FR2098 NORTH TO
END OF RO 0

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POSTED ROUTE	BEGIN MPNT	I R	FUNC CLS	HEAVY COMM	COUNTY	Y P	2003	2002	2001	METH	YEAR	TERMINUS
49RR01	0.125	P	LOC	0	SANTA FE	11	0	0	0	AGF		JCT. CAMINO CHARRO
	0.375	P		0		11	0	0	0	AGF		JCT. CHALAN RD
END---	0.875											
49Z000	0.000	P		0		99	325	319	313	AGF		
	0.001	P		0		99	325	319	313	AGF		
END---	0.002											
49Z001	0.000	P		0		99	572	560	549	AGF		
	0.001	P		0		99	572	560	549	AGF		
	0.002	P		0		99	572	560	549	AGF		
	0.003	P		0		99	325	319	313	AGF		
	0.004	P		0		99	325	319	313	AGF		
	0.005	P		0		99	325	319	313	AGF		
	0.006	P		0		99	325	319	313	AGF		
	0.007	P		0		99	325	319	313	AGF		
	0.008	P		0		99	325	319	313	AGF		
	0.009	P		0		99	325	319	313	AGF		
	0.010	P		0		99	325	319	313	AGF		
	0.011	P		0		99	572	560	549	AGF		
	0.012	P		0		99	325	319	313	AGF		
	0.013	P		0		99	325	319	313	AGF		
	0.014	P		0		99	325	319	313	AGF		
	0.015	P		0		99	325	319	313	AGF		

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								Santa Fe	
	0.016	P		0		99	325	319	313 AGF
	0.017	P		0		99	325	319	313 AGF
	0.018	P		0		99	325	319	313 AGF
	0.019	P		0		99	325	319	313 AGF
	0.020	P		0		99	325	319	313 AGF
	0.021	P		0		99	325	319	313 AGF
	0.022	P		0		99	325	319	313 AGF
	0.023	M		0		99	162	159	156 AGF
	0.023	P		0		99	162	159	156 AGF
	0.024	M		0		99	162	159	156 AGF
	0.024	P		0		99	162	159	156 AGF
END---	0.025								
49Z002	0.000	P		0		99	572	560	549 AGF
	0.001	P		0		99	572	560	549 AGF
END---	0.002								
49Z003	0.000	P		0		99	325	319	313 AGF
	0.001	P		0		99	325	319	313 AGF
END---	0.002								

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001 METH YEAR TERMINUS
49Z004	0.000	P	LOC		SANTA FE	99	325	319	313 AGF

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```
                        0
         0.001 P                 99    325    319    313 AGF
                        0
END---   0.002
49Z005   0.000 P                 99    325    319    313 AGF
                        0
         0.001 P                 99    325    319    313 AGF
                        0
END---   0.002
49Z006   0.000 P                 99    325    319    313 AGF
                        0
         0.001 P                 99    325    319    313 AGF
                        0
         0.002 P                 99    325    319    313 AGF
                        0
END---   0.003
49Z007   0.000 P                 99    325    319    313 AGF
                        0
         0.001 P                 99    325    319    313 AGF
                        0
END---   0.002
49Z008   0.000 P                 99    325    319    313 AGF
                        0
         0.001 P                 99    325    319    313 AGF
                        0
END---   0.002
49Z009   0.000 P                 99    325    319    313 AGF
                        0
         0.001 P                 99    325    319    313 AGF
                        0
END---   0.002
49Z010   0.000 P                 99    325    319    313 AGF
                        0
         0.001 P                 99    325    319    313 AGF
                        0
END---   0.002
490001   0.000 P                 11      0      0      0 AGF    CR 1 FROM CR 8 TO BERNALILLO CTY
LINE-N/FROM                0
         2.860 P                  5      0      0      0 AGF
                        0
         3.540 P                  5      0      0      0 AGF
                        0
END---   4.570
490006   0.000 P                 11      0      0      0 AGF    CR 6 (CHURCH STREET E) FROM QUAIL
TRAIL EASTW               0
END---   1.000
490008   0.000 P                  2      0      0      0 AGF    JUNCTION I-40 - EAST
                        0
```


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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS	END
													16.000
490012	0.000	P		0		11	0	0	0	AGF		CR 12 (HILL RANCH RD) FROM JCT CR 5B WESTWARD	1.000
490013	0.000	P		0		11	0	0	0	AGF		CR 13 FROM JCT CR 8 NORTHWARD TO THE JUNCTION	1.000

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS	END
490014	0.000	P	LOC	0	SANTA FE	11	0	0	0	AGF		CR 14 (NUGENT RD) FROM JCT SR 344 WESTWARD TO	2.000
490015	0.000	P		0		11	0	0	0	AGF		CR 15 (CROSS RANCH RD) FROM JCT 472 SOUTHWARD	1.010
490016	0.000	P		0		11	0	0	0	AGF		CR 16 (FROST RD) FROM BERNALILLO COUNTY LINE	2.950
490017	0.000	P		0		11	0	0	0	AGF		CR 17 (MARTIN RD) FROM JCT CR 8 SOUTHWARD TO	3.000
490018	0.000	P		0		11	0	0	0	AGF		CR 18 (ENTRANOSA RD) FROM JCT SR 344 WESTWARD	2.970
490021	0.000	P		0		11	0	0	0	AGF		CR 21 (KING FARM RD) FROM JCT CR 2A NORTHWARD	3.010
490023	0.000	P		0		11	0	0	0	AGF		CR 23 (VALLEY IRRIGATION RD) FROM JCT CR 10A	4.000
490025	0.000	P		0		11	0	0	0	AGF		CR 25 (HALE RD) FROM JCT SR 472 SOUTHWARD TO	4.010
490026	0.000	P		0		11	0	0	0	AGF		CR 26 (SIMMONS RD) FROM SR 344 EASTWARD TO JU	11.000

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490027 0.000 P 11 0 Santa Fe 0 0 AGF CR 27 (KING RD) FROM JCT SR 472
SOUTHWARD TO 0
END--- 4.010
49003A 0.000 P 11 0 0 0 AGF CR 3A (BROKEN ARROW TRAIL) FROM JCT
CR 14 NOR 0
END--- 2.950
490032 0.000 P 11 0 0 0 AGF CR 32 (RENDONA RD) FROM CR 34
EASTWARD TO SAN 0
END--- 1.950
490033 0.000 P 11 544 534 524 AGF JCT.US285 EAST TO END OF ROUTE AT
LAMY. 0
0.186 P 5 544 534 524 AGF
0
END--- 1.392
490034 0.000 P 11 93 91 89 AGF JCT.US 285 NORTH TO SANTA FE/SAN
MIGUEL COUNT 0
1.830 P 5 93 91 89 AGF
0
7.060 P 5 93 91 89 AGF
0
END--- 11.230

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS

490036 0.000 P MJCL SANTA FE 11 0 0 0 SANTA FE CR36,FROM JCT OLD LAS
VEGAS HWY E-WA 0
END--- 0.270
49004B 0.000 P LOC 11 0 0 0 AGF CR 4B (MONTOYA RD) FROM JCT SR 41
EASTWARD TO 0
END--- 4.140
490041 0.000 P 11 0 0 0 AGF CR 41 (KINSELL RD) FROM CR 20B
SOUTHWARD TO J 0
END--- 2.190
490042 0.000 P MJCL 5 464 464 454 AGF 1995 SANTA FE COUNTY ROAD 42 FROM THE
JCT. OF NM14 0
END--- 9.500
490044 0.000 P LOC 5 2,443 2,395 2,348 AGF 1996 CR 44 FROM JCT SR 14 EASTWARD TO

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NORTHFORK, S				0							
END---	2.780										
490045	0.000	P	MNCL		5	506	0	0	COV	2003	CR 45 FROM JCT SR 14 W,N,W THEN
NORTHWESTWARD				0							
END---	6.720										
490049	0.000	P	LOC		11	0	0	0	AGF		CR 49 (LAS NORIAS RANCH RD) FROM
JCT SR 285 S				0							
END---	2.720										
490051	0.000	P	MNCL		5	0	0	0	AGF		CR 51 FROM JCT I-25 SE,NE LOOP SW,
SE & S TO				0							
	0.250	P			5	0	0	0	AGF		
				0							
	1.250	P	LOC		5	0	0	0	AGF		BEGIN BASECOURSE, END ASPHALT.
				0							
	4.210	P			5	0	0	0	AGF		BEGIN DIRT, END BASECOURSE.
				0							
	4.460	P			5	0	0	0	AGF		
				0							
END---	18.370										
490052	0.000	P			5	0	0	0	AGF		CR 52 (LAS ESTRELLAS RD) FROM W
FRTG RD NW,N				0							
END---	1.790										
490054	0.000	P			2	4,039	0	0	COV	2003	JUNCTION I-25 - WEST
				0							
END---	5.200										
490055	0.000	P	MNCL		11	0	0	0	AGF		CR 55 (GOLDMINE RD) FROM JCT SR 14
SE, NE,SE				0							
	3.100	P			5	0	0	0	AGF		
				0							
	4.460	P			5	0	0	0	AGF		
				0							
END---	5.600										
490056	0.000	P	COLL		5	3,644	3,557	3,488	AGF	1996	SANTA FE CR 56 FROM JCT SF CR54
N-WEST THEN N				0							
END---	5.690										
490057	0.000	P	LOC		5	0	0	0	AGF		SANTA FE CNTY RD 57 FROM CERILLOS
TO JCT. I-2				0							
	0.100	P			11	0	0	0	AGF		JCT. RR-XING
				0							
END---	6.500										

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POSTED ROUTE	BEGIN MPNT	I R	FUNC CLS	HEAVY COMM	COUNTY	Y P	2003	2002	2001	METH	YEAR	TERMINUS
490058	0.000	P	MNCL	0	SANTA FE	11	1,386	1,406	1,378	AGF	1993	SANTA FE CR 490058,FROM JCT NM300
W- THEN N-												
END---	2.980											
490059	0.000	P	LOC	0		11	0	0	0	AGF		CR 59 FROM JCT CR 59B NORTHEASTWARD
TO END OF												
	1.380	P		0		5	0	0	0	AGF		
	1.540	P		0		5	0	0	0	AGF		
END---	1.730											
49006A	0.000	P		0		11	0	0	0	AGF		CR 6A (WESTERN RD) FROM JCT SR 41
EASTWARD TO												
END---	3.780											
490060	0.000	P		0		11	807	791	775	AGF	1993	CNTY RD 60 (NINE MILE RD) FROM JCT
NM 300 WES												
END---	2.600											
490062	0.000	P	COLL	0		11	0	0	0	AGF		SANTA FE CR 62,FROM JCT AGUA FRIA
N-WESTWARD												
	0.232	P		0		11	0	0	0	AGF		.
	0.810	P	MNAR	0		11	0	0	0	AGF		JUNCTION NM 599.
	1.400	P		0		11	0	0	0	AGF		JCT. COUNTY ROAD 70
END---	2.910											
490064	0.000	P	LOC	0		5	8,138	7,978	7,822	AGF	1997	RICHARDS FROM JCT COMMUNITY COLLEGE
ENTRANCE												
	1.118	P		0		11	2,938	2,880	2,824	AGF	1990	JCT. I-25 (NORTH BOUND)
	1.249	P		0		11	10,193	9,993	9,797	AGF	1997	JCT. I-25 (SOUTH BOUND)
END---	2.001											
490066	0.000	P	MNAR	9		11	3,311	4,434	4,347	COV	2003	JCT AIRPORT ROAD (NM 284), NORTH &
EAST TO SA												
	0.818	P		9		11	6,658	6,666	4,464	AGF	2002	JCT COTTONWOOD MOBILE HOME PARK
ENTRANCE.												
	1.313	P		9		11	5,656	5,327	5,222	ATR	2003	JCT JEMEZ ROAD.
	1.813	P		9		5	5,656	5,327	5,222	ATR	2003	
	2.303	P		0		11	6,694	7,018	6,881	COV	2003	JCT CAMINO DE LOS LOPEZ (CO. RD.
61E).												

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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
	2.469	P		0	Santa Fe	5	6,694	7,018	6,881	COV	2003	
	2.998	P		0		11	10,485	10,499	10,293	AGF	1997	JCT COUNTY ROAD 68A.
END---	3.668											
490067 SANTA FE C	0.000	P	MJCL	0		5	799	1,213	1,189	COV	2003	SANTA FE COUNTY ROAD 67-C NORTH TO
	2.120	P		0		5	799	1,213	1,189	COV	2003	ASPHALT BEGINS.
	6.820	P	COLL	0		5	799	1,213	1,189	COV	2003	URBAN BOUNDARY.
END---	7.620											
490070 E-WARD TO	0.000	P	LOC	0		5	949	930	912	AGF	2000	SF CNTY RD70,FROM JCT SF CNTY RD62
	0.251	P	MNAR	0		11	1,136	1,138	1,116	AGF	1991	JCT. COUNTY ROAD 70A
	0.712	P		0		11	0	0	0	AGF		JCT. COUNTY ROAD 62A
	1.314	P		0		11	380	380	372	AGF	1992	JCT. COUNTY ROAD 68
END---	2.990											

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490072 BOUNDARY NW	0.000	P	MNCL	0	SANTA FE	5	2,891	2,835	2,779	AGF	2001	SF CR72 (TANO RD),FROM URBAN AREA
	0.200	P		0		5	2,891	2,835	2,779	AGF	2001	JCT. SAN JUAN RANCH ROAD_(CR87).
	0.660	P		0		5	2,891	2,835	2,779	AGF	2001	JCT. CALLE SAN MARTIN (CR 72F).
	1.100	P		0		5	2,891	2,835	2,779	AGF	2001	JCT. LOMA SERENA.
	1.130	P		0		5	2,891	2,835	2,779	AGF	2001	JCT. SAN RAFAEL DRIVE (CR 72G).
	1.640	P		0		5	2,891	2,835	2,779	AGF	2001	JCT. CAMINO DEL LOS MONTOYAS.
	2.570	P				5	2,891	2,835	2,779	AGF	2001	ASPHALT ENDS, BEGIN DIRT.

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				0							
END---	3.530										
490073	0.000	P	MJCL		11	4,457	4,369	4,283	AGF	1991	JCT US 84/285, NORTH VIA TESUQUE,
TO JCT US 8				0							
	0.200	P			5	4,457	4,369	4,283	AGF	1991	
				0							
	1.225	P			11	3,857	3,781	3,707	AGF	1991	JCT NM 590 IN TESEQUE.
				0							
	1.315	P			5	3,857	3,781	3,707	AGF	1991	
				0							
	1.500	P			5	3,857	3,781	3,707	AGF	1991	
				0							
	2.929	P			5	3,857	3,781	3,707	AGF	1991	
				0							
END---	3.100										
490074	0.000	P	LOC		5	0	0	0	AGF		CR 74 FOR MP .34 ON SR 592 TO
PRIVATE ROAD				0							
	1.360	P			5	0	0	0	AGF		
				0							
END---	1.960										
490076	0.000	P			11	0	0	0	AGF		CR 76 (PACHECO CANYON RD) FROM SR
592 SE TO F				0							
END---	1.420										
490077	0.000	P	MJCL		11	0	0	0	AGF		CR 77 (CAMINO LA TIERRA) FROM NM
599 W THEN N				0							
	3.940	P	LOC		5	0	0	0	AGF		
				0							
END---	14.960										
490078	0.000	P			11	0	0	0	AGF		CR 78 (CHUPADERO) FROM JCT SR 592
NORTHWESTWA				0							
END---	1.020										
490084	0.000	P	MJCL		2	0	0	0	AGF		FROM THE JUNCTION OF US 285
WESTWARD TO JCT S				0							
	4.410	P			5	0	0	0	AGF		BEGIN BASECOURSE.
				0							
	5.710	P			5	0	0	0	AGF		BEGIN DIRT.
				0							
END---	5.810										
490085	0.000	P	MNCL		5	342	335	328	AGF	2000	SANTA FE CNTY RD 85,FROM JCT CITY
LIMITS N-WA				0							
	0.750	P			5	342	335	328	AGF	2000	ASPHALT END, BEGIN BASECOURSE.
				0							
	1.200	P			11	3,141	3,079	3,019	AGF	2000	JCT. LA TIERRA SUBDIVISION ROAD
				62							
END---	2.030										
490086	0.000	P	LOC		5	0	0	0	AGF		COUNTY ROAD 86 FROM JCT. CAMINO
SUDESTA N. TO				0							
END---	0.621										

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490088 E-WARD,NE-WARD,N	0.000	P	MJCL	3	Santa Fe	5	4,184	4,102	4,022	AGF	1999	SANTA FE CR 88,FROM JCT US84

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END---	2.800											
49009B NORTHEAST	0.000	P	LOC	0	SANTA FE	11	0	0	0	AGF		CR 9B (ORO QUAY RD) FROM JCT SR 344
END---	1.210											
49009E 344 NORTH	0.000	P		0		11	0	0	0	AGF		CR 9E (LIVING WATER RD) FROM JCT SR
END---	1.100											
490090 JUNCTION US 285	0.000	P		0		2	0	0	0	AGF		SANTA FE COUNTY ROAD 90 FROM
END---	5.200											
490098 NORTH TO JC	0.000	P	MJCL	4		11	1,820	1,784	1,749	AGF	1992	FROM JCT NM 503 EAST OF POJOAQUE,
	2.400	P		4		5	1,820	1,784	1,749	AGF	1992	
END---	3.600											
490109 JUNCTION OF	0.000	P	LOC	0		5	0	0	0	AGF		SANTA FE COUNTY ROAD 109 FROM THE
END---	1.800											
49011B SOUTHWARD	0.000	P		0		11	0	0	0	AGF		CR 11B (WEIMER RD) FROM JCT SR 344
END---	2.530											
490112 SR 344 SO	0.000	P		0		11	0	0	0	AGF		CR 112 (AVENIDA DEL MONTE) FROM JCT
END---	1.250											
490113	0.000	P		0		2	0	0	0	AGF		JUNCTION COUNTY ROAD 84-E - NORTH
END---	0.500											
490117 84-E - NORTH	0.000	P		0		2	0	0	0	AGF		FROM THE JUNCTION OF COUNTY ROAD
END---	2.600											
490119 JUNCTION OF	0.000	P		0		2	0	0	0	AGF		SANTA FE COUNTY ROAD 119 FROM THE

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END--- 1.100
49012A 0.000 P 11 0 0 0 AGF CR 12A FROM JCT CR 11B (MOSELEY RD)
E TO JCT 0
END--- 1.020
49012B 0.000 P 11 0 0 0 AGF CR 12B (B ANAYA RD) FROM SR 41
E,SE,E,NE TO E 0
END--- 8.290
490123 0.000 P 5 0 0 0 AGF CR 123 (CERRO PINON) FROM JCT SR
503 SOUTHEAS 0
END--- 4.100
49014A 0.000 P 11 0 0 0 AGF CR 14A FROM JCT COUNTY ROAD 15
EASTWARD TO TH 0
END--- 1.000

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49014B	0.000	P	LOC	0	SANTA FE	11	0	0	0	AGF		CR 14B (FEED LOT RD) FROM JCT SR 41
NORTHWEST												
END---	1.650											
49016A	0.000	P		0		11	0	0	0	AGF		CR 16A (JAYMAR RD) FROM SR 41
EASTWARD TO JCT												
END---	4.450											
49016B	0.000	P		0		11	0	0	0	AGF		CR 16B FROM JCT US 285 NW THEN
SOUTHWESTWARD												
END---	2.080											
49017A	0.000	P		0		11	0	0	0	AGF		CR 17A FROM SR 472 SOUTHWARD TO THE
JUNCTION												
END---	1.010											
49020B	0.000	P		0		11	0	0	0	AGF		CR 20B (WHITE LAKES RD) FROM SR 41
NE,E,NE,E												
END---	11.220											
49021A	0.000	P		0		11	0	0	0	AGF		CR 21A (IRBY RD) FROM SR 472
SOUTHWARD TO THE												
END---	3.000											
49024C	0.000	P		0		11	0	0	0	AGF		CR 24C FROM JCT US 285 EAST, NE
THEN EAST TO												
END---	4.470											

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49037C     0.000 P                 11      0      0      0 AGF    CR 37C (ONEAL RD) FROM JCT CR 6A
SOUTHWARD TO          0
END---     1.010
49038B     0.000 P                 11      0      0      0 AGF    CR 38B (ANAYA RANCH RD) FROM JCT SR
41 WESTWA           0
END---     3.300
49044A     0.000 P                  5      0      0      0 AGF    CR 44A FROM JCT SR14 NORTHEASTWARD
THEN SOUTH           0
END---     1.100
49048G     0.000 P COLL            11      0      0      0        SANTA FE CR 48G,FROM JCT W.
FRONTAGE RD W-WAR         0
           0.920 P LOC              5      0      0      0        ASPHALT ENDS, DIRT BEGINS.
                    0
END---     1.970
49050F     0.000 P COLL            11  1,146  1,124  1,102 AGF    SANTA FE CR 50F,FROM JCT I-25
NORTHWESTWARD T          0
           0.167 P                  5  1,146  1,124  1,102 AGF
                    0
END---     1.000
49054A     0.000 P LOC              5      0      0      0 AGF    CR 54A FROM JCT CR 56 SOUTHWESTWARD
TO A DEAD           0
END---     1.830
49055A     0.000 P                 11      0      0      0 AGF    CR 55A (GEN. GOODWIN RD) FROM JCT
SR 14 SE TO            0
END---     3.760
49055B     0.000 P                 11      0      0      0 AGF    CR 55B (OLD CASH RANCH RD) FROM JCT
CR 55A SO           0

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                 D                 T
POSTED   BEGIN   I FUNC            Y
                   HEAVY
ROUTE    MPNT    R CLS   COUNTY    P   2003   2002   2001 METH YEAR TERMINUS
                   COMM
-------------------------------------------------------------------------------------------
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END---     1.010
49056C     0.000 P LOC   SANTA FE   5      0      0      0 AGF    CR 56C IN SF CTY, FROM JCT CR 56 NW
THEN SOUT           0
END---     1.120
49057A     0.000 P                 11     76     74     72 AGF    JCT. NM14 SOUTH OF MADRID,
NORTHWEST TO JCT.        12
           1.400 P                  5     76     74     72 AGF
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                          12
          2.400 P                     5      76      74      72 AGF
                          12
END---    3.400
49058B    0.000 P                    11       0       0       0 AGF       CR 58B (ARROYO HONDO TRAIL) FROM
JCT CR 8 WES                  0
END---    1.490
49058D    0.000 P                    11       0       0       0 AGF       CR 58D (OLD AGUA FRIA RD) FROM
DEADEND ADJACE                  0
END---    1.580
490586    0.000 P                    11     409     401     393 AGF  1992 JCT.NM 14 TO WEST I-25 FRONTAGE
ROAD LA CIENE                  1
          2.630 P                    15     409     401     393 AGF  1992
                          1
          4.030 P                    15     409     401     393 AGF  1992
                          1
END---    6.790
490587    0.000 P                    11   1,201   1,177   1,153 AGF       JCT.COUNTY ROAD 56 LA CIENEGA SOUTH
TO THE EA                 0
          0.167 P                     5   1,201   1,177   1,153 AGF
                          0
END---    1.100
49059A    0.000 P                    11       0       0       0 AGF       CR 59A FROM JCT CR 59 NORTHEASTWARD
THEN SOUT                 0
END---    1.050
49061B    0.000 P COLL                5   9,380   9,196   3,343 AGF  2002 SF CR61B(JEMEZ),JCT NM284(AIRPORT)
NW-WARD TO                 0
END---    0.800
49061E    0.000 P                     5   5,015   4,916   4,819 AGF  1995 SF CR61E(CAM LOPEZ),FROM JCT
MP0.220 NW-WARD                   0
END---    0.870
49062A    0.000 P LOC                11       0       0       0 AGF       SANTA FE CR 62A,FROM JCT CAJA DEL
RIO N-WESTW                 0
END---    1.220
49063A    0.000 P                    11       0       0       0 AGF       CR 63A (LA CUEVA RD) FROM JCT SR 50
NORTHEAST                 0
END---    3.280
49064L    0.000 P                    11       0       0       0 AGF       CR 64L (RICHARDS AVE) FROM CITY
LIMITS SOUTH                 0
END---    2.230
49067A    0.000 P                     2       0       0       0 AGF       SANTA FE COUNTY ROAD 67-A FROM THE
JUNCTION O                 0
END---    1.400
```


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POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
49067C LAS VEGAS	0.000	P	MNCL	0	SANTA FE	2	3,618	3,547	3,478	AGF	1999	SF CR 67C(TWO TRAILS),FROM JCT OLD
END---	0.940											
49068A CR66 N/W/N-W	0.000	P	MJCL	0		2	1,011	991	971	AGF	2000	SF CR68A(SAN YSIDRO),FROM JCT SF
END---	0.640											
49073A JCT CO. RD	0.000	P	MNAR	0		5	3,885	3,809	3,734	AGF	1995	FROM SANTA FE NORTH URBAN LIMIT TO
	0.400	P		0		5	3,885	3,809	3,734	AGF	1995	
END---	3.078											
49077C VISTAS NW,	0.000	P	LOC	0		5	0	0	0	AGF		CR 77C (PASEO NOPAL) FROM PASEO DE
END---	1.350											
49084C CR 84B NW	0.000	P		0		11	0	0	0	AGF		CR 84C FROM SAN ILDEFONSO PUEBLO AT
	1.570	P		0		5	0	0	0	AGF		
END---	3.170											
49084D ROAD.	0.000	P		0		11	2,520	2,470	2,422	AGF		JCT.NM 502 NORTH TO JCT. LOCAL
END---	0.410											
49084E SOUTHEASTWARD TO	0.000	P		0		11	0	0	0	AGF		CR 84E FROM JUNCTION US 84
	1.450	P		0		5	0	0	0	AGF		
END---	1.930											
49084F NE TO NAM	0.000	P		0		11	0	0	0	AGF		CR 84F FROM CR'S 113A & 84G SE THEN
END---	1.200											
49084G NORTHEASTWA	0.000	P		0		11	0	0	0	AGF		CR 84F FROM JCT CR'S 113A AND 84F
END---	0.920											
49084J COUNTY RO	0.000	P		0		2	0	0	0	AGF		FROM THE JUNCTION OF US 285 EAST TO
END---	0.900											
49088D SOUTHWESTW	0.000	P		0		11	0	0	0	AGF		CR 88D (PLACITA RD) FROM JCT SR 76
END---	2.210											

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Santa Fe

49089D 0.000 P 2 0 0 0 AGF SANTA FE COUNTY ROAD89D FROM THE
JUNCTION OF 0
END--- 3.100
49089E 0.000 P 11 0 0 0 AGF CR 89E (FEATHER RD) FROM JCT CR 89B
NORTHWEST 0
END--- 1.250
49094C 0.000 P 2 0 0 0 AGF SANTA FE COUNTY ROAD 94C FROM THE
JUNCTION OF 0
END--- 1.940

DATE: 07/02/04 08:18 NEW MEXICO STATE HIGHWAY & TRANSPORTATION DEPARTMENT
PROG: R1PRR011
USER: EPENA01 CHDB ROAD SEGMENTS BY POSTED ROUTE/POINT WITH AADT INFO
PAGE: 61

POSTED ROUTE	BEGIN MPNT	DIR	FUNC CLS	HEAVY COMM	COUNTY	TYP	2003	2002	2001	METH	YEAR	TERMINUS
49098A 503, SOUTHW	0.000	P	MNCL	6	SANTA FE	11	112	114	115	AGF	1998	SANTA FE CO. RD. 98A--FROM JCT NM
END---	1.520											
49101D US 64	0.000	P	LOC	0		2	0	0	0	AGF		JUNCTION COUNTY ROAD 84-C SOUTH TO
END---	0.800											
49101E	0.000	P		0		11	743	729	715	AGF		JCT.NM 502 NORTH TO JACONITA.
END---	0.461											
49101G TO JACONA.	0.000	P		0		11	150	148	146	AGF		JCT.NM 502 WEST OF POJOAQUE NORTH
END---	0.443											
49109N NE THEN N	0.000	P		0		2	0	0	0	AGF		CR 109N (N SHINING SUN) FROM SR 503
END---	1.100											
49113A	0.000	P		0		2	0	0	0	AGF		COUNTY ROAD 117 - EAST
END---	2.900											

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