THE LOS ALAMOS NATIONAL LABORATORY SITE-WIDE ENVIRONMENTAL IMPACT STATEMENT PROCESS

The United States Department of Energy (DOE) has a policy (10 Code of Federal Regulations [CFR] 1021.330) of preparing a Site-Wide Environmental Impact Statement (SWEIS) for certain large, multiple-facility sites, such as the Los Alamos National Laboratory (LANL). The purpose of a SWEIS is to provide DOE and its stakeholders with an analysis of the environmental impacts resulting from ongoing and reasonably foreseeable new operations and facilities and reasonable alternatives at the DOE site. The SWEIS analyzes four alternatives for the continued operation of LANL to identify the potential effects that each alternative could have on the human environment.

The SWEIS Advance Notice of Intent, published in the *Federal Register* (FR) on August 10, 1994 (59 FR 40889), identified possible issues and alternatives to be analyzed. Based on public input received during prescoping, DOE published the Notice of Intent to prepare the SWEIS in the *Federal Register* on May 12, 1995 (60 FR 25697). DOE held a series of public meetings during prescoping and scoping to provide opportunities for stakeholders to identify the issues, environmental concerns, and alternatives that should be analyzed in the SWEIS. An Implementation Plan[1] was published in November 1995 to summarize the results of scoping, describe the scope of the SWEIS based on the scoping process, and present an outline for the draft SWEIS. The Implementation Plan also included a discussion of the issues reflected in public comments during scoping.

In addition to the required meetings and documents described above, the SWEIS process has included a number of other activities intended to enhance public participation in this effort. These activities have included:

- Workshops to develop the Greener Alternative described and analyzed in the SWEIS.
- Meetings with and briefings to representatives of federal, state, tribal, and local governments during prescoping, scoping, and preparation of the draft SWEIS.
- Preparation and submission to the Los Alamos Community Outreach Center of information requested by members of the public related to LANL operations and proposed projects.
- Numerous Open Forum public meetings in the communities around LANL to discuss LANL activities, the status of the SWEIS, and other issues raised by the public.

The draft SWEIS was distributed to interested stakeholders for comment. The comment period extended from May 15, 1998, to July 15, 1998. Public hearings on the draft SWEIS were announced in the *Federal Register*, as well as community newspapers and radio broadcasts. Public hearings were held in Los Alamos, Santa Fe, and Española, New Mexico, on June 9, 1998, June 10, 1998, and June 24, 1998, respectively.

Oral and written comments were accepted during the 60-day comment period for the draft SWEIS. All comments received, whether orally or in writing, were considered in preparation of the final SWEIS. The final SWEIS includes a new volume IV with responses to individual comments and a discussion of general major issues. DOE will prepare a Record of Decision no sooner than 30 days after the final SWEIS Notice of Availability is published in the *Federal Register*. The Record of Decision will describe the rationale used for DOE's selection of an alternative or portions of the alternatives. Following the issuance of the Record of Decision, a Mitigation Action Plan may also be issued to describe any mitigation measures that DOE commits to in concert with its decision.

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1. DOE *National Environmental Policy Act* regulations (10 CFR 1021) previously required that an implementation plan be prepared; a regulation change (61 FR 64604) deleted this requirement. An implementation plan was prepared for this SWEIS.

COVER SHEET

Responsible Agency: U.S. Department of Energy (DOE)

Cooperating Agency: Incorporated County of Los Alamos

Title: Site-Wide Environmental Impact Statement for the Continued Operation of the Los Alamos National Laboratory, Los Alamos, New Mexico (DOE/EIS-0238)

Contact: For further information concerning this Site-Wide Environmental Impact Statement (SWEIS), contact:

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For general information on DOE's *National Environmental Policy Act* (NEPA) process, contact:

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Abstract: DOE proposes to continue operating the Los Alamos National Laboratory (LANL) located in Los Alamos County, in north-central New Mexico. DOE has identified and assessed four alternatives for the operation of LANL: (1) No Action, (2) Expanded Operations, (3) Reduced Operations, and (4) Greener. Expanded Operations is DOE's Preferred Alternative, with the exception that DOE would only implement pit manufacturing at a level of 20 pits per year. In the No Action Alternative, DOE would continue the historical mission support activities LANL has conducted at planned operational levels. In the Expanded Operations Alternative, DOE would operate LANL at the highest levels of activity currently foreseeable, including full implementation of the mission assignments from recent programmatic documents. Under the Reduced Operations Alternative, DOE would operate LANL at the minimum levels of activity necessary to maintain the capabilities to support the DOE mission in the near term. Under the Greener Alternative, DOE would operate LANL to maximize operations in support of nonproliferation, basic science, materials science, and other nonweapons areas, while minimizing weapons activities. Under all of the alternatives, the affected environment is primarily within 50 miles (80 kilometers) of LANL. Analyses indicate little difference in the environmental impacts among alternatives. The primary discriminators are: collective worker risk due to radiation exposure, socioeconomic effects due to LANL employment changes, and electrical power demand.

Public Comment and DOE Decision: The draft SWEIS was released to the public for review and comment on May 15, 1998. The comment period extended until July 15, 1998, although late comments were accepted to the extent practicable. All comments received were considered in preparation of the final SWEIS[1]. DOE will utilize the analysis in this final SWEIS and prepare a Record of Decision on the level of continued operation of LANL. This decision will be no sooner than 30 days after the Notice of Availability of the final SWEIS is published in the *Federal Register*.

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1. Changes made to this SWEIS since publication of the draft SWEIS are marked with a vertical bar to the right or left of the text.

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APPENDIXES (2 PARTS)

VOLUME IV
COMMENT RESPONSE DOCUMENT

VOLUME II
ABBREVIATIONS AND ACRONYMS

ADT	average daily trip
ARIES	Advanced Recovery and Integrated Extraction System
BNM	Bandelier National Monument
CEDE	committed effective dose equivalent
CMIP	Capability Maintenance and Improvement Project
CMR	Chemistry and Metallurgy Research
dBA	decibels A-weighted frequency scale
DOE	U.S. Department of Energy
DOP	detailed operating procedure
EIS	environmental impact statement
EM	DOE Office of Environmental Management
ER	environmental restoration
FR	*Federal Register*
ft	feet
FWS	U.S. Fish and Wildlife Service
HE	high explosives
HEPA	high-efficiency particulate air (filter)
HVAC	heating, ventilation, and air conditioning
ICRP	International Commission on Radiological Protection
JCI	Johnson Controls, Inc.
km	kilometer
LANL	Los Alamos National Laboratory
LCF	latent cancer fatality

LLMW	low-level mixed waste
LLW	low-level radioactive waste
m	meter
MDA	Material Disposal Area
MEI	maximally exposed individual
mi	mile
MOX	mixed oxide (fuel)
NA	not applicable
NEPA	*National Environmental Policy Act of 1969*, as amended
NMED	New Mexico Environment Department
NOI	Notice of Intent
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
OEL	occupational exposure limit
OLE	Ojo (Transmission) Line Extension
OSHA	U.S. Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PF	Plutonium Facility
PEIS	programmatic environmental impact statement
PNM	Public Service Company of New Mexico
ppm	parts per million
PSSC	project-specific siting and construction
RCRA	*Resource Conservation and Recovery Act*
rem	roentgen equivalent man
RLWTF	Radioactive Liquid Waste Treatment Facility

ROD	Record of Decision
SHPO	State Historic Preservation Office(r)
SNM	special nuclear material
SOP	standard operating procedure
SSM	Stockpile Stewardship and Management
SWEIS	site-wide environmental impact statement
SWMU	solid waste management unit
T&E	threatened and endangered (species)
TA	technical area
TCE	1,1,1-trichloroethane
TCP	traditional cultural property
TRU	transuranic (waste)
TSCA	*Toxic Substances Control Act*
U.S.	United States
U.S.C.	United States Code
USGS	U.S. Geological Survey
VOC	volatile organic compound
WIPP	Waste Isolation Pilot Plant
WM	waste management

VOLUME II
MEASUREMENTS AND CONVERSIONS

The following information is provided to assist the reader in understanding certain concepts in this SWEIS. Definitions of technical terms can be found in volume I, chapter 10, Glossary.

SCIENTIFIC NOTATION

Scientific notation is used in this report to express very large or very small numbers. For example, the number 1 billion could be written as 1,000,000,000 or, using scientific notation, as 1×10^9. Translating from scientific notation to a more traditional number requires moving the decimal point either right (for a positive power of 10) or left (for a negative power of 10). If the value given is 2.0×10^3, move the decimal point three places (insert zeros if no numbers are given) to the right of its current location. The result would be 2,000. If the value given is 2.0×10^{-5}, move the decimal point five places to the left of its present location. The result would be 0.00002. An alternative way of expressing numbers, used primarily in the appendixes of this SWEIS, is exponential notation, which is very similar in use to scientific notation. For example, using the scientific notation for 1×10^9, in exponential notation the 10^9 (10 to the power of 9) would be replaced by E+09. (For positive powers, sometimes the "+" sign is omitted, and so the example here could be expressed as E09.) If the value is given as 2.0×10^{-5} in scientific notation, then the equivalent exponential notation is 2.0E-05.

UNITS OF MEASUREMENT

The primary units of measurement used in this report are English units with metric equivalents enclosed in parentheses.

Many metric measurements presented include prefixes that denote a multiplication factor that is applied to the base standard (e.g., 1 kilometer = 1,000 meters). The following list presents these metric prefixes:

giga	1,000,000,000 (10^9; E+09; one billion)
mega	1,000,000 (10^6; E+06; one million)
kilo	1,000 (10^3; E+03; one thousand)
hecto	100 (10^2; E+02; one hundred)
deka	10 (10^1; E+01; ten)
unit	1 (10^0; E+00; one)
deci	0.1 (10^{-1}; E-01; one tenth)
centi	0.01 (10^{-2}; E-02; one hundredth)
milli	0.001 (10^{-3}; E-03; one thousandth)

micro 0.000001 (10^{-6}; E-06; one millionth)

nano 0.000000001 (10^{-9}; E-09; one billionth)

pico 0.000000000001 (10^{-12}; E-12; one trillionth)

DOE Order 5900.2A, *Use of the Metric System of Measurement*, prescribes the use of this system in DOE documents. Table MC–1 lists the mathematical values or formulas needed for conversion between English and metric units. Table MC–2 summarizes and defines the terms for units of measure and corresponding symbols found throughout this report.

RADIOACTIVITY UNIT

Part of this report deals with levels of radioactivity that might be found in various environmental media. Radioactivity is a property; the amount of a radioactive material is usually expressed as "activity" in curies (Ci) (Table MC–3). The curie is the basic unit used to describe the amount of substance present, and concentrations are generally expressed in terms of curies per unit of mass or volume. One curie is equivalent to 37 billion disintegrations per second or is a quantity of any radionuclide that decays at the rate of 37 billion disintegrations per second. Disintegrations generally include emissions of alpha or beta particles, gamma radiation, or combinations of these.

RADIATION DOSE UNITS

The amount of ionizing radiation energy received by a living organism is expressed in terms of radiation dose. Radiation dose in this report is usually expressed in terms of effective dose equivalent and reported numerically in units of rem (Table MC–4). Rem is a term that relates ionizing radiation and biological effect or risk. A dose of 1 millirem (0.001 rem) has a biological effect similar to the dose received from about a 1-day exposure to natural background radiation. A list of the radionuclides discussed in this document and their half-lives is included in Table MC–5.

CHEMICAL ELEMENTS

A list of selected chemical elements, chemical constituents, and their nomenclature is presented in Table MC–6.

TABLE MC–1.—*Conversion Table*

MULTIPLY	BY	TO OBTAIN	MULTIPLY	BY	TO OBTAIN
ac	0.405	ha	ha	2.47	ac
°F	(°F -32) x 5/9	°C	°C	(°C x 9/5) + 32	°F
ft	0.305	m	m	3.28	ft
ft^2	0.0929	m^2	m^2	10.76	ft^2
ft^3	0.0283	m^3	m^3	35.3	ft^3
gal.	3.785	l	l	0.264	gal.
in.	2.54	cm	cm	0.394	in.
lb	0.454	kg	kg	2.205	lb
mCi/km^2	1.0	nCi/m^2	nCi/m^2	1.0	mCi/km^2
mi	1.61	km	km	0.621	mi
mi^2	2.59	km^2	km^2	0.386	mi^2
mi/h	0.447	m/s	m/s	2.237	mi/h
nCi	0.001	pCi	pCi	1,000	nCi
oz	28.35	g	g	0.0353	oz
pCi/l	10^{-9}	µCi/ml	µCi/ml	10^9	pCi/l
pCi/m^3	10^{-12}	Ci/m^3	Ci/m^3	10^{12}	pCi/m^3
pCi/m^3	10^{-15}	mCi/cm^3	mCi/cm^3	10^{15}	pCi/m^3
ppb	0.001	ppm	ppm	1,000	ppb
ton	0.907	metric ton	metric ton	1.102	ton

TABLE MC–2.—*Names and Symbols for Units of Measure*

LENGTH	
SYMBOL	**NAME**
cm	centimeter (1 x 10^{-2} m)
ft	foot
in.	inch
km	kilometer (1 x 10^{3} m)
m	meter
mi	mile
mm	millimeter (1 x 10^{-3} m)
µm	micrometer (1 x 10^{-6} m)
VOLUME	
SYMBOL	**NAME**
cm^3	cubic centimeter
ft^3	cubic foot
gal.	gallon
$in.^3$	cubic inch
l	liter
m^3	cubic meter
ml	milliliter (1 x 10^{-3} l)
ppb	parts per billion
ppm	parts per million
yd^3	cubic yard
RATE	
SYMBOL	**NAME**
Ci/yr	curies per year
cm^3/s	cubic meters per second
ft^3/s	cubic feet per second
ft^3/min	cubic feet per minute
gpm	gallons per minute
kg/yr	kilograms per year
km/h	kilometers per hour
mg/l	milligrams per liter
MGY	million gallons per year
MLY	million liters per year
m^3/yr	cubic meters per year
mi/h or mph	miles per hour
µCi/l	microcuries per liter
pCi/l	picocuries per liter

TABLE MC–2.—*Names and Symbols for Units of Measure*-Continued

NUMERICAL RELATIONSHIPS	
SYMBOL	**MEANING**
<	less than
≤	less than or equal to
>	greater than
≥	greater than or equal to
2σ	two standard deviations
TIME	
SYMBOL	**NAME**
d	day
h	hour
min	minute
nsec	nanosecond
s	second
yr	year
AREA	
SYMBOL	**NAME**
ac	acre (640 per mi^2)
cm^2	square centimeter
ft^2	square foot
ha	hectare (1 x 10^4 m^2)
$in.^2$	square inch
km^2	square kilometer
mi^2	square mile
MASS	
SYMBOL	**NAME**
g	gram
kg	kilogram (1 x 10^3 g)
mg	milligram (1 x 10^{-3} g)
µg	microgram (1 x 10^{-6} g)
ng	nanogram (1 x 10^{-9} g)
lb	pound
ton	metric ton (1 x 10^6 g)
oz	ounce

TABLE MC–2.—*Names and Symbols for Units of Measure*-Continued

TEMPERATURE	
SYMBOL	**NAME**
°C	degrees Celsius
°F	degrees Fahrenheit
°K	degrees Kelvin
SOUND/NOISE	
SYMBOL	**NAME**
dB	decibel
dBA	A-weighted decibel

TABLE MC–3.—*Names and Symbols for Units of Radioactivity*

RADIOACTIVITY	
SYMBOL	**NAME**
Ci	curie
cpm	counts per minute
mCi	millicurie (1 x 10^{-3} Ci)
µCi	microcurie (1 x 10^{-6} Ci)
nCi	nanocurie (1 x 10^{-9} Ci)
pCi	picocurie (1 x 10^{-12} Ci)

TABLE MC–4.—*Names and Symbols for Units of Radiation Dose*

RADIATION DOSE	
SYMBOL	**NAME**
mrad	millirad (1 x 10^{-3} rad)
mrem	millirem (1 x 10^{-3} rem)
R	roentgen
mR	milliroentgen (1 x 10^{-3} R)
µR	microroentgen (1 x 10^{-6} R)

TABLE MC–5.—*Radionuclide Nomenclature*

SYMBOL	RADIONUCLIDE	HALF-LIFE	SYMBOL	RADIONUCLIDE	HALF-LIFE
Am-241	americium-241	432 yr	Pu-241	plutonium-241	14.4 yr
H-3	tritium	12.26 yr	Pu-242	plutonium-242	3.8×10^5 yr
Mo-99	molybdenum-99	66 hr	Pu-244	plutonium-244	8.2×10^7 yr
Pa-234	protactinium-234	6.7 hr	Th-231	thorium-231	25.5 hr
Pa-234m	protactinium-234m	1.17 min	Th-234	thorium-234	24.1 d
Pu-236	plutonium-236	2.9yr	U-234	uranium-234	2.4×10^5 yr
Pu-238	plutonium-238	87.7 yr	U-235	uranium-234	7×10^8 yr
Pu-239	plutonium-239	2.4×10^4 yr	U-238	uranium-238	4.5×10^9 yr
Pu-240	plutonium-240	6.5×10^3 yr			

TABLE MC–6.—*Elemental and Chemical Constituent Nomenclature*

SYMBOL	CONSTITUENT	SYMBOL	CONSTITUENT
Ag	silver	Pa	protactinium
Al	aluminum	Pb	lead
Ar	argon	Pu	plutonium
B	boron	SF_6	sulfur hexafluoride
Be	beryllium	Si	silicon
CO	carbon monoxide	SO_2	sulfur dioxide
CO_2	carbon dioxide	Ta	tantalum
Cu	copper	Th	thorium
F	fluorine	Ti	titanium
Fe	iron	U	uranium
Kr	krypton	V	vanadium
N	nitrogen	W	tungsten
Ni	nickel	Xe	xenon
NO_2^-	nitrite ion	Zn	zinc
NO_3^-	nitrate ion		

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PART I
EXPANSION OF TA–54/AREA G LOW-LEVEL WASTE DISPOSAL AREA

I.1 ROLE OF THIS PROJECT-SPECIFIC SITING AND CONSTRUCTION ANALYSIS IN THE SITE-WIDE ENVIRONMENTAL IMPACT STATEMENT

This Project-Specific Siting and Construction (PSSC) analysis addresses the proposed expansion of the Area G low-level radioactive waste (LLW)[1] disposal area in Technical Area (TA)–54. It examines the siting and construction alternatives specific to this project in greater detail than the description and analysis presented in volume I of the Los Alamos National Laboratory (LANL) Site-Wide Environmental Impact Statement (SWEIS). The preferred alternative from this PSSC analysis is then included as one of the activities within the Expanded Operations Alternative discussed in volume I.

This arrangement of information and analysis allows the U.S. Department of Energy (DOE) to "zoom" in on aspects of this project that warrant more detailed description and analysis, while maintaining the clarity of volume I of the SWEIS. The siting and construction impacts of the Preferred Alternative described in this PSSC analysis are included along with the operational impacts described for the Expanded Operations Alternative in volume I to provide a complete understanding of the impacts of that alternative. Any differences in impacts that would be expected if a different PSSC alternative were selected are discussed in chapter 5 of volume I (section 5.3).

Waste volumes and strategies for managing the various waste streams are discussed in *Waste Management Strategies for LANL* (LANL 1998a) and chapter 5 (sections 5.2.9.3, 5.3.9.3, 5.4.9.3, and 5.5.9.3) of volume I, and are summarized in section I.1.1.3. Operations within the existing Area G, including new disposal cell excavation, are discussed in the *Description of Technical Areas and Facilities at LANL* (LANL 1998b) and in chapter 2 (sections 2.1.2.1 and 2.2.2.15) of the SWEIS, volume I.

More information regarding the approaches for disposal of LANL's wastes across the SWEIS alternatives (shipment off the site, storage on the site, and treatment) is presented in chapter 3 (sections 3.1, 3.2, 3.3, and 3.4) of volume I. The SWEIS analyzes continued disposal of LLW on the site within the Expanded Operations Alternative. The SWEIS also analyzes the LLW management strategy of storing the waste on the site for some short period and then shipping it off the site for disposal elsewhere, as part of the No Action, Reduced Operations, and Greener Alternatives.

The environmental impacts of operating the LLW disposal area and of the post-closure period are included in chapter 5 of volume I. The volume of disposal cells excavated, emissions to air, worker doses, and certain other parameters associated with LLW disposal operations would depend on the volume of LLW to be disposed of and not on the disposal location. The consequences to members of the public (especially post-closure), however, would depend on location because distance from the LLW disposal operation to the public depends on the location selected, and the

1. Waste that contains radioactivity but is not classified as high-level waste, transuranic waste, spent nuclear fuel, or "11e(2) by-product material" as defined by DOE Order 5820.2A, *Radioactive Waste Management*.

PSSC Alternatives for Expansion of Area G LLW Disposal

Develop Zone 4 at TA–54*—DOE would develop up to 24 acres (10 hectares) within Zone 4, which is immediately west of the existing active disposal area (see Figure I.2.5–1).*

Develop Zone 6 in TA–54*—DOE would develop up to 17 acres (7 hectares) within Zone 6, which is immediately to the west of Area L (Zone 5) and extends to Area J (see Figure I.2.5–1).*

Develop the North Site in TA–54*—DOE would develop up to 49 acres (20 hectares) within the North Site, which is immediately to the north of Zone 6 and Area J (see Figure I.2.5–1).*

Develop New Disposal Site at Another LANL TA*—DOE would establish a new LLW disposal facility at another location within LANL, presumed to be an undeveloped, undisturbed mesa. TA–67 is the specific TA examined as an example of the requirements and impacts associated with development of an undeveloped site for LLW disposal. The disposal site analyzed would develop up to 50 acres (20 hectares) plus roads and support areas at TA–67, which is located on Pajarito Mesa (see Figures I.1.1–1 and I.2.4.1–1).*

Preferred Alternative*—DOE's Preferred Alternative is to develop both Zones 4 and 6, proceeding westward in a step-by-step fashion from the existing footprint of Area G.*

magnitude of impacts decreases with distance. Post-closure impacts to the public are addressed for all alternative locations in chapter 5, section 5.3.3.5, of volume I.

In section I.2, this PSSC analysis identifies alternative locations at LANL where the additional LLW disposal capacity could be developed. Section I.2 also identifies alternative LLW management options not analyzed in this PSSC analysis because they are completely analyzed as part of the SWEIS alternatives in volume I. Section I.3 contains more detailed information about the environmental conditions at each of the alternative locations. Section I.4 presents the environmental consequences of development at each location. The SWEIS, including this PSSC analysis, is intended to provide a complete *National Environmental Policy Act of 1969* (NEPA) analysis of impacts regarding the proposed expansion of LLW disposal at LANL.

I.1.1 Background

DOE is considering the need to expand the LLW disposal area at LANL within the next 10 years. This PSSC analysis describes the alternatives for that development within LANL and their environmental consequences.

DOE and its predecessor agencies have operated LANL since 1943. Work at LANL produces LLW. Historically, DOE has disposed of this waste by burial in various designated sites within LANL. LANL's only currently active solid LLW disposal area is in the Material Disposal Area (MDA) G (referred to as Area G) at TA–54, shown in Figure I.1.1–1. TA–54 is located on Mesita del Buey, a narrow southeast-trending mesa about 2.5 miles (4 kilometers) long. Mesita del Buey is bordered by Cañada del Buey on the north and Pajarito Canyon on the south. San Ildefonso Pueblo land is located to the northeast of TA–54. The boundary between DOE land at TA–54 and San Ildefonso Pueblo land lies along the south edge of the top of the next mesa to the northeast of Cañada del Buey, an unnamed mesa south of Cedro Canyon. This boundary is about 650 feet (210 meters) northeast of the edge of Cañada del Buey at Area G.

Burial of LLW at TA–54, Area G, began in 1957 after the U.S. Atomic Energy Commission, with the assistance of the United States Geological Survey (USGS), selected

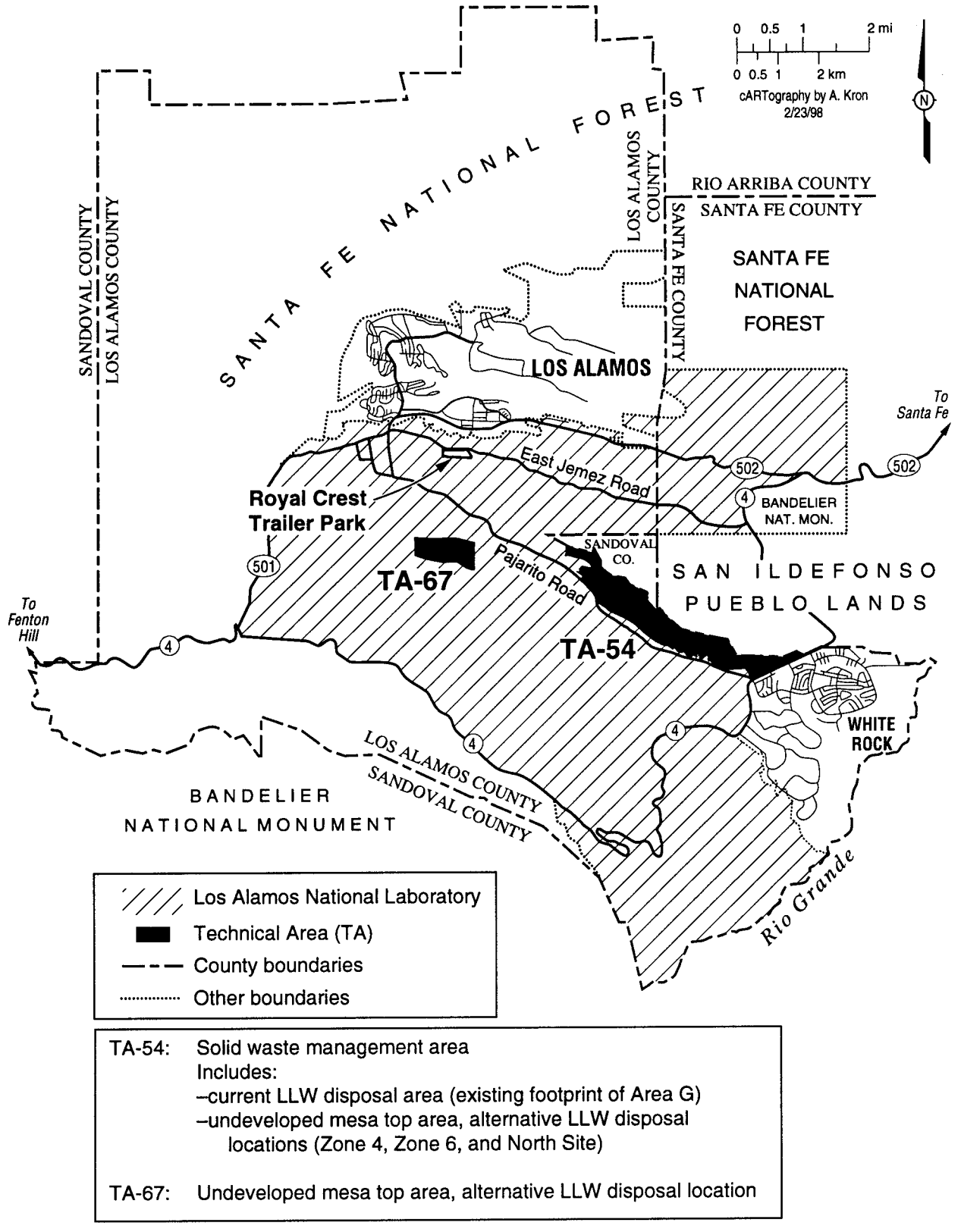

FIGURE I.1.1–1.—*Location of LANL, TA–54, and TA–67.*

Mesita del Buey as the disposal site for LANL's LLW. Area G was described in a historical report as one of the on-site land disposal facilities for radioactive wastes (Rogers 1977).

The previous (1979) SWEIS identified all of Mesita del Buey as an area for handling operational solid waste, including radioactive waste (DOE 1979). The 1979 SWEIS states, "The radioactive disposal area in use is Area G, located on Mesita del Buey. The dedicated waste disposal area contains a total of about 80 acres (32 hectares) of which approximately 37 acres (15 hectares) has been in active use since 1958. Based upon current waste generation rates, this area should provide an additional 15 or more years use. However, since the entire Mesita del Buey has been designated for the handling of operational solid waste, there will still be another 23 acres available for use beyond that time" (DOE 1979).

The original LLW disposal area at Area G was expanded once to reach its current size of 63 acres (25 hectares). This active area was referred to in the 1979 SWEIS as the "existing footprint." Waste management facilities at Area G include LLW disposal cells and shafts, a 200-ton (180-metric ton) compactor for LLW, soil-covered asphalt pads containing stacks of waste drums, temporary tension domes used to store drums of transuranic (TRU) waste[2] and low-level radioactive mixed waste[3] (LLMW), and a monofill disposal cell (a disposal cell containing a single waste type) for asbestos that has radioactive contamination.

A detailed description of the LLW streams and estimates of the volumes that might be produced under each of the SWEIS alternatives is provided in *Waste Management Strategies for LANL* (LANL 1998a) and chapter 5 of the SWEIS, volume I. Descriptions of the techniques by which LLW disposal cells are constructed, filled, and closed are found in the *Detailed Operating Procedure* (DOP) *54G–013*, (LANL 1996a). This DOP incorporates recommendations made by USGS (cited in Rogers 1977 and in Purtymun et al. 1980) and others (Koopman 1965) on disposal cell placement with regard to distances from canyon walls and bottoms. The Performance Assessment describes closure and post-closure requirements for the existing Area G (LANL 1998f).

I.1.1.1 *History of Expansion Plans at Area G*

Given the limited area within the existing footprint at Area G, DOE and LANL waste management personnel have recognized for several years the need to consider additional areas at LANL that would be suitable for burial of LLW (LANL 1982). The part of Mesita del Buey immediately to the west of Area L (Figure I.1.1.1–1) received the first and most thorough investigation because it is contiguous with the existing footprint and is within the area designated in 1957 for solid waste management operations. Expansion to Area L was regarded as logical but not imminent at the time the previous SWEIS was issued (DOE 1979). Specific planning and siting for the next LLW disposal area began about 1989.

I.1.1.2 *History of NEPA Reviews*

On October 20, 1990, DOE directed that NEPA review of an expansion of existing Area G be prepared. By 1994, no draft was considered ready for preapproval public review, in part because of questions about the need, arising from uncertainties in decontamination and decommissioning and environmental

2. TRU wastes contain a radionuclide with a half-life greater than 20 years and alpha activity of 100 nanocuries per gram (nCi/g) or greater at the time of measurement, excluding naturally occurring and depleted uranium, spent nuclear fuel, and high-level waste.

3. LLMW contains LLW, plus chemicals regulated as hazardous under the *Resource Conservation and Recovery Act* (RCRA) (42 United States Code [U.S.C.] §6901).

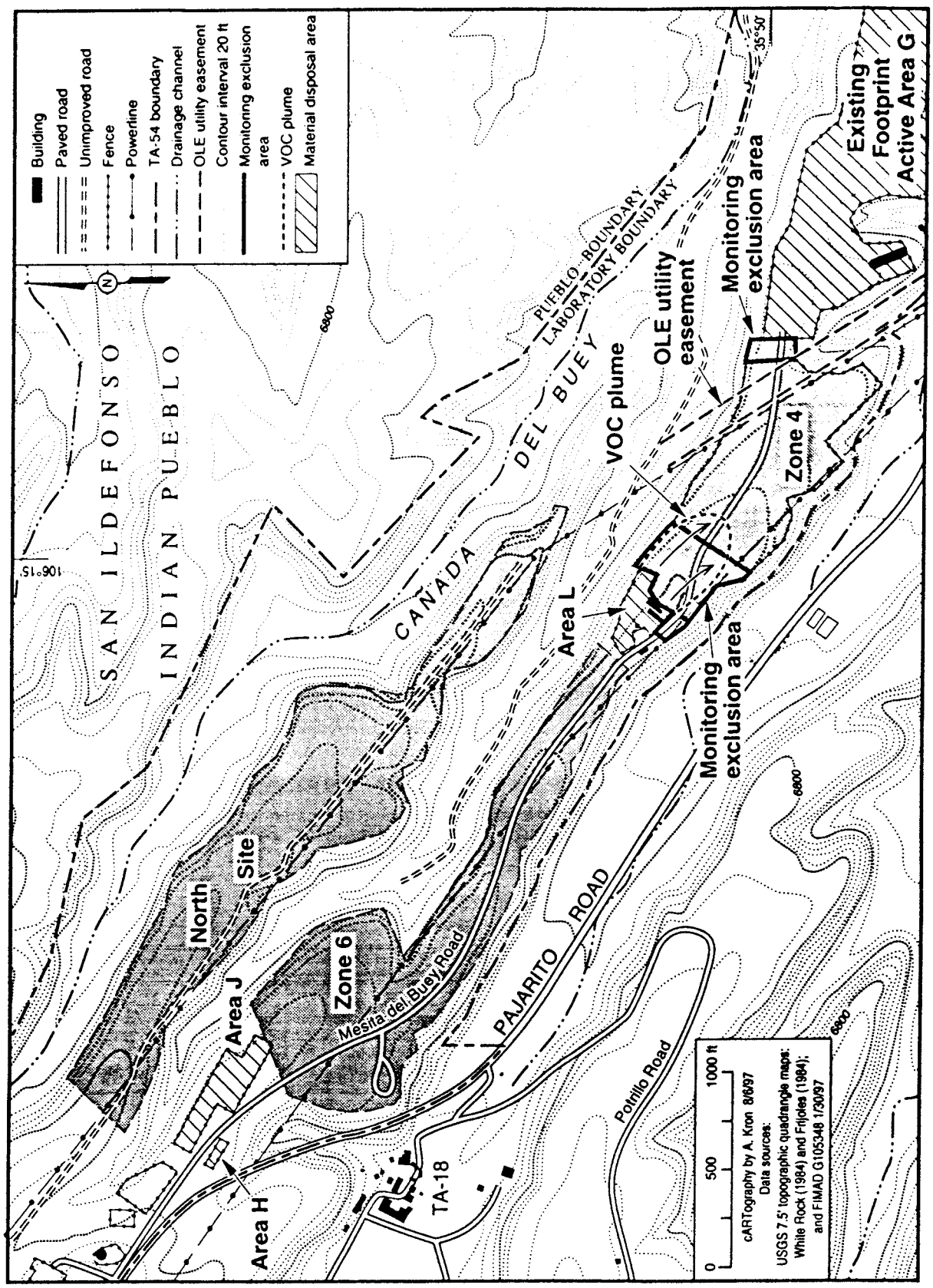

FIGURE I.1.1.1–1.—*Location Within TA–54 of Zones 4 and 6, Areas H, J, and L, and North Site.*

restoration (ER) waste volume projections. Several of the unresolved questions were discussed in a report prepared by a group named Our Common Ground (OCG 1993). (This was an unofficial group of LANL employees and members of the surrounding community that were asked by the LANL Director in 1993 to review the proposal for expansion of Area G.) In August 1994, the Advance Notice of Intent (NOI) to prepare a new SWEIS was published in the *Federal Register* (FR). Further development of disposal capacity outside the existing Area G footprint was specifically suggested for coverage in the new SWEIS. The NOI published in the FR on May 12, 1995 (60 FR 25697), made the commitment to include the NEPA review for this proposal in the SWEIS.

I.1.1.3 *Low-Level Radioactive Waste Generation and Anticipated Disposal Requirements at LANL*

Operations at LANL will continue to generate LLW that requires disposal by DOE. Waste volumes during the 10-year SWEIS timeframe will increase significantly over volumes generated in recent years (1990 through 1994). This increase stems primarily from clean-up projects planned under the ER Project. The assumptions used here are that the volume of LLW would vary by the SWEIS alternative, that regardless of alternative at least some of the LLW generated would be disposed of in disposal cells (trenches)[4] at Area G, and that the remaining LLW would need to be disposed of off site (except under the Expanded Operations Alternative, when on-site disposal capacity is expanded and all LLW is disposed of on site). The projected volumes of LANL's LLW by SWEIS alternative are summarized in Table I.1.1.3–1[5]. There is insufficient space within existing Area G to accommodate all LLW anticipated from LANL activities in the next 10 years, regardless of alternative.

4. LLW with high surface activity, tritium-contaminated LLW, and some other special wastes are disposed of in shafts drilled into tuff. There is sufficient space in the existing footprint to meet the 10-year shaft disposal requirements.

5. Volumes shown in tables in this document are presented in metric units (cubic meters) because this is the form used in volume I of the SWEIS, the *Waste Management Programmatic Environmental Impact Statement* (WM PEIS) (DOE 1997), and other documents on this subject. Also, exponential notation is used; 10^3 means "thousand."

TABLE I.1.1.3–1.—*LANL's LLW Volume to be Disposed of in Next 10 Years, by SWEIS Alternative (10^3 cubic meters)*[a]

LLW CATEGORY	NO ACTION	EXPANDED OPERATIONS	REDUCED OPERATIONS	GREENER
LLW Generated[a]	95	117	84	97
LLW to be Disposed[b]	88	112	78	90
Currently Developed Area G Capacity	36	36	36	36
Waste Volume Above Currently Developed Area G Capacity[c]	52	76	42	54

[a] From volume I of the SWEIS, chapter 5 (sections 5.2.9.3, 5.3.9.3, 5.4.9.3, and 5.5.9.3).
[b] Volume after compaction and other treatments.
[c] Under the No Action, Reduced Operations, and Greener Alternatives, much of the waste volume would be shipped off the site for disposal. Under Expanded Operations, on-site disposal capacity would be expanded, and the waste would be disposed of on the site (volume I, chapter 3).

The volume of LLW disposal space that can be developed within the existing Area G is uncertain because the best terrain has been used. The excavated but unfilled disposal cell volume is 34,000 cubic yards (26,000 cubic meters). The surface of the remaining area is sloped and the subsurface features are unknown. New disposal cell volume is estimated at 13,000 cubic yards (10,000 cubic meters) but could be less.

In addition, in the final *Waste Management Programmatic Environmental Impact Statement* (WM PEIS) (DOE 1997), the Preferred Alternative for LLW designates LANL as one of six candidate sites from which DOE will choose two or three regional LLW disposal sites (DOE 1997)[6]. The options under which LANL may receive off-site LLW and the projected volumes are shown in Table I.1.1.3–2.

6. In addition, the WM PEIS Preferred Alternative for LLMW designates LANL as one of six candidate sites, from which DOE will choose two or three regional disposal sites. LANL does not currently dispose of such waste at Area G or elsewhere. If LANL is chosen as a regional disposal site for LLMW, the site-specific impacts of such disposal would be addressed in further NEPA review, tiered from the WM PEIS and this SWEIS.

DOE's decisions within the context of the WM PEIS are independent of the SWEIS but may, in and of themselves, force expansion of Area G. A reasonably foreseeable future and bounding case would be a combination of the WM PEIS Preferred Alternative—Regionalized (Regionalized 3, 4, 5) with the Expanded Operations Alternative in LANL's SWEIS, whereby the 10-year shortfall of LLW disposal space at LANL would be about 125,000 cubic yards (96,000 cubic meters). Such a decision from the WM PEIS would represent a substantial change in the approach to LLW disposal at LANL. This would be a long-term commitment (beyond the 10-year period addressed in the SWEIS) by DOE to utilize space at LANL as a regional LLW disposal site. (If LANL is chosen as a regional disposal site for LLW, the site-specific impacts of that decision would be addressed in further NEPA review tiered from the WM PEIS and this SWEIS.) Alternatively, DOE could decide to ship all LANL's LLW to one of the other regional disposal sites. (As discussed above, shipment of LANL's LLW for off-site disposal is analyzed in the No Action, Reduced Operations, and Greener Alternatives.)

TABLE I.1.1.3–2.—*Bounding LLW Volumes to be Disposed at LANL, Including LLW Potentially Shipped to LANL Based on WM PEIS over 10 Years (10^3 cubic meters)*

WM PEIS ALTERNATIVE	REGIONALIZED 1, 2	PREFERRED ALTERNATIVE: REGIONALIZED 3, 4, 5[a]	CENTRALIZED 3, 4
Off-Site LLW Volume for Disposal at LANL[b]	16	20	3
LANL LLW to be Disposed[c]	112	112	112
Maximum LLW Volume for Disposal at LANL	128	132	115
Available Capacity in Area G	36	36	36
Shortfall in Capacity at Area G	92	96	79

[a] The Preferred Alternative for LLW disposal in WM PEIS is regionalized, with LANL as a candidate for one of the two or three disposal sites for the complex.
[b] From Appendix I, Table I.3–4, WM PEIS (DOE 1997), adjusted to 10 years.
[c] Maximum volume, Expanded Operations Alternative, from Table I.1.1.3–1.

There are several sources of uncertainty in predictions about volume of the LLW to be disposed of at LANL over the next 10 years. One source of uncertainty is in predictions of waste to be generated at LANL under the four SWEIS alternatives. Although operations-related LLW volumes are reasonably predictable given the levels of operations, the volume of LLW to be produced by ER and decontamination and decommissioning activities is potentially very large but is tied to the level of funds allocated annually by DOE for the clean-up programs. The *Waste Management Strategies for LANL* LLW volume projections have been used here because they are bounding cases that include both operational and ER/ decontamination and decommissioning LLW estimates (LANL 1998a). This waste volume estimating method responds to one of the issues raised in the report by Our Common Ground (OCG 1993).

The volume of additional LLW disposal space needed over the next 10 years and into the future is not known at present. DOE's options to ship LLW from other locations for disposal at LANL, as developed in the WM PEIS, introduce another uncertainty into the space needed for LLW disposal.

This PSSC analysis presents various alternative locations at LANL that could be developed for LLW disposal. To preserve flexibility and as a bounding case for the next 10 years, this PSSC analysis assumes the LLW volume to be accommodated is that described for the SWEIS Expanded Operations Alternative (146,000 cubic yards [112,000 cubic meters]) from the *Waste Management Strategies for LANL* and in chapter 5 (section 5.3.9.3) of the SWEIS, volume I, plus the maximum quantity of LLW proposed to be moved to LANL from other DOE locations over 10 years (26,000 cubic yards [20,000 cubic meters]), as described in the WM PEIS (DOE 1997). The remaining 47,000 cubic yards (36,000 cubic meters) of disposal space in the existing footprint at Area G will be used prior to expansion of on-site LLW disposal capacity. Over the next 10 years, DOE could need to develop additional disposal space at LANL for up to 125,000 cubic yards (96,000 cubic meters) of LLW (the greatest foreseeable disposal capacity shortfall, as reflected in Table I.1.1.3–2).

I.2 ALTERNATIVES

This section identifies alternative locations that DOE could develop as disposal cells (trenches) to dispose of LLW that would be generated at LANL over the next 10 years, plus LLW that might be shipped to LANL for disposal from other DOE locations. This discussion is focused on construction and development of new LLW disposal areas. (Figures I.1.1–1 and I.1.1.1–1 illustrate the locations being considered.) Alternatives discussed include:

- Develop Zone 4 at TA–54.
- Develop Zone 6 at TA–54.
- Develop the North Site at TA–54.
- Develop an undisturbed site at another LANL TA. (TA–67 is used as an example.)
- Develop both Zones 4 and 6 in step-wise fashion (the Preferred Alternative).

Each of the five alternatives could provide more than enough space for potential LLW disposal needs (125,000 cubic yards [96,000 cubic meters]) for the next 10 years (Table I.1.1.3–2). The differences among alternatives follow from consequences of development at the different locations. The alternative of developing at an undisturbed location responds to one of the issues raised in the report by Our Common Ground (OCG 1993).

Additional alternatives for LLW management are not analyzed in detail in this PSSC analysis because they are analyzed within the SWEIS itself. The typical No Action Alternative (i.e., to continue burying LLW within the existing footprint at Area G) is discussed in chapter 3 of

volume I as a part of normal operations; its consequences are presented in chapter 5. This activity is common to all the SWEIS alternatives up to the point that on-site disposal ends (for the No Action, Reduced Operations, and Greener Alternatives). Shipping LLW off the site for disposal elsewhere is a part of the SWEIS No Action, Reduced Operations, and Greener Alternatives, but not the Expanded Operations Alternative.

I.2.1 Develop Zone 4 at TA–54

Under this alternative, DOE would develop Zone 4 within Area G, immediately west of the active disposal area as shown in Figure I.1.1.1–1, for the additional LLW disposal capacity. The Zone 4 area is about 30 acres (12 hectares), but some of the area could not be developed for disposal cells because of groundwater monitoring wells and a utility easement. Two options will be discussed for developing Zone 4, the area north of the current road and the entire area, both north and south of the road. Developing just the area north of the road would avoid archaeological sites. Although the area to the south of the road is larger, it would be impractical to develop just that area because of the archaeological sites located there.

I.2.1.1 *Location Description*

Zone 4 is located on Mesita del Buey, within TA–54 (Figures I.1.1–1 and I.1.1.1–1). The upper portion of Mesita del Buey is of Bandelier Tuff. The Bandelier Tuff is composed primarily of volcanic ash. The tuff is a good material in which to dispose of LLW because it forms a natural barrier to fluid migration, primarily because of its generally low hydraulic conductivity (Purtymun and Kennedy 1971 and Rogers 1995). No geologic faults have been identified at Mesita del Buey.

Zone 4, an area of slightly less than 30 acres (12 hectares), runs westward from the existing footprint of Area G to Area L, where chemical wastes are managed. This area is fenced, and access is controlled by the gate at the westernmost end of the waste management area. The paved Mesita del Buey Road runs the length of the mesa into the developed area. The area is level and covered with second-growth pinyon[7] and juniper and an understory of shrubs and grasses. Zone 4 is within the foraging area of a peregrine falcon nest site, a site that has been unoccupied in recent years.

There are some constraints on developing LLW disposal space in Zone 4. Because Area L was once used for chemical waste disposal, there is a volatile organic compound (VOC) plume in the subsurface. LANL set aside monitoring exclusion zones on either side of Zone 4 to track the movement of the VOC plume. At the western edge of Zone 4, the monitoring zone is about 3 acres (1.2 hectares), and the eastern monitoring zone is about 1 acre (0.4 hectares). These features are shown in Figure I.1.1.1–1. The VOC plume is being monitored and has not moved appreciably in about 5 years. It extends in the pore gas space about 500 feet (150 meters) eastward into Zone 4 (LANL 1994). The organic compound of maximum concentration is 1,1,1-trichloroethane (TCE), at 5,540 parts per million (ppm), as detected in 1997 (LANL 1998e). The identity and concentrations of VOCs are listed in appendix I.B. A study of the human health risk posed by this plume will be performed under the ER Project at LANL during the 1997 to 1999 timeframe. Until the results are known, excavations will not be made in these exclusion zones. If disposal cells were to be excavated, administrative controls such as monitoring the air in the breathing area and supplying workers with respiratory protection could protect worker health.

7. A cross-reference between the common and scientific names of the plants and animals noted in the text is found in appendix I.A.

Very small but measurable amounts of VOCs are being released into the atmosphere as a consequence of the VOC plume. Any effects that these emissions are having on fossorial (digging) animals as well as other area plants and animals are being assessed through ecological risk assessments.

An easement for the proposed Public Service Company of New Mexico (PNM) Ojo (Transmission) Line Extension (OLE) passes through this end of Zone 4; but, plans to construct the OLE have been suspended indefinitely. The need for additional electrical power at LANL has not been resolved yet. This easement area would be avoided until the electrical supply issue is settled.

Nine cultural resources, remains of prehistoric Native American habitation, have been identified within Zone 4. All except one is south of Mesita del Buey Road. The exception is located north of the road but within the ER monitoring zone. The site would not be excavated because this monitoring zone would not be disturbed. As discussed further in section I.3.6, an archeological data recovery plan has been approved by the New Mexico State Historic Preservation Office(r) (SHPO) for the sites in Zone 4 that are eligible for the National Register of Historic Places (NRHP). At Zone 4, the boundary of San Ildefonso Pueblo is 1,300 feet (400 meters) northeast of the north edge of the top of Mesita del Buey (Figure I.1.1.1–1). The traditional cultural property (TCP) study conducted for the SWEIS did not identify any TCPs in this area.

I.2.1.2 *Development*

If this alternative were implemented, a radiation control and monitoring zone would be placed adjacent to an active disposal cell so that waste disposal crews could be monitored as they prepared to leave the area. A decontamination facility, probably an impervious wash pad capable of accommodating a truck, would be added if needed. Decontamination water would be collected and transferred to the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA–50. These facilities would be connected to the existing utility lines. In addition, an air monitoring network would be installed. The existing waste management support facilities and infrastructure within the existing footprint area would continue to be used. No new roads or utilities would be required. The trees in the area, mainly pinyon and juniper, would be removed and the wood would be chipped and burned or used as mulch on the site (as discussed in section I.4.1.2).

DOE has identified two options for developing LLW disposal areas within Zone 4. Just the area to the north of Mesita del Buey Road could be developed, or the areas on both the north and south sides of the road could be developed together. Several archaeological sites would have to be excavated in order to proceed with development south of the road. If additional disposal area was limited to the north side of the road, avoiding the monitoring zones, no archeological sites need be excavated, and the VOC monitoring apparatus would not be disturbed. Engineering and administrative controls could be put in place to mitigate the potential for radiological contamination of archeological sites to the south of the road.

If the area on the both sides of Mesita del Buey Road were developed, the eight archaeological sites to the south of the road would be affected. Excavating waste disposal cells among unexcavated archaeological sites is not feasible for several reasons. Fencing around the surface features would reduce but not prevent the chance of their being run over by heavy excavation equipment and waste delivery trucks. The extent of a site cannot be accurately determined from remaining surface features alone, and the equipment used to excavate disposal cells (back hoe and front-end loader) could destroy subsurface features. Avoiding archaeological sites would greatly reduce the potential disposal volume per acre, thus

expanding the number of acres needed for a dedicated LLW disposal area. Finally, there are concerns about the possibility of contamination migrating into the archaeological sites from buried radioactive wastes.

The areas that would be disturbed are summarized in Table I.2.1.2–1. The estimate of usable acreage takes into account the requirement for disposal cells to be 50 feet (15 meters) from the competent canyon wall (Rogers 1977 and Purtymun et al. 1980), avoiding the VOC plume, monitoring areas, and the OLE easement. The long-term impacts of disposal at this location were assessed in the Area G Performance Assessment (LANL 1998f) and are discussed further in volume I (section 5.3.3.5).

I.2.2 Develop Zone 6 at TA–54

Under this alternative, DOE would develop the area of Mesita del Buey that lies within TA–54 immediately to the west of Area L (Zone 5) and extends to Area J for the additional LLW disposal capacity. This area, referred to as Zone 6, is slightly less than 40 acres (16 hectares). The location is shown in Figure I.1.1.1–1. The location is not fenced, but access by road is controlled by the same gate referred to in section I.2.1.1.

I.2.2.1 *Location Description*

The soil and underlying tuff at Zone 6 are the same as those described for Zone 4 in section I.2.1.1.

The area is level and covered with second-growth pinyon and juniper and an understory of shrubs and grasses. The mesa top is quite narrow in part of this location, and Mesita del Buey Road runs down the middle of the mesa. These features would make about half the surface area difficult and inefficient to develop as disposal cells. Zone 6 is also within the foraging area of the peregrine falcon nest site noted in section I.2.1.1. Monitoring data indicate the presence of no ER locations. There are seven archaeological sites within Zone 6 that could be affected. Prior to developing this area, a recovery plan would be prepared, and the SHPO would be consulted. At Zone 6, the boundary of San Ildefonso Pueblo lies about 1,600 feet (500 meters) northeast of the north edge of the top of Mesita del Buey (Figure I.1.1.1–1). The TCP study conducted for the SWEIS did not result in the identification of specific TCPs in Zone 6.

I.2.2.2 *Development*

If this alternative were implemented, the same steps would be implemented as those discussed in section I.2.1.2. No new roads or utilities

TABLE I.2.1.2–1.—*Low-Level Waste Disposal Areas Within Zone 4 of TA–54*

OPTION	APPROXIMATE AREA DISTURBED	APPROXIMATE WASTE VOLUME (10^3 m^3)[a]
Option 1 – Designate approximately 7 acres (3 hectares) west of the existing footprint and east of the existing ER monitoring area as an MDA, north of the Mesita del Buey access road only.	7 acres (3 hectares)	260
Option 2 – Designate approximately 30 acres (12 hectares) west of the existing footprint and east of the existing ER monitoring zone as an MDA, both sides of Mesita del Buey access road.	24 acres (10 hectares)	800

[a] Waste capacity value calculated assuming disposal cell depth of 65 feet (20 meters) and a 40 percent fill efficiency.

would be required, but the present road could be relocated nearer to the canyon rim to free more contiguous space for disposal cell development. Here, fencing would not be placed around the entire zone; only the disposal cells being excavated and filled with LLW would be fenced. This fencing would prevent people and medium- to large-sized animals from entering open disposal cells. Fencing would be removed after the disposal cells are closed.

The trees in the mesa-top area, mainly pinyon and juniper, would be removed as necessary and managed as discussed in section I.2.1.2.

Zone 6 presents some constraints on efficient development because much of the area is located along a narrow part of the mesa. In the narrow area, it would be difficult to site disposal cells with the required 50 feet (15 meters) set back from the mesa edges and still avoid Mesita del Buey Road. Most of the disposal cells would be placed in the wider area at the west end of Zone 6. The area that could be disturbed and potential waste volume are shown in Table I.2.2.2–1.

While this site was not specifically analyzed regarding the long-term impacts of waste disposal at this location, the site characteristics at Zone 6 are essentially identical to those analyzed in the Area G Performance Assessment (LANL 1998f). Thus, the results of the Performance Assessment (discussed further in volume I, chapter 5, section 5.3.3.5) are considered to be applicable to this location (Newell 1998).

TABLE I.2.2.2–1.—*LLW Disposal Area Within Zone 6 of TA–54*

OPTION	APPROX. AREA DISTURBED	APPROX. WASTE VOLUME (10^3 m^3)
Designate 40 acres (16 hectares) Immediately West of Area L as an MDA	17 acres (7 hectares)	550

Waste capacity value calculated assuming disposal cell depth of 65 feet (20 meters) and a 40 percent fill efficiency.

I.2.3 Develop the North Site, TA–54

Under this alternative, DOE would develop the northern finger of Mesita del Buey that lies within TA–54 immediately to the north of Zones 6 and Area J for the additional LLW disposal capacity. The area is shown in Figure I.1.1.1–1. The mesa top in this area is undeveloped and relatively undisturbed. A 115-kilovolt electrical power line and an unimproved road run down its length. The location is not fenced, and access is not controlled. This area will be referred to in this document as the North Site, TA–54. The total area is about 63 acres (25 hectares), but not all is developable for disposal cells.

I.2.3.1 *Location Description*

The soil and underlying tuff at the North Site are the same as those described for Zone 4 in section I.2.1.1.

The mesa top at the North Site has an area suitable for disposal cell development of about 49 acres (20 hectares). The area is very similar to Zones 4 and 6, described in sections I.2.1.1 and I.2.2.1. At the North Site, the boundary of San Ildefonso Pueblo is about 300 feet (90 meters) northeast of the north edge of the top of Mesita del Buey (Figure I.1.1.1–1). The TCP study conducted for the SWEIS did not result in the identification of specific TCPs at the North Site.

Four archaeological sites are known to be present within the North Site, but the area has not been as rigorously surveyed as has the rest of Mesita del Buey. Additional sites may be present. Prior to developing this area, a recovery plan would be prepared and the SHPO

would be consulted. No ER locations have been identified.

I.2.3.2 *Development*

If this alternative were implemented, the development would be the same as presented for Zone 6 (section I.2.2.2), except that the unpaved road down the mesa would be upgraded by topping it with asphalt. The support structures at Area G would continue to be used as the management center. However, due to the distance from the developed part of Mesita del Buey, some utility lines, including a 110/220-volt electrical line and telephone lines, may be installed aboveground. A decontamination facility, probably an impervious wash pad capable of accommodating a truck, could be added if needed. Decontamination water would be collected and transferred to the RLWTF by tank truck or through the existing pipeline from Area G. Here, fencing would not be placed around the entire zone; only the disposal cells being excavated and filled with LLW would be fenced. This fencing would prevent people and animals from entering open disposal cells. Fencing would be removed after the cells are closed.

The trees in the mesa top area, mainly pinyon and juniper, would be removed as needed and managed as discussed in section I.2.1.2.

The North Site may present some constraints on efficient development. A 115-kilovolt utility line runs the length of the mesa. Current practice precludes disposal cell construction under electrical lines for safety reasons. The electrical line could be relocated toward the edge of the mesa to maximize disposal space. In addition, the USGS specification is that the bottom of the disposal cell be a minimum of 10 feet (3 meters) above the adjacent canyon bottom; this limits the allowable depth of the disposal cells and requires longer or wider disposal cells to accommodate a given volume of waste. The acreage disturbed under this alternative takes this constraint into account.

While this site was not specifically analyzed regarding the long-term impacts of waste disposal at this location, the site characteristics at the North Site are essentially identical to those analyzed in the Area G Performance Assessment (LANL 1998f). Thus, the results of the Performance Assessment (discussed further in volume I, chapter 5, section 5.3.3.5) are considered to be applicable to this location (Newell 1998).

The potential area disturbed and approximate waste volume are summarized in Table I.2.3.2–1.

I.2.4 Develop New Disposal Site at Another LANL Technical Area (TA–67)

Under this alternative, DOE would establish a new LLW disposal facility at another unspecified location at LANL. The new area is assumed to be an undeveloped, undisturbed mesa, not adjacent to the existing LLW disposal area. This alternative would require that the existing facilities at Area G be duplicated in

TABLE I.2.3.2–1.—*Low-Level Waste Disposal Area Within the North Site of TA–54*

OPTION	APPROX. ACREAGE DISTURBED	APPROX. WASTE VOLUME (10^3 m^3)
Designate 63 acres (25 hectares) Immediately North of Zone 6 and Area J as an MDA	49 acres (20 hectares)	1,600

Waste capacity value calculated assuming disposal cell depth of 65 feet (20 meters) or 10 feet above the adjacent canyon bottom (whichever is less) and a 40 percent fill efficiency.

another location at LANL. A good deal of information is known about Pajarito Mesa within TA–67 because this area was evaluated as a possible location for a mixed waste disposal facility, a proposal subsequently canceled. This location was chosen as an example of requirements for developing undeveloped mesas within LANL for LLW disposal. Other undeveloped mesa-top locations would present similar but not necessarily identical requirements for development (i.e., not all mesa tops are within potential habitat of threatened and endangered [T&E] species or possible existence of a fault, but virtually all contain archaeological sites).

I.2.4.1 *Location Description*

The representative undeveloped location selected is TA–67 on Pajarito Mesa because it is the best characterized area on an undeveloped mesa. This location is shown in Figures I.1.1–1 and I.2.4.1–1.

The upper portion of Pajarito Mesa is also of Bandelier Tuff, the properties of which are described in section I.2.1.1. Beneath TA–67, the tuff is a 295-foot (90-meter) thick bed of Bandelier Tuff (Broxton and Chipera 1994). The underlying layer is also of older sedimentary deposits and basalt flows. The Rendija Canyon fault may underlie the western portion of TA–67. (See chapter 4, section 4.2.2.2, Figure 4.2.2.2–1).

TA–67 is an undeveloped area of slightly less than 72 acres (29 hectares) atop Pajarito Mesa. To the north of the mesa lies Pajarito Canyon; to the south is Threemile Canyon. The mesa top is level and covered with ponderosa pine, pinyon, and juniper with an understory of shrubs and grasses. The site is within the buffer zone of a high explosives (HE) research and development area. It is also within the blast circles for active HE firing sites at TA–15 and TA–40 (LANL 1991). The blast circle defines an area wherein fragments from tests may fall and from which humans are excluded during tests. Access to TA–67 at present is via West Jemez Road (State Route 501) and then through a security gate via Anchor Ranch Road and east on R-Site Road.

TA–67 is within one-quarter mile of potential nesting habitat for the Mexican spotted owl, and is within potential roosting and foraging habitat for that species.

There are 11 cultural resources within TA–67 that might be affected by development of the site (LANL 1998c). The TCP study conducted for the SWEIS did not identify any specific TCPs in the area. The boundary of San Ildefonso Pueblo is about 1.5 miles (2.4 kilometers) east of TA–67 (Figure I.1.1–1).

I.2.4.2 *Development*

If this alternative were implemented, a set of waste management support facilities and infrastructure similar to that in the existing footprint area would be constructed and installed at TA–67, including office structures, personnel showers, equipment and supply storage lockers, control rooms, personnel monitoring stations, and the surface decontamination wash pad and structures. It would not be efficient to continue to use the support facilities at Area G because of the distance. Decontamination water would be collected in a tank and moved by tank truck to the RLWTF. Another 200-ton (180-metric ton) compactor may be installed, or the existing unit might be relocated. The infrastructure (consisting of roads, utility lines, and air monitoring network) would have to be installed. An access control gate and some fencing would be installed. The access road would require either a bridge over Threemile Canyon or an access road around the west end of the canyon. The installation in the existing footprint would remain active while the new location was being developed.

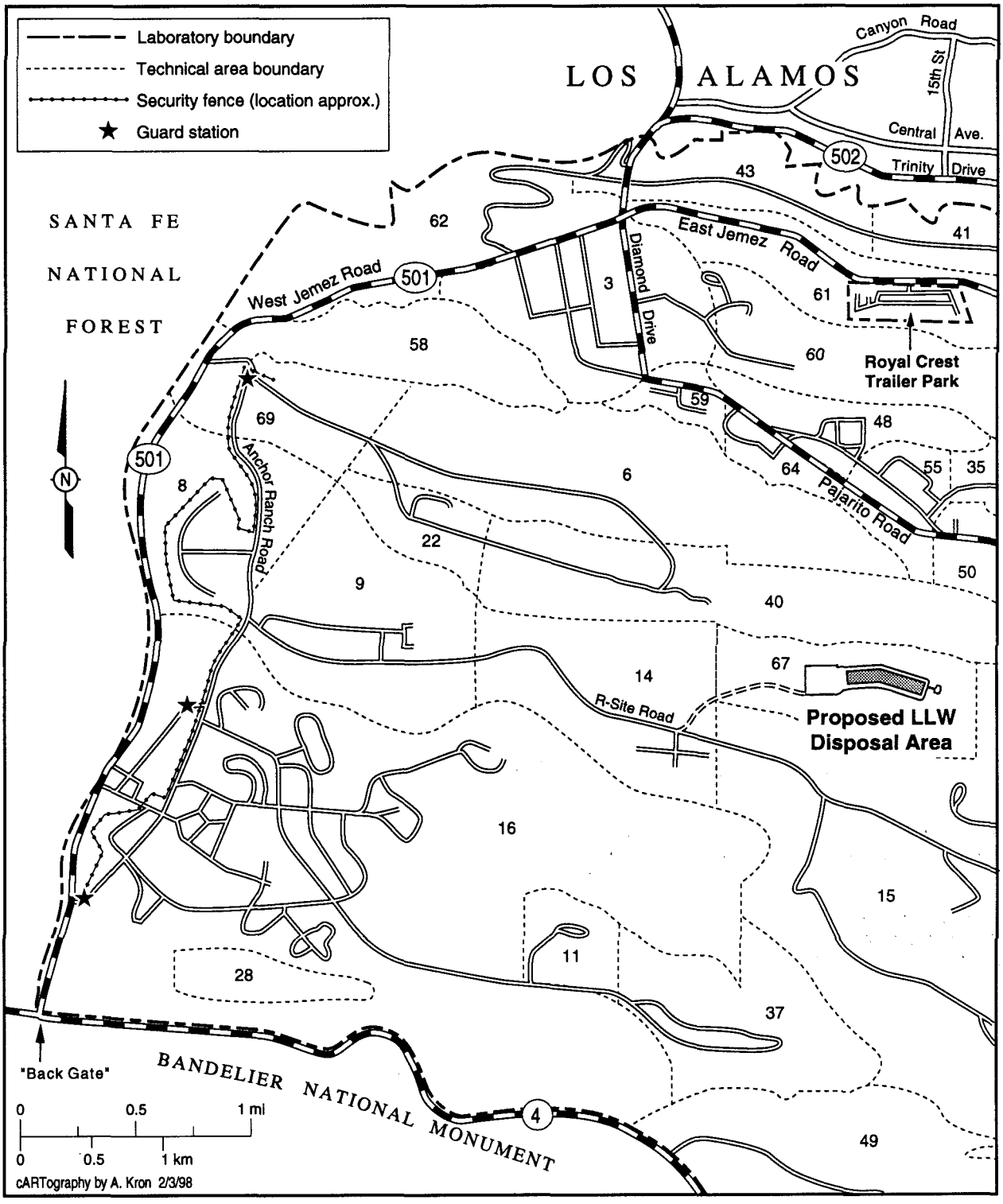

FIGURE I.2.4.1–1.—*Location of the Proposed LLW Disposal Area at TA–67.*[1]

[1] The TA numbers are included.

The trees in the mesa-top area, ponderosa pines, pinyons, and juniper, would be removed and managed as discussed in section I.2.1.2. The surface contour would be changed as needed to control runoff and protect the wetland north of the mesa. A data recovery plan would be developed, archaeological sites would be excavated as necessary, and data would be recovered, as discussed in sections I.3.6 and I.4.4.5.

Fencing would not be placed around the entire zone; only the disposal cells being excavated and filled with LLW would be fenced. This fencing would prevent people and animals from entering open cells. Fencing would be removed after the disposal cells are closed.

About 50 acres (24 hectares) is assumed for waste disposal cells, while the remainder of the area disturbed would be for roads and other infrastructure development. The potential area disturbed and waste volume are summarized in Table I.2.4.2–1.

While this site was not specifically analyzed regarding the long-term impacts of waste disposal at this location, the site characteristics at TA–67 (and many other mesa tops in the area) are sufficiently similar to those analyzed in the Area G Performance Assessment (LANL 1998f) in that the Performance Assessment results (discussed in volume I, chapter 5, section 5.3.3.5) are considered applicable to other mesa-top locations, such as TA–67 (Newell 1998). It is important to note that the possible existence of a fault beneath part of the TA–67 site introduces additional issues that do not exist at TA–54.

TABLE I.2.4.2–1.—*LLW Disposal Area Within TA–67*

OPTION	APPROX. ACREAGE DISTURBED	APPROX. WASTE VOLUME (10^3 m^3)
Designate 72 acres (29 hectares) at TA–67 on Pajarito Mesa as an MDA	50 acres (20 hectares)	1,600

Waste capacity value calculated assuming disposal cell depth of 65 feet (20 meters) and a 40 percent fill efficiency.

I.2.5 Preferred Alternative—Develop Zones 4 and 6 at TA–54

The Preferred Alternative is to develop both Zones 4 and 6, proceeding westward in a step-by-step fashion from the existing footprint of Area G. The majority of the area on top of Mesita del Buey (excluding the North Site) would effectively be designated for LLW management and disposal. The Preferred Alternative is shown in Figure I.2.5–1.

This alternative has been designated as preferred because it offers DOE several advantages. Because LLW disposal areas require long-term institutional control and LLW has been disposed of at both ends of Mesita del Buey (Area H and Area G, shown in Figure I.2.5–1), it would be more efficient to control the mesa top as one contiguous disposal area, continuing west from the existing Area G. Zones 4 and 6 on Mesita del Buey are not currently occupied or used by any T&E species. The space set aside might suffice for as long as 130 years. Setting aside an area that is more than adequate for the LLW disposal needs forecasted for 10 years gives DOE flexibility in case the needs have been underestimated. Finally, setting aside this entire area preserves DOE's flexibility to continue to dispose of LLW (north of the road in Zone 4) while addressing the issues of the archaeological sites in the remaining part of Zones 4 and 6.

Disposal cells would be excavated as needed. The development would ultimately be equivalent to the sum of that described individually for all of Zone 4 (section I.2.1.2)

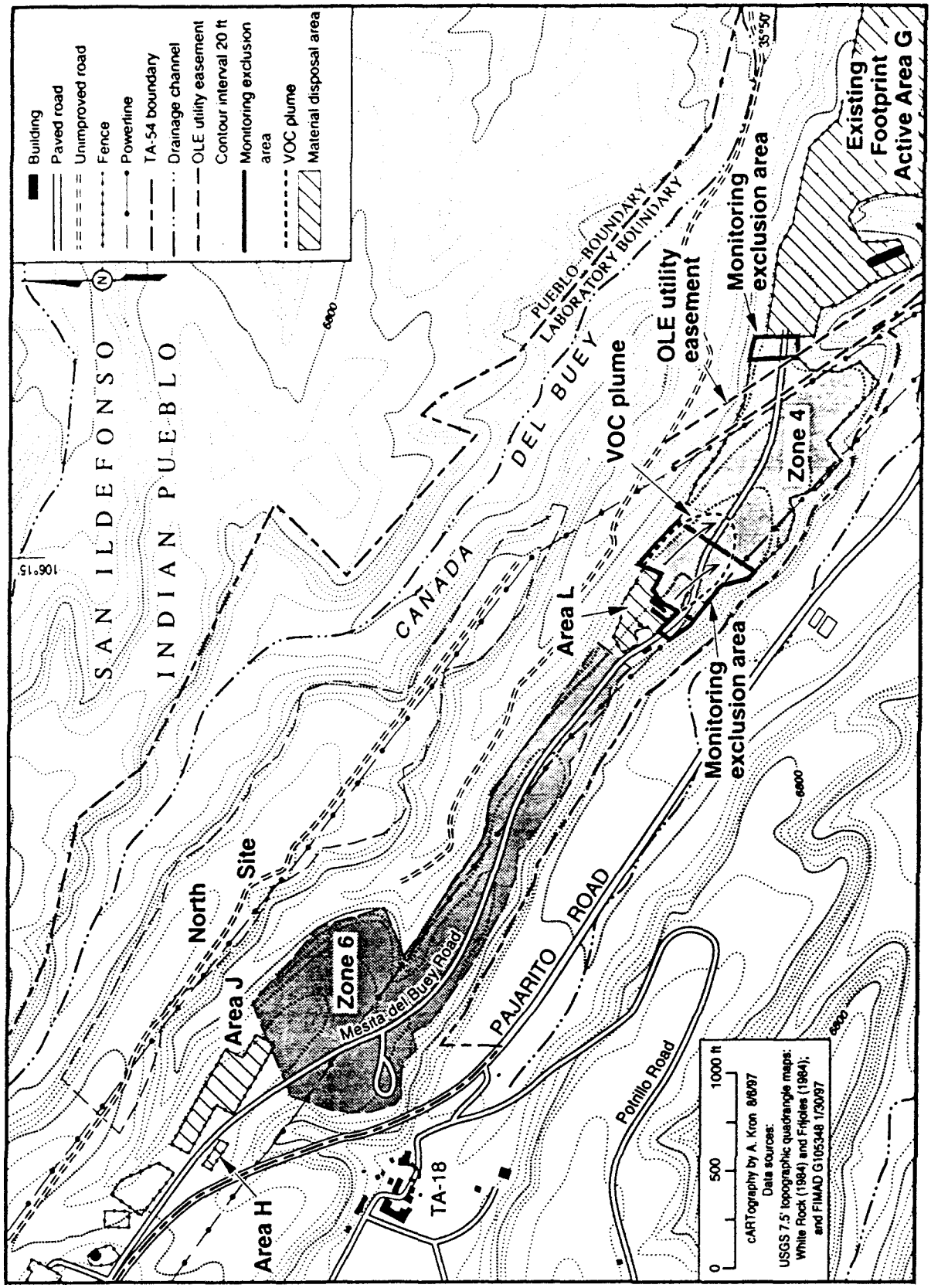

FIGURE I.2.5–1.—*Location of the Preferred Alternative Within TA–54.*

and Zone 6 (section I.2.2.2) added together, and as shown in Table I.2.5–1.

I.3 AFFECTED ENVIRONMENT

This section does not repeat information that is presented in volume I of the SWEIS; it focuses on alternative-specific information that is needed to illuminate the differences in alternatives. Table I.3–1 identifies the environmental resources common to this PSSC analysis and volume I of the SWEIS, along with their location in volume I and in this PSSC analysis. Table I.3–2 identifies environmental resources that are not discussed in this PSSC analysis, provides information about why they are not discussed further here, and identifies the locations of discussions in volume I of the SWEIS. Zones 4 and 6 and the North Site are on the top of the Mesita del Buey area at TA–54. The environmental conditions for the whole mesa top are described as a unit (as Mesita del Buey). TA–67, on Pajarito Mesa, is described separately.

I.3.1 Land Resources

Distances and directions from the residential areas, the San Ildefonso Pueblo boundary, and the Bandelier National Monument (BNM) boundary to the alternative locations are shown in Table I.3.1–1. The distances to these resources from existing Area G are included for comparison. Although the distances are shown to the nearest San Ildefonso Pueblo boundary, this is not the distance to a residential area at San Ildefonso. The mesa top on San Ildefonso Pueblo land nearest the DOE boundary may be used for other intermittent purposes, but no dwellings are located there. The nearest human habitations on pueblo land are at Totavi, some 3.6 miles (5.8 kilometers) northeast of Area G, and Otowi, which is farther away.

TABLE I.2.5–1.—*LLW Disposal Area Within the Preferred Alternative, Zones 4 and 6*

OPTION	APPROX. ACREAGE DISTURBED	APPROX. WASTE VOLUME (10^3 m^3)
Designate Zones 4 and 6 on Mesita del Buey, 70 acres (28 hectares)	41 acres (17 hectares)	1,350

Waste capacity value calculated assuming disposal cell depth of 65 feet (20 meters) and a 40 percent fill efficiency.
For Zone 4, option 2 (develop both north and south of the access road) is assumed.

I.3.1.1 *Land Use*

TA–54 is a designated waste management and disposal area and is not accessible to the general public. In contrast, TA–67 land is designated as an explosives test or storage area that is currently used as a safety buffer zone for nearby LANL explosives testing operations; LANL workers are excluded from TA–67 during tests.

I.3.1.2 *Visual Resources*

From Pajarito Road, motorists can see only the sides of support facilities and storage domes of the existing footprint of Area G on the edge of the mesa above, to the north of the road. The areas next to the structures at Area G are predominately grass-covered expanses (at closed disposal sites) surrounded by undeveloped areas that are forested with native shrubs and small trees. Mesita del Buey is not visible from the BNM Visitors' Center or developed campgrounds. It is visible from the nearest San Ildefonso Pueblo boundary, although not from the dwellings at Totavi and Otowi.

The easternmost end of TA–67 is visible from Pajarito Road but not from the BNM Visitors' Center, developed campgrounds, or San Ildefonso Pueblo land. The TA–67 area

TABLE I.3–1.—*Potential Environmental Resource Issues Addressed in Volume I and This PSSC*

ENVIRONMENTAL RESOURCE	LOCATIONS OF DISCUSSIONS
Land Use	Volume I, section 4.1.1 and PSSC Analysis, section I.3.1.1
Visual Resources	Volume I, section 4.1.2 and PSSC Analysis, section I.3.1.2
Noise	Volume I, section 4.1.3 and PSSC Analysis, section I.3.1.3
Air Quality	Volume I, section 4.4 and PSSC Analysis, section I.3.2
Ecological Resources	Volume I, section 4.5 and PSSC Analysis, section I.3.3
Threatened and Endangered Species	Volume I, section 4.5 and PSSC Analysis, section I.3.3.2
Human Health	Volume I, section 4.6 and PSSC Analysis, section I.3.4
Environmental Justice	Volume I, section 4.7 and PSSC Analysis, section I.3.5
Cultural Resources	Volume I, section 4.8 and PSSC Analysis, section I.3.6
Waste Management	Volume I, section 4.9 and PSSC Analysis, section I.3.7
Environmental Restoration	Volume I, section 2.1.2.5 and PSSC Analysis, section I.3.8
Traffic	Volume I, section 4.10 and PSSC Analysis, section I.3.9

TABLE I.3–2.—*Potential Environmental Resource Issues Addressed Only in Volume I of the SWEIS*

ENVIRONMENTAL RESOURCE	REASON NOT ADDRESSED IN THIS PSSC	LOCATION OF DISCUSSION
Parks, Forests, Conservation Areas, Areas of Recreational, Ecological, or Aesthetic Importance	Public access not permitted in any of the areas under consideration due to their present designated uses.	Volume I, section 4.1.1
Geology and Soils	Alternatives would involve the same types of surface soils and the same underlying Bandelier Tuff (Purtymun and Kennedy 1971, Nyhan et al. 1978, and Broxton and Chipera 1994).	Volume I, section 4.3
Water Resources	None of the alternatives would affect water resources. Any modifications to runoff patterns would be minor relocations. Surface water conditions are described in Reneau 1994, Banar 1996, and LANL 1996b.	Volume I, section 4.4
Wetlands	No wetlands present on mesa tops at TA–54 or TA–67 or in other locations that could be affected by any of the PSSC alternatives.	Volume I, section 4.5
Socioeconomics	The labor required to implement any of the alternatives is very small and well within the capacity of the local labor market.	Volume I, section 4.7

TABLE I.3.1–1.—*Distances to Residential Areas, Bandelier National Monument, and San Ildefonso Pueblo Boundaries from Each Alternative Location*

ALTERNATIVE LOCATION	FROM ROYAL CREST TRAILER PARK	FROM WHITE ROCK	FROM LOS ALAMOS TOWNSITE	FROM BANDELIER NATIONAL MONUMENT	FROM SAN ILDEFONSO PUEBLO BOUNDARY[a]
Zone 4	3.7 mi (5.9 km)	1.3 mi (2.1 km)	3.9 mi (6.2 km)	3.0 mi (4.8 km)	0.25 mi (0.4 km)
Zone 6	3.0 mi (4.8 km)	2.1 mi (3.4 km)	3.1 mi (5.0 km)	3.2 mi (5.1 km)	0.3 mi (0.5 km)
North Site, TA–54	2.9 mi (4.6 km)	2.1 mi (3.4 km)	3.0 mi (4.8 km)	3.2 mi (5.1 km)	0.05 mi (0.1 km)
TA–67	1.5 mi (2.4 km)	5.2 mi (8.3 km)	2.0 mi (3.2 km)	2.0 mi (3.2 km)	1.5 mi (2.4 km)
Area G Existing Footprint	1.6 mi (2.5 km)	1.0 mi (1.6 km)	4.2 mi (6.7 km)	3.2 mi (5.1 km)	0.13 mi (0.2 km)

[a] Distance to human habitation on the Pueblo lands at Totavi is 3.6 miles (mi) (5.8 kilometers [km]). Otowi is farther away.

presents a forested appearance with tall native trees.

I.3.1.3 *Noise*

Operations at TA–54 contribute to the overall background noise level generated by LANL activities primarily through the traffic into and away from the facilities located within the TA and from heavy machinery and equipment used to excavate the disposal cells and shafts and move waste containers. Actual operational noise heard outside of structures is mostly limited to the immediate vicinity of the activity; most of these noises are due to the routine movement of equipment and waste containers into and around the facilities. No measurements of environmental noise have been conducted within the TA–54 area; but the level of noise present there is fairly representative of other industrially developed sites around LANL.

TA–67 is undeveloped land covered with native vegetation. It is forested with native trees and contributes little to the overall background noise at LANL.

I.3.2 Air Quality

LANL maintains five meteorological towers around LANL, including one on Pajarito Road below the mesa-top location of TA–55 and Area G and one at TA–6 near TA–67 (LANL 1998b). These towers are instrumented to record temperature, relative humidity, wind direction, and wind velocity at 15-minute intervals. Statistics of wind measured 36 feet (11 meters) above ground level indicate that the prevailing daytime wind at TA–54 is from the southeast. At TA–6, the prevailing daytime wind is from the south.

On-site and off-site air monitoring stations collect samples from which the radionuclides in routine emissions and resuspended dust are analyzed. Eight such sampling stations are located around the developed footprint of Area G. LANL's annual surveillance reports document tritium, plutonium, uranium, and americium emissions in comparison with the DOE allowable concentration guides. These reports also contain a more thorough description of monitoring activities (LANL 1996b).

There are no monitoring stations in or bordering Zone 4, Zone 6, the North Site, or TA–67. Thus, there is no radioactive air quality information specific to any of the potential expansion areas.

The monitoring station nearest to these areas on Mesita del Buey, Station 36, is located at the west end of the developed footprint of Area G, just east of the monitoring exclusion area that separates the zone from the developed footprint of Area G (LANL 1996b). The air monitoring stations nearest to the TA–67 site are stations 76 and 78, approximately 5,000 feet (1.6 kilometers) to the east-southeast (LANL 1996b).

I.3.3 Ecological Resources

I.3.3.1 *Flora and Fauna*

Mesita del Buey

Most of Mesita del Buey, particularly Area G, is a high density area for LANL workers and traffic movement with continual disturbance related to waste disposal activities. The North Site is relatively undisturbed. The vegetation of the undisturbed portions of Mesita del Buey is primarily comprised of pinyon pine-juniper woodland with a ground cover of blue grama grass. In the disturbed areas, including the closed waste disposal cells, the vegetation is of mixed grasses and low-growing native plants (Usner 1996). The vegetation supports about 23 wildlife species that represent a broad diversity including insects, reptiles, amphibians, mammals, and birds. Some 95 species of birds, both resident and migratory varieties, have been identified in the general vicinity. Mule deer and elk are the most visible of the large mammals of the region. Other common species include black bear, mountain lion, bobcat, fox, and coyote. Small mammals known to inhabit the general area include species of voles, mice, and chipmunks (Banar 1996, Keller and Bennett 1996, Usner 1996).

TA–67

The TA–67 site is covered with the ponderosa pine habitat type, generally over the Pajarito Plateau's elevational ranges from 6,900 to 7,500 feet (2,100 to 2,300 meters). Overall, TA–67 is a fairly flat, wooded mesa top adjacent to moderately steep to very steep canyons; the north-facing canyon slope areas include fir and spruce species. The TA–67 area vegetation communities support about 90 wildlife species that represent a broad diversity, including insects, reptiles, amphibians, mammals, and birds.

Forty-nine species of birds, both resident and migratory varieties, have been identified in the general vicinity. Mule deer and elk are the most visible of the large mammals in the region. Other common species include black bear, mountain lion, fox, bobcat, and coyote (Cross and Usner 1996).

I.3.3.2 *Threatened and Endangered Species*

DOE analyzed existing available field information and used a preliminary model of nesting and roosting habitat for the Mexican spotted owl (*Strix occidentalis lucida*) to assess use of the TA–54 and TA–67 areas by species of animals and birds that are federally and state listed and protected as threatened or endangered. Three federally protected (also state listed) species of birds potentially use the surrounding area of TA–54 for habitat: the American peregrine falcon (*Falco peregrinus*), the Mexican spotted owl, and the southwestern willow flycatcher (*Empidonax traillii extimus*). However, species-specific field surveys located no T&E species habitat use for nesting or roosting purposes on Mesita del Buey itself, as well as none within 0.25 mile of the mesa top. The mesa top may provide some foraging habitat for the peregrine falcon. One federally protected species of bird, the Mexican spotted owl, potentially uses habitat in the TA–67 area for roosting and foraging purposes; potential nesting habitat is located next to TA–67 in the canyon area. No known use of this nesting habitat has occurred recently.

LANL conducted preliminary consultation with the U.S. Fish and Wildlife Service (FWS) concerning TA–67 development. According to the FWS, additional surveys would be needed in order to establish baseline information. Mitigation measures would be developed through consultations, in accordance with the *Endangered Species Act* (16 U.S.C. §1531), if the TA–67 alternative were to be implemented.

I.3.4 Human Health

I.3.4.1 *Radiological Dose*

Personnel at TA–54 are exposed to radiation from working with the various types of wastes managed there. Personnel are not exclusively assigned to one type of waste, so their doses represent an integration over all the jobs performed there. The LLW disposal cells are excavated by personnel who are part of the regular TA–54 workforce, so their doses cannot be partitioned to show only exposures received while excavating disposal cells. TRU and TRU mixed wastes (waste with both TRU and chemicals regulated as hazardous under the RCRA) produce the majority of the workers' doses. In 1995, of the 470 individuals working at Area G who wore dosimetry badges, 408 received no dose. In 1996, out of 228 badged personnel, 213 had no dose. The health effects of radiation are expressed as the increased risk or chance of dying from cancer at some point later in life (excess latent cancer fatality [LCF]). The average external doses of personnel assigned to TA–54 who wear dosimetry badges and received detectable (non-zero) doses in 1995 and 1996 with associated health effects are shown in Table I.3.4.1–1. Dose and health effect information on LANL personnel working in other locations under the Expanded Operations Alternative is presented in volume I of the SWEIS, chapter 5, section 5.3.6. (Long-term public health impacts from disposal operations are discussed in section 5.3.3.5 of volume I and the Area G Performance Assessment [LANL 1998f]).

Area development and disposal cell construction activities would not be expected to expose equipment operators to radioactive material, regardless of alternative location. Thus, there would be no worker dose associated with area development and cell construction. Any workers who are on the site for a short time to construct disposal cells and support facilities and do not work in the vicinity of TRU wastes should receive no work-related dose, regardless of alternative location.

TABLE I.3.4.1–1.—*Annual Individual Worker Dose (External Dose) and Health Effects at Area G (1995, 1996)*

TOTAL BADGED WORKERS AT AREA G	INDIVIDUALS WITH ZERO DOSE	AVERAGE DOSE FOR INDIVIDUALS WITH MEASURABLE DOSE	HEALTH EFFECT—CHANCE OF EXCESS LCF IN THE EXPOSED POPULATION
470 Individuals in 1995	408 (87 percent)	18 millirem (62 individuals)	less than 1—(0.00045 or 4 in 10 thousand)
228 Individuals in 1996	213 (93 percent)	38 millirem (15 individuals)	less than 1—(0.00023 or 2 in 10 thousand)
DOE Individual Annual Occupational Dose Limit	—	5,000 millirem[a] (5 rem)	less than 1—(0.0020 or 20 in 10 thousand)

[a] DOE 1994

I.3.4.2 *Construction Activities*

The regular workforce at Area G excavates new disposal cells as part of normal operations. Construction and relocation activities can expose workers to a variety of risks, such as being crushed beneath heavy equipment, back injuries, electrical hazards, and those related to working below grade. All work is performed according to facility procedures for each type of task and LANL-wide general standards. Worker health is protected by following administrative controls and wearing personal protective equipment such as hard hats and steel-toed boots, as needed. Information on safety and construction-related accidents that have occurred at LANL is found in chapter 4 of volume I.

I.3.5 Environmental Justice

The WM PEIS has identified a potential environmental justice issue because of the proximity of LLW disposal areas at LANL to minority and low-income populations, such as the Native Americans at San Ildefonso Pueblo and the Hispanic population in Española, Santa Fe, and the surrounding area (DOE 1997). As noted in section I.1.1, the northern boundary of LANL at TA–54 is San Ildefonso Pueblo land. However, the nearest human habitations on San Ildefonso Pueblo land are at Totavi, some 3.6 miles (5.8 kilometers) from Area G, and at Otowi, which is farther away. Distance is even farther to Española, the nearest town with a predominately Hispanic population. The distances to the residential areas from each of the proposed LLW disposal locations are presented in Table I.3.1–1. The environmental justice affected environment is discussed further in chapter 4, section 4.8, of volume I.

I.3.6 Cultural Resources

The presence of TCPs in the Mesita del Buey area and the TA–67 area is unknown. Cultural resource surveys have been conducted over most of TA–54 and over a portion of TA–67 to identify archeological sites within those areas.

Cultural resource surveys conducted over Mesita del Buey within the designated footprint of Area G have identified 20 archaeological sites in the area west and north of the existing Area G disposal area. Sixteen of these 20 sites have been evaluated for inclusion on the NRHP. Of the 16 sites evaluated for register inclusion, 8 are located in Zone 4 to the south of the roadway, and 1 is located to the north of the roadway in an ER monitoring zone. All 9 sites within Zone 4 are Coalition Period pueblo roomblocks (A.D. 1100 through A.D. 1325). An archeological data recovery plan on seven of the sites located south of the road in Zone 4 that are eligible for inclusion on the NRHP (Larson 1991b) has been approved by the New Mexico SHPO, and site work to implement the recovery plan has been initiated but not completed; the remaining site on the south side of the road is not eligible for NRHP inclusion. The single site located north of the roadway in Zone 4 is not included in the data recovery plan because there are no current plans to excavate this site since it is located within an ER monitoring zone. Seven of the 16 archaeological sites evaluated for NRHP inclusion were identified within the Zone 6 area of Mesita del Buey. All of these seven sites are pueblo roomblocks dating from the Coalition Period and the Classic Period (A.D. 1325 through A.D. 1600) (Larson 1997). Consultation with the SHPO and the four Accord Pueblos has not yet been initiated by DOE for these seven sites. The remaining 4 sites of the total of 20 sites located to the west and north of the existing Area G disposal area are not believed to be eligible for inclusion on the NRHP. Surveys of these sites were not comprehensive, however, and a rigorous survey and additional consultation with the SHPO and Accord Pueblos, together with site work to implement such a plan, have not yet been undertaken by DOE.

Cultural resource surveys of the TA–67 area of interest revealed the presence of 11 archaeological sites and these have been evaluated for eligibility for inclusion on the NRHP. These sites are from the Coalition and Classic Periods (LANL 1998c). Of the 11 sites, all but 1 are eligible for inclusion in the register. An archaeological data recovery plan on the 10 sites, together with consultation with the SHPO and Accord Pueblos, and site work to implement such a plan have not yet been undertaken by DOE.

I.3.7 Waste Management (Construction Refuse)

Uncontaminated wastes produced by operations at LANL, such as construction debris and office refuse, are collected by a subcontractor and recycled where feasible. The remaining uncontaminated wastes are disposed of in the Los Alamos County Landfill.

I.3.8 Environmental Restoration

I.3.8.1 *Mesita del Buey*

All of TA–54 has been placed in ER Operable Unit 1148. Eventual cleanup and site closure would follow ER procedures and other applicable regulations in place at that time.

Area L was historically used as a disposal site for hazardous chemical wastes and has a VOC vapor plume in its subsurface. Various chemicals are present in the plume; the one in highest concentration is TCE. Constituents and concentrations of the VOC plume are listed in appendix I.B. This plume extends about 55 feet (20 meters) east of Area L into Zone 4. Within Zone 4, there are two ER monitoring zones, as shown in Figure I.1.1.1–1. The first is located immediately east of Area L and covers about 4 acres (1.6 hectares). The second comprises about 1 acre (0.4 hectare) immediately west of the current disposal area at Area G. Monitor wells in both monitoring exclusion zones are being tested on a quarterly basis to determine movement of pore gas in the vadose zone. The plume has not expanded spatially in the last 5 years. There are no known areas of contamination in Zone 6 or the North Site.

I.3.8.2 *TA–67*

Because TA–67 is in the blast circles for active firing sites, it is possible that debris and airborne particulates from test activities have been deposited onto portions of TA–67. To date, no such debris or contamination has been identified at this site. In addition, TA–67 is not currently an ER operable unit area.

I.3.9 Traffic

Traffic to and from Los Alamos County and within LANL is discussed in volume I, chapter 4, section 4.10. At present, LLW is moved to Area G by truck. Construction materials are also moved to LANL and within LANL by truck. Access to Mesita del Buey is via Pajarito Road (State Route 4). Access to TA–67 is via West Jemez Road (State Route 501).

I.3.10 Comparison of Environmental Conditions at Alternative Locations

The environmental conditions at each of the identified alternative locations are summarized and compared in Table I.3.10–1.

The conditions for the Preferred Alternative are the sum of the individual conditions for Zones 4 and 6, except for distances and noise.

I.4 ENVIRONMENTAL CONSEQUENCES

The environmental consequences of developing new LLW disposal areas at LANL are presented

TABLE I.3.10–1.—*Comparison of Environmental Resource Conditions in Alternative Locations for Low-Level Radioactive Waste Disposal*

	PREFERRED ALTERNATIVE			
ENVIRONMENTAL RESOURCE CONDITION	**ZONE 4 (AREA G, TA–54)**	**ZONE 6 (TA–54)**	**NORTH SITE (TA–54)**	**TA–67**
Land Area Available	7 acres (3 hectares) north of road, 24 acres (10 hectares) both sides of road developable	41 acres (16 hectares), 17 acres (7 hectares) developable	63 acres (25 hectares), 49 acres (20 hectares) developable	72 acres (29 hectares), 50 acres (20 hectares) developable
- Current Identified Use	LLW disposal area	solid waste management area	solid waste management area	buffer zone, blast circle for HE testing
- Potential Waste Disposal Capacity (10^3 m^3)	260 north of road 800 both sides	550	1,600	1,600
Distance to - Nearest Residential Area	1.3 mi (2.1 km)	2.1 mi (3.4 km)	2.1 mi (3.4 km)	1.5 mi (2.4 km)
- Bandelier National Monument	3.0 mi (4.8 km)	3.2 mi (5.1 km)	3.2 mi (5.1 km)	2.0 mi (3.2 km)
- San Ildefonso Pueblo Boundary[a]	0.25 mi (0.4 km)	0.3 mi (0.5 km)	0.05 mi (0.1 km)	1.5 mi (2.4 km)
- Totavi	3.6 mi (5.8 km)	3.6 mi (5.8 km)	3.6 mi (5.8 km)	> 3.6 mi (5.8 km)
- Otowi	> 3.6 mi (5.8 km)	> 3.6 mi (5.8 km)	> 3.6 mi (5.8 km)	> 3.6 mi (5.8 km)
- Española	> 10 mi (16 km)	> 10 mi (16 km)	> 10 mi (16 km)	> 10 mi (16 km)
Visibility from - Public Areas - San Ildefonso Pueblo Boundary	not visible visible	not visible visible	not visible visible	visible not visible
Noise	< 80 dBA	< 80 dBA	< 80 dBA	< 80 dBA except during HE open air testing
Air Quality	no site-specific data available; nearest air monitor is on Pajarito Road below TA–54	no site-specific data available; nearest air monitor is on Pajarito Road below TA–54	no site-specific data available; nearest air monitor is on Pajarito Road below TA–54	no site-specific data available; nearest air monitor is at TA–6, near TA–67
Ecological Resources - Flora and Fauna	pinyon-juniper, small mammals and birds	pinyon-juniper, large and small mammals and birds	pinyon-juniper, large and small mammals and birds	ponderosa pine-mixed conifers, large and small mammals and birds

TABLE I.3.10–1.—*Comparison of Environmental Resource Conditions in Alternative Locations for Low-Level Radioactive Waste Disposal*-Continued

	PREFERRED ALTERNATIVE			
ENVIRONMENTAL RESOURCE CONDITION	**ZONE 4 (AREA G, TA–54)**	**ZONE 6 (TA–54)**	**NORTH SITE (TA–54)**	**TA–67**
- Threatened, Endangered, and Sensitive Species	within peregrine falcon foraging habitat	within peregrine falcon foraging habitat	within peregrine falcon foraging habitat	within potential Mexican spotted owl roosting and foraging habitat, next to potential nesting habitat
Human Health	no dose from construction activities	no dose from construction activities	no dose from construction activities	no dose from construction activities
Environmental Justice	adjacent to San Ildefonso Pueblo boundary, nearest populations not minority or low income	adjacent to San Ildefonso Pueblo boundary, nearest populations not minority or low income	adjacent to San Ildefonso Pueblo boundary, nearest populations not minority or low income	not adjacent to San Ildefonso Pueblo boundary, nearest populations not minority or low income
Cultural Resources - Archaeological Sites	one site north of road (avoidable), 8 sites south of road	7 sites	4 known sites	11 sites
- Traditional Cultural Properties	no information	no information	no information	no information
Waste Management	construction waste recycled or disposed at landfill	construction waste recycled or disposed at landfill	construction waste recycled or disposed at landfill	construction waste recycled or disposed at landfill
Environmental Restoration	part of Operable Unit 1148, adjacent to VOC plume	part of Operable Unit 1148, no contaminated areas known	part of Operable Unit 1148, no contaminated areas known	not part of an operable unit, no contaminated areas known
Traffic	access via Pajarito Road	access via Pajarito Road	access via Pajarito Road	access via west Jemez Road (State Route 501)

[a] Distance from the existing LLW disposal site in Area G to the San Ildefonso Pueblo boundary is 0.13 mi (0.2 km).
dBA = decibels A-weighted frequency scale

for each alternative and compared below. The differences among alternatives derive from development and construction activities at the different locations where LLW would be disposed. The primary differences among alternatives relate to current land use and surface features. All alternatives call for constructing and developing an LLW disposal area by excavating into the same underlying Bandelier Tuff. The disposal volume to be excavated and the consequences of excavating the tuff itself are assumed to be equivalent for all alternatives. The impacts of LLW management and disposal operations including post-closure are addressed in chapter 5 of volume I. The following siting, development, and construction impacts would be in addition to the operational impacts for LLW management, including disposal.

I.4.1 Develop Zone 4 at TA–54

I.4.1.1 *Land Resources*

Land Use

Because Area G (80 acres [32 hectares]) has been dedicated for LLW disposal, developing Zone 4 would represent no change in land use (DOE 1979). Land use for the entire TA–54 area has been designated for research and development and waste disposal (volume I, chapter 4, Figure 4.1.1.2–1).

Visual Resources

New disposal cells would not be visible from Pajarito Road. New disposal cells would be visible from the boundary of the San Ildefonso Pueblo, but not from the human habitations at White Rock, Los Alamos, Totavi, Otowi, or BNM.

Noise

Excavating new LLW disposal cells would produce the same noise at the point of excavation for all alternatives because the same type of tuff underlies all locations. As shown in Table I.4.1.1–1, cell construction in Zone 4 would be audible at the San Ildefonso Pueblo boundary, but not at the human habitations at Totavi and Otowi, which are much farther away than White Rock and the Los Alamos townsite. Disposal cell construction could be audible above background levels at the nearest point in White Rock. Noise levels at residential areas due to the excavation and construction activities could be audible but within normal levels in the

TABLE I.4.1.1–1.—*Sound Level Estimates[a] from Excavations/Construction in Zone 4 at Receptor Locations[b]*

ALTERNATIVE	(OPERATORS) 3 to 6 ft (1 to 2 m) DISTANCE, dBA	ON-SITE PERSONNEL, 50 ft (15 m) DISTANCE, dBA	WHITE ROCK, dBA	ROYAL CREST TRAILER PARK, dBA	LOS ALAMOS TOWNSITE, dBA	BANDELIER NATIONAL MONUMENT, dBA	SAN ILDEFONSO PUEBLO BOUNDARY, dBA
Zone 4 Disposal Cell Excavation	90 to 113[c]	72 to 95	30 to 53	20 to 43	17 to 40	22 to 45	45 to 68
Normal Background	NA	NA	38 to 51	no data (assume 38 to 51)	38 to 51	31 to 35	no data (assume 31 to 35)

[a] Values calculated from standard noise ranges at 50 feet (ft) (15 meters [m]) using the inverse square relationship: sound $level_1$ - sound $level_2 = 20 \log r_2 r_1^{-1}$ where 1 and 2 represent two locations.
[b] Distances from residential areas shown in Table I.3.1–1.
[c] Standard construction equipment noise ranges (from Canter 1996).
NA = Not applicable

Los Alamos townsite and at Royal Crest Trailer Park. Noise from cell construction could also be audible above background at the roadway boundary to BNM, but not at the Visitors' Center or in the developed campgrounds. The estimates presented are very conservative; in practice, the uneven terrain, intervening vegetation, and direction of air movement would further reduce the noise at receptor locations.

The sound levels at and near the excavation equipment are sufficiently high that operators would be provided with hearing protection. Hearing protection may be provided for other personnel in the vicinity of construction, as needed.

I.4.1.2 *Air Quality*

As LLW disposal cells are excavated, dust particles and vehicle exhaust fumes would be generated by bulldozers, back hoes, and similar construction equipment. LANL personnel would use standard dust suppression methods such as minimizing the area of ground disturbed and misting (LANL 1996c). Excavating disposal cells would not be expected to degrade the quality of air in residential areas.

If the VOC plume has spread from Area L into Zone 4 and the soil and tuff in that location are excavated, VOC components could be released into the air. Consequences to air quality have not been estimated, pending the outcome of the study on risk related to this VOC plume.

Part or all of the wood from trees cleared from Zone 4 would be chipped and burned or used as mulch on the site. Burning would be conducted, under an open burning permit obtained from the New Mexico Environment Department (NMED), such that the air quality standards would not be violated.

I.4.1.3 *Ecological Resources*

Flora and Fauna

Developing Zone 4 would require that most or all of the pinyon-juniper tree cover on 24 acres (10 hectares) be removed. The vegetative coverage of Zone 4 is comparable in density to the general forested area along the mesa top. The wood would be chipped and burned or used for mulch on the site. This would change or eliminate part of the habitat of birds and small mammals living in or around Zone 4. The habitat change would be small (24 acres [10 hectares]) compared to the available habitat remaining in the area (which is many hundreds of acres in size). Construction noise and activity would cause minor and short-term disturbance to wildlife utilizing adjacent habitat during the various development phases. Because the new cells would be within an area that is already fenced, no new impacts are anticipated to the large game animals that utilize the area.

Threatened and Endangered Species

A peregrine falcon nest site is located more than 3 miles (4.8 kilometers) from the proposed expansion areas at TA–54. Peregrine falcons have a wide foraging area, typically up to 12.3 miles (19.8 kilometers) from their nest. The total amount of foraging habitat for this nesting location is 126,805 acres (50,722 hectares), not including developed areas. Developing Zone 4 would require that trees be removed and result in a loss of about 24 acres (10 hectares) of possible foraging habitat (approximately 0.03 percent of available forage area) (Keller and Bennett 1996). The removal of less than 1 percent of available forage area would not result in an appreciable effect on this species.

I.4.1.4 *Environmental Justice*

Developing an LLW disposal area at any location on Mesita del Buey would place the

development and subsequent operations adjacent to the San Ildefonso Pueblo boundary but not to the nearest human habitations on pueblo land, as shown in Table I.3.1–1. The development would be visible from the pueblo boundary, and the noise from disposal cell excavations would be audible, should anyone be present at the boundary. However, the noise is not in the range considered harmful to human health.

I.4.1.5 *Cultural Resources*

DOE lacks information regarding the presence of TCPs within TA–54. In the absence of specific information, the consequences of developing Zone 4 on such resources can only be estimated in a qualitative manner. If these resources are present in the Zone 4 area, they would either be destroyed by construction or diminished in value by alteration of the area. If none of these resources are present, no effect would be expected.

If only the area within Zone 4 on the north side of the road were developed and the monitoring exclusion zone were avoided, no archaeological sites would be disturbed. Eight archaeological sites within Zone 4 could be affected or destroyed by constructing an LLW disposal facility that includes the south side of Mesita del Buey Road. All of the eight sites are eligible for the NRHP (Larson 1991a). Two of the eligible sites have already been partially tested or excavated in accordance with a 1991 data recovery plan (Larson 1991b and Larson 1997). If the area on the south side of the road were to be developed, all of the sites would have to be excavated prior to the start of project activities. DOE would need to consult with the four Accord Pueblos and take their comments into consideration in the data recovery plan before the archaeological excavations at Zone 4 could be continued.

I.4.1.6 *Waste Management (Construction Refuse)*

Waste from disposal cell construction (i.e., rock and soil) would be managed at the location (used for fill and for cover or disposed of). No other construction would be needed.

I.4.1.7 *Environmental Restoration*

All of TA–54 is considered a part of ER Operable Unit 1148. If Zone 4 were to be developed, consideration would have to be given to the VOC plume originating in Area L. Possible effects of excavating cells in Zone 4 on the VOC plume and the contaminant source at Area L are not known at present. LANL personnel have initiated a study of the risks posed by the old waste disposal at Area L and the VOC plume, but there is no information at present.

I.4.1.8 *Traffic*

As noted in section I.2.1.2, no new construction (except for excavation of disposal cells) would be required to implement this alternative. Thus, developing Zone 4 would not require construction materials to be transported to the site nor generate construction wastes to be removed from the site. Developing Zone 4 would have no effect on the flow of traffic on public roads.

I.4.2 Develop Zone 6 at TA–54

I.4.2.1 *Land Resources*

Land Use

Because the whole of Mesita del Buey, including Area G, has been identified for management of solid wastes, developing Zone 6 would not represent a change in land use category (DOE 1979).

Visual Resources

New disposal cells would not be visible from Pajarito Road. New cells would be visible from the boundary of the San Ildefonso Pueblo, but not from the human habitations at White Rock, Los Alamos, Totavi, Otowi, or BNM.

Noise

The noise level to which people could be exposed varies with receptor location, as shown in Table I.4.2.1–1. Disposal cell construction in Zone 6 would be audible at the San Ildefonso Pueblo boundary but not at the human habitations at Totavi and Otowi, which are much farther away than White Rock and the Los Alamos townsite. Noise levels at residential areas due to the excavation and construction activities would be audible, but within normal levels in White Rock, the Los Alamos townsite, and at the Royal Crest Trailer Park. Noise from disposal cell construction could be audible above background at the roadway boundary to BNM, but not at the Visitors' Center nor in the developed campgrounds. The estimates presented are very conservative; in practice, the uneven terrain, intervening vegetation, and direction of air movement would further reduce the noise at receptor locations.

The sound levels at and near the excavation equipment are sufficiently high that operators would be provided with hearing protection. Hearing protection may be provided for other personnel in the vicinity of construction, as needed.

I.4.2.2 *Air Quality*

As discussed in section I.4.1.2, LANL personnel would use standard dust suppression methods. Excavating disposal cells would not be expected to degrade the quality of air in residential areas.

The wood from trees cleared from Zone 6 would be chipped and burned or used as mulch on the site. Burning would be conducted under an open burning permit obtained from NMED, such that the air quality standards would not be violated.

I.4.2.3 *Ecological Resources*

Flora and Fauna

Developing Zone 6 would require that most or all of the pinyon-juniper tree cover on 17 acres (7 hectares) be removed. The vegetative

TABLE I.4.2.1–1.—*Sound Level Estimates[a] from Excavations/Construction in Zone 6 at Receptor Locations[b]*

ALTERNATIVE	OPERATORS, 3 to 6 ft (1 to 2 m) DISTANCE, dBA	ON-SITE PERSONNEL, 50 ft (15 m) DISTANCE, dBA	WHITE ROCK, dBA	ROYAL CREST TRAILER PARK, dBA	LOS ALAMOS TOWNSITE, dBA	BANDELIER NATIONAL MONUMENT, dBA	SAN ILDEFONSO PUEBLO BOUNDARY, dBA
Zone 6 Disposal Cell Excavation	90 to 113[c]	72 to 95	24 to 47	22 to 45	22 to 45	22 to 45	42 to 65
Normal Background	NA	NA	38 to 51	no data (assume 38 to 51)	38 to 51	31 to 35	no data (assume 31 to 35)

[a] Values calculated from standard noise ranges at 50 ft (15 m), using the inverse square relationship: sound level$_1$ - sound level $_2$ = 20 log r_2 r_1^{-1} where 1 and 2 represent two locations.
[b] Distances from residential areas shown in Table I.3.1–1.
[c] Standard construction equipment noise ranges (from Canter 1996).
NA = Not applicable

coverage of Zone 6 is comparable in density to the general forested area along the mesa top. The wood would be chipped and burned or used for mulch on the site. This would change or eliminate part of the habitat for birds and small mammals living in and around Zone 6. The habitat change would be small (17 acres [7 hectares]) compared to the available habitat remaining in the area (which is many hundreds of acres in size). Construction noise and activity would cause minor and short-term disturbance to wildlife utilizing adjacent habitat during the various development phases. Because the new disposal cells and shafts would only be fenced during the time that they are active, and the whole area would not be fenced, no new impacts are anticipated to the large game animals that utilize the area.

Threatened and Endangered Species

A peregrine falcon nest site is located more than 3 miles (4.8 kilometers) from both proposed expansion areas at TA–54. Peregrine falcons have a wide foraging area, typically up to 12.3 miles (19.8 kilometers) from their nest. The total amount of foraging habitat for this nesting location is 126,805 acres (51,318 hectares), not including developed areas. Cutting the trees would remove some 17 acres (7 hectares, less than 0.02 percent) of possible foraging habitat for peregrine falcons, in the event that this alternative is chosen (Keller and Bennett 1996). The removal of less than 1 percent of available foraging habitat area would not result in an appreciable effect on this species.

I.4.2.4 *Environmental Justice*

The disposal area development would be visible from the pueblo boundary, and the noise from disposal cell excavations would be audible, should anyone be present at the boundary. However, the noise is not in the range considered harmful to human health.

I.4.2.5 *Cultural Resources*

DOE lacks information regarding the presence of TCPs within TA–54. In the absence of such information, the potential consequences of developing Zone 6 can only be estimated qualitatively. If these resources are present in Zone 6, they would either be destroyed by construction or diminished in value by alteration of the area. If no such resources are present, no effect would be expected.

Seven archaeological sites would be affected or destroyed by constructing an LLW disposal facility at Zone 6. The cultural resource report documenting the survey has not been submitted to the SHPO, and official eligibility determinations for the seven sites have not been made. In compliance with current regulations, adverse effects to the NRHP eligible sites could be successfully mitigated by conducting archaeological excavations designed to recover scientific data. If Zone 6 is selected as the location for an LLW facility, DOE would prepare a proposal for mitigation of adverse effects to the eligible sites (a data recovery plan) and incorporate the concerns of the Accord Pueblos. The New Mexico SHPO would review the document prior to implementation of mitigation measures and be requested to concur in a determination of no adverse effect before the start of project activities.

I.4.2.6 *Waste Management (Construction Refuse)*

Waste from disposal cell construction (i.e., rock and soil) would be managed at the location (used for fill and for cover or disposed of). No other construction would be needed.

I.4.2.7 *Environmental Restoration*

All of TA–54 is considered part of ER Operable Unit 1148. There would be no additional ER implications from disposing of LLW in Zone 6.

I.4.2.8 *Traffic*

As noted in section I.2.2.2, the only construction required to implement this alternative would be to fence cells being excavated and filled. Thus, developing Zone 6 would not require construction materials to be transported to the site nor generate construction wastes to be removed from the site. Developing Zone 6 would have no effect on the flow of traffic on public roads.

I.4.3 Develop the North Site at TA–54

I.4.3.1 *Land Resources*

Land Use

Because the whole of Mesita del Buey, including Area G, has been identified for management of solid wastes, developing the North Site would not represent a change in land use category (DOE 1979).

Visual Resources

New disposal cells would not be visible from Pajarito Road. New cells would be visible from the boundary of the San Ildefonso Pueblo, but not from the human habitations at White Rock, Los Alamos, Totavi, Otowi, or BNM.

Noise

The noise level to which people could be exposed varies with receptor location, as shown in Table I.4.3.1–1. Disposal cell construction at the North Site would be audible at the San Ildefonso Pueblo boundary, but not at the human habitations at Totavi and Otowi, which are much farther away than White Rock and the Los Alamos townsite. Noise levels at residential areas due to the excavation and construction activities would be audible but within normal levels in White Rock, the Los Alamos townsite, and at the Royal Crest Trailer Park. Noise from cell construction could be audible above background at the roadway boundary to BNM, but not at the Visitors' Center nor in the developed campgrounds. The estimates presented are very conservative; in practice, the uneven terrain, intervening vegetation, and direction of air movement

TABLE I.4.3.1–1.—*Sound Level Estimates[a] from Excavations/Construction in the North Site at Receptor Locations[b]*

ALTERNATIVE	OPERATORS, 3 to 6 ft (1 to 2 m) DISTANCE, dBA	ON-SITE PERSONNEL, 50 ft (15 m) DISTANCE, dBA	WHITE ROCK, dBA	ROYAL CREST TRAILER PARK, dBA	LOS ALAMOS TOWNSITE, dBA	BANDELIER NATIONAL MONUMENT, dBA	SAN ILDEFONSO PUEBLO BOUNDARY, dBA
North Site	90 to 113[c]	72 to 95	24 to 47	22 to 45	22 to 45	22 to 45	54 to 79
Normal Background	NA	NA	38 to 51	no data (assume 38 to 51)[d]	38 to 51	31 to 35	no data (assume 31 to 35)[d]

[a] Values calculated from standard noise ranges at 50 ft (15 m), using the inverse square relationship: sound level$_1$ - sound level $_2$ = 20 log r_2 r_1^{-1} where 1 and 2 represent two locations.
[b] Distances from residential areas shown in Table I.3.1–1.
[c] Standard construction equipment noise ranges (from Canter 1996).
[d] In these cases, noise levels were assumed to be the same as those measured in nearby locations. The noise level at the Royal Crest Trailer Park was assumed to be the same as that measured at the Los Alamos townsite, and the noise level at the San Illdefonso boundary is assumed to be the same as that at the adjacent BNM land (refer to Figure I.1.1–1).
NA = Not applicable

would further reduce the noise at receptor locations.

The sound levels at and near the excavation equipment are sufficiently high that operators would be provided with hearing protection. Hearing protection may be provided for other personnel in the vicinity of construction, as needed.

I.4.3.2 *Air Quality*

As discussed in section I.4.1.2, LANL personnel would use standard dust suppression methods. Excavating cells would not be expected to degrade the quality of air in residential areas.

Part or all of the wood from trees cleared from the North Site would be chipped and burned or used as mulch on the site. The burning would be conducted under an open burning permit obtained from NMED, such that the air quality standards would not be violated.

I.4.3.3 *Ecological Resources*

Flora and Fauna

Developing the North Site could also require that the pinyon-juniper tree cover on 49 acres (20 hectares) be removed. The vegetative coverage of the North Site is comparable to the general forested area along the mesa top. The wood would be chipped and burned or used for mulch on the site. This would change or eliminate part of the habitat for birds and small mammals living in or around the North Site. The habitat change would be small, compared to the available 49 acres (20 hectares) of habitat remaining in the area, which is many hundreds of acres in size. Construction noise and activity would cause minor and short-term disturbance to wildlife utilizing adjacent habitat during the various development phases. Because the new disposal cells and shafts would only be fenced during the time that they are active, and the whole area would not be fenced, no new impacts are anticipated to the large game animals that utilize the area.

Threatened and Endangered Species

Peregrine falcons have a wide foraging area, typically up to 12.3 miles (19.8 kilometers) from their nest, which is more than 3 miles (5 kilometers) away from the North Site. The total amount of forage habitat for this nesting location is 126,805 acres (50,722 hectares), not including developed areas. At the North Site, the loss of foraging habitat due to removing trees would be 40 acres (16 hectares), approximately 0.05 percent (Keller and Bennett 1996). The removal of less than 1 percent of available foraging habitat area would not result in an appreciable effect on this species.

I.4.3.4 *Environmental Justice*

The development would be visible from the pueblo boundary, and the noise from disposal cell excavations would be audible, should anyone be present at the boundary. However, the noise is not in the range considered harmful to human health.

I.4.3.5 *Cultural Resources*

Cultural resource surveys of the North Site identified four archaeological sites. The surveys were not comprehensive; a rigorous survey would be needed if this alternative were selected, and additional sites may be identified. As discussed in section I.4.2.5, if this alternative were selected, a cultural resource report would be submitted to the SHPO and Accord Pueblos, and their comments would be taken into consideration in developing a data recovery plan.

DOE lacks information regarding the presence of TCPs within TA–54. In the absence of such information, the potential consequences of

developing the North Site can only be estimated qualitatively. If these resources are present within the North Site area, they would either be destroyed by construction or diminished in value by the alteration of the area. If none of these resources are present, then no effect would be expected.

I.4.3.6 *Waste Management (Construction Refuse)*

Waste from disposal cell construction (i.e., soil and rock) would be managed at the location (used for fill and for cover or disposed of). Any refuse from utility line construction would be disposed of in the Los Alamos County Landfill. The amount of refuse would be very small.

I.4.3.7 *Environmental Restoration*

All of TA–54 is considered a part of ER Operable Unit 1148. There would be no additional ER implications from disposing of LLW in the North Site.

I.4.3.8 *Traffic*

As noted in section I.2.3.2, the only construction required to implement this alternative would be to pave the unpaved road down the mesa top and install utility lines and a decontamination facility (wash pad for a truck). Fencing would be needed for disposal cells being excavated and filled. Developing the North Site would require perhaps a dozen truckloads of construction materials to be transported to the site. No construction wastes would be removed from the site. Developing the North Site would have no noticeable effect on the flow of traffic on public roads.

I.4.4 Develop a New Disposal Site at Another LANL Technical Area (TA–67)

I.4.4.1 *Land Resources*

Land Use

Currently, TA–67 is a secured area used as an inactive buffer zone for HE research and development. It is within the blast circles for active HE firing sites at TA–15 and TA–40. Its development for LLW disposal would require dual land use designation. Development of an LLW disposal site within TA–67 would require that disposal operations be suspended temporarily during HE open firing tests. It would result in a change in land use designation from Explosives Use to Explosives/Waste Disposal.

The possible presence of a geologic fault underlying the western edge of TA–67 could potentially disqualify this site from further consideration as a disposal area. Should development be pursued in the future, additional investigation would be required.

Visual Resources

New disposal cells would not be visible from Pajarito Road. If the TA–67 site was developed, the support structures would probably be visible from Pajarito Road and possibly from State Road 4 bordering BNM, but not from the San Ildefonso Pueblo land. If a bridge were constructed over Threemile Canyon, this might also be visible from Pajarito Road. None of these would be visible from the boundary of the San Ildefonso Pueblo, nor from the human habitations at White Rock, Los Alamos, Totavi, Otowi, or BNM.

Noise

If TA–67 were developed, the additional construction would cause noise generation

intermittently for 1 to 2 years, in addition to the disposal cell excavation noise. Trenching for utility lines with a back hoe would produce the loudest of these operational noises. The noise level for back hoe operations (72 to 92 decibels A-weighted frequency scale [dBA]) is bounded by that for tractor operations (76 to 95 dBA) (Canter 1996).

The noise level to which people could be exposed varies with receptor location, as shown in Table I.4.4.1–1. Disposal cell construction at TA–67 could be audible above background level in White Rock, the Los Alamos townsite, and at the Royal Crest Trailer Park. Noise from cell construction could be audible above background at the roadway boundary to BNM, but not at the Visitors' Center nor in the developed campgrounds. The estimates presented are very conservative; in practice, the uneven terrain, intervening vegetation, and direction of air movement would further reduce the noise at receptor locations.

The sound levels at and near the excavation equipment are sufficiently high that operators would be provided with hearing protection. Hearing protection may be provided for other personnel in the vicinity of construction, as needed.

I.4.4.2 *Air Quality*

As discussed in section I.4.1.2, LANL personnel would use standard dust suppression methods. Excavating cells would not be expected to degrade the quality of air in residential areas.

Considerable additional construction would be required to develop the TA–67 site. These activities would also generate more dust particles and vehicle exhaust fumes. The consequences to air quality have not been estimated but would be comparable to other ground-breaking activities (less than highway construction) and of short duration.

Part or all of the wood from trees cleared from TA–67 would be chipped and burned or used as mulch on the site. The burning would be conducted under an open burning permit obtained from NMED, such that the air quality standards would not be violated.

TABLE I.4.4.1–1.—*Sound Level Estimates[a] from Excavations/Construction in TA–67 at Receptor Locations[b]*

ALTERNATIVE	OPERATORS, 3 to 6 ft (1 to 2 m) DISTANCE, dBA	ON-SITE PERSONNEL, 50 ft (15 m) DISTANCE, dBA	WHITE ROCK, dBA	ROYAL CREST TRAILER PARK, dBA	LOS ALAMOS TOWNSITE, dBA	BANDELIER NATIONAL MONUMENT dBA	SAN ILDEFONSO PUEBLO BOUNDARY, dBA
TA–67	90 to 113[c]	72 to 95	18 to 41	28 to 51	27 to 40	27 to 40	27 to 50
Normal Background	NA	NA	38 to 51	no data (assume 38 to 51)[d]	38 to 51	31 to 35	no data (assume 31 to 35)[d]

[a] Values calculated from standard noise ranges at 50 ft (15 m), using the inverse square relationship: sound level$_1$ - sound level $_2$ = 20 log r_2 r_1^{-1} where 1 and 2 represent two locations.
[b] Distances from residential areas shown in Table I.3.1–1.
[c] Standard construction equipment noise ranges (from Canter 1996).
[d] In these cases, noise levels were assumed to be the same as those measured in nearby locations. The noise level at the Royal Crest Trailer Park was assumed to be the same as that measured at the Los Alamos townsite, and the noise level at the San Illdefonso boundary is assumed to be the same as that at the adjacent BNM land (refer to Figure I.1.1–1).
NA = Not applicable

I.4.4.3 *Ecological Resources*

Flora and Fauna

Developing TA–67 could require that most or all of the ponderosa pine, pinyon, and juniper tree cover on 60 acres (24 hectares) be removed. The vegetative coverage of mostly mature trees over 40 feet (12 meters) tall is comparable in density to the general forested area along the mesa top. This wood would be chipped and burned or used as mulch on the site.

This development would change or eliminate part of the habitat for birds and small mammals living in and around the developed part of TA–67. The habitat change would be small because the disturbed area would be about 60 acres (24 hectares) within a more than 1,000-acre (greater than 400-hectares) relatively undisturbed area. Construction noise and activity would cause minor and short-term disturbance to wildlife utilizing adjacent habitat during the various development phases. Because the new disposal cells would only be fenced during the time that they are active, and the whole area would not be fenced, no new impacts are anticipated to the large game animals that utilize the area.

Threatened and Endangered Species

The Mexican spotted owl has been found to nest over 1 mile (1.6 kilometers) away from TA–67 within the general vicinity of the southern portion of TA–15; however, potential nesting habitat is present near TA–67 within 0.25 mile (0.4 kilometer) of the proposed disposal site. The TA–67 location is also within potential roosting and foraging habitat areas. Removing ponderosa pine trees at the site would decrease the potential foraging habitat for the Mexican spotted owl by about 1.3 percent and the potential roost-only habitat by about an equal amount (Keller and Bennett 1996). Potential nesting habitat may be adversely affected in that noise and light from the disposal site could reduce the desirability of the area and its future usefulness to the species.

I.4.4.4 *Environmental Justice*

The disposal area development would not be visible from the pueblo boundary, and the noise from disposal cell excavations would not be audible, should anyone be present at the boundary.

I.4.4.5 *Cultural Resources*

Eleven specific archaeological sites would be affected or destroyed by the construction of an LLW disposal facility at TA–67. In addition to these 11 sites, people working in the area may be able to reach and disturb other sites in close proximity to the construction area. One site has been determined not to be eligible for the NRHP. Adverse effects to the 10 NRHP-eligible sites could be mitigated by conducting archaeological excavations designed to recover scientific data. A survey report documenting the results of the 1992 to 1993 archaeological survey would be sent to the SHPO in order to begin the required consultation process. The procedure would be as described in section I.4.2.5 for Zone 6.

DOE lacks information regarding the presence of TCPs within TA–67. In the absence of specific information on such resources, the potential consequences of developing the TA–67 site on such resources can only be estimated qualitatively. If these resources are present within TA–67, they would either be destroyed by construction or diminished in value by the alteration of the area. If none of these resources are present, then no effect would be expected.

I.4.4.6 *Waste Management (Construction Refuse)*

Developing a new LLW disposal location at TA–67 would generate refuse from constructing the support facilities. The quantity is not known at present. This refuse would be recycled to the extent possible, and the remainder would be disposed of in the Los Alamos County Landfill. Waste from disposal cell construction would be managed at the location.

I.4.4.7 *Environmental Restoration*

Developing an LLW disposal area at TA–67 is not anticipated to have ER implications. However, developing in a new and uncontaminated location would create another area with permanent constraints on future uses due to waste buried there.

I.4.4.8 *Traffic*

If TA–67 were developed, the traffic would increase less than 1 percent for 1 to 2 years on Pajarito Road and West Jemez Road as construction materials and pre-engineered support structures were moved to the site and construction wastes were removed. Constructing new LLW disposal cells subsequently would have no impact on the flow of traffic on public roads.

I.4.5 Preferred Alternative—Develop Zones 4 and 6 at TA–54

The consequences of the Preferred Alternative, to develop Zones 4 and 6 in step-wise fashion moving westward from the present LLW disposal area in Area G, would be the additive consequences of those discussed separately for Zone 4 in section I.4.1 and Zone 6 in section I.4.2, except for noise. The consequences of noise are taken as the louder of the noise effects from Zone 4 or 6 at each of the receptor locations.

I.4.5.1 *Land Resources*

Land Use

Because the whole of Mesita del Buey has been identified for management of solid wastes, developing Zones 4 and 6 would not result in a change to the land use designation of research and development and waste disposal.

Visual Resources

New disposal cells would not be visible from Pajarito Road. The cells would be visible from the boundary of the San Ildefonso Pueblo, but not from the human habitations at White Rock, Los Alamos, Totavi, Otowi, or BNM.

Noise

The noise level to which people could be exposed varies with receptor location, as shown in Table I.4.5.1–1. The estimates shown represent the louder of the estimates from Tables I.4.1.1–1 (Zone 4) and I.4.2.1–1 (Zone 6) at each receptor location. Disposal cell construction in Zones 4 and 6 would be audible at the San Ildefonso Pueblo boundary, but not at the human habitations at Totavi and Otowi, which are much farther away than White Rock and the Los Alamos townsite. Noise levels at residential areas due to the excavation and construction activities would be audible, but within normal levels in White Rock, the Los Alamos townsite, and at the Royal Crest Trailer Park. Noise from cell construction could be audible above background at the roadway boundary to BNM, but not at the Visitors' Center nor in the developed campgrounds. The estimates presented are very conservative; in practice, the uneven terrain, intervening vegetation, and direction of air movement would further reduce the noise at receptor locations.

TABLE I.4.5.1–1.—*Sound Level Estimates[a] from Excavations/Construction in Zones 4 and 6 at Receptor Locations[b]*

ALTERNATIVE	OPERATORS, 3 to 6 ft (1 to 2 m) DISTANCE, dBA	ON-SITE PERSONNEL, 50 ft (15 m) DISTANCE, dBA	WHITE ROCK, dBA	ROYAL CREST TRAILER PARK, dBA	LOS ALAMOS TOWNSITE, dBA	BANDELIER NATIONAL MONUMENT, dBA	SAN ILDEFONSO PUEBLO BOUNDARY, dBA
Zones 4 and 6 Disposal Cell Excavation	90 to 113[c]	72 to 95	30 to 53	22 to 45	22 to 45	22 to 45	45 to 68
Normal Background	NA	NA	38 to 51	no data (assume 38 to 51)[d]	38 to 51	31 to 35	no data (assume 31 to 35)[d]

[a] Values calculated from standard noise ranges at 50 ft (15 m), using the inverse square relationship: sound level$_1$ - sound level $_2$ = 20 log r_2 r_1^{-1} where 1 and 2 represent two locations.
[b] Distances from residential areas shown in Table I.3.1–1.
[c] Standard construction equipment noise ranges (from Canter 1996).
[d] In these cases, noise levels were assumed to be the same as those measured in nearby locations. The noise level at the Royal Crest Trailer Park was assumed to be the same as that measured at the Los Alamos townsite, and the noise level at the San Illdefonso boundary is assumed to be the same as that at the adjacent BNM land (refer to Figure I.1.1–1).
NA = Not applicable

The sound levels at and near the excavation equipment are sufficiently high that operators would be provided with hearing protection. Hearing protection may be provided for other personnel in the vicinity of construction, as needed.

I.4.5.2 *Air Quality*

As discussed in section I.4.1.2, LANL personnel would use standard dust suppression methods. Excavating cells would not be expected to degrade the quality of air in residential areas.

The wood from trees cleared from Zones 4 and 6 would be chipped and burned or used as mulch on the site. The burning would be conducted under an open burning permit obtained from NMED, such that the air quality standards would not be violated. Trees would be cleared in a step-wise fashion, as disposal area becomes needed.

I.4.5.3 *Ecological Resources*

Flora and Fauna

Developing Zone 4 and then Zone 6 would require that most or all of the pinyon-juniper tree cover on the 41 acres (17 hectares) be removed; however, this would be done in a gradual manner as disposal space was needed. The wood would be chipped and burned or used as mulch on the site. This would change or eliminate bird and small mammal habitat in direct proportion to the acreage disturbed. The habitat change caused by removing 41 acres (17 hectares) of vegetative cover would be small compared to the available habitat remaining in the area, which measures hundreds of acres in size. Similar habitat is available at the North Site. Construction noise and activity would cause minor and short-term disturbance to wildlife utilizing adjacent habitat during the various development phases. Because the new disposal cells would only be fenced during the time that they are active, and the whole area would not be fenced, no new impacts are

anticipated to the large game animals that utilize the area.

The cumulative impact of removing an additional 41 acres (17 hectares) of pinyon-juniper woodland when added to the 63 acres (25 hectares) removed (assuming comparable plant density) in achieving the current size of the Area G LLW disposal area should be small. Much of Mesita del Buey is likely part of the Pajarito Canyon watershed, which currently has approximately 1,900 acres (770 hectares) of pinyon-juniper woodland. This vegetation type is the most abundant on LANL, currently covering an estimated 13,000 acres (5,265 hectares), or slightly over 46 percent of LANL. The cumulative impact would be a decrease in about 104 acres (42 hectares) of pinyon-juniper habitat for the birds and small and large mammals that utilize this habitat type. This habitat is located in an area that has experienced fragmentation from past actions, and any contribution to fragmentation would be minor. When considering the abundance of this habitat on LANL as well as the region, cumulative biological and ecological effects would be small.

Threatened and Endangered Species

A peregrine falcon nest site is located more than 3 miles (4.8 kilometers) from both proposed expansion areas at TA–54. Peregrine falcons have a wide foraging area, typically up to 12.3 miles (19.8 kilometers) from their nest. The total amount of foraging habitat for this nesting location is 126,805 acres (50,722 hectares), not including developed areas. Some 41 acres (17 hectares), or less than 0.05 percent of possible foraging habitat for peregrine falcons could ultimately be lost due to tree removal, in the event that this Preferred Alternative is chosen (Keller and Bennett 1996). However, this loss would be gradual and would not result in an appreciable effect on this species. Cumulative effects would not change appreciably from current conditions.

I.4.5.4 *Environmental Justice*

The disposal area development would be visible from the pueblo boundary, and the noise from disposal cell excavations would be audible, should anyone be present at the boundary. However, the noise is not in the range considered harmful to human health.

I.4.5.5 *Cultural Resources*

DOE lacks information regarding the presence of TCPs on Mesita del Buey. In the absence of specific information on such resources, the potential consequences of developing Zones 4 and 6 on such resources can only be estimated qualitatively. If these resources are present within Zones 4 and 6, they would either be destroyed by construction or diminished in value by the alteration of the area. If none of these resources are present, then no effect would be expected.

A total of 15 archaeological sites would be affected or destroyed by constructing an LLW disposal facility at Zones 4 and 6. Although the cultural report and data recovery plan for Zone 4 has been accepted by the SHPO, that is not the case with Zone 6, as discussed in section I.4.2.5. The Zone 4 area north of the road, where there are no sites, could be developed first. Simultaneously, the approved excavation and data recovery plan could be initiated in Zone 4 south of the road. Before Zone 6 could be developed, DOE would prepare a proposal for mitigation of adverse effects to the eligible sites (a data recovery plan) and incorporate the concerns of the Accord Pueblos. The New Mexico SHPO would review the document prior to implementation of mitigation measures and be requested to concur in a determination of no adverse effect before the start of project activities.

I.4.5.6 *Waste Management (Construction Refuse)*

Waste from disposal cell construction (i.e., soil and rock) would be managed at the location (used for fill and for cover or disposed of). No other construction would be needed.

I.4.5.7 *Environmental Restoration*

All of TA–54 is considered a part of ER Operable Unit 1148. There would be no additional ER implications from disposing of LLW in Zones 4 and 6.

I.4.5.8 *Traffic*

As noted in section I.2.5, the only construction required to implement this alternative would be to fence cells being excavated and filled. Thus, developing the Preferred Alternative would not require construction materials to be transported to the site nor generate construction wastes to be removed from the site. There would be no effect on the flow of traffic on public roads.

I.4.6 Potential Accidents

The potential accidents identified are those that could take place during disposal cell construction and during support facility and infrastructure construction in the case of the TA–67 alternative. The consequences of construction accidents are injury or possibly death to one or more workers. The probability for such an accident is low where the amount of construction work required is small (i.e., disposal cell construction only), but increases with the increased amount of construction work. Thus, the probability of an accident would be greatest for the TA–67 development alternative, because it would require substantially more construction work.

During construction, the bounding case accident for a worker would be injury or death due to industrial accident. A piece of heavy equipment such as a crane could fall on a worker or a trench wall could collapse. Any industrial accident could cause injury or death to one or more involved workers. Uninvolved workers and members of the public would not be affected. The environment would not be contaminated. Working according to standard operating procedures, facility procedures, and worker training would decrease the probability of this accident.

Operational accidents and their consequences are analyzed in chapter 5 of volume I. Projected accident rates are also presented there.

I.4.7 Comparison of Environmental Consequences

The potential consequences of expanding LLW disposal in each of the alternative locations are summarized and compared in Table I.4.7–1. The consequences of the Preferred Alternative, developing both Zones 4 and 6, are the additive consequences of those associated with the two individual locations, except for noise where the louder of the noise estimates for Zone 4 and 6 is presented for each of the receptor locations. Similarly, the distance to various locations is taken as the closer of the two figures presented. The environmental consequences of the selected alternative, developing an additional area for LLW disposal, are included in chapter 5 (section 5.3) of volume I, along with the consequences of ongoing LANL operations in describing overall impacts of LANL operations.

TABLE I.4.7–1.—*Comparison of Environmental Consequences of Expanding Low-Level Waste Disposal in Alternative Locations*

	PREFERRED ALTERNATIVE			
FACTOR, MEASURE	**ZONE 4, TA–54**	**ZONE 6, TA–54**	**NORTH SITE, TA–54**	**TA–67**
Status (distance to and location of nearest residential area)	1.3 mi (2.1 km) White Rock	2.1 mi (3.4 km) White Rock	2.1 mi (3.4 km) White Rock	1.5 mi (2.4 km) Royal Crest Trailer Park
Distance to BNM Boundary	3.0 mi (4.8 km)	3.2 mi (5.1 km)	3.2 mi (5.1 km)	2.0 mi (3.2 km)
Distance to San Ildefonso Pueblo Boundary[a]	0.25 mi (0.4 km)	0.3 mi (0.5 km)	0.05 mi (0.1 km)	1.5 mi (2.4 km)
LANL Land Use Designation	no change in designation	no change in designation	no change in designation	designation changed to include LLW disposal
Visibility from Public Access Area	no change	no change	no change	increased visibility from Pajarito Road
Excavation and Construction Noise at Nearest Residential Area	may slightly exceed normal background level	may slightly exceed normal background level	may slightly exceed normal background level	equivalent to normal background level
Air Quality	dust and exhaust during disposal cell and shaft excavation, smoke from open burning of cleared trees	dust and exhaust during disposal cell and shaft excavation, smoke from open burning of cleared trees	dust and exhaust during disposal cell and shaft excavation, smoke from open burning of cleared trees	dust and exhaust during site and road development, then during disposal cell and shaft excavation, smoke from open burning of cleared trees
Ecological Resources (flora and fauna)	clear 24 acres (10 hectares), loss of pinyons and understory	clear 17 acres (7 hectares), loss of pinyons and understory	clear 49 acres (20 hectares), loss of pinyons and understory	clear 60 acres (24 hectares), loss of pinyon and ponderosa pine, juniper, and understory
Threatened, Endangered, and Sensitive Species	loss of < 0.1 percent foraging area; no appreciable effect on threatened peregrine falcon	loss of < 0.1 percent foraging area; no appreciable effect on threatened peregrine falcon	loss of < 0.1 percent foraging area; no appreciable effect on threatened peregrine falcon	loss of about 1.3 percent of roosting and foraging habitat; no appreciable effect on threatened Mexican spotted owl; may adversely affect potential nesting habitat desirability and usefulness to the species

TABLE I.4.7–1.—*Comparison of Environmental Consequences of Expanding Low-Level Waste Disposal in Alternative Locations*-Continued

	PREFERRED ALTERNATIVE			
FACTOR, MEASURE	**ZONE 4, TA–54**	**ZONE 6, TA–54**	**NORTH SITE, TA–54**	**TA–67**
Environmental Justice	development visible and noise audible at San Ildefonso Pueblo boundary	development visible and noise audible at San Ildefonso Pueblo boundary	development visible and noise audible at San Ildefonso Pueblo boundary	development not visible and noise not audible at San Ildefonso Pueblo boundary
Cultural Resources (archaeological sites)	1 site north side of road (avoidable), 8 sites affected if whole area developed	7 sites affected, data recovery plan needed	4 or more sites affected, data recovery plan needed	11 sites affected, data recovery plan needed
Traditional Cultural Properties	no information available, any sites present could be destroyed or degraded	no information available, any sites present could be destroyed or degraded	no information available, any sites present could be destroyed or degraded	no information available, any sites present could be destroyed or degraded
Waste Management	no change	no change	no change	some construction refuse
Environmental Restoration	need to avoid exclusion area	no change	no change	no change
Traffic	no change	no change	no change	increase for 1 to 2 years due to construction
Accidents (industrial)	probability is low, consequence is injury or death to a worker	probability is low, consequence is injury or death to a worker	probability is low, consequence is injury or death to a worker	probability is higher (additional construction), consequence is injury or death to a worker

[a] Distance from the existing LLW disposal site in Area G to the San Ildefonso Pueblo boundary is 0.13 mi (0.2 km). Distance to human habitations at San Ildefonso Pueblo (Totavi) is 5 mi (8 km).

The greatest differences among the PSSC alternatives are due to the differences between TA–54 and TA–67.[8] That is, the TA–54 PSSC alternatives (Zone 4, Zone 6, North Site, and Zones 4 and 6) have very similar impacts; but each is very different from the TA–67 alternative. This is due primarily to the need to replicate at TA–67 much of the infrastructure that already exists at TA–54, including office space, showers, locker rooms, control rooms, personnel monitoring stations, a decontamination wash pad, packaging and inspection areas, fencing, utilities, and roads. Such infrastructure development would require substantially more construction and land disturbance to provide a comparable area for waste disposal. This level of construction at TA–67 would result in (as compared to any of the TA–54 alternatives) additional dust and exhaust (from construction) and smoke (from burning cleared trees), substantially greater loss of bird habitat (including potential roosting and forage-only habitat for the Mexican spotted owl), the potential to adversely affect the Mexican spotted owl (no effect to federally protected species is expected at any of the TA–54 alternative sites), greater waste generation, increased traffic during construction to establish the site infrastructure, and a greater likelihood of construction accidents (due to the additional construction). While the TA–67 location is slightly closer to the nearest residential area and to the nearest BNM boundary, it is much farther from the San Ildefonso Pueblo boundary, as compared to any of the TA–54 alternatives. Under all alternatives, the disposal cells would not be visible from inhabited areas, but the support structures would be visible from public access areas (such as Pajarito Road); the principal difference in visual impacts is due to the fact that TA–67 is not currently developed. Areas of relatively minor difference between the TA–54 alternatives and the TA–67 alternative are: noise from any of the TA–54 sites would be slightly above normal background at the nearest residential area, while noise from TA–67 would be equivalent to normal background levels at the nearest residential area; all of the alternative sites contain archaeological sites that would require data recovery plans or avoidance; no information exists regarding specific TCPs at any of the alternative sites; none of the alternative sites would be expected to disturb the sites of ER projects; and TA–67 development and operations would not be visible or audible at the San Ildefonso Pueblo boundary, but would be visible and audible from this boundary for all of the TA–54 alternative sites (although not from any San Ildefonso Pueblo residential areas).

8. TA–67 was selected to represent development of a new disposal site at LANL. While the specific characteristics of TA–67 may not be applicable to all potential sites, the majority of the differences in the impacts of TA–54 alternatives and the TA–67 alternatives are attributed to the need to establish an appropriate infrastructure to support waste disposal at TA–67 (as discussed in this section), and these types of differences would apply to other locations for a new disposal site. The possible existence of a fault in part of TA–67 may not be applicable to other sites.

APPENDIX I.A—*Scientific Names of Animals and Plants* (referred to by their common names in the text)

COMMON NAME	SCIENTIFIC NAME	STATUS
ANIMALS		
Black Bear	*Ursus americanus*	
Bobcat	*Felis rufus*	
Brush Mouse	*Peromyscus boylii*	
Colorado Chipmunk	*Eutamias quadrivittatus*	
Coyote	*Canis latrans*	
Elk	*Cervus elaphus Subspecies: candensis*	
Gray Fox	*Urocyon cinereoagenteus*	
Jemez Mountain Salamander	*Plethodon neomexicanus*	species of concern[a], state threatened[b]
Least Chipmunk	*Eutamias minimus*	
Little Brown Occult Bat	*Myotis occultus*	species of concern
Long-Tailed Vole	*Microtus longicaudus*	
New Mexican Meadow Jumping Mouse	*Zapus hudsonius luteus*	species of concern, state threatened
Mexican Spotted Owl	*Strix occidentalis lucida*	Federal threatened[c]
Montane Vole	*Microtus montanus*	
Mountain Lion	*Felis concolor*	
Mule Deer	*Odocoileus hemionus*	
Northern Goshawk	*Accipiter gentilis*	species of concern
Peregrine Falcon	*Falco peregrinus*	Federal endangered[d], state endangered[e]
Spotted Bat	*Euderma maculata*	species of concern, state threatened
Southwestern Willow Flycatcher	*Empidonax traillii*	Federal endangered, state endangered
VEGETATION		
Blue Grama	*Bouteloua gracilis* (H.B.K.) Lag.	
One-Seeded Juniper	*Juniperus monosperma* (Engelm.) Sarg.	
Pinyon Pine	*Pinus edulis* Engelm.	
Ponderosa Pine	*Pinus ponderosa* Laws. var. *scoparium* Engelm.	

[a] Species of local concern: Any species known to exist or potentially exist within the proximity of LANL lands and surrounding areas that are rare in numbers and/or occurrences and whose habitat requirements are very specific, rare to this area, or threatened in any way.

[b] State threatened: Any species whose prospects of survival or recruitment within the state are likely to become jeopardized in the near future.

[c] Federal threatened: Any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

[d] Federal endangered: Any species that is in danger of extinction throughout all or a significant portion of its range.

[e] State endangered: Any species listed in the New Mexico endangered list because it is rare in numbers and/or occurrences and, without protection, its further existence in the state is in serious jeopardy.

APPENDIX I.B.—*Volatile Organic Contaminant Plume Constituents*

TA–54 MDA L Volatile Organic Contaminant Plume: Observed Maximum Concentrations During May 1997[a] with Modified EPA Method TO–14[b]

COMPOUND	WELL NO.	PORT DEPTH (ft)	MAXIMUM CONCENTRATION (ppmv)[c]
Trichloroethane[1,1,1-]	54-02089	46	5,540
Trichloroethene	54-02089	46	679
Trichloro-1,2,2-trifluoroethane[1,1,2-]	54-02089	46	386
Dichloropropane[1,2-]	54-02089	46	144
Trichlorofluoromethane	54-02089	46	68
Dichloroethane[1,1-]	54-02089	46	48
Chloroform	54-02089	46	47
Dichloroethane[1,2-]	54-02089	46	36
Hexane	54-02089	46	33
Tetrahydrofuran	54-02089	46	30
Methylene Chloride	54-02089	46	23
Diethyl Ether	54-02089	46	22
Tetrachloroethene	54-02089	46	19
Cyclohexane	54-02089	46	9
Carbon Tetrachloride	54-02089	46	7
Butene[1-]	54-02089	46	3
Methylcyclohexane	54-02089	46	3
Dichloroethene[1,1-]	54-01004	124	2
Methylcyclopentane	54-02089	46	2
Toluene	54-01004	124	2
Pentane	54-02089	46	2
Acetone	54-01004	124	2
Methylpentane[2-]	54-02089	46	2
Methylpentane[3-]	54-02089	46	2
Chlorobenzene	54-02089	46	2
Benzene	54-02089	46	1
Isooctane	54-02089	46	1
Isobutane	54-02089	46	1
Butane[n-]	54-02089	46	1
Isopentane	54-02089	46	1
Methylhexane[3-]	54-02089	46	1
Dichlorodifluoromethane	54-01004	124	1

[a] Compendium Method TO–14, "The Determination of Volatile Organic Compounds in Ambient Air Using SUMMA® Passivated Canister Sampling and Gas Chromatography Analysis." Modified for collection of samples from pore gas sampling ports.
[b] *Source*: LANL 1998d
[c] Parts per million by volume

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PART II
ENHANCEMENT OF PLUTONIUM PIT MANUFACTURING

II.1 INTRODUCTION

The draft SWEIS identified the Utilize Existing Unused Space in the Chemistry and Metallurgy Research (CMR) Building as the Project-Specific Siting and Construction (PSSC) Preferred Alternative for the proposed enhancement of plutonium pit manufacturing capability at LANL. However, as a result of delays in the implementation of the Capability Maintenance and Improvement Project (CMIP) and recent additional controls and operational constraints in the CMR Building (instituted to ensure that the risks associated with CMR operations are maintained at an acceptable level), the DOE has determined that additional study of methods for implementing the 50 pits per year production is warranted. In effect,

has postponed the decision to implement the pit manufacturing capability beyond a level of 20 pits per year (14 pits per year is the No Action level). The DOE believes it can expand the pit manufacturing capability to 20 pits per year at Technical Area (TA)–55 without significant infrastructure upgrades, as analyzed in this PSSC analysis, and still meet its near-term mission requirements. When any necessary additional studies are completed, DOE will provide the appropriate NEPA review, tiered from this SWEIS, to implement the pit manufacturing capability beyond the 20 pits per year capacity. This postponement does not modify the long-term goal announced in the Record of Decision (ROD) for the *Stockpile Stewardship and Management Programmatic Environmental Impact Statement* (SSM PEIS) (DOE 1996) (up to 80 pits per year using multiple shifts). For completeness and to bound the impacts of implementing pit production at LANL, the "CMR Building Use" Alternative is still included in the Expanded Operations Alternative. However, the Preferred Alternative would only implement pit manufacturing at a level of 20 pits per year. Also, the ROD for the SWEIS would only include a decision regarding the operations to implement the pit production mission at LANL for up to 20 pits per year.

II.1.1 The Role of the Enhancement of Plutonium Pit Manufacturing Project-Specific Siting and Construction Analysis in the Site-Wide Environmental Impact Statement

This PSSC analysis addresses the proposed enhancement of plutonium pit manufacturing capability at LANL. It examines the siting and construction alternatives for this project, supplementing the description and analysis presented in volume I of this SWEIS. The Utilize Existing Unused Space in the CMR Building ("CMR Building Use") Alternative from this PSSC analysis is included as one of the activities in the Expanded Operations Alternative in volume I of the SWEIS. The differences between the impacts of this alternative for pit manufacturing and the impacts of the other alternatives considered are discussed in chapter 5, section 5.3, of volume I. For the key facilities involved, construction activities examined in this PSSC and the subsequent operations (described in volume I, chapter 3, section 3.2) form a substantial portion of the Expanded Operations Alternative of the SWEIS.

The focus of this PSSC analysis is the siting and construction related to the enhancement of pit

PSSC Alternatives for Enhancement of Plutonium Pit Manufacturing

- ***Utilize Existing Unused Space in the CMR Building****—DOE would make existing unused nuclear space in the CMR Building operational and would move some of the existing activities in TA–55–4 to the CMR Building in TA–3 to make adequate space in TA–55–4 for plutonium pit manufacturing activities. DOE also would establish a dedicated transportation corridor between TA–55 and TA–3.*
- ***Brownfield Plutonium Facility****—DOE would build a new plutonium-qualified facility in a developed area near TA–55–4 and within the existing fence line at TA–55. As with the "CMR Building Use" Alternative, activities currently located within TA–55–4 would be moved to this new facility to make space available in TA–55–4 for plutonium pit manufacturing. The transportation corridor also could be constructed under this alternative.*
- ***Add-on to the TA–55–4****—DOE would enlarge the existing TA–55–4 by adding new nuclear space onto this building. Because this adds space to TA–55–4, it may not be necessary to relocate activities currently located in TA–55–4 to this new nuclear space. Rather, this space may be designed specifically for, and house, the expanded pit manufacturing operations. The transportation corridor also could be constructed under this alternative.*

manufacturing. The environmental impacts of operating pit manufacturing facilities are included in chapter 5 of the SWEIS, volume I. The air emissions, worker doses, and certain other parameters associated with pit manufacturing operations would depend on the number of pits manufactured. The consequences to members of the public, however, are dominated by the location of the operations because distance from the operations to the public affects the magnitude of impacts. (Note that the operational impacts related to pit production are small relative to other operational impacts, as discussed in volume I, chapter 3, section 3.6.)

This arrangement of information and analysis allows DOE to "zoom in" on aspects of this project that require more detailed description and analysis, while maintaining the clarity of volume I. The organization of this PSSC is complementary to the organization of information in volume I. The siting and construction information presented here is additional to the operational information provided in volume I and is pertinent to understanding the actions and alternatives described in that portion of the SWEIS. The siting and construction consequences from the "CMR Building Use" Alternative described in this PSSC analysis are included in those described in volume I, chapter 5, for the Expanded Operations Alternative to provide a complete and bounding analysis of the impacts of those operations.

Section II.2 of this PSSC analysis identifies alternative locations at LANL where the additional pit manufacturing capacity could be developed. Section II.3 contains more detailed information about the environmental conditions at each of these locations than is presented in volume I, chapter 4, of the SWEIS. Section II.4 presents the environmental consequences of the construction phase only for enhanced pit manufacturing, and section II.5 addresses the consequences of a potential construction accident. Operational impacts, including operational accidents, are addressed in volume I. The entire SWEIS, including this PSSC analysis, is intended to provide a complete and bounding NEPA analysis of pit fabrication at LANL.

II.1.2 Background Information

In September 1996, DOE issued the SSM PEIS (DOE 1996). Based on this PEIS, DOE issued a ROD on December 19, 1996, that selected LANL as the site for the fabrication of weapon components referred to as pits. The SSM PEIS and its ROD established pit production at LANL. It is expected that up to 50 pits will be manufactured per year under routine operations with a maximum capacity that could produce up to 80 pits per year (with multiple-shift operations). For this reason, the Expanded Operations Alternative includes production of up to 80 pits per year, as well as all related support operations for this capability.

As noted in the description of the Expanded Operations Alternative, this production level of pit manufacturing necessitates operations that, together with other ongoing operations, cannot be accommodated within the available floorspace in the LANL Plutonium Facility at TA–55 (Building TA–55–4). DOE and LANL have identified that 15,300 square feet (1,425 square meters) of additional floorspace is needed to fully support this level of operation (LANL 1997). The Expanded Operations Alternative description and analysis includes the establishment and use of this needed floorspace. The establishment of this additional floorspace (through allocation of existing space or construction of new space) is addressed in detail in this PSSC analysis, as is the utilization of the space (including a discussion of functions that could be performed in this space).

II.1.3 Material Flows Associated with the Pit Manufacturing Capability

The relationship between the manufacture of pits and other related operations at LANL is presented in Figure II.1.3–1.[1] This diagram reflects the types of material flows associated with these operations. A more detailed description of these operations is presented in volume I, chapter 3, of the SWEIS. The manufacture of pits involves the generation of samples for analysis; generation of residues for stabilization or recovery; generation of waste for treatment, storage, and disposal; and storage and handling of plutonium in solid and liquid forms.

The following existing capabilities are essential to support pit manufacturing operations as well as other ongoing operations at LANL: TA–3 capabilities for analytical chemistry and nonnuclear parts; TA–50 and TA–54 waste treatment, storage, and disposal capabilities; TA–55 capability for residue processing, particularly aqueous and pyrochemical processing; TA–55 capability for storage and handling of plutonium in several forms; and TA–8 capability for radiography. The locations of the TAs that support pit manufacturing operations are shown in Figure II.1.3–2. These capabilities support ongoing operations throughout LANL, and therefore, their continued viability is essential to many missions and programs at LANL. DOE does not currently propose to replace these capabilities. The alternatives in this PSSC analysis maximize use of existing capabilities in order to minimize the environmental effects of establishing the pit production operations identified above. Construction and reconfiguration activities to enhance pit manufacturing are only anticipated to occur at TA–55 and, for a bounding analysis, at the CMR Building under the "CMR Building Use" Alternative.

II.1.4 Laboratory Floorspace Requirements

Increased nuclear materials processing floorspace and analytical chemistry space are

1. In addition to pits returned from storage or the stockpile, feed material for pit production could also come from other portions of DOE's plutonium inventory. The diagram reflects only pit returns as feed material for the sake of simplicity.

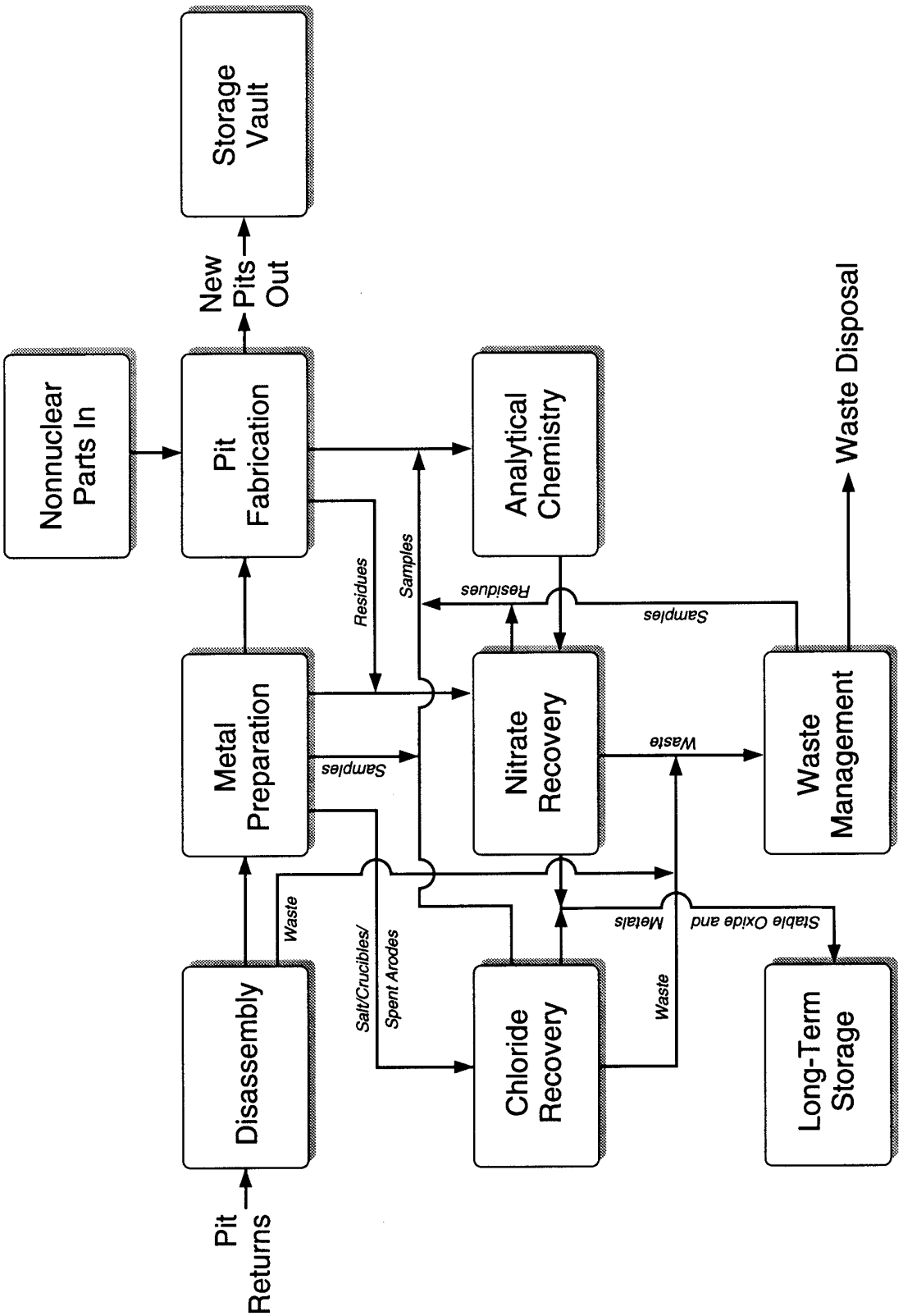
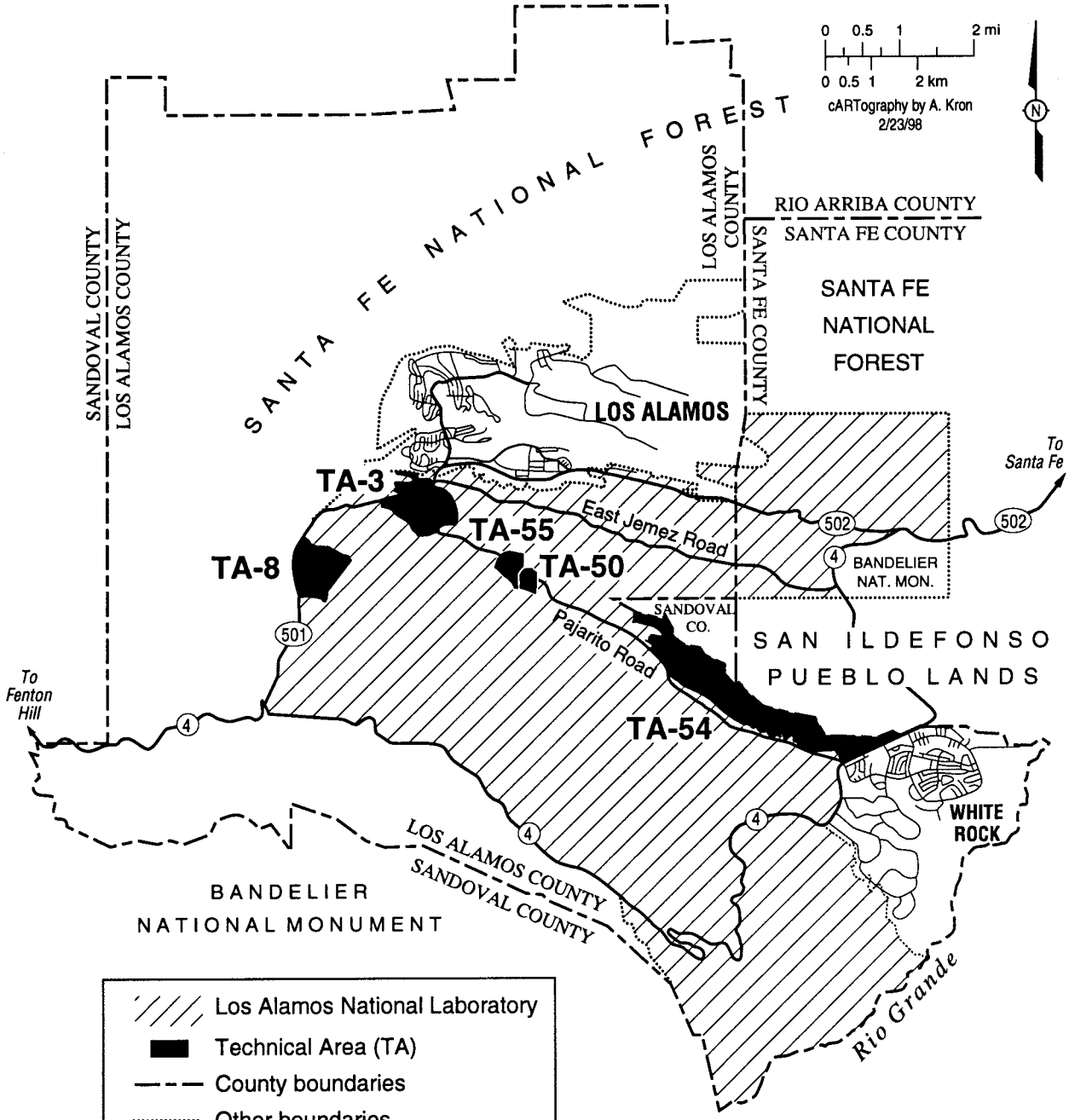


FIGURE II.1.3–1.—*Flow Diagram of Proposed Pit Manufacturing at Los Alamos.*



TA-3:	Analytical Chemistry and Non-Nuclear Parts
TA-8:	Radiography
TA-50:	Radioactive Liquid Waste Treatment
TA-54:	Solid Waste Handling and Low-Level Radioactive Waste Disposal
TA-55:	Processing, Handling, and Storage of Plutonium

FIGURE II.1.3–2.—*Location of LANL Operations that Support Pit Manufacturing.*

required to meet reasonably foreseeable pit manufacturing requirements. Two steps were involved in determining the floorspace requirements. First, subject matter experts provided the total floorspace that their capability would require based on the projected requirements, without regard to the final location of the program or function. Results of this analysis indicated that approximately 15,300 square feet (1,425 square meters) were required in addition to floorspace currently available in TA–55–4 (see Table II.1.4–1). Second, the following criteria were employed to select the functions that could be relocated from existing space in TA–55–4 in order to make space available for pit manufacturing:

- Total floorspace would fulfill anticipated functional requirements.
- Only liquid waste and residues generated in large volumes at the additional space facility would be low-level radioactive liquid waste. (This can be sent to TA–50 for treatment.)
- Major equipment that is integral to the TA–55–4 plutonium infrastructure would not be moved from TA–55–4.
- Both locations should dedicate space to materials handling and waste management functions.
- Functions, such as plutonium-238 operations, that would require extensive decontamination would not move.
- Additional support functions that specific capabilities require would be moved if the capability is moved.

These criteria are consistent with the following two basic concepts: (1) identifying capabilities that can most easily be separated from the current TA–55–4 infrastructure and remaining capabilities and (2) reconfiguring TA–55–4 to provide adequate contiguous space to accommodate the remaining capabilities such as the expanded pit manufacturing activities.

With the information and criteria above, the floorspace allocations for operations and support functions were determined and are shown in Table II.1.4–1. Under these criteria, all or part of the capabilities marked with a superscripted letter “a” in Table II.1.4–1 could be conducted in the additional space. The functions analyzed for potential relocation in this PSSC analysis were selected to be representative of the functions that could move and to bound the potential impacts of the Expanded Operations Alternative.

The risks and hazards associated with each of these functions that are candidates for the additional space are essentially identical. They are driven by the type and form of the material (plutonium oxide or metal in almost all cases), the nature of the operations (physical manipulation, destructive and nondestructive analytical work, solid chemistry, and aqueous chemistry in small quantities), and the nature of the facility and equipment (which is driven by current design and other safety-related standards associated with plutonium operations). The one exception to this statement is the Special Recovery Line, which includes the capability to handle small quantities of tritium contamination (a different radioactive material than is associated with the rest of the materials that could transfer to the additional space) of plutonium parts (LANL 1997). Because the hazards associated with them are essentially the same for all of the functions that are being considered, the question of exactly which process(es) might be moved is not important to the analysis within this document. In other words, the operational impacts of the alternatives addressed in this PSSC analysis (discussed in volume I, chapter 5) are driven by the location of the operations, not the differences between those operations being considered to move to that location. For the purposes of this document, it is assumed that pit surveillance (as well as metallography associated with this function), pit disassembly for manufacturing feedstock, about 50 percent

TABLE II.1.4–1.—*Laboratory Floorspace Requirements in Square Feet (Square Meters)*

FUNCTION	EXISTING TA–55–4 FLOORSPACE ft^2 (m^2)	ALLOCATION OF EXISTING FLOORSPACE AT TA–55–4 UNDER EXPANDED OPERATIONS ft^2 (m^2)	ADDITIONAL FLOORSPACE NEEDED UNDER EXPANDED OPERATIONS ft^2 (m^2)	TOTAL EXPANDED OPERATIONS FLOORSPACE REQUIREMENT ft^2 (m^2)
Manufacturing Plutonium Components[a]	11,400 (1,060)	15,300 (1,425)	3,200 (300)	18,500 (1,720)
Disassembly and Surveillance of Weapons Components[a]	2,300 (215)	0 (0)	4,500 (420)	4,500 (420)
Plutonium-238 Research, Development, and Applications	9,000 (835)	9,000 (835)	0 (0)	9,000 (835)
Actinide Materials Science and Processing Research and Development				
Actinide Research and Development—General[a]	3,400 (315)	3,400 (315)	1,000 (95)	4,400 (410)
Actinide Research and Development—Waste Management	800 (75)	0 (0)	0 (0)	0 (0)
Special Recovery Line[a]	700 (65)	0 (0)	1,200 (110)	1,200 (110)
Neutron Source Materials Recovery	800 (75)	800 (75)	0 (0)	800 (75)
Pit Disassembly and Material Conversion	1,000 (95)	1,500 (140)	0 (0)	1,500 (140)
Fabrication of Ceramic-Based Reactor Fuels	3,000 (280)	3,000 (280)	0 (0)	3,000 (280)
Plutonium Recovery	13,400 (1,250)	13,400 (1,250)	0 (0)	13,400 (1,250)
Support Activities				
Material Control and Accountability	0 (0)	0 (0)	0 (0)	0 (0)
Materials Management and Radiation Control[a]	4,400 (410)	4,400 (410)	2,000 (185)	6,400 (595)
Waste Management[a]	2,400 (225)	2,400 (225)	1,200 (110)	3,600 (335)
Analytical Chemistry—Metallography[a]	4,700 (435)	2,600 (240)	1,500 (140)	4,100 (380)
Contingency Space[a]	0 (0)	1,500 (140)	700 (65)	2,200 (205)
Total	57,300 (5,330)	57,300 (5,530)	15,300 (1,425)	72,600 (6,750)

[a] All or parts of these activities could be conducted in the additional space.
Metric totals may not sum due to rounding.

of the actinide research and development and the Special Recovery Line would constitute the functions that would be moved. Based on the quantities and types of materials involved, these processes bound the materials and risks for the functions being considered to move to the additional space.

The enhancement of pit manufacturing operations would require improvements in infrastructure, rearrangement of processes to optimize material flows, and equipment purchases so that LANL could provide a maximum capacity of up to 80 pits per year (using multiple shift operations) for the enduring nuclear weapons stockpile. However, pit manufacturing would not be the only function at LANL that requires dedicated floorspace in a nuclear materials facility. Other functions currently exist at TA–55–4 and must continue for the foreseeable future. These functions, their floorspace requirements in TA–55–4, and additional space are outlined in appendix II.A.

II.1.5 Capability Maintenance and Improvement Project

The CMIP is the name of the construction project under which the enhancement of pit manufacturing would occur. The CMIP is a construction project that consists of two parts. The capability maintenance activities within this project are necessary to provide for the continued viability of several facilities, as discussed in volume I. These include TA–55 and the Sigma Building. These activities are included in all of the SWEIS alternatives described in volume I because they are necessary to maintain existing capabilities. The SWEIS analyses of these aspects of the CMIP are addressed in chapter 5 of volume I for all alternatives.

Alternatives that DOE could develop for creation of adequate additional space to accommodate pit production are presented in section II.2 of this PSSC analysis. As described earlier, modifications to TA–55–4 would be consistent with the following concepts: (1) identifying for possible relocation those capabilities that can most easily be separated from the TA–55 infrastructure and remaining capabilities and (2) providing adequate space within TA–55 to accommodate the remaining capabilities, including the enhanced pit manufacturing activities.

II.2 SITING AND CONSTRUCTION ALTERNATIVES

This section discusses alternatives for the construction of adequate additional space to accommodate pit production in addition to the other activities described in the Expanded Operations Alternative. Because of the potential transportation and handling implications of moving materials from TA–55 to the CMR Building, options for transporting special nuclear materials (SNMs) are discussed also. The options for transporting SNMs are applicable to each of the alternatives.

The typical No Action Alternative regarding this project (that is, not enhancing the existing capability), is discussed in the SWEIS No Action Alternative in volume I, and that discussion is not repeated here.

Conceptual locations have been identified for the Brownfield Plutonium Facility and the Add-on to TA–55–4 alternatives based on the conceptual operational requirements of the pit manufacturing capability provided in the SSM PEIS. These conceptual requirements have been used to broadly define facility size and category, utility needs, and other possible infrastructure characteristics. This information has been generally reviewed in the context of LANL's siting criteria and construction codes. The resulting locations are the product of this conceptual analysis.

II.2.1 Alternatives Analyzed in Detail

The text box on page II–2 briefly describes the three alternatives analyzed in detail. This section provides further information on these alternatives. As noted in these descriptions, pit manufacturing would continue during these construction activities by phasing construction. This approach allows for continuous support of missions throughout the construction activities.

II.2.1.1 *Utilize Existing Unused Space in the CMR Building Alternative*

Only two existing facilities at LANL are qualified to undertake the types of operations described in appendix II.A of this PSSC analysis: TA–55–4 and the CMR Building in TA–3. As noted previously, TA–55–4 does not currently have adequate available space. However, the CMR Building has two wings available and another wing that may become available in time to support these needs. These three wings are essentially equivalent, and would have almost identical construction and operational impacts if utilized.

This alternative is distinct from the others in that it does not require construction of new nuclear facility floorspace; rather, the construction project would focus on making existing nuclear facility space operational. Additionally, the majority of the construction involved is within existing facilities (which substantially reduces disturbance of land beyond the existing disturbance). Given that current employee office space is very limited at TA–55 and makes extensive use of portable trailers, it is reasonably foreseeable that a new office support facility could be constructed; thus, creation of this office space is included in the analyses for this alternative. The size and location of such a facility would likely be limited to currently developed areas. Operationally, the potential for transportation on public roads, as well as material handling volume and risk, are more substantial for this alternative than the alternatives discussed in sections II.2.1.2 and II.2.1.3. This alternative poses minimal potential for biological or cultural effects, and there would be no addition to the potentially contaminated space in either TA–55 or the CMR Building (i.e., uses existing nuclear space). Additionally, facility modifications under this alternative would generate transuranic (TRU)[2] waste and low-level radioactive waste (LLW)[3] (because these modifications would occur within the nuclear facility), which would require treatment and disposal.

The above discussion reflects an endpoint achievement in pit manufacturing capacity at TA–55–4. DOE would achieve this capacity in a phased manner. First, additional maintenance and equipment procurement would be conducted in TA–55–4 to support continued pit manufacturing at the existing capacity of about 14 pits per year (this is part of all SWEIS alternatives). Secondly, construction would be initiated to complete refurbishment of TA–55–4 for long-term viability of the facility in support of all missions: replacement of aged analytical chemistry support equipment and improvements to nonnuclear support facilities. By completion of the second phase, it is expected that an intermediate pit manufacturing capability of 20 pits per year at TA–55–4 would be achieved through use of the upgraded facilities and efficiencies gained in manufacturing operations. The final phase would be transfer of activities to the CMR Building, followed by modification of TA–55–4

2. TRU wastes contain a transuranic radionuclide with a half-life greater than 20 years and alpha activity of 100 nanocuries per gram (nCi/g) or greater at the time of measurement, excluding naturally occurring and depleted uranium, spent nuclear fuel, and high-level waste.

3. LLW contains radioactivity, but is not classified as high-level waste, TRU waste, spent nuclear fuel, or "11e(2) byproduct material" as defined by DOE Order 5820.2A, *Radioactive Waste Management*.

to provide for pit manufacturing at TA–55–4, as described above. The analyses of the "CMR Building Use" Alternative bound the potential risk to workers and the public from this phased approach.

Transportation Corridor

Transportation of SNM among the facilities at LANL would increase under the Expanded Operations Alternative. The transportation of samples between the CMR Building and TA–55–4 would also increase substantially (as described in the Expanded Operations transportation analysis). These shipments typically would require specially designed packaging and vehicles or road closures. In this case, total shipments between TA–55 and the CMR Building would be expected to increase by approximately 500 shipments of SNM per year (see appendix F in volume III). Road closures would occur more frequently.

In order to minimize impacts to the public (ranging from transportation-related risks to inconvenience), a restricted-access road between TA–55 and TA–3 (Figures II.2.1.1–1 and II.2.1.1–2) is proposed. This road would be developed on an existing dirt road just off of the existing public road. It would be utilized for all SNM shipments between TA–55 and the CMR Building. In addition to removal of vegetation, filling the road bed and paving the road, fences, gates, lights, towers, and other physical security structures would be constructed within the corridor. This road would not be constructed for the 20 pits per year rate.

In order to ensure that the potential impacts of the Expanded Operations Alternative are bounded, the transportation analysis in volume I includes transportation of these materials on public roads utilizing appropriate packaging to minimize road closures. The Expanded Operations Alternative (volume I, chapter 5, section 5.3.10) also includes the impacts of building the dedicated road. The resulting analysis is thus conservative in terms of public risk due to transportation accidents and in terms of public radiation exposures associated with routine shipments.

Inclusion of the "CMR Building Use" Alternative in the SWEIS

The "CMR Building Use" Alternative from this PSSC analysis is included in the SWEIS Expanded Operations Alternative and its associated impacts analysis. The "CMR Building Use" Alternative for pit manufacturing is to utilize existing unused space in the CMR Building (moving activities from TA–55–4 to CMR to make adequate space in TA–55–4 for plutonium pit manufacturing activities) and use a dedicated restricted access road (with minimal environmental impacts) to mitigate the impacts to the public related to transportation between TA–55 and the CMR Building.

II.2.1.2 *Brownfield Plutonium Facility Alternative*

In this alternative, DOE would build a new plutonium-qualified facility in a developed area near the existing Plutonium Facility at TA–55, hence, the use of the term "Brownfield." This stand-alone facility would take about as long to build and start up as a facility at an undeveloped or "Greenfield" site. A Greenfield facility, however, would require additional nonnuclear space (staging and storage, measurement equipment, etc.) as well as nuclear space (operational space); whereas, the Brownfield facility would be able to take advantage of some infrastructure at the existing TA–55 facility and thus, would likely require slightly less total floorspace and less total acreage than a Greenfield site. The Brownfield Plutonium Facility would have a new parking lot, new cold laboratory, low-level radiography, and support space. Approximately 15,300 square feet (1,425 square meters) of new laboratory floorspace would be required for this facility. A new office support facility could be required in the future and is analyzed as part of this

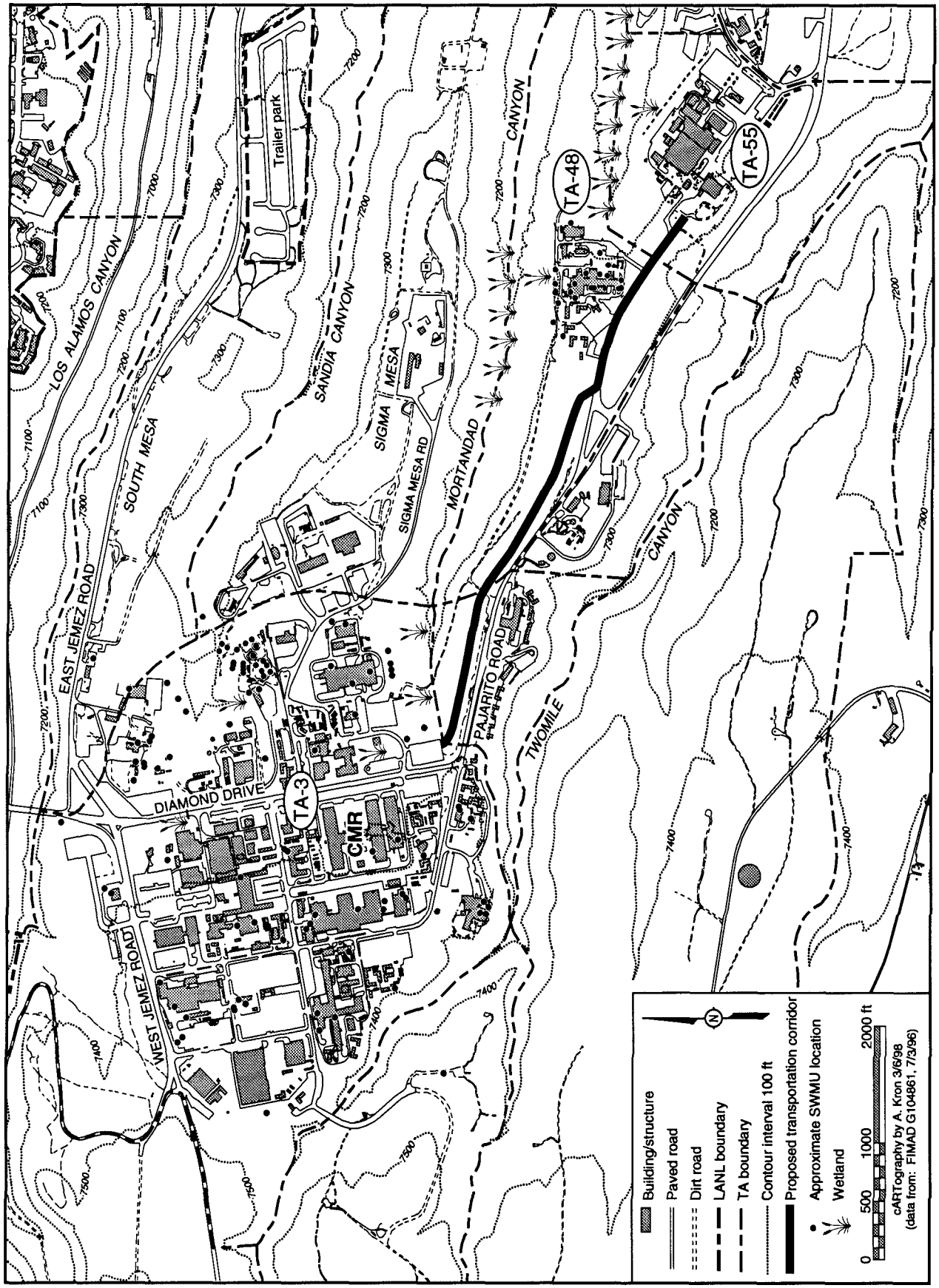


FIGURE II.2.1.1-1.—*Location of Proposed Transportation Corridor.*

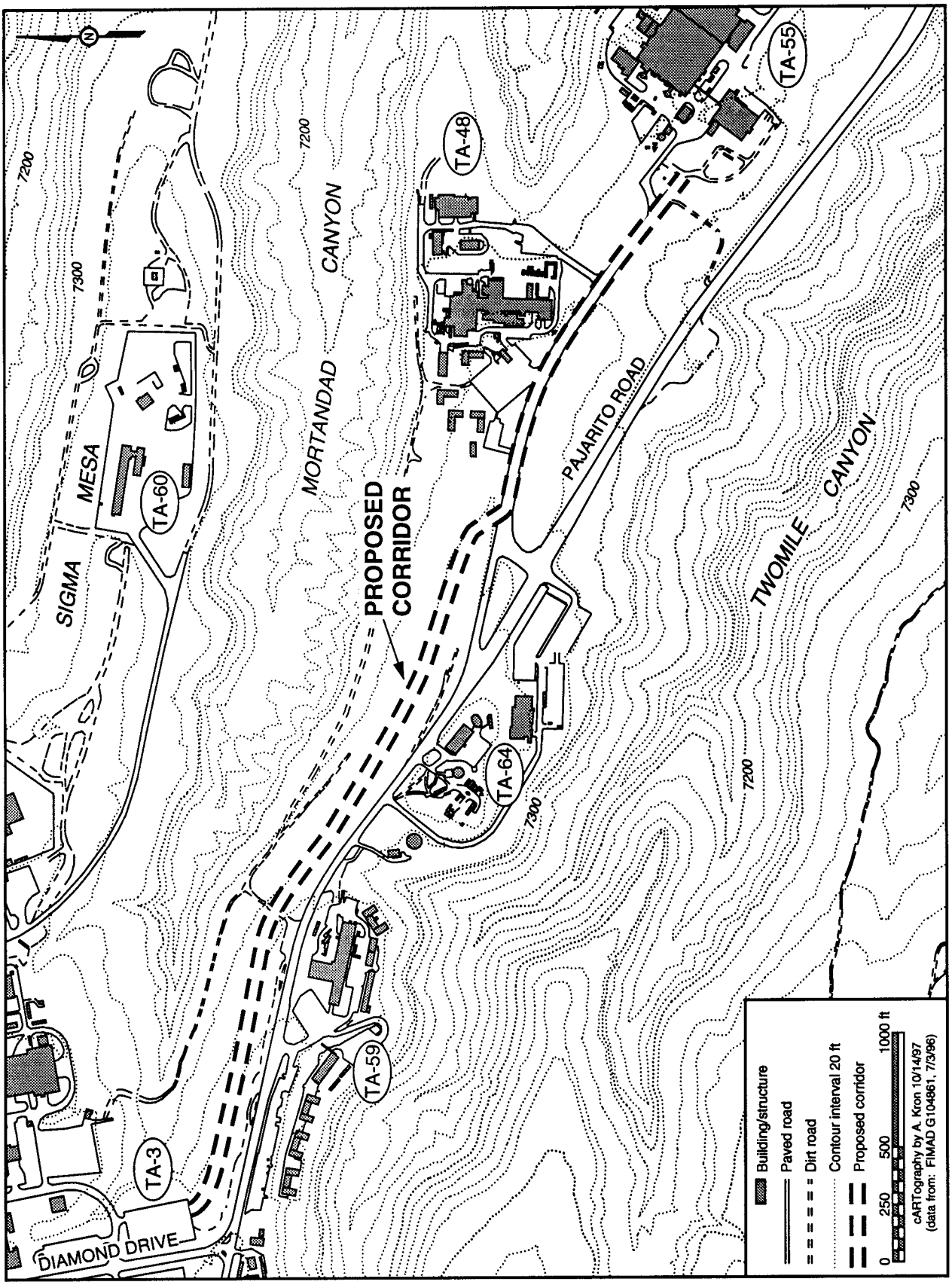


FIGURE II.2.1.1–2.—*Detailed Location of Proposed Transportation Corridor.*

alternative. This alternative includes a dedicated transportation corridor to be constructed between TA–55 and the CMR Building to provide analytical chemistry support to TA–55 pit manufacturing operations. The additional transportation options discussed in section II.2.1.1 also would be considered under this alternative.

As with the "CMR Building Use" Alternative for enhanced pit manufacturing, the increased pit manufacturing capacity would be phased under this alternative. The analysis of this alternative bounds the impacts of the phased implementation, and the operations impacts analyzed in volume I, chapter 5, bound the operational impacts of the phased implementation.

Conceptually, the Brownfield Plutonium Facility could be constructed just south and west of Buildings 1 and 2 within an existing protected area at TA–55 (Figure II.2.1.2–1). Although the facility itself is within the TA–55 fence line, the fencing and security system may have to be moved to provide adequate buffer between the building and the fence. In order to provide the operational space required (see Table II.1.4–1) under this alternative, this stand-alone facility would need to contain approximately 15,300 square feet (1,425 square meters) of designated nuclear laboratory space; it is assumed that this space would become contaminated during operations, creating a liability for eventual cleanup. The required utilities would be routed to this stand-alone facility from nearby utility corridors. The facility waste streams would be routed to nearby waste collection lines. Most transportation of materials would occur within the existing protected area at TA–55, and access control would be managed using existing or slightly modified security fencing and equipment. This alternative would minimize transportation of materials between the CMR Building and TA–55. Potential environmental advantages for this alternative would include minimizing transportation risks and minimizing development in currently undeveloped areas (less potential for cultural and biological impacts); however, it would create additional nuclear facility space that would potentially be contaminated (and have the liability for eventual decontamination and decommissioning).

II.2.1.3 *Add-On to the TA–55–4 Alternative*

Construction to add plutonium-qualified space to the existing plutonium facility at TA–55 is also considered reasonable. Because this alternative would take maximum advantage of the existing TA–55 facility infrastructure (i.e., utilities, structural support, vaults, alarm systems, etc.), it would require less total development than the Brownfield site to provide the same operational floorspace. This facility also may have low-level radiography as well as a new cold laboratory, and may require office support space (thus, construction of this office space is analyzed as part of this alternative).

Based on a conceptual siting, the TA–55 add-on plutonium facility could be located directly adjacent and along the northeastern wall of TA–55–4 between Buildings 42 and 8 (Figure II.2.1.3–1). The add-on plutonium facility would house approximately 15,300 square feet (1,425 square meters) of nuclear laboratory space. The infrastructure necessary to support the pit manufacturing capabilities under this alternative would be provided by the existing, or slightly modified, TA–55–4 Plutonium Facility. The utilities required for operations within the add-on facility would be provided by extending, and tying into, utility infrastructure already existing in TA–55–4. Material handling and movement would occur within TA–55–4, and the add-on facility and access control would be managed by using the existing TA–55–4 Plutonium Facility security systems.

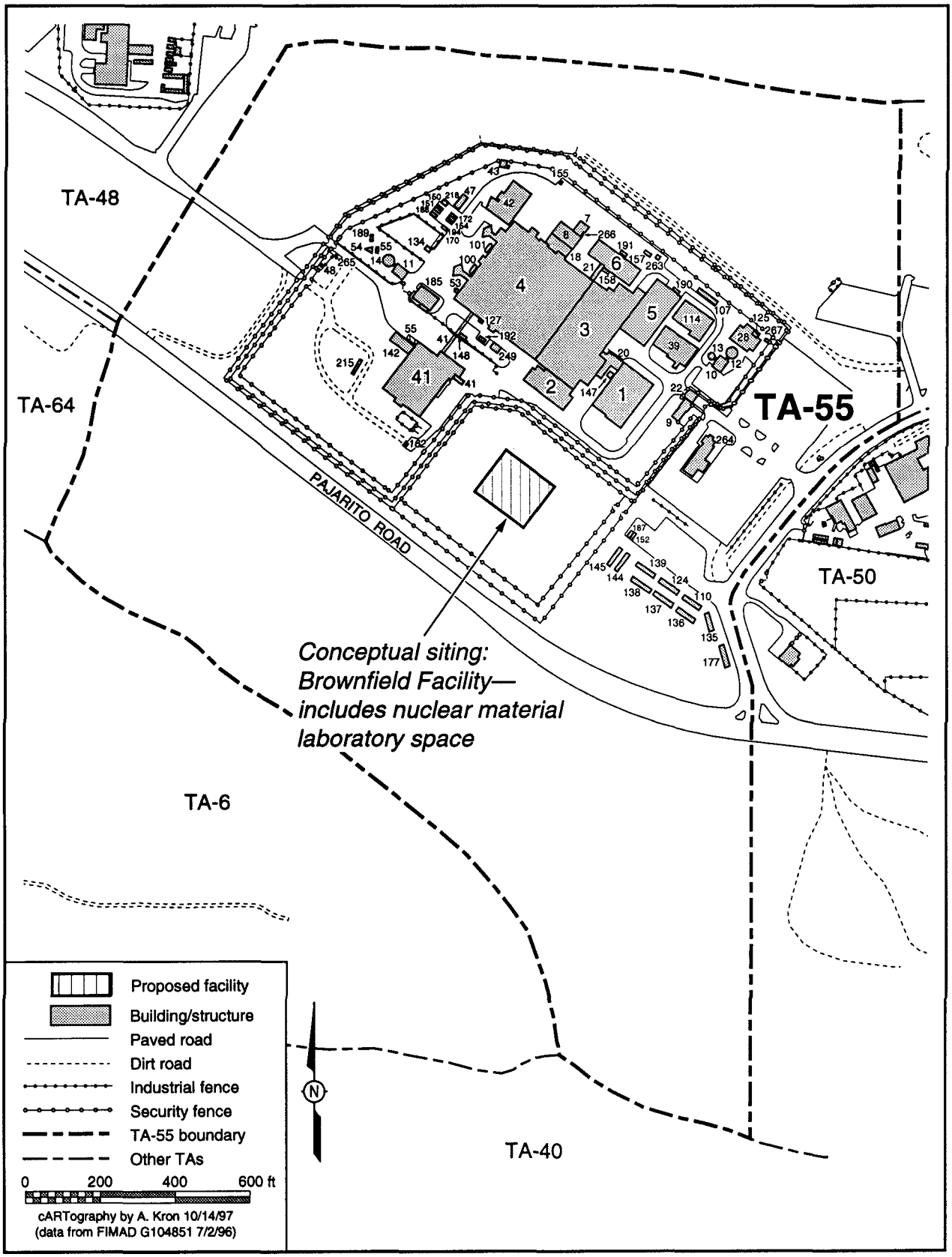


FIGURE II.2.1.2–1.—*Conceptual Location of the Brownfield Facility.*

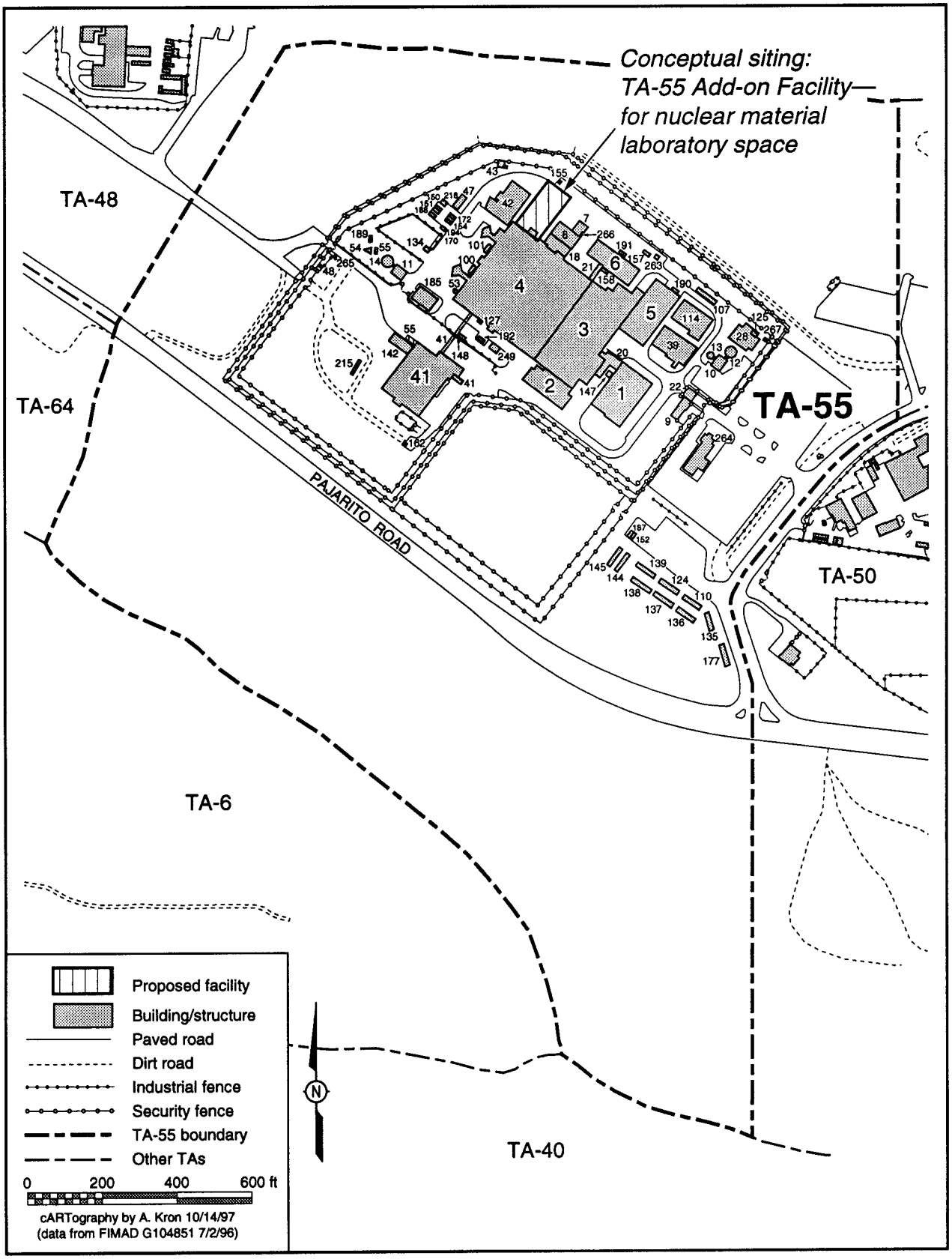


FIGURE II.2.1.3–1.—*Conceptual Location for the Add-On Facility.*

The add-on facility may not require relocation of current TA–55–4 operations. While this is an option that would be implemented in a phased manner (as discussed in the other two alternatives), it also is possible to maintain and operate existing activities in TA–55–4 as a new pit production facility is built within the add-on facility (again, this may also utilize a phased approach that increases the capacity of the existing capability up to 20 pits per year). Once the add-on facility was completed and functioning under this option, the activities in TA–55 would be expanded and rearranged within TA–55–4 to meet projected floorspace requirements. As with the other alternatives, the analysis includes all construction operations (under either of the alternative options), and the analysis of operations discussed in volume I, chapter 5, bounds the operations of the phased approach. This alternative would minimize transportation between TA–55 and the CMR Building (the same as for Brownfield). This alternative includes a dedicated transportation corridor to be constructed between TA–55 and TA–3 to provide analytical chemistry support to TA–55 pit manufacturing operations in the add-on facility. However, the additional transportation options discussed in section II.2.1.1 also would be considered under this alternative. This facility would create additional contaminated space. This alternative has essentially the same environmental impacts as the Brownfield facility.

II.2.2 Alternatives Not Examined in Detail

II.2.2.1 *Eliminate Existing Capabilities*

Existing plutonium facilities and capabilities at LANL are needed to support ongoing missions. Many of the capabilities that currently exist are essential to successfully support ongoing programmatic missions and implement the SSM PEIS decisions and cannot be eliminated (for example, aqueous and pyrochemical recovery and stabilization process, storage and handling of plutonium, plutonium metallurgy, analytical chemistry, and nondestructive analysis). Other nuclear facility capabilities are critical to ongoing missions at LANL, and there has been no DOE programmatic determination to cease or transfer these responsibilities to another site. Hence, the elimination of existing capabilities at LANL to make space available for enhanced pit manufacturing is not considered reasonable. For these reasons, an elimination alternative is not examined further.

II.2.2.2 *Greenfield Plutonium Facility*

An alternative to construct a new facility or facilities at an undeveloped location at LANL also was considered but dismissed from detailed evaluation. Such a facility would have to be largely self-sufficient and could take little advantage of existing infrastructure available at a developed site (replication of such infrastructure would mean a facility with far more total floorspace than the minimum required to perform the operations). Under such an alternative, site disturbance would be extensive (roads, parking areas, fences, utilities, administrative offices, etc.) with the potential for affecting biological, visual, and/or cultural resources. Such an action also would add substantially to the operating nuclear space in the weapons complex and at LANL at a time when DOE is trying to minimize this type of space (and thus, minimize the eventual liability for decommissioning of contaminated space). The time required to build and start up such a facility is extensive. There are no programmatic, environmental, or other advantages to undertaking this type of action beyond those represented in the alternatives described in section II.2.1. Transportation, material handling, and other issues are no different for this alternative than are represented in the other alternatives. Because there are no potential advantages to undertaking a

Greenfield Plutonium Facility, and there are additional unique environmental impacts associated with disturbing an undeveloped site, this alternative is not considered reasonable for detailed analysis.

II.2.2.3 *Other Existing Space*

While there may be other facilities with existing available space at LANL, with the exception of existing unused plutonium-qualified space at the CMR Building, this space does not meet current standards for supporting plutonium operations. Substantial upgrades to such facilities would be required to allow for their use in plutonium operations. By the nature of requirements for plutonium facilities, these upgrades would be so intrusive and complex that they would be similar in duration to the Brownfield Alternative. Additionally, such facilities are farther away from the existing infrastructure at TA–55 than is examined in the Brownfield Alternative, and so additional transportation risks would be incurred in this event (as compared to Brownfield). This alternative would have no programmatic or environmental advantages over the Brownfield Alternative. As such, this alternative is not considered to be distinct from the Brownfield Alternative and is not analyzed.

II.3 AFFECTED ENVIRONMENT

This section does not repeat information that is presented in volume I, chapter 4; it focuses on alternative-specific information that is needed to illuminate the differences among alternatives. Table II.3–1 identifies the environmental resources common to this PSSC analysis and volume I, along with their location in both documents. Table II.3–2 identifies environmental resources that are not discussed in this PSSC analysis, provides information about why they are not discussed, and identifies the locations of the discussions in volume I, chapter 4.

TABLE II.3–1.—*Potential Environmental Resource Issues Addressed in Volume I and This PSSC*

ENVIRONMENTAL RESOURCE	LOCATIONS OF DISCUSSIONS
Land Use	Volume I, section 4.1.1 and PSSC Analysis, section II.3.1.1
Noise	Volume I, section 4.1.3 and PSSC Analysis, section II.3.1.3
Air Quality	Volume I, section 4.4 and PSSC Analysis, section II.3.2
Ecological Resources	Volume I, section 4.5 and PSSC Analysis, section II.3.3
Cultural Resources	Volume I, section 4.8 and PSSC Analysis, section II.3.4
Traffic	Volume I, section 4.10 and PSSC Analysis, section II.3.5
Environmental Justice	Volume I, section 4.7 and PSSC Analysis, section II.3.6
Human Health	Volume I, section 4.6 and PSSC Analysis, section II.3.7
Environmental Restoration and Waste Management	Volume I, sections 2.1.2.5 and 4.9 and PSSC Analysis, section II.3.8

II.3.1 Land Resources

II.3.1.1 *Land Use*

TA–55 and TA–3 have been designated for research and development land use purposes, as has the land within the neighboring TAs, including TA–48, TA–60, and TA–59. The majority of the land within TA–55 and TA–3 is highly developed industrially. TA–55 is located on Mesita del Buey, which is a narrow southeast-trending mesa about 2.5 miles (4 kilometers) long. The CMR Building is located in TA–3 about 1.2 miles (2 kilometers) west of TA–55 on South Mesa. The locations of TA–55 and TA–3 are shown in Figure II.1.3–2. Currently undeveloped land within the vicinity of TA–55, including that along the proposed transportation corridor, is open to wildlife use. It is not considered to be the highest quality

TABLE II.3–2.—*Potential Environmental Resource Issues Addressed Only in Volume I*

ENVIRONMENTAL RESOURCE	REASON NOT ADDRESSED IN THIS DOCUMENT	LOCATION OF DISCUSSION
Visual Resources	Any major construction would occur in developed industrial areas.	Chapter 4, section 4.1.2
Parks; Forests; Conservation Areas; Wetlands; and Areas of Recreational, Ecological, or Aesthetic Importance	None of these resources is located in any of the areas under consideration.	Chapter 4, section 4.1
Geology and Soils	Alternatives would involve the same types of surface soils and the same underlying Bandelier Tuff (Nyhan et al. 1978).	Chapter 4, section 4.2
Water Resources	None of the alternatives would affect water resources. Any modifications to runoff patterns would be minor relocations.	Chapter 4, section 4.3
Socioeconomic Conditions	Fewer than 140 workers would be required to implement the Preferred Alternative during times of peak labor demand. Construction projects associated with any of the alternatives would be approximately 4 years in duration, and the number of potential workers is very small compared to the population base in northern New Mexico.	Chapter 4, section 4.9

habitat, however, due to its close proximity to highly developed areas with high levels of human activities and busy roadways.

II.3.1.2 *Visual Environment*

The visual environment around TA–55 is that of an industrially developed site with a backdrop of forested and grass covered areas. Similarly, the larger industrial development within TA–3 is set against a predominately silvan backdrop. The surrounding TAs are either sparsely developed and forested, or their development is clustered into one or two areas with forested areas within their boundaries.

II.3.1.3 *Noise Environment*

Operations at TA–55 and TA–3 contribute to the overall background noise level generated by LANL activities, primarily through the traffic into and away from the facilities located within these TAs. Actual operational noise heard outside of structures is limited to the immediate vicinity of the buildings; mostly these noises are due to occasional routine maintenance activities (such as grass mowing) and the movement of equipment and waste containers into and around the facilities. No measurements of environmental noise have been conducted within the TA–55 area, but the level of noise present there and around the TA–3 area is fairly representative of other industrially developed sites around LANL.

II.3.2 Air Quality

Air monitors in the stacks at TA–55–4 and the CMR Building collect data from routine emissions. The index used in this SWEIS for the CMR Building radioactive stack emissions is 0.0002 curies per year (see Table 3.6.1–4 in chapter 3, volume I). The index for TA–55 radioactive stack emissions is 0.00002 curies per year of plutonium-239, and about 1,100 curies per year of tritium (in the form of hydrogen and water vapor) (see Table 3.6.1–2, chapter 3, in volume I).

II.3.3 Ecological Resources

II.3.3.1 *Threatened or Endangered Species*

DOE utilized existing available field information and a preliminary model of nesting and roosting habitat for the Mexican spotted owl to assess use of the TA–55 and TA–3 areas by species of animals and birds that are federally listed and state listed and protected as threatened or endangered. Three federally protected (also state listed) species of birds potentially use the areas for foraging habitat: the bald eagle (*Haliaeetus leucocephalus*), the American peregrine falcon (*Falco peregrinus*), and the Mexican spotted owl (*Strix occidentalis lucida*) (Haarmann 1997).

II.3.3.2 *Flora and Fauna*

The areas within the fenced portion of TA–55 where TA–55–4, the Brownfield Plutonium Facility, and the add-on to the TA–55–4 alternatives are proposed for location, are not available for use by any but the smallest wildlife species. This also is the case with the fenced portion of TA–3 around the CMR Building. These areas within the TA security fences are grassed over with a mixture of native and nonnative grass species and have small landscaped areas that include low lying bushes and a few small trees, but no large-trunked trees. The mesa-top area along the proposed transportation corridor within TA–55, TA–48, and TA–59 is predominantly covered with ponderosa pine (*Pinus ponderosa* Laws. *var. scoparium* Engelm.), with small stands of Gambel oak (*Quercus gambelii* Nutt.) understory trees (*Quercus gambelii*) and a groundcover of mostly mountain muhly grass (*Muhlenbergia montana* (Nutt. (A.S. Hitchc.) and blue grama grass (*Bouteloua gracilis* (H.B.K.) Lag.)). Wildlife in the mesa-top area includes a variety of insects, reptiles, birds, and mammals. Small mammals known to inhabit the area include voles (*Microtus* spp.), brush mice (*Peromyscus boylii*), and chipmunks (*Eutamias* spp.). Large mammals known to use and inhabit the area include game animals such as elk (*Cervus elaphus*) and mule deer (*Odocoileus hemionus*), as well as coyote (*Canis latrans*) and black bear (*Ursus americanus*). Field data suggest that many of these animals are attracted to and use surface water located in the upper portion of Mortandad Canyon to the northeast of TA–55.

II.3.4 Cultural Resources

Historic and archaeological sites are located in the vicinity of TA–55. These include a two-room pueblo (LA 12705) and historic wagon road (LA 71160) near the proposed corridor. LA 12705 has been determined eligible for the National Register of Historic Places (NRHP). LA 71160 has been determined ineligible for the NRHP (LANL 1996b). Other cultural properties are not expected to be found within the areas encompassed by the various alternatives because of the currently disturbed states of the potential alternative sites.

II.3.5 Traffic

Four publicly accessible vehicle routes convey traffic to and from LANL (Figure II.1.3–2). State Road 502 (Main Hill Road) and East Jemez Road are heavily used by commuter traffic from Santa Fe and Española. State Roads 4 and 501 (West Jemez Road) provide access to LANL for small communities to the west of LANL. Pajarito Road conveys traffic from White Rock to LANL. The four main portals to LANL convey about 40,000 average daily trips (ADTs). They are Los Alamos Canyon bridge (28,000 ADTs), Pajarito Road (8,000 ADTs), East Jemez Road (6,000 ADTs), and State Road 4 from the west (1,000 ADTs). East Jemez Road and Pajarito Road are DOE-owned and provide public access to many of the TAs at LANL.

In addition to private vehicles, government vehicles contribute to the volume of traffic on these roadways. Routine shipments of SNM are made across these roads in the DOE/U.S. Nuclear Regulatory Commission (NRC) Type B certified packaging. DOE has delegated the authority to LANL to temporarily close roads for the purpose of transporting hazardous or radioactive materials on DOE-owned roads. On average, the total number of on-site transfers of radioactive materials is approximately 950 per year. The number of hazardous or radioactive material shipments that actually require temporary road closures is approximately 80 per year. Road closures for on-site hazardous or radioactive material transfers are routinely conducted at one of three times: 5:00 a.m., 9:00 a.m., or 2:00 p.m. Road closures generally last less than 1 hour. Traffic is either held in place by security personnel or rerouted to the other available access roads at LANL. Because of the temporary and infrequent nature of the road closures and the ability to schedule road closures during off-peak hours, no discernible changes in routine traffic patterns are known to result from these actions at LANL.

II.3.6 Environmental Justice

Section 4.8, of chapter 4, volume I, discusses environmental justice and the populations near LANL. Because any of the alternative construction sites would have only local effects and the local populations are not minority or low-income populations, environmental justice considerations are complete in volume I, chapter 5.

II.3.7 Human Health

Work (including facility modification, maintenance and similar work) in the nuclear facilities at TA–55–4 and the CMR Building is presumed to involve exposure to radiation. Such work is conducted according to strict guidelines established by existing LANL standard operating procedures (SOPs). Under these SOPs, engineering and administrative controls are implemented to minimize worker and public exposure to radiation. Chapter 5 of volume I addresses projected worker doses at TA–55. Worker doses at the CMR Building are considerably lower than for TA–55.

Construction and relocation activities can expose workers to a variety of health risks and accidents, such as handling hazardous materials, being crushed beneath heavy equipment, back injuries, hidden electrical hazards, and working in a confined space. All work is performed according to SOPs for each type of task. In some cases, special work permits are required for work in secure areas or areas where radioactive or hazardous chemicals are present. Worker health is protected by the use of administrative controls and the wearing of personal protective equipment as needed and as specified in the special work permits.

II.3.8 Environmental Restoration and Waste Management

LANL has established procedures to be in compliance with all applicable laws and regulations for collecting, storing, treating, and disposing of waste. LANL's construction debris and nonhazardous solid waste are disposed of at the Los Alamos County Landfill on East Jemez Road. Typical radioactive wastes generated at TA–55 and the CMR Building include radioactive liquid waste, which is piped or trucked to the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA–50; solid LLW, which is managed and may be disposed of at TA–54, Area G; and TRU waste, which is packaged and stored at TA–54 pending ultimate disposal at the Waste Isolation Pilot Plant (WIPP). In addition, mixed waste (containing both a radioactive and a *Resource Conservation and Recovery Act* (RCRA)-regulated hazardous component) is generated at these facilities. TRU mixed waste is transported to TA–54, Area

G, and stored there pending disposal at the WIPP. Solid, low-level mixed waste (LLMW)[4] and liquid LLMW are transported to TA–54, Area G, and TA–54, Area L, respectively, and stored there until appropriate disposal options become available. These options may include shipment off site to a commercial or other DOE facility for treatment and disposal.

The Environmental Restoration (ER) Project was established to identify the extent of environmental contamination at LANL from past practices and the appropriate means of cleaning it up under RCRA (as described in chapter 2, section 2.1.2). No potential release sites are known to exist in the immediate vicinity or are expected to be disturbed by activities planned under any of the alternatives under consideration in this PSSC analysis.

II.4 ENVIRONMENTAL CONSEQUENCES

Routine air emissions, wastewater, and solid waste projections from operations and their associated impacts are discussed in volume I (chapters 4 and 5) and are associated with the locations of facilities under the "CMR Building Use" Alternative. Impacts from the operations located in TA–55 could potentially be less than the TA–3 location; but, because routine emissions are so low, changes in impacts between these locations are not identifiable. Some aspects of impacts do not have a location difference. For example, radioactive wastewater treatment and radioactive waste disposal have the same final disposal locations under each alternative.

Impacts from operational accidents could show a locational difference because the CMR Building is closer to more members of the public than TA–55–4. The accident analysis section of volume I considers that the location for the operations requiring the additional space is in the CMR Building. Impacts due to accidents from these same operations being located in the vicinity of TA–55 could potentially be less. It is noted however, that this change would manifest only in the overall consideration of risk due to accidents. Existing operations with radioactive materials in the CMR Building and TA–55 represent the same potential hazards as those proposed for the future. The frequency of the potential accident might increase with an increase in the amount of work, but the potential consequences of such accidents have been considered for both facilities in chapter 5.

Another distinction among the alternatives is the creation of new nuclear space. The "CMR Building Use" Alternative is the only alternative that does not create any new nuclear space. Operations in new nuclear space under the other alternatives are assumed to create contaminated space and the liability for eventual decontamination and decommissioning. This is a conservative assumption and presents a bounding analysis for the alternatives presented in this PSSC analysis.

Note that any impacts associated with the dedicated transportation corridor would not be incurred at the 20 pits per year production rate.

II.4.1 Utilize Existing Unused Space in the CMR Building Alternative

II.4.1.1 *Land Use*

The expansion and reconfiguration activities to enhance plutonium pit manufacturing under this alternative would involve existing structures in TA–55–4 and the CMR Building at TA–3. Land uses in TA–55 and the CMR Building would not change from the current classification of use for research and development.

4. LLMW contains LLW, plus chemicals regulated as hazardous under the RCRA (42 United States Code [U.S.C.] §6901).

Under this alternative, a dedicated transportation corridor would be constructed to transport plutonium pits and various plutonium samples and components among the facilities at TA–55, the analytical chemistry operations at the CMR Building, and the nonnuclear support facilities in TA–3 (Figures II.2.1.1–1 and II.2.1.1–2). The corridor would be approximately 1 mile (1.6 kilometer) in length and 75 feet (23 meters) wide. It would occupy an area of approximately 7 acres (2.8 hectares). Development of the corridor would require road construction activities, including the removal of vegetation and the filling of a road bed. The dedicated corridor would cross Diamond Drive at its intersection with Sigma Road. At this intersection, a gate would be constructed to exclude public access during the movement of SNM into or out of the CMR Building. Public access to Pajarito Road would be allowed to continue unimpeded.

II.4.1.2 *Noise*

Implementation of the alternative to use existing CMR Building space would result in noise production both within the CMR Building and TA–55–4, as well as exterior to both structures in the case of the roadway and related construction actions. Noise produced from the construction activities conducted within both buildings and outside of structures would not likely affect the public. Involved workers would be exposed to levels of noise under normal working conditions, ranging from about 45 decibels A-weighted frequency scale (dBA) to 55 dBA for decontamination activities (May 1978) all the way up to slightly in excess of about 95 dBA for construction activities involving the use of heavy machinery (such as chainsaws, bulldozers, rock drills, and concrete mixers). At a distance of 50 feet (15 meters) from the work site, however, these noise levels would range from about 75 dBA to 95 dBA (Magrab 1975).

Most of the noise produced by the decontamination, construction, and reconfiguration activities at the CMR Building, TA–55, and the transportation corridor would fall below the occupational exposure limit (OEL) of the U.S. Occupational Safety and Health Administration (OSHA). Noise intensity would quickly decrease with distance from the source (Lipscomb and Taylor 1978). Any noise produced above 80 dBA would require the operators and nearby workers to participate in a personnel hearing conservation program (LANL 1993). The majority of the remodeling and construction activities would take place inside existing buildings, such as the CMR Building. The damping effect of building walls and greater than a 50-foot (15-meter) distance would reduce the noise levels below 80 dBA and to normal background levels (Canter 1996). The public would not be subjected to noise above 80 dBA at the closest public areas of Diamond Drive and Pajarito Road.

II.4.1.3 *Air Quality*

Radiological Emissions

Many proposed reconfiguration and associated activities would take place in the CMR Building. The decontamination and improvements would be conducted primarily indoors. The existing space to be remodeled would be physically segregated from the rest of the CMR Building. Normal operations would continue unhindered in the rest of the CMR Building. Engineering controls and SOPs would be in place to prevent radiological contaminants from leaving the work area. The room air would be filtered by the existing high-efficiency particulate air (HEPA) filters in the ventilation system during the reconfiguration. The CMR Building stack air exhaust would continue to be sampled. CMR Building improvements, such as installing a new heating, ventilation, and air conditioning (HVAC)

system would be made only after appropriate decontamination procedures were followed.

Workers would wear appropriate protective gear and radiation dosimetry for performing decontamination. The applicable SOPs for decontaminating interior spaces and equipment would be followed. Radiological monitoring of the workers and work space would be conducted routinely to assure containment of any radioactive contamination. Under these administrative, engineering controlled, and closed systems, no radioactive material would be expected to be released into the environment. The radiological air quality outside the CMR Building would not be expected to vary from normal operations. The workers and public would not be affected, with respect to radiological air emissions, from these decontamination and improvement activities at the CMR Building because any contaminated air would be filtered before leaving the building. Any radioactive waste from the decontamination process would be transported to TA–54, Area G following the current SOPs, which call for closing public access to Diamond Drive and Pajarito Road during radioactive waste transport. The public would not be affected because of the road closure.

The construction of a new transportation corridor between TA–55 and the CMR Building at TA–3 would be along Mortandad Canyon and Pajarito Road. The stretch of land is comprised of developed areas and forest. No solid waste management units (SWMUs) or radioactively contaminated soils are present along the corridor route (LANL 1990). The ground leveling, road paving, and construction of guard stations and security fences would not contribute additional radioactive air emissions from the area. No facilities or operations exist along the corridor that would emit radioactive constituents to the atmosphere. The radiological air quality of this area would not be expected to change from the historical average for the area. No environmental impacts with respect to radiological air emissions would be expected for workers or the public from the construction of the transportation corridor.

Nonradiological Emissions

The air emissions of nitrogen oxides, carbon monoxide, sulfur oxides, and particulate matter from construction equipment exhaust only occur during the periods of active construction and are small compared to routine vehicle emissions associated with traffic in the area. Workers and the public would not be impacted by these emissions primarily because of the low volume of emissions and distance from the construction sites to the nearest public area.

II.4.1.4 *Ecological Resources*

Threatened or Endangered Species

Bald Eagle. LANL studies indicate that the bald eagle may occasionally forage in the areas proposed for the transportation corridor under the "CMR Building Use" Alternative. The bald eagle primarily occurs in habitats along permanent streams, rivers, and lakes. The areas proposed for use in the "CMR Building Use" Alternative do not contain permanent streams, rivers, or lakes. Therefore, these areas are considered only low-level use foraging habitat for the bald eagle. The loss of this small amount of low-level use foraging habitat would not have any appreciable effect on this species.

Peregrine Falcon. LANL studies indicate that the areas proposed for the transportation corridor constitute less than 0.05 percent of the total area available for potential foraging habitat for the peregrine falcon within the LANL boundary. Because this represents only a small portion of the total foraging habitat for the peregrine falcon, this would not have any appreciable effect on this species.

Mexican Spotted Owl. The area proposed for the transportation corridor has been analyzed using the preliminary model for Mexican spotted owl potential nesting and roosting

habitat. The results of the analysis indicated that fragmented patches of potential nesting/ roosting habitat exist within 0.2 mile (322 meters) of the proposed corridor. This area is already considerably disturbed by noise and light from existing roads and buildings near the site. Given the fragmented nature of this potential habitat and the current level of disturbance, the "CMR Building Use" Alternative should not contribute additional disturbances to the potential habitats. The preliminary model also indicated that the corridor includes Mexican spotted owl foraging habitat. It is estimated that the loss of foraging habitat to the owl would represent roughly 0.06 percent of the total available foraging habitat within the LANL boundary. The loss of this foraging habitat would not have any appreciable effect on this species.

Flora and Fauna

The upgrades for the "CMR Building Use" Alternative are primarily indoor upgrades to existing facilities, with the exception of the transportation corridor. The transportation corridor could contain a security fence that would alter approximately 1 mile (1.6 kilometers) of large mammal and predator movement along Pajarito Road in the vicinity of TA–59 and TA–48, but would not restrict game animal movement within the immediate vicinity. The removal of about 7 acres (2.8 hectares) of overstory and understory vegetation within the proposed road corridor would displace small mammals and birds.

II.4.1.5 *Cultural Resources*

No adverse effects to cultural resources are expected to occur under this alternative. The NRHP-eligible site along the transportation corridor would be avoided, if possible. If the site cannot be avoided, appropriate mitigation measures, including data recovery, would be designed and implemented in consultation with the New Mexico State Historic Preservation Office(r) (SHPO) (LANL 1996b).

II.4.1.6 *Traffic*

This alternative is expected to increase the volume of traffic at the CMR Building on Diamond Drive and at TA–55 on Pajarito Road during the construction of facilities and operations that support enhanced pit manufacturing at LANL. Vehicles required to transport construction workers' materials would contribute to an increase in local traffic. This additional traffic load is anticipated to occur primarily within the first 3 years of the project. Pajarito Road currently averages about 8,000 vehicle trips per day and Diamond Drive about 13,000 vehicle trips per day. Assuming an additional 600 vehicle trips per day due to construction and a fairly even distribution to both roads, increases are projected to be about 2 to 5 percent. Effects of this increase would not be significant. Construction activities at TA–55 would not require the permanent or extended closure of any public roads or rerouting of traffic. Temporary closures could be required to accommodate certain construction activities.

Construction activities could temporarily decrease the number of available employee parking spaces and interfere with the existing employee parking situation in TA–3 and TA–55. Construction activities could adversely affect the traffic flow around TA–55 primarily at the start and end of each work day. At a minimum, the potential shortage of parking spaces would result in delays for both site workers and construction workers and could result in an increase in the number of vehicular accidents. Following completion of construction activities, sufficient parking would be available.

During peak operations, up to an additional 140 employees are anticipated to be on the site. Assuming 280 vehicle trips as a result, an increase of about 1 to 2 percent in traffic is

projected for Diamond Drive and Pajarito Road. With the related construction traffic no longer present, the effect of this traffic increase would not be significant.

The construction and operation of a dedicated transportation corridor between TA–55 and TA–3 is proposed as part of this alternative. It would restrict vehicular access to TA–48, the Sigma Complex in TA–3, and public use of Diamond Drive because it would cross the access roads into each of these TAs and Diamond Drive. The construction and operation of railroad-type crossing gates at the intersection of Diamond Drive and Sigma Road and at the entrance of TA–48 off of Pajarito Road would restrict traffic movements during construction and would stop traffic when dedicated vehicles are using the corridor. Based on an estimated peak rate of 500 SNM shipments each year using the corridor and 220 working days per year, the number of road closures would average less than three per working day and last less than 15 minutes per closure. These closures would be coordinated to avoid peak traffic hours. No members of the public would be allowed access to the dedicated transportation corridor.

The use and operation of the transportation corridor would reduce the number of LANL vehicles that carry SNM on publicly accessible Pajarito Road and Diamond Drive by approximately 500 shipments per year or about three vehicles per work day. This decrease in traffic volume would result in a reduction in the potential for vehicular accidents involving SNM. However, radioactive materials from other LANL operations would continue to use publicly accessible roads. The dedicated transportation corridor also would provide for incremental improvements in the level of security and efficiency in transporting SNM between TA–55 and the CMR Building.

II.4.1.7 *Human Health*

Human health impacts may potentially result from decontamination of equipment, relocation of equipment and materials, and the construction and interior modifications that would be performed over the transition period. Radiological impacts may result from exposure to plutonium, uranium, tritium, and a variety of actinides when these materials are moved to new locations and as workers reconfigure radiological control areas.

Workers involved in construction of a new guard gate and the construction of a safe and secure transportation corridor would not be exposed to radioactivity at levels above background. Doses to construction workers are expected to be no higher than doses to permanent LANL workers. LANL worker doses are displayed in Table II.4.1.7–1 and discussed below.

Workers involved in decontamination and building modification activities at TA–55 and the CMR Building would be working in radiological control areas and in areas adjacent to ongoing operations, and therefore, would have a greater exposure to radioactivity than the workers mentioned in the preceding paragraph. Approximately 364,000 labor hours would be needed to accomplish the decontamination and reconfiguration activities within TA–55–4. In order to estimate potential health effects, the external dose to construction workers at TA–55 is assumed to be approximately the same as that received by radiological control technicians and by Johnson Controls, Inc. (JCI), workers performing routine maintenance and equipment installations at TA–55–4. As a group, these technicians and workers received about 0.12 millirem per hour. Therefore, the collective dose to workers performing the decontamination and building modifications is estimated to be about 45 person-rem. Using a risk conversion factor of 4×10^{-4} excess latent cancer fatality (LCF) per person-rem

TABLE II.4.1.7–1.—*Radiological Doses and Excess Latent Cancer Fatalities for Construction Activities Under the "CMR Building Use" Alternative*

WORKERS	HISTORICAL COLLECTIVE DOSE RATE (rem/hr)	EXPOSURE LENGTH (person-hours)	COLLECTIVE DOSE (person-rem)	EXCESS LATENT CANCER FATALITIES
Construction Worker at TA–55	0.00012[a]	364,000	43.68	0.018
Construction Worker at CMR Building	0.0000039[b]	305,000	1.19	0.00048

[a] Stokes 1997
[b] PC 1996

(International Commission on Radiological Protection [ICRP] 1991), this means that 1.8×10^{-2} excess LCF would be expected over the life of the "CMR Building Use" Alternative. In other words, it is unlikely that the decontamination and building modifications would result in any excess cancer fatalities among the construction worker population.

Approximately 305,000 labor hours would be needed to accomplish the decontamination and reconfiguration activities within the CMR Building. The external dose to construction workers at the CMR Building is assumed to be approximately the same as that received by radiological control technicians and by JCI workers performing routine maintenance and equipment installations at the CMR Building. Based on a review of their radiation exposures, these technicians and workers received on average about 0.0039 millirem per hour. Therefore, the collective dose to workers performing the decontamination and building modifications is estimated to be 1.2 person-rem. Using a risk conversion factor of 4×10^{-4} excess LCF per person-rem, this means that 4.8×10^{-4} excess LCF would be expected over the life of the "CMR Building Use" Alternative. In other words, it is highly unlikely that the decontamination and building modifications would result in any excess cancer fatalities among the worker population.

Worker exposures to radiation and radioactive materials in radiological control areas would be controlled under established procedures that require doses to be kept as low as reasonably achievable. Any potential hazards would be evaluated as part of the radiation worker and occupational safety programs at LANL. Nonroutine construction activities may require special work permits with worker protection measures given for specific locations and activities. Under the "CMR Building Use" Alternative, the public would not receive any additional radiological dose beyond the background level. Therefore, no adverse human health effects to the public are anticipated.

II.4.1.8 *Waste Management*

The "CMR Building Use" Alternative would produce waste from the construction of a new dedicated transportation corridor, interior building modifications, and the replacement of old equipment used to support pit manufacturing operations in TA–55–4 and the CMR Building. The types of waste that could be generated from these activities would include nonhazardous solid waste from construction activities, RCRA waste, *Toxic Substances Control Act* (TSCA) (15 U.S.C. §2601) polychlorinated biphenyl (PCB) waste, LLW, and LLMW from modifications to manufacturing operations. Sanitary wastes also

would be generated from the construction activities. Table II.4.1.8–1 shows the estimated volumes of radioactive waste that would be generated from the construction activities. As shown in Table II.4.1.8–1, the total volume of radioactive waste that would be generated by construction and building modifications would be 2,685 cubic yards (77 cubic meters) over the 3 to 4 years of construction activity.

Nonhazardous wastes would be disposed of in the Los Alamos County Landfill, which has adequate capacity to handle the projected amount of waste. RCRA and PCB wastes would be sent off site for treatment and disposal at a commercial facility. Commercial treatment is readily available and currently used to treat most LANL RCRA wastes. LLW would be taken to TA–54, Area G or to a permitted off-site facility for disposal. LLMW would be stored at Area G pending the selection of an acceptable treatment and disposal option. Because of the relatively small amount of LLW and LLMW that would be produced, the "CMR Building Use" Alternative is not expected to adversely affect the disposal or storage capacity at Area G. Sanitary wastes could either be collected by subcontractors during construction operations or be put into the LANL sanitary sewer system. The anticipated volume of sanitary wastes would not be expected to have any effect on the existing capacity of the sanitary sewer system.

II.4.2 Brownfield Plutonium Facility Alternative

II.4.2.1 *Land Use*

The proposed activities would be conducted within areas that are already heavily disturbed for industrial use connected to research and development purposes. The new structure proposed under this alternative would be built within the fenced area of TA–55 that has already undergone heavy disturbance and clearing for security reasons related to TA–55–4. Implementation of the Brownfield Alternative would not result in a change to the land use classification currently assigned to TA–55.

As discussed in section II.4.1.1, under this alternative, a dedicated transportation corridor would be constructed to transport plutonium pits and various plutonium samples and components among the facilities at TA–55, the analytical chemistry operations at the CMR Building, and the nonnuclear support facilities in TA–3.

II.4.2.2 *Noise*

Implementation of the Brownfield Alternative would result in actions that create noise, both within TA–55–4 and outside the building. Noise produced from the construction activities conducted within TA–55–4 and outside the

TABLE II.4.1.8–1.—*Total Radioactive Waste Generation from Construction Under the "CMR Building Use" Alternative*[a]

WASTE TYPE	TA–55, PF–4 (yd^3/m^3)	CMR BUILDING (yd^3/m^3)	TA–55 PLUS CMR (yd^3/m^3)
TRU	300/229	258/197	558/426
TRU Mixed	—	377/288	377/288
LLW	300/229	1,410/1,077	1,710/1,306
LLMW	—	40/31	40/31
Total Waste	600/458	2,085/1,593	2,685/2,051

PF = Plutonium Facility, yd = yards, m = meters

[a] Time period is the entire period of construction, 3 to 4 years.

structure would not likely affect the public. Involved workers would be exposed to levels of noise under normal working conditions, ranging from about 45 dBA to 55 dBA for decontamination activities (May 1978), all the way up to slightly in excess of about 95 dBA for construction activities involving the use of heavy machinery (such as chainsaws, bulldozers, rock drills, and concrete mixers). At a distance of 50 feet (15 meters) from the work site, however, these noise levels would range from about 75 dBA to 95 dBA (Magrab 1975).

Most of the noise produced by the construction activities at TA–55 would fall below dBA OEL of the OSHA. The high-level noise generated would be localized at the work sites. Any noise produced above 80 dBA would require the operators and nearby workers to participate in a personnel hearing conservation program as per LANL administrative requirements. The public would not be subjected to noise above 80 dBA at the closest public areas of Diamond Drive and Pajarito Road.

Under this alternative, TA–55 workers not involved in the construction activity would not be subjected to excessive noise produced by construction activities because they are physically removed from the construction site. The public would not be affected by the construction- and improvement-generated noise, also due to the distance from the construction activities to the public.

II.4.2.3 *Air Quality*

Radiological Emissions

The construction of a new building at TA–55 would take place within the current boundary for the TA. The vacant ground within the TA–55 secured area has been previously disturbed but is not contaminated. The construction of a new building would not contribute additional radioactive air emissions above normal operations for TA–55. The radiological air quality would not be expected to change from the historical average for the area. Workers and the public at or along Pajarito Road would not be impacted by radiological air emissions because no such emissions would be generated by the construction.

Nonradiological Emissions

The air emissions of nitrogen oxides, carbon monoxide, sulfur oxides, and particulate matter from construction equipment exhaust only occur during the periods of active construction and are small compared to routine vehicle emissions associated with traffic in the area. Impacts to workers would be minimal because the emissions are of relatively low volume. The public would not be impacted for this reason as well because of the distance from the construction site to the public.

II.4.2.4 *Ecological Resources*

Threatened or Endangered Species

The construction of a Brownfield Plutonium Facility in a previously disturbed area near the TA–55 Plutonium Facility would result in the loss of less than 0.01 percent of the total LANL foraging habitat for the bald eagle, peregrine falcon, and Mexican spotted owl. Less than 0.05 percent of these species habitats would be affected by the proposed transportation corridor. This would not result in an appreciable effect on these species.

II.4.2.5 *Cultural Resources*

No adverse effects to cultural resources from construction of a new stand-alone facility within the current security fence at TA–55 are expected to occur under this alternative. If the facility were to be sited elsewhere at TA–55, cultural resources surveys would not likely be required to determine the effect of construction because of the disturbed nature of TA–55. As discussed in section II.4.1.5, the NRHP-eligible site

located along the transportation corridor would not be disturbed in order to avoid having an impact on the site.

II.4.2.6 *Traffic*

This alternative is expected to increase the volume of traffic at nearby TA–55 during the construction of facilities and operations that support pit manufacturing at LANL. Vehicles required to transport construction materials and workers would contribute to an increase in local traffic. This additional traffic load is anticipated to occur primarily within the first 3 years of the anticipated 4-year project. Based on an average daily traffic rate of approximately 8,000 vehicle trips per day on Pajarito Road and assuming an additional 600 construction vehicle trips per day, the increase in vehicle traffic from construction activities is estimated to be no more than about 8 percent above routine traffic volumes. Effects of this increase would not be significant. Construction activities at TA–55 would not require the permanent or extended closure of any public roads or rerouting of traffic. Temporary closures of short duration could be required to accommodate certain construction activities.

Construction activities could decrease the number of available employee parking spaces and interfere with the existing employee parking situation in the area. The construction of new facilities near TA–55 could result in additional temporary loss of parking spaces if construction equipment and trailers are located in existing parking areas. Construction activities could adversely affect the traffic flow around TA–55, primarily at the start and end of each work day. At a minimum, the potential shortage of parking spaces would result in delays for both site workers and construction workers and could result in an increase in the number of vehicular accidents. Following completion of construction activities, sufficient parking would be provided for all workers at TA–55. Impacts from the construction of the dedicated transportation corridor would be the same under this alternative as under the Preferred Alternative.

During peak operations, up to an additional 140 employees are anticipated to be on the site. Assuming 280 vehicle trips per day as a result, an increase of about 3 percent in traffic is projected for Pajarito Road. With the related construction traffic no longer present, the effect of this traffic increase would not be significant.

II.4.2.7 *Human Health*

Human health impacts may potentially result from the construction of a Brownfield Plutonium Facility. Radiological impacts may result from exposure to plutonium, uranium, tritium, and a variety of actinides when these materials are moved to the new facility location. Workers involved in construction activities at TA–55 would not be exposed to radioactivity at levels above background. Workers involved in building modification activities at TA–55 would be working in radiological control areas and in areas adjacent to ongoing operations. Worker exposures to radiation and radioactive materials in radiological control areas would be controlled under established procedures that require doses to be kept as low as reasonably achievable. Any potential hazards would be evaluated as part of the radiation worker and occupational safety programs at LANL. Nonroutine construction activities may require special work permits with worker protection measures given for specific locations and activities. Doses to construction workers would be expected to be equal to or less than those received by workers under the "CMR Building Use" Alternative (Table II.4.1.7–1). Under this alternative, the public would not receive any additional radiological dose beyond the background level. Therefore, no adverse human health effects to the public are anticipated.

II.4.2.8 *Waste Management*

This alternative would produce waste from the construction of a new building at TA–55 that would include 15,300 square feet (1,425 square meters) of designated nuclear material laboratory space. The types of waste that could be generated from this activity would include nonhazardous solid waste from construction activities and possibly RCRA waste. Sanitary wastes also would be generated under this alternative. Small amounts of LLW could be generated in the process of relocating equipment to the new facility (this waste would have to be treated and disposed). The total volume of RCRA wastes also would be minimal. Nonhazardous wastes would be disposed of in the Los Alamos County Landfill, which has adequate capacity to handle the projected amount of waste. RCRA wastes would be sent off site for treatment and disposal at a commercial facility. Commercial treatment is readily available and currently used to treat most LANL RCRA wastes. Sanitary wastes could either be collected by subcontractors during construction operations or be put into the LANL sanitary sewer system. The anticipated volume of sanitary wastes would not be expected to have any effect on the existing capacity of the sanitary sewer system. This alternative also would create new nuclear space at LANL, which would imply a liability for future cleanup (and related waste generation).

II.4.3 Add-On to TA–55–4 Alternative

II.4.3.1 *Land Use*

The proposed activities would be conducted within areas that are already used for research and development purposes. Implementation of this alternative would not change the land use designations of TA–55 or adjacent areas.

As discussed in section II.4.1.1, under this alternative, a dedicated transportation corridor would be constructed to transport plutonium pits and various plutonium samples and components among the facilities at TA–55, the analytical chemistry operations at the CMR Building, and the nonnuclear support facilities in TA–3.

II.4.3.2 *Noise*

Implementation of the Add-on to TA–55–4 Alternative would result in actions that create noise, both within TA–55–4 and outside the building. Noise produced from the construction activities conducted within the TA–55–4 building and outside the structure would not likely affect the public. Involved workers would be exposed to levels of noise under normal working conditions ranging from about 45 dBA to 55 dBA for decontamination activities (May 1978) all the way up to slightly in excess of about 95 dBA for construction activities involving heavy machinery (such as chainsaws, bulldozers, rock drills, and concrete mixers). At a distance of 50 feet (15 meters) from the work site, however, these noise levels would range from about 75 dBA to 95 dBA (Magrab 1975).

Most of the noise produced by the construction activities at TA–55 would be below the OEL of OSHA. The noise generated would be confined to TA–55 and to the new transportation corridor. The high-level noise generated would be localized at the work sites. Any noise produced above 80 dBA would require the operators to participate in a personnel hearing conservation program as per LANL administrative requirements. The public at Pajarito Road would not be affected by the noise levels because the noise would fall below 80 dBA after 50 feet (15 meters) from the work site.

II.4.3.3 *Air Quality*

Radiological Emissions

The construction of a new add-on facility at TA–55–4 would take place within the current security boundary of the area. The vacant ground within the TA–55 secured area has been previously disturbed, but is not contaminated. No SWMUs or radioactively contaminated soils are present within the vacant area (LANL 1990). The construction, erection, and finishing of the add-on facility would not contribute additional radioactive air emissions above normal operations for TA–55. The radiological air quality would not be expected to change from the historical average for the area. Workers and the public would not be affected by the building construction.

Nonradiological Emissions

The air emissions of nitrogen oxides, carbon monoxide, sulfur oxides, and particulate matter from construction equipment exhaust only occur during the periods of active construction and are small compared to routine vehicle emissions associated with traffic in the area. Workers and the public would not be impacted by these emissions primarily because of the low volume of emissions and distance from the construction sites to the nearest public area.

II.4.3.4 *Ecological Resources*

Threatened or Endangered Species

Under this alternative, there would be negligible (less than 0.06 percent) loss of bald eagle, peregrine falcon, and Mexican spotted owl foraging habitat. This would not result in any appreciable effect on these species.

II.4.3.5 *Cultural Resources*

No adverse effects to cultural resources from construction of an addition to TA–55–4 within the current security fence are expected to occur under this alternative. As discussed in section II.4.1.5, the NRHP-eligible site along the transportation corridor would be avoided during construction of the corridor.

II.4.3.6 *Traffic*

Traffic patterns and volumes required to support new construction or the reconfiguration of existing facilities under this alternative would be increased at TA–55. Based on an average daily traffic rate of approximately 8,000 ADTs on Pajarito Road and assuming an additional 600 construction vehicle trips per day, the increase in vehicle traffic from construction activities is estimated to be no more than about 8 percent above routine traffic volumes. Effects of this increase would not be significant. Construction activities at TA–55 would not require the permanent or extended closure of any public roads or rerouting of traffic. Temporary closures of short duration could be required to accommodate certain construction activities.

Construction activities could decrease the number of available employee parking spaces and interfere with the existing employee parking situation in the area. The construction of new facilities at TA–55 could result in additional temporary loss of parking spaces if construction equipment and trailers are located in existing parking areas. Construction activities could adversely affect the traffic flow around TA–55 primarily at the start and end of each work day. At a minimum, the potential shortage of parking spaces would result in delays for both site workers and construction workers and could result in an increase in the number of vehicular accidents. Following completion of construction activities, sufficient parking would be provided for all workers at TA–55. Impacts from the construction of the dedicated transportation corridor would be the same under this alternative as under the Preferred Alternative.

During peak operations, up to an additional 140 employees are anticipated to be on the site. Assuming 280 vehicle trips as a result, an increase of about 3 percent in traffic is projected for Pajarito Road. With the related construction traffic no longer present, the effect of this traffic increase would not be significant.

II.4.3.7 *Human Health*

Workers involved in the construction of the add-on facility at TA–55–4 could be exposed to plutonium, uranium, tritium, and a variety of actinides when these materials are moved to new locations and as workers reconfigure existing radiological control areas. Some reconfiguration and remodeling work would be performed inside TA–55–4. Workers performing these activities are expected to receive about the same doses as workers performing the "CMR Building Use" Alternative. Doses to construction workers would be expected to be equal to or less than those received by workers under the "CMR Building Use" Alternative (Table II.4.1.7–1). Under this alternative, the public would not receive any additional radiological dose beyond the background level. Therefore, no adverse human health effects are anticipated under this alternative.

II.4.3.8 *Waste Management*

This alternative would produce waste from the construction of an add-on building at TA–55 that would include approximately 15,300 square feet (1,425 square meters) of laboratory space. The types of waste that could be generated from these activities would include nonhazardous solid waste from construction activities and possibly RCRA waste. Sanitary wastes would also be generated under this alternative. Some LLW could be generated in the process of relocating equipment to the new space. The total volume of nonhazardous waste and the amount of RCRA waste would be minimal. Nonhazardous wastes would be disposed of in the Los Alamos County Landfill, which has adequate capacity to handle the projected amount of waste. RCRA wastes would be sent off site for treatment and disposal at a commercial facility. Commercial treatment is readily available and currently used to treat most LANL RCRA wastes. Sanitary wastes could either be collected by subcontractors during construction operations or be put into the LANL sanitary sewer system. The anticipated volume of sanitary wastes would not be expected to have any effect on the existing capacity of the sanitary sewer system. This alternative also would create new nuclear space at LANL, which would imply a liability for future cleanup (and related waste generation).

II.4.4 Comparison of Alternatives

Table II.4.4–1 shows a summary of the potential impacts of the alternatives.

There are few differences in the construction impacts across the PSSC alternatives. Because all of the construction (except for the proposed transportation corridor) would occur within previously disturbed areas and would result in land use consistent with the existing use of land in these areas, no land use, cultural resource, or ecological resource impacts would be anticipated unless the proposed transportation corridor were constructed. Construction of this corridor under any of the alternatives would have an equal impact under any of the alternatives; but the land use, ecological resources, and cultural resources impacts of constructing the corridor would be minimal. Construction noise and construction traffic impacts would be minimal under any of the alternatives with or without the transportation corridor. If the corridor is constructed, it would mitigate operational impacts by substantially reducing the operational transport on public roads under the Expanded Operations Alternative. (This is true under all of the PSSC alternatives, but this mitigation is more important for the "CMR Building Use"

TABLE II.4.4–1.—*Summary of Potential Impacts of the Alternatives*

FACTOR, MEASURE	"CMR BUILDING USE" ALTERNATIVE[a]	BROWNFIELD ALTERNATIVE	ADD-ON TO TA–55–4 ALTERNATIVE
Land Use	No change in land use designations of research and development for TA–55 and TA–3. Development of the transportation corridor would change disturbed but undeveloped land to industrial land use.	No change in land use designations of research and development for TA–55 and TA–3. Development of the transportation corridor would change disturbed but undeveloped land to industrial land use.	No change in land use designations of research and development for TA–55 and TA–3. Development of the transportation corridor would change disturbed but undeveloped land to industrial land use.
Noise	Increased noise levels temporarily to 80 dBA and above for TA–3 and TA–55 construction workers. Noise levels not likely to affect the public.	Increased noise levels temporarily to 80 dBA and above for TA–55 construction workers. Noise levels not likely to affect the public.	Increased noise levels temporarily to 80 dBA and above for TA–55 construction workers. Noise levels not likely to affect the public.
Air Quality	Minor radiological emissions during construction phase. Nonradiological emissions expected during construction period.	No radiological emissions during construction phase. Nonradiological emissions expected during construction period.	No radiological emissions during construction phase. Nonradiological emissions expected during construction period.
Ecological Resources	Loss of < 0.1 percent of foraging habitat for individual threatened or endangered species due to the construction of the optional dedicated road; no appreciable effect to individual threatened or endangered (T&E) species.	Loss of < 0.05 percent of foraging habitat for individual threatened or endangered species due to the construction of the optional dedicated road; no appreciable effect to individual T&E species.	Loss of < 0.05 percent of foraging habitat for individual threatened or endangered species due to the construction of the optional dedicated road; no appreciable effect to individual T&E species.
Cultural Resources	No disturbance of archeological sites.	No disturbance of archeological sites.	No disturbance of archeological sites.
Traffic	Vehicular traffic on Pajarito Road, Diamond Drive, and West Jemez Road would increase by 5 percent or less during construction phase. Transport of SNM would increase.	Vehicular traffic on Pajarito Road would increase by about 8 percent during construction phase. Transport of SNM would increase.	Vehicular traffic on Pajarito Road would increase by about 8 percent during construction phase. Transport of SNM would increase.
Human Health	Potential physical and construction related hazards. Minimal worker radiation hazard (0.018 excess LCFs); no radiation risk to the public.	Potential physical and construction related hazards. Minimal worker radiation hazard (0.018 excess LCFs); no radiation risk to the public.	Potential physical and construction related hazards. Minimal worker radiation hazard (0.018 excess LCFs); no radiation risk to the public.

TABLE II.4.4–1.—*Summary of Potential Impacts of the Alternatives*-Continued

FACTOR, MEASURE	"CMR BUILDING USE" ALTERNATIVE[a]	BROWNFIELD ALTERNATIVE	ADD-ON TO TA–55–4 ALTERNATIVE
Waste Management	LLW disposed of at LANL disposal site or off site. Nonhazardous wastes disposed of at county landfill. RCRA and PCB waste disposed of at off-site commercial facility.	Nonhazardous wastes disposed of at county landfill. Any RCRA waste would be disposed of at off-site commercial facility. Creates additional nuclear space, which would constitute a future cleanup liability.	Nonhazardous wastes disposed of at county landfill. Any RCRA waste would be disposed of at off-site commercial facility. Creates additional nuclear space, which would constitute a future cleanup liability.
Accidents	Unlikely to occur with worker and public dose; accident would result in off-site maximally exposed individual (MEI) dose of about 8 rem (resulting in 0.005 excess LCFs). The worker involved would inhale plutonium; this would not result in an acute worker fatality, but would result in an incremental risk of death from cancer over the worker's lifetime. (Risk is dependent on several factors and cannot be quantified.)	Unlikely to occur with worker and public dose; accident would result in off-site MEI dose of about 8 rem (resulting in 0.005 excess LCFs). The worker involved would inhale plutonium; this would not result in an acute worker fatality, but would result in an incremental risk of death from cancer over the worker's lifetime. (Risk is dependent on several factors and cannot be quantified.)	Unlikely to occur with worker and public dose; accident would result in off-site MEI dose of about 8 rem (resulting in 0.005 excess LCFs). The worker involved would inhale plutonium; this would not result in an acute worker fatality, but would result in an incremental risk of death from cancer over the worker's lifetime. (Risk is dependent on several factors and cannot be quantified.)

[a] Utilize existing unused space in the CMR Building.

Alternative because it would result in the greatest operational transport between TA–55 and the CMR Building out of the three PSSC alternatives.)

The few differences in construction impacts across the PSSC alternatives are attributable to the difference between construction within an existing nuclear facility and construction to create additional nuclear facility space. Air emissions for construction within existing nuclear space (as proposed under the "CMR Building Use" Alternative) would include radiological emissions because of the radioactive material contamination (primarily in equipment) in the areas involved in the construction, in addition to the nonradioactive emissions from construction equipment exhaust. The creation of new nuclear facility space would not result in radioactive air emissions and would have comparable nonradioactive emissions from construction equipment exhaust. Similarly, construction under the "CMR Building Use" Alternative would result in construction workers receiving radiation doses due to the ongoing nuclear operations in the areas of the facility that are not involved in the construction activities, and the construction waste generated from within the existing facilities would include some LLW and TRU waste for disposal. These impacts would not be expected under the Brownfield or Add-on to TA–55–4 Alternatives (except for the relatively small exposures and waste quantities generated in moving existing contaminated equipment into the new facilities). Finally, the "CMR Building Use" Alternative utilizes existing nuclear space, which does not incur a new liability for cleanup of contaminated space. (The areas used under this alternative are presumed to be contaminated from past activities in these areas.) The Brownfield or Add-on to TA–55–4 Alternatives would result in the construction of about 15,000 square feet (about 1,400 square meters) of new nuclear space, which implies a liability for future cleanup and related radioactive waste generation.

II.5 POTENTIAL ACCIDENT SCENARIO

One additional accident with significant consequences was analyzed for the "CMR Building Use" Alternative. This accident involved construction activities only. Operational and transportation accidents are addressed in chapter 5 of volume I. The construction accident scenario was developed to evaluate potential impacts on the workers and the public in and around TA–55 and the dedicated transportation corridor development areas. The details of the accident analysis are described in the following text and, in more detail, in appendix II.B.

II.5.1 Construction Accident

This hypothetical accident scenario was developed for the TA–55 Safety Analysis Report (LANL 1996a) to evaluate the impact to individuals at a construction site. Construction workers and their management would be located in and around the TA–55 area where building modifications would be made in support of the enhanced pit manufacturing operations. Heavy equipment would be located and operated on site. During normal conditions, laboring construction workers and operating machinery would be present at the site.

The postulated accident would occur during the reconfiguration of a building. This scenario is based on a postulated accident during modifications or upgrades of structures, systems, or components at TA–55–4. The scenario is initiated by the accidental drop of a plutonium dioxide storage container during movement to or from storage in order to perform a building modification or upgrade activity. The container is assumed to rupture upon impact with the floor, resulting in an airborne

release of particulate matter. A worker is exposed. The suspended particulate matter is processed through the ventilation system and released through the north exhaust stack, assuming that the ventilation system and HEPA filtration are not operable. (See appendix II.B for a discussion of this accident assuming these systems remain operable.)

An accident of this type would have an occurrence frequency that makes it an unlikely event (appendix II.B) under any of the SWEIS alternatives. "Unlikely" is defined as a frequency between 1 in 100 years and 1 in 10,000 years or at least once in 10,000 similar facilities operated for 1 year. Under this postulated accident, the worker who dropped the container would be exposed to a significant inhalation dose, but no acute worker fatality occurs. The risk to this worker is highly dependent on the type of protective measures taken at the time of the accident, the speed with which these measures are taken, and the effectiveness of medical treatment after exposure; as such, the risk to this worker cannot be predicted quantitatively or reliably. The dose to the off-site maximally exposed individual (MEI) is 8.1 rem, which corresponds to a risk of about 0.005 excess LCFs.

APPENDIX II.A
CAPABILITIES AND FLOORSPACE REQUIREMENTS UNDER THE EXPANDED OPERATIONS ALTERNATIVE

This appendix provides more information about the TA–55–4 nuclear materials capabilities and their floorspace requirements to supplement the discussion in section II.1.4.

II.A.1 Manufacturing of Plutonium Components

Existing capabilities for pit manufacturing at LANL have developed and maintained the technology base required to build research and development pits and pits that can replace individual units removed from the stockpile for surveillance and other purposes. Current floorspace allocation for this capability, which includes general pit manufacture, disassembly, and assembly is 11,400 square feet (1,060 square meters). Based on the SSM PEIS (DOE 1996) and its ROD (61 FR 68014), DOE has chosen to meet its future pit production needs by expanding this existing manufacturing capability. With this expansion, DOE would be able to produce up to 50 pits per year (single shift) and 80 pits per year with multiple shifts. Floorspace allocation for this expanded capability is 15,300 square feet (1,425 square meters) of contiguous space in TA–55–4 and 3,200 square feet (298 square meters) for the additional space addressed in this PSSC analysis. This 3,200 square feet (298 square meters) would be used primarily to test new technologies outside of the production lines and to prepare components for testing.

II.A.2 Disassembly and Surveillance of Weapons Components

LANL conducts destructive and nondestructive evaluations on pits to evaluate stockpile reliability and staging safety. These pits also are disassembled, and the plutonium contained therein is converted to oxide for storage or other uses. Each destructive evaluation, depending on pit type, includes the following operations: leak testing, weighing, dimensional inspection, dye penetrant inspection, radiography, metallography, chemical analysis, and microtensile testing. Most of these disassembly and surveillance activities are performed at TA–55–4 and share equipment with pit manufacturing operations. Approximately 20 pits are examined each year. The disassembly capacity is greater than this, and is at times used to disassemble additional pits. The pit material remaining after the evaluation is stored in the TA–55–4 vault. These functions are candidates for transfer from TA–55–4 to the additional space addressed in this PSSC analysis. If transferred, these activities would no longer be able to use the pit manufacturing equipment at TA–55–4 (thus, additional equipment and floorspace would be required).

Under the Expanded Operations Alternative, LANL would disassemble and analyze 65 pits per year. Current floorspace allocation for the disassembly and surveillance of weapons components is 2,300 square feet (214 square meters). This would need to increase to 4,500 square feet (419 square meters) to support the levels of operations discussed in the Expanded Operations Alternative, including replication of the equipment in TA–55–4 that is necessary to support expanded operations.

II.A.3 Plutonium-238 Research, Development, and Applications

Plutonium-238 activities include research on radioisotopic thermoelectric generator design, fabrication, and testing, as well as plutonium

oxide fuel recycle and processing, plutonium oxide heat-source recovery, disposition, and stabilization operations. The plutonium oxide removed from excess and retired radioisotopic thermoelectric generators and other heat sources received from Pantex, Sandia National Laboratories, and other facilities is processed at LANL. LANL would maintain the capability to conduct research, fabrication, and processing activities with plutonium-238 from both defense-related and nondefense-related heat sources. Because these are potentially high-dose operations, special glovebox lines are required. This function is not a candidate for transfer from TA–55–4 to the additional space because of the unique storage, handling, and processing requirements associated with this material, which could not be easily replicated. In addition, any space vacated by these activities in TA–55–4 would require equipment removal and decontamination prior to introducing other activities that could be compromised if contaminated with plutonium-238. Current floorspace allocation for the plutonium-238 processing activities is 9,000 square feet (837 square meters). This floorspace allocation would not change under the level of operations in the Expanded Operations Alternative.

II.A.4 Actinide Materials Science and Processing Research and Development

II.A.4.1 *Actinide Research and Development—General*

As part of the effort to better understand the material science aspects of nuclear materials and weapons aging and performance, various materials research activities are conducted at TA–55–4. Experiments also are conducted to evaluate the scientific underpinnings of stockpile activities, such as improved welding and bonding processes, development of special mold coatings, and fire-resistance tests. Some activities are related to dynamic experiments conducted by LANL and involve experiments at other sites as well as TA–55–4. Most of the actinide research and development involving aqueous materials would remain at TA–55–4. However, activities such as solid state synthesis and associated analyses (including both surface and bulk evaluations) could be transferred. Current floorspace allocation in TA–55–4 for general actinide research and development programs is 3,400 square feet (316 square meters) and would not change under the level of operations in the Expanded Operations Alternative in TA–55–4. However, some additional space would be needed. It is estimated that the space allocation for these actinide research and development activities would be 1,000 square feet (93 square meters) of contiguous space in addition to the 3,400 square feet (316 square meters) of space in TA–55–4.

II.A.4.2 *Actinide Research and Development—Environmental Management*

LANL provides continuing technical support to DOE's Office of Environmental Management (EM) regarding clean-up activities around the DOE complex, including process development for stabilization of residues. The efforts for EM are in three general areas, including: (1) issues associated with stabilization, chemical processing, storage shelf-life, surveillance, and skid-mounted processing techniques; (2) technology transfer to other sites or organizations involving mock-ups and operator training; and (3) stabilizing minor quantities of specialty items from other DOE sites. In effect, this effort builds on the capabilities of other TA–55–4 functions and demonstrates their application in these three areas. Because of its integral ties to other TA–55–4 functions, this is not a candidate to transfer to the additional space. Current floorspace allocations for EM technology support programs are 800 square feet (74 square meters).

II.A.4.3 *Special Recovery Line*

The Special Recovery Line supports the recovery of plutonium and other actinides from items that are potentially contaminated with tritium. LANL personnel would disassemble up to 40 items per year that are potentially contaminated with tritium. Current floorspace allocation for the Special Recovery Line is 700 square feet (65 square meters). Under the Expanded Operations Alternative, floorspace allocation for this would need to increase to 1,200 square feet (112 square meters). This function is a candidate for transfer from TA–55–4 to the additional space addressed in this PSSC analysis.

II.A.4.4 *Neutron Source Materials Recovery*

This function separates (recovers) radionuclides from light metals or light metal oxides to reduce the neutron radiation associated with excess neutron sources. Current and future floorspace allocation for neutron source material recovery programs is 800 square feet (74 square meters) in TA–55–4. Some of this work also is performed in the CMR Building at this time. Work performed in TA–55–4 depends extensively upon the unique plutonium processing and handling capability of TA–55–4. This is not a candidate for transfer from TA–55–4 to the additional space.

II.A.4.5 *Pit Disassembly and Material Conversion*

LANL has been tasked by DOE to develop and demonstrate pit disassembly and material conversion technologies. This is being done as part of the Advanced Recovery and Integrated Extraction System (ARIES). The ARIES can disassemble a pit by a cutting operation; convert the plutonium into plutonium metal or oxide; place the material in a welded storage container; and decontaminate and assay the container. This system currently exists in a series of gloveboxes in TA–55–4.

Under the Expanded Operations Alternative, LANL would conduct a one-time demonstration involving the disassembly of up to 250 pits and conversion of the plutonium to plutonium oxide as part of an integrated pit disassembly and conversion system, as opposed to a series of individual glovebox operations. This work would be done in TA–55–4 over a period of 4 years. The potential environmental impacts of this proposed action were analyzed in an environmental assessment (chapter 1, section 1.5.7, volume I) (DOE 1998).

The disassembly of pits, including those for surveillance and pit manufacturing purposes, would be an ongoing activity, at a level of up to 200 pit disassemblies per year, after the demonstration activities are completed. In order to accommodate the projected throughput for this process after demonstration, some expansion is anticipated. The disassembly portion of ARIES is very similar to the pit disassembly operations for surveillance. In this sense, these operations could be a candidate for transfer to the additional space. However, there are differences that make such a transfer very difficult. These include:

- The ARIES is still under development (as opposed to the disassembly for surveillance).
- The potential throughput of the integrated pit disassembly and conversion demonstration could make handling and packaging of the output materials between TA–55–4 and the additional space very costly.
- The space used for ARIES is not contiguous to the other space that would be made available by the other potential transfers. This means that if the ARIES space in TA–55–4 were made available, it would be difficult to use this space in an efficient manner.

All of these factors would make moving a portion of this capability to the additional space very costly and time consuming. For these reasons, DOE does not consider it reasonable to transfer this capability to the additional space. Note that some of the technologies used for pit disassembly in this project may be replicated and applied to disassembly and surveillance activities that are being considered for transfer (section II.A.2).

In summary, under the Expanded Operations Alternative, LANL would use ARIES in TA–55–4 for both the pit disassembly and conversion demonstration and for other pit disassembly needs at a level of up to 200 pit disassemblies per year. This alternative would result in the expansion of the ARIES space allocation from 1,000 square feet (93 square meters) to 1,500 square feet (140 square meters) in TA–55–4.

II.A.5 Fabrication of Ceramic-Based Reactor Fuels

LANL has been tasked by DOE to develop and demonstrate ceramic-based reactor fuels technology. A specific application of this function is to utilize output from pit disassembly and conversion (discussed under section II.A.4) for fabrication into mixed oxide (MOX) reactor fuel. Under the Expanded Operation Alternative, LANL personnel would demonstrate the ability to produce MOX fuel from older pits for use in nuclear reactors. Thus, for the next several years, this function is closely linked to the pit disassembly and material conversion function; DOE does not consider it appropriate to separate these two functions for the foreseeable future. Current floorspace allocation for the MOX demonstration activities is 3,000 square feet (280 square meters). This floorspace allocation would not change under the Expanded Operations Alternative. Similar to pit disassembly and conversion, this process would be a candidate for possible transfer to the additional space. The materials involved are metals and oxides, and the processes involved are not substantially different than those used for other processes considered for transfer. However, this process is closely linked to ARIES, and DOE does not consider it appropriate to separate these two functions. Therefore, as with ARIES, transfer of this process is not analyzed in this document.

II.A.6 Plutonium Recovery

Currently, LANL uses aqueous nitrate and chloride chemical techniques to extract plutonium from various residues. Processes include dissolution, ion exchange, solvent extraction, precipitation, pyrolysis, and carbonate oxidation/salt distillation. Pyrochemical recovery operations, or electrorefining, convert impure actinide metal to pure actinide metal. Plutonium recovery is a unique function in TA–55–4 that supports virtually all other activities in that facility. It is not feasible to transfer this function to the additional space. Current floorspace allocation for plutonium recovery is 13,400 square feet (1,246 square meters). No change in floorspace is anticipated for the Expanded Operations Alternative.

II.A.7 Support Activities

II.A.7.1 *Material Control and Accountability*

Material control and accountability is a support function for all operations at TA–55. Moreover, experience gained through this activity is directly applicable to the development and demonstration of nonproliferation technologies. The TA–55 nonproliferation technologies involve development of safeguards methodologies and instrumentation for plutonium nondestructive assay. A typical example is the development of nondestructive assay equipment for the ARIES program.

Plutonium nondestructive assay devices developed for nonproliferation purposes are routinely tested at TA–55–4. TA–55–4 provides LANL with a unique capability in the development of nonproliferation technology. TA–55 supports the development of safeguards instrumentation that contributes to nonproliferation technology. LANL would develop safeguards instrumentation for nonproliferation technologies; yet no dedicated floorspace would be allocated, because the equipment can be shared with various material management activities. This function is integral to other TA–55 functions and is not a candidate for transfer from TA–55 to the additional space.

II.A.7.2 *Materials Management and Radiation Control*

Materials management and radiation control include all support activities that track material movements to and from processing function spaces and storage areas, such as the TA–55–4 vault. Also, all facilities that process nuclear materials must allocate space for radiation measurement and control support staff. These support activities must be provided in facilities that handle nuclear materials. Current floorspace allocations for the material management and radiation control function are 4,400 square feet (409 square meters). No change to this floorspace allocation is anticipated for the level of operations addressed in the Expanded Operations Alternative in TA–55–4. It is also estimated that any functions transferred from TA–55–4 to the additional space would require similar support functions as well. It is estimated that the floorspace allocations for materials management and radiation control would require 2,000 square feet (186 square meters) in the additional space.

II.A.7.3 *Waste Management*

The plutonium processing and recovery programs produce waste materials that contain trace amounts of actinides. The presence of actinides requires that the waste materials be properly packaged and assayed prior to disposal. This is a support activity that must be provided for any facility handling nuclear materials. Current floorspace allocations for the waste management functions in TA–55 are 2,400 square feet (223 square meters). Floorspace allocations under the Expanded Operations Alternative for the waste management function are 2,400 square feet (223 square meters) in TA–55–4. It is estimated that the space allocation for this function in the additional space utilized would be 1,200 square feet (112 square meters).

II.A.7.4 *Analytical Chemistry—Metallography*

A core capability at TA–55 is the fundamental and applied analysis of plutonium using metallography. This supports the nuclear materials processing activities at TA–55–4. Current floorspace allocation for analytical chemistry metallography functions in TA–55–4 is 4,700 square feet (437 square meters). Future floorspace allocations for analytical chemistry metallography functions are 2,600 square feet (242 square meters) in TA–55–4. This reduction in floorspace is the result of including analytical chemistry functions that are specific to pit surveillance with the pit surveillance function and reduced floorspace requirements that result from improvement in analytical chemistry technologies. The analytical chemistry functions specific to pit surveillance are a candidate for transfer from TA–55 to the additional space, if pit surveillance is transferred also. This function would require 1,500 square feet (140 square meters) of floorspace in the additional space.

II.A.8 Contingency Space

Approximately 1,500 square feet (140 square meters) and 700 square feet (65 square meters)

of contingency space would be allocated in TA–55–4 and the additional space facility, respectively. At this stage of design, contingency space is typically established to address the uncertainties in floorspace projections. This contingency amounts to about 3 percent of the total projected floorspace requirements.

APPENDIX II.B
ACCIDENT SCENARIO FOR BUILDING MODIFICATIONS AND UPGRADES OF STRUCTURES, SYSTEMS, OR COMPONENTS FOR THE ENHANCEMENT OF PIT MANUFACTURING OPERATIONS AT LANL

II.B.1 Preliminary Scenario Description

This scenario is based on a postulated accident during modifications or upgrades of structures, systems, or components at TA–55–4. The scenario is initiated by the accidental drop of a plutonium dioxide storage container during movement to or from storage, which is necessary to allow for building modification or upgrade activity. The container is assumed to rupture upon impact with the floor, resulting in an airborne release of particulate material. A worker is exposed. The suspended particulate material is processed through the ventilation system and released through the north exhaust stack.

II.B.1.1 *Scenario Description*

Description of the Activity

Storage containers, mostly metal, have been extensively used to package most of the radioactive material at TA–55 (LANL 1996a). It is postulated that prior to or during CMIP activities related to building modifications or upgrades at TA–55, some of these containers will be moved similar to routine movements that occur in TA–55–4 for operational purposes. Movements of this type present the potential for contamination spread in vaults and potential radiological exposures to personnel handling the containers (LANL 1996a). Although storage containers are typically intact, closed, and free of smearable contamination, some storage containers, after prolonged storage, may have been subjected to significant stresses as a result of chemical or physical changes in the stored material (LANL 1996a). Pages 3 through 135 of LANL 1996a may be consulted for additional details on the structural integrity of the various types of storage containers.

Frequency Range

This type of accident is expected to have a frequency of 0.1 to 0.01 per year assuming operation of ventilation and HEPA filtration, and a frequency of 10^{-2} to 10^{-4} per year in an unmitigated accident scenario (LANL 1996a). These are considered to be "anticipated" and "unlikely" events, respectively. Events necessary for the unmitigated version of this accident to occur and result in a release include: chance that the container is degraded, failure to follow procedures to inspect containers for visible signs of deterioration, failure of visual inspection to detect a deteriorated container, an accidental drop, breach of a degraded container upon impact with the floor, failure of the HVAC system, and failure or lack of HEPA filters. This assumes that, similar to operational requirements, activities related to building modifications or upgrades are restricted by procedure to inspect containers for visible signs of degradation or deformities. The frequency estimate of 10^{-2} to 10^{-4} per year for an unmitigated accident is conservative because: (1) the frequency of only a portion (accidental drop, maximum = 1×10^{-2} failure to follow an administrative procedure, maximum = 5×10^{-2} failure of visual inspection, maximum = 0.5) of the event sequence is 2.5×10^{-4}; therefore, quantification of additional events would likely place the sequence in a lower frequency; and

(2) it is likely that the ventilation system and associated filtration will be operable during upgrade activities (LANL 1998). On the other hand, the number of moves per year, if greater than 1.0, would increase the frequency.

Consequence Severity

A similar accident at TA–55–4 during normal operations has been estimated to result in a dose consequence to the MEI of 8.1 rem (committed effective dose equivalent [CEDE]) in the unmitigated scenario and a dose of 6.6×10^{-12} rem CEDE in a realistic scenario where the ventilation system and HEPA filtration are operable.

The worker who dropped the container would be exposed to a significant inhalation dose, but no acute worker fatality occurs. This inhalation dose would be expected to cause an increased risk of death from cancer over the worker's lifetime; however, this increase in risk is highly dependent on the following:

- The type of protective measures taken at the time of the accident
- The speed with which these measures are taken
- The effectiveness of medical treatment after the exposure

Thus, the risk to this worker cannot be predicted quantitatively or reliably.

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ABOUT THE *NATIONAL ENVIRONMENTAL POLICY ACT*

The *National Environmental Policy Act* (NEPA) (42 United States Code [U.S.C.] §4321 *et seq.*) was enacted to ensure that federal decision makers consider the effects of proposed actions on the human environment and to lay their decisionmaking process open for public scrutiny. NEPA also created the President's Council on Environmental Quality (CEQ). The U.S. Department of Energy's (DOE's) NEPA regulations (10 Code of Federal Regulations [CFR] 1021) augment the CEQ regulations (40 CFR 1500 through 1508).

Under NEPA, an environmental impact statement (EIS) documents a federal agency's analysis of the environmental consequences that might be caused by major federal actions, defined as those proposed actions that may result in a significant impact to the environment. An EIS also:

- Explains the purpose and need for the agency to take action.
- Describes the proposed action and the reasonable alternative courses of action that the agency could take to meet the need.
- Describes what would happen if the proposed action were not implemented—the "No Action" (or status quo) Alternative.
- Describes what aspects of the human environment would be affected if the proposed action or any alternative were implemented.
- Analyzes the changes, or impacts, to the environment that would be expected to take place if the proposed action or an alternative were implemented, compared to the expected condition of the environment if no action were taken.

The DOE EIS process follows these steps:

- The Notice of Intent, published in the *Federal Register*, identifies potential EIS issues and alternatives and asks for public comment on the scope of the analysis.
- The public scoping period, with at least one public meeting, during which public comments on the scope of the document are collected and considered.
- The issuance of a draft EIS for public review and comment (for a minimum of 45 days), with at least one public hearing.
- The preparation and issuance of the final EIS, which incorporates the results of the public comment period on the draft EIS.
- Preparation and issuance of a Record of Decision, which states:
  - — The decision.
  - — The alternatives that were considered in the EIS and the environmentally preferable alternative.
  - — All decision factors, such as cost and technical considerations, that were considered by the agency along with environmental consequences.
  - — Mitigation measures designed to reduce adverse environmental impacts.
- Preparation of a Mitigation Action Plan, as appropriate, which explains how the mitigation measures will be implemented and monitored.