DOE/EIS-0281-SA-04

Final Supplement Analysis for the
Final Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico

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U.S. Department of Energy
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Sandia Site Office

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COVER SHEET

RESPONSIBLE AGENCY: U.S. DEPARTMENT OF ENERGY/NATIONAL NUCLEAR SECURITY ADMINISTRATION

TITLE: **Final Supplement Analysis for the Final Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico (DOE/EIS-0281-SA-04)**

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Abstract: This Supplement Analysis (SA) determines whether the 1999 Final Site-Wide Environmental Impact Statement (SWEIS) for Sandia National Laboratories/New Mexico (SNL/NM) remains adequate in characterizing potential environmental impacts from the operation of SNL/NM. The U.S. Department of Energy (DOE) issued a Record of Decision in late 1999 identifying the Expanded Operations Alternative, analyzed in the SWEIS, as the preferred alternative assessing environmental impacts for operating SNL/NM. For this SA, a screening analysis was performed for each resource area presented in the SWEIS, evaluating new or modified projects or proposals, changed circumstances, and new regulations, to determine whether impacts remain within the envelope of consequences established in the SNL/NM SWEIS. All resource areas, with the exception of groundwater quantity, were eliminated from detailed analysis as key analysis parameters were near or below those used in the SNL/NM SWEIS. A detailed analysis was performed for water quantity as SNL/NM's projected 2008 water usage calculated in this SA exceeds the projected usage in the SNL/NM SWEIS by 11 percent (555.3M gal/yr versus 499M gal/yr). It was determined that the impact of this increased water usage would remain within the envelope of consequences described in the SNL/NM SWEIS analysis.

For all resource areas, the analyses performed for this SA indicate that the environmental impacts of current and projected SNL/NM operations are within the envelope of consequences established in the 1999 SNL/NM SWEIS.

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ACRONYMS AND ABBREVIATIONS

ACF	Aerial Cable Facility
ACRR	Annular Core Research Reactor
AEHD	Albuquerque Environmental Health Department
AMPL	Advanced Manufacturing Processes Laboratory
APPDL	Advanced Pulsed Power Development Laboratory
BOR	United States Bureau of Reclamation
BLM	Bureau of Land Management
CAA	*Clean Air Act*
CABQ	City of Albuquerque
CAMU	Corrective Action Management Unit
CFR	Code of Federal Regulations
Ci	curie
CINT	Center for Integrated Nanotechnologies
CO	carbon monoxide
CPMS	Criteria Pollutant Monitoring Station
CSRL	Compound Semiconductor Research Laboratory
CTF	Coyote Test Field
CWA	Clean Water Act
CWL	Chemical Waste Landfill
CY	calendar year
dBA	decibel (adjusted)
DoD	Department of Defense
DOE	Department of Energy
DNPF	data not provided by facility
DU	depleted uranium
EA	environmental assessment
EAL	Explosives Applications Laboratory
ECF	Explosive Components Facility
EOA	Expanded Operations Alternative
EPA	United States Environmental Protection Agency
EPCRA	*Emergency Planning and Community Right-To-Know Act*
ER	Environmental Restoration (Project)

ACRONYMS AND ABBREVIATIONS (continued)

ERP	Environmental Restoration Program
ES&H	environmental safety and health
FLAME	Fire Laboratory for the Authentication of Models and Experiments
FONSI	Finding of No Significant Impact
FTE	full-time equivalent
FY	fiscal year
gal	gallon
GIF	Gamma Irradiation Facility
gsf	gross square foot/feet
HAP	hazardous air pollutant
HCF	Hot Cell Facility
HEPA	high-efficiency particulate air
HERMES	High Energy Radiation Megavolt Electron Source
HWMF	Hazardous Waste Management Facility
IBL	Ion Beam Laboratory
IMRL	Integrated Materials Research Laboratory
IRP	Installation Restoration Program
KAFB	Kirtland Air Force Base
LANL	Los Alamos National Laboratory
lb	pound
LCF	latent cancer fatality
LLMW	low-level mixed waste
LLW	low-level waste
LNG	liquid natural gas
LN_2	liquid nitrogen
MA	mega-amperes
MAC	maximum allowable concentration
MCL	maximum contaminant level
MDL	Microelectronics Development Laboratory
MEI	maximally-exposed individual
MESA	Microsystems and Engineering Science Applications
MeV	mega-electron volt

ACRONYMS AND ABBREVIATIONS (continued)

mm	millimeter
MOU	Memorandum of Understanding
MRCOG	Mid-Region Council of Governments
MWh	megawatt hours
MWL	Mixed Waste Landfill
NAAQS	National Ambient Air Quality Standard
NMAAQS	New Mexico Ambient Air Quality Standard
NEPA	National Environmental Policy Act
NFA	No Further Action
NGPF	Neutron Generator Production Facility
NMAC	New Mexico Administrative Code
NNSA	National Nuclear Security Administration
NRHP	National Register of Historic Places
OEL	occupational exposure limit
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PETL	Processing and Environmental Technology Laboratory
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
R&D	research and development
RCRA	*Resource Conservation and Recovery Act*
RHEPP	Repetitive High Energy Pulsed-Power (Unit)
RITS	Radiographic Integrated Test Stand
RMWMF	Radioactive and Mixed Waste Management Facility
ROD	record of decision
ROI	region of influence
SA	Supplement Analysis
SCF	standard cubic foot
SGWS	Shallow Groundwater System
SHPO	State Historical Preservation Officer
SNL	Sandia National Laboratories
SNL/NM	Sandia National Laboratories/New Mexico

ACRONYMS AND ABBREVIATIONS (concluded)

SPCC	Spill Prevention Control and Countermeasures
SPHINX	Short-Pulse High Intensity Nanosecond X-Radiator
SPR	Sandia Pulsed Reactor
SSO	Sandia Site Office
SWEIS	site-wide environmental impact statement
TA	technical area
TBF	Terminal Ballistics Facility
TCP	traditional cultural property
TCR	Test Capabilities Revitalization
TESLA	Tera-Electron Volt Energy Superconducting Linear Accelerator
TEV	threshold emission value
TPY	tons per year
TRU	transuranic
TSCA	*Toxic Substances Control Act*
TSS	total suspended solids
TTC	Thermal Test Complex
TTF	Thermal Treatment Facility
UNO	United Nations Organization
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

METRIC CONVERSION CHART

TO CONVERT FROM U.S. CUSTOMARY INTO METRIC			TO CONVERT FROM METRIC INTO U.S. CUSTOMARY		
If you know	Multiply by	To get	If you know	Multiply by	To get
Length					
inches	2.540	centimeters	centimeters	0.3937	inches
feet	30.48	centimeters	centimeters	0.03281	feet
feet	0.3048	meters	meters	3.281	feet
yards	0.9144	meters	meters	1.094	yards
miles	1.609	kilometers	kilometers	0.6214	miles
Area					
square inches	6.452	square centimeters	square centimeters	0.1550	square inches
square feet	0.09290	square meters	square meters	10.76	square feet
square yards	0.8361	square meters	square meters	1.196	square yards
acres	0.4047	hectares	hectares	2.471	acres
square miles	2.590	square kilometers	square kilometers	0.3861	square miles
Volume					
fluid ounces	29.57	milliliters	milliliters	0.03381	fluid ounces
gallons	3.785	liters	liters	0.2642	gallons
cubic feet	0.02832	cubic meters	cubic meters	35.31	cubic feet
cubic yards	0.7646	cubic meters	cubic meters	1.308	cubic yards
Weight					
ounces	28.35	grams	grams	0.03527	ounces
pounds	0.4536	kilograms	kilograms	2.205	pounds
short tons	0.9072	metric tons	metric tons	1.102	short tons
Temperature					
Fahrenheit (^{o}F)	subtract 32, then multiply by 5/9	Celsius (^{o}C)	Celsius (^{o}C)	multiply by 9/5, then add 32	Fahrenheit (^{o}F)
kelvin (^{o}k)	subtract 273.15	Celsius (^{o}C)	kelvin (^{o}k)	Multiply by 9/5, then add 306.15	Fahrenheit (^{o}F)
Note: 1 sievert = 100 rems					

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SUMMARY

The U.S. Department of Energy's (DOE's) National Environmental Policy Act (NEPA) Implementing Procedures at 10 CFR 1021.330(d) require evaluation of its site-wide environmental impact statements (SWEISs) at least every 5 years by preparation of a supplement analysis (SA), as provided in 10 CFR 1021.314. Based on the SA, a determination is made as to whether the existing SWEIS remains adequate, or whether preparation of a new SWEIS, or a supplement to the existing SWEIS, is appropriate. This SA evaluates whether the 1999 *Final Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico*, referred to as the SNL/NM SWEIS, should be supplemented, a new SWEIS should be prepared, or no further NEPA documentation is required.

DOE issued the SNL/NM SWEIS in October 1999. The SWEIS assessed impacts relative to each area of the human and natural environment potentially affected by operations performed at SNL/NM between 1998 and 2008. The SWEIS evaluated activities associated with SNL's mission of National Security, Energy Resources, Environmental Quality, Science and Technology, and Work for Others.

DOE issued a Record of Decision in late 1999 identifying the Expanded Operations Alternative (EOA) as the preferred alternative assessing environmental impacts for operating SNL/NM. Under the EOA, DOE and interagency programs and activities at SNL/NM were analyzed as increasing to the highest reasonable activity levels that could be supported by current facilities, including specifically identified potential expansion and construction of new facilities for future actions. Environmental impacts analyzed under this alternative provided a bounding analysis against which to track changes to SNL/NM operations.

For all resource areas, the analyses performed for this SA indicate that the environmental impacts of current and projected SNL/NM operations are within the envelope of consequences established in the 1999 SNL/NM SWEIS.

Analytical Approach

A three-step review and analysis approach was used in developing this SA. These steps are summarized as follows:

1. Perform initial screening analyses of new or modified projects or proposals, changed circumstances, and new regulations. This screening analysis determined, without further detailed analysis, which specific resource areas clearly remain within the limits of environmental consequences established in the 1999 SNL/NM SWEIS (i.e., that adverse impacts are not more adverse than, or beneficial impacts are not more beneficial than, those discussed in the SWEIS).

2. Perform more detailed analyses of impact areas that did not pass the screening criteria (Step 1) to determine whether the combined impacts remain within the envelope of consequences established in the 1999 SNL/NM SWEIS.

3. For those impacts that were outside the envelope of consequences established in the 1999 SNL/NM SWEIS, determine whether the incremental change in environmental consequences is significant, as defined in NEPA regulations.

As a result of the initial screening review, the following resource areas meet the screening criteria and thus do not require detailed analysis: land use and visual resources, infrastructure, geology and soils, biological and ecological resources, cultural resources, air quality, human health and worker safety, accidents, transportation, waste generation, noise and vibration, socioeconomics, and environmental justice. Water resources and hydrology were broken down into resource areas of groundwater quality, groundwater quantity, surface water quality, and surface water quantity, with only groundwater quantity requiring detailed analysis.

For the resource areas listed above that did not require detailed analysis, the 1999 SNL/NM SWEIS remains an adequate description of potential environmental impacts. The results of the groundwater quantity detailed consequence analysis are presented later in this summary.

New and/or Modified Facilities and Information

A requirement for additional NEPA analysis could be prompted by changes in site activities (new or modified site missions) that could result in changes in environmental impacts, changes in the characteristics of SNL/NM or its environs, or changes in regulatory requirements or guidance. Therefore, this SA describes the current status of those areas and identifies any changes since the 1999 SNL/NM SWEIS.

The SA identifies substantive changes in existing SNL/NM facilities (from those analyzed in the 1999 SNL/NM SWEIS) and any new facilities. These facilities are summarized below.

Microelectronics Development Laboratory (MDL)

The MDL was assessed in two configurations in the 1999 SNL/NM SWEIS. One configuration covered expansion of the existing MDL. The other included the MDL as part of the Microsystems and Engineering Science Applications (MESA) Complex, an integration of SNL/NM capabilities to support the areas of stockpile stewardship and management, the Stockpile Life Extension Program, and the Defense Program’s Enhanced Surety Campaign. Major components of the MESA Complex are being constructed adjoining the MDL. By sharing modernized equipment with the MDL, the MESA Complex will integrate activities of both the MDL and the Compound Semiconductor Research Laboratory (CSRL).

Neutron Generator Production Facility (NGPF)

In 2005, the NNSA prepared the *Final Environmental Assessment for the Proposed Consolidation of Neutron Generator Tritium Target Loading Production*. Under the proposed action, two production loaders would be relocated from Los Alamos National Laboratory to the NGPF. Until at least 2008, only one loader would be installed at SNL/NM and used while the other remains in storage.

Z-Accelerator

In early 2002, NNSA/SSO approved environmental documentation for SNL/NM to refurbish and reconfigure the Z-Accelerator (Z-Machine) to facilitate near-term experimental activities and future long-range testing needs. The Z-Machine Refurbishment would be accomplished within the existing structure and peripheral support facilities.

Annular Core Research Reactor (ACRR)

The 1999 SNL/NM SWEIS analyzed two modes of operation for the ACRR: pulse configuration and medical isotope production configuration. In 2001, the ACRR was reconfigured for pulse mode when the medical isotope program was suspended. An SA to the SWEIS was prepared to address potential environmental effects of reestablishing long term pulse mode testing capabilities at the ACRR in support of defense programs. NNSA determined that additional pulse mode testing, including the production of small quantities of radioisotopes and support to other nuclear research programs, would not result in any significant impact to the environment.

Hot Cell Facility (HCF)

The HCF is in standby status. If operations at the HCF resume, the facility configuration would remain substantially the same as that analyzed in the 1999 SNL/NM SWEIS.

Microsystems and Engineering Science Applications (MESA) Complex

The then-planned MESA Complex was evaluated in the 1999 SNL/NM SWEIS, but subsequent changes to facility plans required completion of a separate Environmental Assessment (EA) in 2000.

Center for Integrated Nanotechnologies (CINT)

Construction is complete for the CINT Core Facility and the establishment of the CINT Gateway to Sandia Facility within existing space at the Integrated Materials Research Laboratory. The CINT Core Facility has been constructed on 20 acres of DOE-owned land on the west side of Eubank Boulevard, north of the entrance to Kirtland Air Force Base, The Gateway to Sandia Facility will be established in existing space within the existing Integrated Materials Research Laboratory at Technical Area (TA)-I. DOE completed an EA for CINT in 2003.

Test Capabilities Revitalization (TCR) Project

The TCR includes renovation and upgrade of several existing facilities in TA-I, TA-III, and the Coyote Test Field, including the Centrifuge Complex, Sled Track Complex, and Aerial Cable Facility Complex. TCR involves construction, modification, renovation, and demolition activities, as well as modifications to operational parameters at some test facilities.

Detailed Consequence Analysis

The technical discipline that did not pass the screening criteria and required further analysis was groundwater quantity.

Since the mid-1940s, groundwater withdrawals in the vicinity of Albuquerque have resulted in water level declines exceeding 120 ft. The United States Geological Survey (USGS) estimated the aquifer is being depleted at a rate twice that of the recharge to the aquifer from the Rio Grande and other sources. As a result, reliance on the regional Albuquerque-Belen aquifer as the sole drinking water source for the City of Albuquerque (CABQ), including SNL/NM and Kirtland Air Force Base (KAFB), is unsustainable. The CABQ has projected a shortage of groundwater resources beginning in 2020 due to overpumping.

DOE projected water use for the EOA in the 1999 SNL/NM SWEIS to be 499M gal/yr through 2008. By including water use at new facilities and the changes at existing facilities, the projected water use through 2008 is estimated in this SA to be 555.3M gal/yr, which is 56.3M gal/yr above the EOA water use projected in the 1999 SNL/NM SWEIS.

The CABQ proposes to protect the aquifer for use as a drought reserve, and facilitate the combined use of groundwater and surface water. These projects, collectively referred to as the San Juan-Chama Drinking Water Supply Project, are proposed to reduce the dependency on groundwater resources. The Drinking Water Supply Project includes diverting about 97,000 acre-feet/yr of San Juan-Chama and Rio Grande surface water. The diversion is scheduled for completion in 2007. With the implementation of the San Juan-Chama Drinking Water Supply Project, the city projects the need for pumping groundwater would be substantially reduced to approximately 730,000 acre-feet/yr by 2060, which would reduce aquifer drawdown from 3-5 ft/yr to 1-3 ft/yr.

The SA has identified an 11-percent increase in SNL/NM's projected 2008 water use over the amount projected in the 1999 SNL/NM SWEIS. This increase in water use would result in a 0.03-ft/yr increase in the aquifer drawdown rate in the KAFB area. However, improvement in the overall water-supply situation in the CABQ through the San Juan-Chama Drinking Water Supply Project will reduce the overall drawdown rate within the regional aquifer. Therefore, the impact from the increase in drawdown rate from SNL/NM's projected increased water usage would be lessened and would fall within the envelope of consequences evaluated in the 1999 SNL/NM SWEIS analysis.

Cumulative Impacts

Past and present actions associated with SNL/NM are described in the 1999 SNL/NM SWEIS, and updated with new and modified projects described in this SA. Reasonably foreseeable future actions for the region around SNL/NM were also reviewed and included in the analysis.

The result of this analysis indicated that the SNL/NM SWEIS cumulative impact analysis is sufficient for past and present programs at SNL/NM and the region of influence. The impacts of continued growth in the Albuquerque area on water supplies and traffic was adequately analyzed in the SWEIS.

1.0 INTRODUCTION

1.1 OVERVIEW OF SANDIA NATIONAL LABORATORIES/NEW MEXICO

Sandia National Laboratories (SNL) is one of several national laboratories that support the Department of Energy's (DOE) statutory responsibilities for nuclear weapons research and design, development of other energy technologies, and basic scientific research. SNL is composed of four geographically separate facilities: Albuquerque, New Mexico; Tonopah, Nevada; Kauai, Hawaii; and Livermore, California. This Supplement Analysis (SA) focuses on Sandia National Laboratories/New Mexico (SNL/NM).

SNL/NM is a government-owned, contractor-operated facility owned by the DOE, National Nuclear Security Administration (NNSA), and managed and operated by Sandia Corporation. Day-to-day operational oversight is performed by the DOE/NNSA Sandia Site Office (SSO), Albuquerque, New Mexico. It is one of the largest laboratories in the world, with an annual budget of approximately $2.3 billion in fiscal year (FY) 2004 and a workforce of approximately 11,300 contractor and subcontractor employees. SNL/NM operates primarily on approximately 8,800 acres of Federal land on Kirtland Air Force Base (KAFB), southeast of Albuquerque. KAFB is shared with SNL/NM and with other Federal agencies, primarily the DOE, U.S. Air Force (USAF), and the U.S. Forest Service (USFS). Through various agreements, land use permits, and leases, SNL/NM occupies land owned by these. Figure 1.1-1 illustrates the location of SNL/NM.

Founded in 1949, the original Sandia Laboratory focused on nuclear weapons engineering and production coordination, with a growing emphasis on research and development (R&D) to improve weapon design. In the 1960s and early 1970s, a new emphasis on strengthening engineering applications resulted in new mission lines and programs. These new areas, including energy research and safeguards and security, addressed international concerns such as the energy crisis and international terrorism. They remain as current programs in the areas of nuclear, fossil and renewable energy. With the end of the Cold War in the late 1980s, the role of SNL/NM in stockpile stewardship, nonproliferation, and stockpile, safety, security, and reliability, took on greater importance.

Since 1993, Sandia Corporation, a wholly-owned subsidiary of the Lockheed Martin Corporation, has operated SNL/NM for the DOE. The Lockheed Martin Corporation was formed in 1995 as a "merger of equals" between Lockheed Corporation and Martin Marietta Corporation.

1.2 DESCRIPTION OF THE 1999 SANDIA NATIONAL LABORATORIES/NEW MEXICO SITE-WIDE ENVIRONMENTAL IMPACT STATEMENT

In late 1999, the DOE published the SNL/NM Site-Wide Environmental Impact Statement (SWEIS), examining the environmental impacts of three alternatives for the continued operation of the facility. To complete the *National Environmental Policy Act* (NEPA) process, DOE issued a Record of Decision (ROD) in late 1999 identifying the Expanded Operations Alternative (EOA) as the preferred alternative assessing environmental impacts for continued operation of SNL/NM.

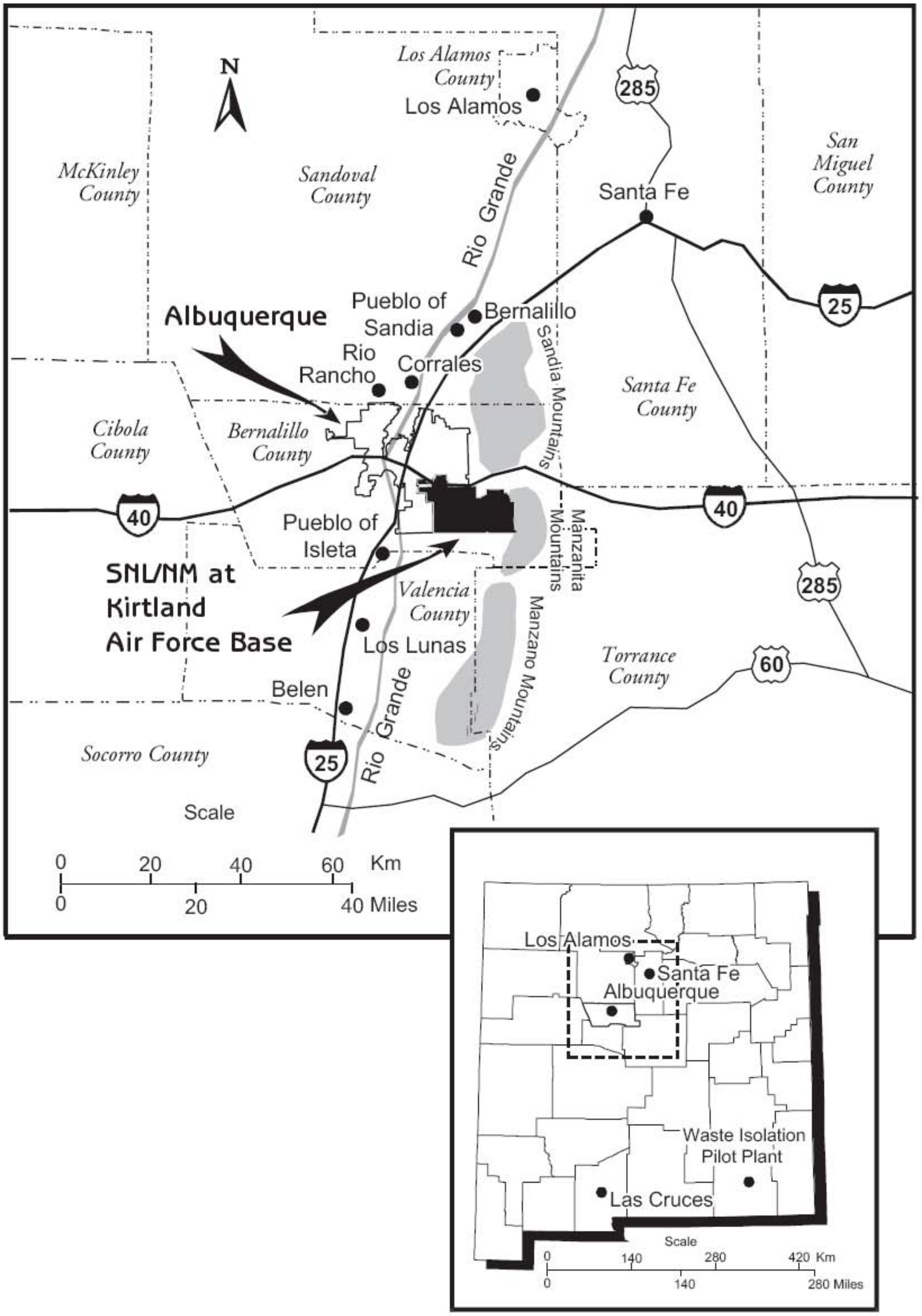


Figure 1.1-1. SNL/NM, KAFB, and Surrounding Region

In the SNL/NM SWEIS, DOE analyzed the potential impacts of continued operations and resource management at SNL/NM to meet evolving DOE missions and to respond to the concerns of affected and interested individuals and agencies. The analysis included three alternatives—reduced operations, no action, and expanded operations (DOE's Preferred Alternative)—that would meet the purpose and need for agency action and would support existing and potential program-related activities at SNL/NM. Under the Reduced Operations Alternative, DOE and interagency programs and activities at SNL/NM were analyzed at the minimum level of operations needed to maintain SNL/NM facilities and equipment in an operational readiness mode. Under the No Action Alternative, ongoing DOE and interagency programs and activities at SNL/NM were analyzed to continue the status quo, that is, operating at planned levels as reflected in current DOE management plans. Under the Preferred Alternative, EOA, DOE and interagency programs and activities at SNL/NM were analyzed as increasing to the highest reasonable activity levels that could be supported by current facilities, including specifically identified potential expansion and construction of new facilities for future actions. Environmental impacts analyzed under this alternative provided a bounding analysis against which to track changes to SNL/NM operations.

1.3 SNL/NM MISSION

SNL/NM provides support for the DOE mission lines, programs and projects in a number of vital areas.

- National Security—SNL/NM's principal DOE assignments under the NNSA mission line focus on maintaining the nuclear stockpile and reducing the vulnerability of a reduced stockpile; managing nonnuclear components of nearly every weapon in the U.S. nuclear weapons stockpile; and reducing the vulnerability of the U.S. to threats of proliferation, the use of weapons of mass destruction, nuclear incidents, and environmental damage.
- Energy Resources—SNL/NM supports DOE assignments under the Energy Resources mission line to enhance the safety, security, and reliability of energy supplies. This work focuses on implications for our national security related to the increasing interdependencies among domestic elements and global resources. SNL/NM helps develop strategies to protect the supply of the Nation's energy resources.
- Environmental Quality—SNL/NM supports DOE assignments under the Environmental Quality mission line with onsite waste operations and development technology. Activities include some treatment, temporary storage, and offsite disposal of hazardous waste, low-level waste (LLW), low-level mixed waste (LLMW), transuranic (TRU) waste, mixed TRU waste, and solid waste generated by ongoing mission-related activities. All environmental restoration (ER) sites at SNL/NM, except the Mixed Waste Landfill (MWL) and the Canyons Area, have a completion goal date in 2006. With completion of the ER Project approaching, long-term environmental stewardship activities have been increasing, and will continue after ER Project completion.
- Science and Technology—SNL/NM's facilities and expertise are used in support of the Science and Technology mission line through R&D in modeling and simulation testing, physical science, and advanced chemical and materials sciences. SNL/NM activities include developing radiation-hardened microelectronic components; computer-based testing, modeling, and simulation; and pulsed-power technology.
- Work for Others—SNL/NM provides technical resources and facilities to a variety of other federal agencies through the DOE-sponsored "Work for Others" program. This program encompasses conventional defense, strategic defense, counterproliferation and nonproliferation, treaty verification, environmental cleanup and monitoring, energy uses, high-performance computing, safeguards and

security, radiation effects, materials development and characterization, law enforcement, transportation, space efforts, and a variety of other national security areas.

1.4 SCOPE OF THE SNL/NM SWEIS SA

Under its NEPA regulations, DOE must evaluate the SWEIS at least every 5 years to determine whether it remains adequate (i.e., it continues to address the environmental impacts of SNL/NM operations), if a new SWEIS should be prepared, or if a supplement to the existing SWEIS is needed (10C.F.R.§ 1021.330). Consistent with this requirement, DOE/SSO has prepared this SA.

This SA builds on NEPA documents prepared for new facilities or modifications to existing facilities, as well as updated operational information for facilities analyzed in the 1999 SNL/NM SWEIS. Environmental assessments and supplement analyses prepared since completion of the SWEIS include:

- *Environmental Assessment for the Microsystems and Engineering Sciences Applications Complex*, DOE/EA-1335, U.S. Department of Energy, Kirtland Area Office, Albuquerque, NM, September 2000 (DOE 2000a).
- *Final Environmental Assessment for the Test Capabilities Revitalization at Sandia National Laboratories/New Mexico*, DOE/EA-1446, U.S. Department of Energy, Office of Kirtland Site Operations, Albuquerque, NM, January 2003 (DOE 2003b).
- *Final Environmental Assessment for the Center for Integrated Nanotechnologies at Sandia National Laboratories/New Mexico,* DOE/EA-1457, U.S. Department of Energy, Sandia Site Office, Albuquerque, NM, March 2003 (DOE 2003a).
- *Final Environmental Assessment for the Proposed Consolidation of Neutron Generator Tritium Target Loading Production*, DOE/EA-1532, U.S. Department of Energy, National Nuclear Security Administration, Sandia Site Office, Albuquerque, NM, June 2005 (DOE 2005a).
- *Supplement Analysis, Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico, Reestablishing Long-Term Pulse Mode Testing Capability at the Annular Core Research Reactor, Sandia National Laboratories, New Mexico*, DOE/EIS-0281-SA-01, U.S. Department of Energy, Kirtland Area Office, Albuquerque, NM, May 2001 (DOE 2001a).
- *Supplement Analysis, Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico, Isentropic Compression and Flyer Plate Experiments Involving Plutonium at the Z and Saturn Accelerators*, DOE/EIS-0281-SA-02, U.S. Department of Energy, Kirtland Area Office, Albuquerque, NM, September 2002 (DOE 2002a).
- *Supplement Analysis, Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico, Installation of a Petawatt Laser System in TA-IV*, DOE/EIS-0281-SA-03, U.S. Department of Energy, Sandia Site Office, Albuquerque, NM, August 2004 (DOE 2004).

2.0 NEW AND/OR MODIFIED OPERATIONS AND INFORMATION

2.1 INTRODUCTION

The purpose of this SNL/NM SWEIS SA is to determine the need for additional NEPA analysis beyond that presented in the 1999 SNL/NM SWEIS. A requirement for additional NEPA analysis could be prompted by changes in site facilities or activities that could result in changes in environmental impacts, changes in the characteristics of the SNL/NM site or its environs, or changes in regulatory requirements or guidance. This chapter describes the current status of those areas and identifies any changes since the 1999 SNL/NM SWEIS, and provides the technical basis for the analyses presented in Chapters 3 and 4. For this analysis, the baseline year is 2004; data from calendar year 2004 are used unless data are not available, or they do not present an accurate picture of recent and future trends. All years referred to in this SA are calendar years (CY) unless specifically noted as FY.

2.2 SELECTED FACILITIES

For the analysis in the 1999 SNL/NM SWEIS, DOE used data from a detailed survey distributed throughout SNL/NM to develop a database containing pertinent information about the approximately 670 buildings in the 5 technical areas (TAs) and the structures in the Coyote Test Field (CTF). This list was further assessed and refined by qualitatively evaluating the types of operations performed, identifying those with the highest potential for environmental impacts or concerns, and then grouping them according to function and location. Key qualitative criteria used in the final screen identified facilities or facility groups with operations that have generated public interest in the past or have a relatively greater potential for impact to the environment, safety, and health.

The operations within these *selected facilities* or facility groups were the basis for differentiating among the three alternatives analyzed in the SWEIS and any associated environmental impacts. Taken together, these facilities and facility groups represented the majority of exposure risks associated with continuing operations at SNL/NM. They represented:

- Over 99 percent of all potential radiation doses to personnel working at SNL/NM.
- Over 99 percent of all potential radiation doses to the public.
- From 81 to 99 percent of stationary source criteria pollutants (nitrogen dioxide, carbon monoxide, particulate matter less than 10 microns in diameter [PM10], and sulfur dioxide), depending on the alternative. This does not include hazardous air pollutants or toxic air pollutants, which instead are analyzed on a site-wide basis in the SWEIS. The remaining stationary source criteria pollutants are associated with backup generators.

This section summarizes changes in the operational parameters at the selected facilities and facility groups. Major facilities not included in the 1999 SNL/NM SWEIS that are now in operation or planned for construction and/or operation during the next five years are also discussed. Unless otherwise noted, information in Section 2.2 is compiled from the *Sandia National Laboratories/New Mexico Facilities and Safety Information Document Calendar Year 2003 Update* (SNL/NM 2005a) and the *Calendar Year 2004 Information Update for the Five-Year Assessment of the Sandia National Laboratories/New Mexico Site-Wide Environmental Impact Statement* (SNL/NM 2005b). Table 2.2-1 summarizes data trends (1999 through 2004) from the selected facilities included in the 1999 SNL/NM SWEIS. The parameters presented are those analyzed in the SWEIS for selected facilities. Values that exceeded the 1999 SNL/NM SWEIS EOA are shaded. The table is ordered by facility groups used in the SWEIS. Major facilities that were not included in the SWEIS are discussed in further detail in Section 2.2.11.

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004

Values that exceed the 1999 SNL/NM SWEIS EOA are shaded

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Manufacturing, R&D Laboratories, and Testing Facilities											
Advanced Manufacturing Processes Lab (AMPL) (TA-I)											
Major Facility Activities	Development or Production of Devices, Processes, and Systems	Materials, Ceramics/Glass Electronics, Processes, and Systems	Operational Hours	347,000	248,000	248,000	312,000	312,000	389,000	333,000	333,000
Waste Generation	Hazardous Waste	NA	kg	6,625	9,300	7,100	12,600	9,200	13,000	8,029	7,949
Support	Facility Personnel	NA	FTEs	204	150	150	175	170	189	196	196
	Expenditures	NA	M dollars	45	33	28	26	26	27	45	45
Explosive Components Facility (ECF) (TA-II)											
Major Facility Activities	Test Activities	Neutron Generator Tests	Tests	500	200	200	50	200	200	175	350
		Explosive Testing	Tests	900	600	600	600	600	600	800	960
		Chemical Analysis	Analyses	1,250	900	900	900	900	900	1,200	1,440
		Battery Tests	Tests	100	50	50	50	55	55	50	60
Material Inventories	Nuclear Material Inventory	Tritium	Ci	49	49	49	49	49	49	20	30
	Explosives Inventory	Bare UNO 1.1	kg	150	130	150	150	150	150	384	422
		Bare UNO 1.2	kg	30	20	30	30	30	30	45	50
		Bare UNO 1.3	kg	30	23	25	30	30	30	94	103
		Bare UNO 1.4	kg	3	2	3	3	3	3	578	636
Material Consumption	Explosives Consumption	Bare UNO 1.1	kg	18	15	15	4	16	16	56	62
		Bare UNO 1.2	kg	4	2	3	1	3	3	2	2
		Bare UNO 1.3	kg	5	3	4	1	4	4	3	3
		Bare UNO 1.4	kg	14	10	14	3	14	14	62	68

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Explosive Components Facility (ECF) (TA-II) (continued)											
Waste Generation	Low-Level Waste	NA	ft^3	190	95	110	110	110	110	170	187
	Mixed Waste	LLMW	kg	1,000	1,000	1,000	1,000	1,000	0	0	0
	Hazardous Waste	NA	kg	500	360	400	400	400	400	1,567	1,724
Emissions	Radioactive Air Emissions	Tritium	Ci	$2x10^{-3}$	$1x10^{-3}$	$1x10^{-3}$	$1x10^{-3}$	$1x10^{-3}$	0	$2x10^{-3}$	$4x10^{-3}$
Process	Wastewater Effluent	NA	M gal	6.4	4.8	5.4	5.4	5.4	5.4	3.04	3.3
Support	Water Consumption	NA	M gal	7.0	6.0	6.0	6.1	6.1	6.1	4.3	4.7
	Electricity Consumption	NA	kWh	3,400,000	2,900,000	2,900,000	2,900,000	2,900,000	2,900,000	2,861,000	3,147,100
	Boiler Energy	Natural Gas	M ft^3	29	24	24	24	24	24	22.2	26.6
	Facility Personnel	NA	FTEs	102	81	86	88	88	100	125	150
	Expenditures	NA	M Dollars	2.5	1.7	1.9	2.1	2.1	2.1	2.8	3.4
Integrated Materials Research Laboratory (IMRL) (TA-I)											
Major Facility Activities	Other	Research and Development of Materials	Operational Hours	395,454	395,000	395,000	NR	NR	395,000	355,910	391,501
Material Inventories	Nuclear Material Inventory	Depleted Uranium	µCi	1.0 [a]	0.93	0	0	NR	0	0	0
Waste Generation	Hazardous Waste	NA	kg	2,000	2,100	3,347	2,372	NR	2,000	2,500	2,750
Support	Facility Personnel	NA	FTEs	250	250	250	220	230	230	225	248
	Expenditures	NA	M Dollars	62	50	55	45	NR	30	40	44
Microelectronics Development Laboratory (MDL) (TA-I)											
Major Facility Activities	Development or Production of Devices, Processes, and Systems	Microelectronic Devices and Systems	Wafers	7,500	4,000	4,000	5,000	4,800	NR	7,500	8,250

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Microelectronics Development Laboratory (MDL) (TA-I) (continued)											
Waste Generation	Low-Level Waste	NA	kg	<1.0	0	0	0	0	NR	0	0
	Hazardous Waste	NA	kg	4,378	3,300	3,000	4,800	3,800	3,700	12,300 [b]	7,995
Process	Wastewater Effluent	NA	M gal	77	79.8	79.8	46.7	52.5	58.3	75.5	75.5
Support	Water Consumption	NA	M gal	77.2	77.9	77.9	91	110	102	82.9	82.9
	Electricity Consumption	NA	MWh	28,600	28,700	28,700	26,500	26,700	28,000	34,500	37,950
	Boiler Energy	Natural Gas	M ft^3	34.3	34.3	34.0	26.1	24.2	29.4	40.5M	40.5M
	Facility Personnel	NA	FTEs	500	133	133	140	137	130	230	242
	Expenditures	NA	M Dollars	7.5	35	37	35	39	32	62 [c]	65
Neutron Generator Production Facility (NGPF) (TA-I)											
Major Facility Activities	Development or Production of Devices, Processes, and Systems	Neutron Generators	Neutron Generators	2,000	600	400	250	500	700	1,000	500
Material Inventories	Nuclear Material Inventory	Tritium	Ci	836[d]	1,500	1,040	800	940	820	780	3,000
Material Consumption	Nuclear Material Consumption	Tritium	Ci	652	652	282	204	350	130	1,082	1,407
Waste Generation	Low-Level Waste	NA	kg	4,000	2,700	2,500	11,050	4,960	3,680	7,075 [e]	6,226
	Mixed Waste	LLMW	kg	300	180	100	483	312	788	1,556 [f]	1,043
	Hazardous Waste	NA	kg	3,680	3,300	3,000	2,800	3,000	4,700	4,400	5,280
Emissions	Radioactive Air Emissions	Tritium	Ci	156	94	41	27	15	25	<20	<17
Process	Wastewater Effluent	NA	M gal	5	3	3	2.9	3.1	3.2	5	5

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Neutron Generator Production Facility (NGPF) (TA-I) (continued)											
Support	Water Consumption	NA	M gal	5	3	3	2.9	3.1	3.2	5	5
	Facility Personnel	NA	FTEs	320	180	262	273	320	296	309	309
	Expenditures	NA	M Dollars	5.2	30	25	33	31.5	NR	60	60
Physical Testing and Simulation Facilities											
Centrifuge Complex (TA-III)											
Major Facility Activities	Test Activities	Centrifuge	Tests	120	32	21	21	22	20	70	70
		Impact	Tests	100	0	0	0	0	0	0	0
Material Consumption	Explosives Consumption	Bare UNO 1.1	kg	7 [g]	0	0	0	0	0	5	5
		Bare UNO 1.3	kg	2,272 [g]	0	0	0	0	0	1,000	1,000
		Bare UNO 1.4	g	890 [g]	0	0	0	0	0	500	500
Waste Generation	Hazardous Waste	NA	kg	15	10	3	3	1	1	10	10
Support	Facility Personnel	NA	FTEs	10	3.5	2	2	2	2	10	10
	Expenditures	NA	M Dollars	0.75	0.4	0.2	0.2	0.2	0.2	0.75	0.75
Drop/Impact Complex (TA-III)											
Major Facility Activities	Test Activities	Drop Test	Tests	50	18	2	3	3	NR	10	10
		Water Impact	Tests	20	1	0	0	0	NR	0	0
		Submersion	Tests	5	1	0	0	0	NR	0	0
		Underwater Blast	Tests	10	0	0	0	0	NR	0	0
Material Inventories	Other Hazardous Material Inventory	LNG	lb	0	NA [h]	NA [h]	NA [h]	NA [h]	NA [h]	20,000 [h]	130,000
Material Consumption	Explosives Consumption	Bare UNO 1.1	kg	0	0	0	0	0	NR	0	0
		Bare UNO 1.3	kg	0	55	6	1	6	NR	0	0
		Bare UNO 1.4	g	0	196	17	4	10	NR	0	0
Waste Generation	Hazardous Waste	NA	kg	Minimal	Minimal	Minimal	Minimal	Minimal	NR	Minimal	Minimal

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Drop/Impact Complex (TA-III) (continued)											
Support	Facility Personnel	NA	FTEs	8	2.5	1.5	2	1.6	NR	8	9
	Expenditures	NA	M Dollars	0.146	0.05	0.05	0.052	0.05	0.05	0.5	0.55
Sled Track Complex (TA-III)											
Major Facility Activities	Test Activities	Rocket Sled Test	Tests	80	10	12	12	18	18	30	30
		Explosive Testing	Tests	239	12	10	10	14	14	100	100
		Rocket Launcher	Tests	24	3	3	3	3	3	10	10
		Free-Flight Launch	Tests	150	40	22	22	0	0	10	10
Material Consumption	Explosives Consumption	Bare UNO 1.1	kg	1,252	0	0	0	0	0	1,252	1,252
		Bare UNO 1.3	kg	36,170	3,354	3,116	3,116	3,300	3,300	20,000	20,000
		Bare UNO 1.4	kg	214	27	27	27	33	33	150	150
Waste Generation	Hazardous Waste	NA	kg	50	15	12	12	12	12	30	30
Emissions	Open Burning	Explosives	kg	1,670	0	0	0	0	0	1,000	1,000
Support	Facility Personnel	NA	FTEs	40	8	9	10	10	10	40	40
	Expenditures	NA	M Dollars	2.0	0.334	0.367	0.40	0.50	0.50	1.95	1.95
Terminal Ballistics Facility (TA-III)											
Major Facility Activities	Test Activities	Projectile Impact Testing	Tests (Series)	350	50	50	50	50	50	100	100
		Propellant Testing	Test Series	100	25	25	25	25	25	25	25
Material Inventories	Explosives Inventory	Bare UNO 1.1	kg	25	19	19	5	20	20	454	454
		Bare UNO 1.2	kg	10	8	8	2	8	8	227	227
		Bare UNO 1.3	kg	25	20	20	5	20	20	227	227
		Bare UNO 1.4	kg	24	20	20	5	20	20	227	227
	Other Hazardous Material Inventory	Nitromethane	gal	NA [i]	NA [i]	NA [i]	NA [i]	NA [i]	NA [i]	<50	<50

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Terminal Ballistics Facility (TA-III) (continued)											
Material Consumption	Explosives Consumption	Bare UNO 1.1	kg	14	2	2	4	10	10	454	454
		Bare UNO 1.2	kg	21	3	3	4	18	18	227	227
		Bare UNO 1.3	kg	14	2	2	2	7	7	227	227
		Bare UNO 1.4	kg	14	2	2	1	7	7	227	227
Waste Generation	Hazardous Waste	NA	kg	0.75	0.25	0.25	0.2	0.2	0.2	10	10
Support	Facility Personnel	NA	FTEs	2	0.3	0.3	2	2	2	2	3
	Expenditures	NA	dollars	12,000	8,500	8,500	14,000	14,000	14,000	50,000	75,000
Accelerator Facilities											
Advanced Pulsed-Power Development Laboratory (APPDL) (TA-IV)											
Major Facility Activities	Test Activities	Accelerator Shots	Shots	2,000	400	234	300	560	1,120	978	978
Material Inventories	Other Hazardous Material Inventory	Insulator Oil	gal	130,000	130,000	137,400	164,000	225,000	NR	225,000	225,000
Waste Generation	Hazardous Waste	NA	kg	200	75	110	100	100	100	2,100 [j]	210
Support	Facility Personnel	NA	FTEs	7	5	5	9.5	9.5	8.5	8	8
	Expenditures	NA	M Dollars	5.5	1.6	1.4	2.0	3.5	4.5	NR	N/A
High Energy Radiation Megavolt Electron Source III (HERMES III) (TA-IV)											
Major Facility Activities	Test Activities	Irradiation of Components or Materials	Shots	1,450	256	183	288	288	407	532	532
Material Inventories	Other Hazardous Material Inventory	Insulator Oil	gal	160,000	160,000	160,000	160,000	160,000	160,000	160,000	160,000
Waste Generation	Low-Level Waste	NA	ft^3	1.38	0.25	0.25	0.25	0	0	0	0
	Hazardous Waste	NA	kg	915	160	893	549	126	183	245	245
Emissions	Radioactive Air	Nitrogen-13	Ci	3.603×10^{-03}	6.4×10^{-04}	6.4×10^{-04}	3.4×10^{-04}	4.75×10^{-04}	1.02×10^{-03}	1.33×10^{-03}	1.33×10^{-03}
	Emissions	Oxygen-15	Ci	3.603×10^{-04}	6.4×10^{-05}	6.4×10^{-05}	3.4×10^{-05}	4.75×10^{-05}	1.02×10^{-04}	1.33×10^{-04}	1.33×10^{-04}

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
High Energy Radiation Megavolt Electron Source III (HERMES III) (TA-IV) (continued)											
Support	Facility Personnel	NA	FTEs	22	4	4	4	4	4	5.5	5.5
	Expenditures	NA	M Dollars	4.4	0.8	1.12	1.2	1.55	1.55	1.89	1.89
Radiographic Integrated Test Stand (RITS) (TA-IV)											
Major Facility Activities	Test Activities	Accelerator Shots	Shots	800	0	0	0	216	190	600	600
Material Inventories	Radioactive Material Inventory	Activated Hardware	kg	~500	0	0	0	0	0	0	0
	Explosives Inventory	Bare UNO 1.1	kg	300	0	0	0	0	0	0	0
	Other Hazardous Material Inventory	Insulator Oil	gal	40,000	0	0	0	10	10	30,000	30,000
Material Consumption	Explosives Consumption	NA	kg	300	0	0	0	0	0	0	0
Waste Generation	Low-Level Waste	NA	ft^3	120	0	0	0	0	0	3	3
	Hazardous Waste	NA	kg	272	0	0	0	0	0	0	0
Emissions	Radioactive Air Emissions	Nitrogen-13	Ci	0.16	0	0	0	0	0	0	0
Support	Facility Personnel	NA	FTEs	10	0	0	0	0	0	NR	N/A
	Expenditures	NA	M Dollars	4	0	0	0	0	0	NR	N/A
Repetitive High Energy Pulsed-Power Unit I (RHEPP I) (TA-IV)											
Major Facility Activities	Test Activities	Accelerator Tests	Tests	10,000	1,957	1,773	2,494	4,694	5,477	7,207	7,207
Material Inventories	Nuclear Inventory	Depleted Uranium	µg	100	0	0	0	0	0	0	0
	Other Hazardous Material Inventory	Insulator Oil	gal	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
Material Consumption	Nuclear Material Consumption	Depleted Uranium	µg	100	0	0	0	0	0	0	0
Waste Generation	Hazardous Waste	NA	kg	10	0	0	1	1	1	10	10

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Repetitive High Energy Pulsed-Power Unit I (RHEPP I) (TA-IV) (continued)											
Support	Facility Personnel	NA	FTEs	10	1.2	1.8	2.5	2.5	2.1	1	1
	Expenditures	NA	M Dollars	5.5	0.8	1.2	1.3	1.1	0.8	0.5	0.5
Saturn (TA-IV)											
Major Facility Activities	Test Activities	Irradiation of Components or Materials	Shots	500	152	137	111	178	102	177	177
Material Inventories	Other Hazardous Material Inventory	Insulator Oil	gal	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
Waste Generation	Hazardous Waste	NA	kg	1,286	384	480	194	89	89	1,850	1,055
Support	Facility Personnel	NA	FTEs	18	14	14	14	14	14	16.5	16.5
	Expenditures	NA	M Dollars	5.4	2.8	2.8	2.8	3.0	3.0	2.81	2.81
Short-Pulse High Intensity Nanosecond X-Radiator (SPHINX) (TA-IV)											
Major Facility Activities	Test Activities	Irradiation of Components or Materials	Shots	6,000	3,500	1,338	1,599	1,684	580	639	639
Material Inventories	Other Hazardous Material Inventory	Insulator Oil	gal	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Waste Generation	Hazardous Waste	NA	kg	107	63	94	35	0	0	63	63
Support	Facility Personnel	NA	FTEs	5	2	2	0	1	1	1.5	1.5
	Expenditures	NA	M Dollars	0.71	0.4	0.45	0.4	0.6	0.45	0.375	0.375
Tera-Electron Volt Energy Superconducting Linear Accelerator (TESLA) (TA-IV)											
Major Facility Activities	Test Activities	Accelerator Shots	shots	1,300	0	37	50	75	NR	93	102
Material Inventories	Other Hazardous Material Inventory	Insulator Oil	gal	10,000	10,000	20,000	20,000	20,000	NR	20,000	22,200
Waste Generation	Hazardous Waste	NA	kg	65	0	150	100	100	NR	400	400

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Tera-Electron Volt Energy Superconducting Linear Accelerator (TESLA) (TA-IV) (continued)											
Support	Facility Personnel	NA	FTEs	5	1	2	2.5	2	6	6	6
	Expenditures	NA	M Dollars	1.6	0.05	0.5	0.5	0.5	1.5	1.5	1.5
Z Accelerator (TA-IV)											
Major Facility Activities	Test Activities	Tritium	Shots	75	NR	NR	NR	NR	0	0	1 [n]
		Deuterium	Shots	100	NR	NR	NR	NR	32	34	34
		Plutonium-239	Shots	50	NR	NR	NR	NR	0	0	1 [n]
		Depleted Uranium	Shots	50	NR	NR	NR	NR	0	1	1
		Other	Shots	75	NR	NR	NR	NR	172	153	230
		NA	Total Shots	350	160	153	162	180	204	188	376
Material Inventories	Nuclear Inventory	Tritium	Ci	50,000	0	0	0	0	0	0	1 [n]
		Deuterium	L	5,000	100	350	350	600	600	700	770
		Plutonium-239	mg	200 (8g) [k]	0	0	0	0	0	0	1 [n]
		Depleted Uranium	mg	200	0	0	600	600	0	600	600
	Radioactive Material Inventory	Activated Hardware	kg	10,000	2,000	2,000	2,000	2,000	2,200	2,000	2,500
	Explosives Inventory	Bare UNO 1.1	g	1,500	225	0	0	0	0	0	0
	Other Hazardous Material Inventory	Insulator Oil	gal	700,000	700,000	700,000	700,000	700,000	700,000	700,000	945,000
Material Consumption	Nuclear Material Consumption	Tritium	Ci	7,500	0	0	0	0	0	0	1 [n]
		Deuterium	L	5,000	100	350	350	600	600	700	770
		Plutonium-239	mg	2,000	0	0	0	0	0	0	1 [n]
		Depleted Uranium	mg	2,000	0	0	600	600	0	600	900
	Radioactive Material Consumption	NA	Ci	0	0	0	0	0.0013	0.002	0	0
	Explosives Consumption	Bare UNO 1.1	g	37,500	225	0	0.14	300	450	150	1,500

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Z Accelerator (TA-IV) (continued)											
Waste Generation	Low-Level Waste	NA	ft^3	28	7.5	5	10	112	224	224	448
	Transuranic Waste	NA	ft^3	16	0	0	0	0	0	0	0
	Hazardous Waste	NA	kg	1,250	750	1,000	1,233	6,135	11,949	12,589	10,071
Support	Facility Personnel	NA	FTEs	115	50	55	55	55	55	55	66
	Expenditures	NA	M Dollars	4	1.2	1.8	1.82	1.98	2.0	2	3
Reactor Facilities											
Annular Core Research Reactor (ACRR) (TA-V)											
Major Facility Activities	Campaign Activities	Irradiation Campaigns	Campaign Series	2 to 3	0	3	5	4 to 5	150 to 200 days/yr	150 to 200 days/yr	150 to 200 days/yr
Material Inventories[f]	Inventory Nuclear	Enriched Uranium	kg	85	12	12	12	12	12	12	12
	Material	Plutonium-239	g	8,800	148	<8,800	<8,800	<10,000	<10,000	<10,000	<10,000
	Radioactive Material	Cobalt-60	Ci	33.6	33.6	33.6	33.6	0	0	0	0
	Explosives Inventory	Bare UNO 1.2	g	500	0	500	500	500	500	500	500
Material Consumption	Nuclear Material Consumption	Enriched Uranium	g	2	0	2	2	2	2	2	2
Waste Generation	Low-Level Waste	NA	ft^3	170	0	0	0	0	0	~120	~120
	Transuranic Waste	NA	ft^3	5 (8) [l]	0	5	6	5	5	5	5
	Mixed Waste	LLMW	ft^3	5 (270) [l]	0	5	5	5	5	5	5
		Mixed TRU	ft^3	5 (8.3) [l]	0	0	0	0	0	0	0
	Hazardous Waste	NA	ft^3	14 (23.3) [l]	0	14	14	14	14	10	10
Emissions	Radioactive Air Emissions	Argon-41	Ci	7.8 (13) [l]	0	30	39	10	10	4.48	4.48
Process	Wastewater Effluent	NA	gal	50,000	0	50,000	50,000	50,000	50,000	30,000	30,000

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Annular Core Research Reactor (ACRR) (TA-V) (continued)											
Support	Water Consumption	NA	gal	100,000	0	100,000	100,000	100,000	100,000	100,000	100,000
	Facility Personnel	NA	FTEs	8	1	4	4	4	6	10	10
	Expenditures	NA	M Dollars	12	0.2	4	4	4	5	2	2
Gamma Irradiation Facility (GIF) (TA-V)											
Major Facility Activities	Test Activities	Tests	Hours	24,000	0	0	0	280	412	10,000	10,000
Material Inventories	Radioactive Material Inventory	Co-60	Ci	2,000,000	0	0	95,500	90,000	180,000	310,000	310,000
	Explosives Inventory	Bare UNO 1.1	g	500	0	0	0	0	0	0	0
Material Consumption	Radioactive Material Consumption	Co-60	Ci	246,000	0	0	0	0	0	0	0
Waste Generation	Low-Level Waste	NA	ft^3	126	0	0	2	0	0	0	0
	Hazardous Waste	NA	ft^3	14	0	0	1	0	0	0	0
Support	Water Consumption	NA	gal	255,000	0	0	85,000	4,400	4,600	4,600	4,600
	Facility Personnel	NA	FTEs	3	0	2	2	2	2	4	4
	Expenditures	NA	M Dollars	1	0	1	1	1	1	0	0

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Hot Cell Facility (HCF) (TA-V)											
Major Facility Activities	Test Activities	Processing	Targets	1,300	0	0	0	0	0	0	0
Material Inventories	Nuclear Material Inventory	Enriched Uranium	g	125	0	0	0	0	0	0	0
		Low Enriched Uranium (LEU), <20% Enriched, as UO_2	kg	NA	NR	NR	NR	1,230	618	618	618
		U-235 in LEU	kg	NA	NR	NR	NR	74	43	43	43
		U- (Other) in LEU	kg	NA	NR	NR	NR	1,156	575	575	575
	Radioactive Material Inventory	NA	Ci	3.9	NR	NR	NR	NR	NR	0	0
	Spent Fuel Inventory	Spent Fuel	kg	399	0	0	0	0	0	0	0
	Explosives Inventory	Bare UNO 1.2	g	500	0	0	0	0	0	0	0
	Other Hazardous Material Inventory	NA	kg	0	0	0	0	0	0	0	0
Material Consumption	Nuclear Material Consumption	Enriched Uranium	kg	32.5	0	0	0	0	0	0	0
Waste Generation	Low-Level Waste	NA	ft^3	5,000	0	0	0	0	0	70	70
	Mixed Waste	LLMW	ft^3	40	0	0	0	0	0	0	0
	Hazardous Waste	NA	ft^3	22	0	0	0	0	0	0	0
Emissions	Radioactive Air Emissions	Tritium	Ci	2.2	0	0	0	0	0	0	0
		Argon-41	Ci	2.2	0	0	0	0	0	0	0
Support	Facility Personnel	NA	FTEs	55	0	0	0	0	0	4	4
	Expenditures	NA	M Dollars	0	0	0	0	0	0	0	0

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Sandia Pulsed Reactor (SPR) (TA-V)											
Major Facility Activities	Test Activities	Irradiation Tests	Tests	200	100	100	0	0	0	0	0
Material Inventories[f]	Nuclear Inventory	Plutonium-239	g	10,000	53	<10,000	<10,000	0	0	0	0
		Enriched Uranium	kg	1,000	600	600	330	330	330	330	330
	Explosives Inventory	Bare UNO 1.1	g	1,000	1,000	1,000	0	0	0	0	0
Waste Generation	Low-Level Waste	NA	kg	900	440	440	10	10	10	10	10
	Transuranic Waste	NA	ft^3	5	0	0	0	0	0	0	0
	Mixed Waste	LLMW	ft^3	14	4	4	0	0	0	0	0
		Mixed TRU	ft^3	5	0	0	0	0	0	0	0
	Hazardous Waste	NA	ft^3	30	7	7	1	1	1	1	1
Emissions	Radioactive Air Emissions	Argon-41	Ci	30.0	9.5	9.5	0	0	0	0	0
Support	Facility Personnel	NA	FTEs	17	10	10	4	4	5	5	5
	Expenditures	NA	M Dollars	6	0	4	4	4	4	4	4
Outdoor Test Facilities											
Aerial Cable Facility (ACF) Complex (Sol Se Mete Canyon)											
Major Facility Activities	Test Activities	Drop/Pull-Down	Tests	100	21	9	5	6	6	10	10
		Aerial Target	Tests	30	6	2	0	0	0	10	10
		Scoring System Tests	Series	2	0	0	0	0	0	0	0
Material Consumption	Explosives Consumption	Bare UNO 1.1	kg	78.8	18.9	9.5	9.5	4	4	10	10
		Bare UNO 1.3 (Rocket Motors)	kg	22,930	1,514	1,112	1,112	1,000	1,000	5,000	5,000
		Bare UNO 1.4	g	2,314	410	205	205	165	165	500	500
Waste Generation	Hazardous Waste	NA	kg	9	5	4.3	4	4	4	4	4

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Aerial Cable Facility (ACF) Complex (Sol Se Mete Canyon) (continued)											
Support	Facility Personnel	NA	FTEs	24	8	8	8	8	8	24	24
	Expenditures	NA	M Dollars	0.725	0.25	0.20	0.18	0.20	0.20	0.75	0.75
Explosives Applications Laboratory (Coyote Test Field)											
Major Facility Activities	Explosive Testing	Tests	Tests	275 to 360	240	138	180	107	161	274	274
Material Inventories	Explosives Inventory	Bare UNO 1.1	g	490,000	327,000	266,000	314,400	328,200	314,300	337,962	>337,962
		Bare UNO 1.2	g	98,250	65,000	1,290	12,800	12,700	974	995	995
		Bare UNO 1.3	g	3,210,000	2,140,000	2,370	1,230	11,850	3,900	2,474	2,474
		Bare UNO 1.4	g	4,050,000	2,700,000	54	1,260	877	1,660	3,720	3,720
	Other Hazardous Material Inventory	Film Developer/Fixer	gal	20	10	20	30	28	40	20	20
Material Consumption	Explosives Consumption	Bare UNO 1.1	g	263,000	175,000	18,100	17,000	32,600	46,300	43,788	>43,788
		Bare UNO 1.2	g	1,500	1,000	3,860	8.5	41	74	138	138
		Bare UNO 1.3	g	15,000	10,000	0	0	0	340	45	45
		Bare UNO 1.4	g	1,500	1,000	0	0	0	1,663	1,330	1,330
Waste Generation	Hazardous Waste	NA	kg	1.5 to 2	1	1.5	1.5	3	0	1	1
Support	Facility Personnel	NA	FTEs	6	3	4	5	5	4	6	6
	Expenditures	NA	M Dollars	0.975	0.65	0.80	0.81	0.81	0.85	0.775	0.775
Lurance Canyon Burn Site (Lurance Canyon)											
Major Facility Activities	Test Activities	Certification	Tests	55	12	10	8	10	6	47	47
		Model Validation	Tests	100	56	50	45	40	43	20	20
		User Testing	Tests	50	37	35	20	23	40	0	0
Material Consumption	Nuclear Material Consumption	DU	g	0	0	0	0	0	0	0	0
Waste Generation	Mixed Waste	LLMW	ft^3	0	0	0	0	0	0	0	0
	Hazardous Waste	NA	kg	900	900	900	900	900	900	900	900

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Lurance Canyon Burn Site (Lurance Canyon) (continued)											
Emissions	Open Burning	JP-8	burns/gal	50/25,000	37/ 5,000	35/ 5,000	20/ 25,000	23/ 25,000	40/ 16,000	67/4,500	67/4,500
		Wood	burns/kg	10/5,000	2/ 1,000	2/ 1,000	2/ 1,000	2/ 1,000	NR/ 500	0	0
		Rocket Propellant	burns/kg	5/7,500	0	0	0	0	0	0	0
Process	Wastewater Effluent	NA	gal	25,000	25,000	25,000	25,000	25,000	8,000	25,000	25,000
Support	Water Consumption	NA	gal	NA	0	10,000	10,000	10,000	11,300	minimal	minimal
	Facility Personnel	NA	FTEs	11	4.5	4.5	4.5	0.5	2	11	9
	Expenditures	NA	M Dollars	0.65	0.25	0.25	0.25	0.35	0.35	0.65	0.52
Thunder Range Complex (Coyote Test Field)											
Major Facility Activities	Other	Equipment Disassembly And Evaluation	Days	144	42	42	5	0	0	0	Activities at Thunder Range are still in planning stages. Projections are unavailable at this time. The responsible organization will communicate any changes in operations with the NEPA team as they become known.
		Ground Truthing Tests	Test Series	10	1	1	1	0	0	0	
Material Inventories[f]	Nuclear Material Inventory	Plutonium-238	Ci	0.62	0.62	≤0.62	≤0.62	0	0	0	
		Plutonium-239	Ci	0.52	0.52	≤0.52	≤0.52	0	0	0	
		Americium-241	Ci	0.52	0.52	≤0.52	≤0.52	0	0	0	
		Americium-243	Ci	0.52	0.52	≤0.52	≤0.52	0	0	0	
		Normal Uranium	Ci	4.2	4.2	≤4.2	≤4.2	0	0	0	
	Explosives Inventory	Bare UNO 1.1	g	436	436	436	436	0	0	0	
Support	Facility Personnel	NA	FTEs	2.6	0.8	0.8	0.8	0	0.05	0	
	Expenditures	NA	dollars	300,000	25	25	10	0	5	0	

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Selected Infrastructure Facilities											
Hazardous Waste Management Facility (HWMF) (South of TA-I)											
Major Facility Activities	Infrastructure	Collection, Packaging, Handling, and Short-Term Storage of Hazardous and Other Toxic Waste	kg	214,000	203,000	73,560	66,559	53,593	204,736	240,162	216,146
Material Inventories	Other Hazardous Material Inventory	Propane	lb	1,188	396	924	900	330	1,452	1,005	1,005
Support	Facility Personnel	NA	FTEs	35	13	11	13	9.5	13	13	13
	Expenditures	NA	M Dollars	2.7	0.9	1.2	1.97	1.936	1.914	2.26	2.26
Radioactive and Mixed Waste Management Facility (RMWMF) (TA-III)											
Major Facility Activities	Infrastructure	Receipt, Packaging, and Shipping of Radioactive Waste	M lb	2.7	0.250	0.250	1.9	1.2	0.175	0.177	0.177
Material Inventories	Other Hazardous Material Inventory	Propane	gal	6,630	6,630	6,630	6,630	6,630	6,630	6,630	6,630
		Liquid Nitrogen	L	8,320	8,320	8,320	8,320	8,320	1,893	8,320	8,320
Waste Generation	Low-Level Waste	Quantity Managed	ft^3	19,592	1,065	12,649	10,259	3,081	2,280	3,678	3,678
	Transuranic Waste	Quantity Managed	ft^3	353	48	48	0	<1	<1	0	0
	Mixed Waste	LLMW Managed	ft^3	8,833	394	394	364	60	0	282	282
		Mixed TRU Managed	ft^3	37	24	24	1	0	0	0	0
Emissions	Radioactive Air Emissions	Tritium	Ci	2.203	2.203	2.203	6.43×10^{-02}	6.43×10^{-02}	18.3	6.43×10^{-02}	6.43×10^{-02}
		Strontium-90	Ci	NA	NR	NR	NR	NR	NR	3.83×10^{-07}	3.83×10^{-07}
		Americium-241	Ci	NA	NR	NR	NR	NR	NR	2.52×10^{-07}	2.52×10^{-07}
		Cesium-137	Ci	NA	NR	NR	NR	NR	NR	1.06×10^{-08}	1.06×10^{-08}
Support	Facility Personnel	NA	FTEs	49	39	39	39	40	40	33	33
	Expenditures	NA	M Dollars	0.528	8	8	8	8	NR	7.5	7.5

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (continued)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Steam Plant (TA-I)											
Major Facility Activities	Infrastructure	Generate and Distribute Steam to DOE, TA-I, KAFB East, Coronado Club	M lb	544	544	517	529	683	247	220	<220 (decreasing due to facility modernization)
Material Inventories	Other Hazardous Material Inventory	Diesel Fuel	M gal	1.5	1.5	1.5	0.8	0.8	0.8	0.8	0.4
		Propane	gal	300	300	0	300	100	425	333	333
		Water Treatment Chemicals	gal	1,752	1,752	1,752	1,752	8,500	2,300	5,720	5,720
Support	Wastewater Effluent	NA	M gal	NA	NR	NR	NR	NR	NR	1.1	<1.1 (decreasing due to facility modernization)
	Water Consumption	NA	M gal	20	18	0	0	23.1	11.7	10.2	<10.2 (decreasing due to facility modernization)
	Electricity Consumption	NA	M kWh	1.2	1.2	1.2	1.2	1.27	1.1	0.2206	<0.2206 (decreasing due to facility modernization)
	Boiler Energy	Natural Gas	M ft^3	779	779	806	806	721	493	399.5	<399.5 (decreasing due to facility modernization)
	Facility Personnel	NA	FTEs	17	17	14	16	16	16	16	16
	Expenditures	NA	M dollars	2.87	2.8	2.8	2.8	3.0	3.8	1.6	<1.6 (decreasing due to facility modernization)

Table 2.2-1. Summary of Activity Levels at Selected Facilities/Facility Groups, 1999 through 2004 (concluded)

Category	Description	Activity Type or Material	Units (per Year)	1999 SNL/NM SWEIS EOA	FY1999	FY2000	FY2001	CY2002	CY2003	CY2004	CY2005-2009 (Average Annual Projection)
Thermal Treatment Facility (TTF) (TA-III)											
Major Facility Activities	Infrastructure	Waste Treated	lb	1,200	2.95	2.95	0	0	0	2,181	2,181
Material Inventories	Explosives Inventory	Bare UNO 1.1	g	10,366	5.1	5.1	0	0	0	0	0
		Bare UNO 1.3	g	165.7	0	0	0	0	0	0	0
	Other Hazardous Material Inventory	Propane	gal	500	500	500	0	0	0	500	500
Waste Generation	Hazardous Waste	NA	kg	272	0	0	0	0	0	12.7	12.7
Emissions	Open Burning	Propane	gal	120	8	8	0	0	0	1,356 (sum total)	1,356 (sum total)
	Open Burning	Waste products	kg	NA [m]	NA [m]	NA [m]	NA [m]	NA [m]	NA [m]	976.9	976.9
Support	Facility Personnel	NA	FTEs	1	0.1	0.1	0.1	0	0	0.2	0.2
	Expenditures	NA	Dollars	100,000	10,000	10,000	0	0	0	1,000	1,000

Sources: SNL/NM 2001c, SNL/NM 2002b, SNL/NM 2003b, SNL/NM 2005a, SNL/NM 2005b, SNL/NM 2006b
Ci = curie
DU = Depleted Uranium
FTE = full-time equivalent
g = gram
gal = gallon
kg = kilogram
kWh = kilowatt-hour
L = liter
LLMW = low-level mixed waste
LNG = liquid natural gas
M = million
μg = microgram
mg = milligram
NA = not applicable
NR = not reported
TRU = transuranic
UNO = United Nations Organization (explosives categories)
[a] DU used in remote sensing and laser calibration; was temporarily stored in facility.
[b] One time quantity due to waste minimization effort designed to reduce chemical inventories.
[c] Related to MESA upgrades.
[d] This number increased to 1,236 based on analyses in the Rapid Reactivation EA (DOE 1999a).
[e] Based on SWEIS conversion factor from Appendix H2, Table H.3-1 (DOE 1999b).
[f] Based on SWEIS conversion factor from Appendix H2, Table H.3-1 (DOE 1999b).
[g] No number provided in SWEIS. This value was taken from SNL/NM Facilities and Safety Information Document, Volume II.
[h] Not tracked in SWEIS, nor in subsequent Annual Reviews, until 2004, when an LNG storage tank with pipeline was constructed.
[i] Not tracked in SWEIS, nor in subsequent Annual Reviews, until 2004.
[j] An increase in hazardous waste is a onetime event due to an oil spill and the related cleanup.
[k] This number reflects changes from the SWEIS EOA threshold to that identified in the NEPA Supplement Analysis for the Z Machine (DOE 2002a).
[l] This number reflects changes from the SWEIS EOA threshold to that identified in the NEPA Supplement Analysis for the ACRR and serves as a revised operational limit (DOE 2001a).
[m] Open burning of waste products was not tracked as part of the SWEIS analysis. CY2004 was the first year that this type of data was tracked.
[n] Data originally reported as 100-percent increase over 2004 operations (zero); clarified in SNL/NM 2005g.

2.2.1 MANUFACTURING, R&D LABORATORIES, AND TESTING FACILITIES

2.2.1.1 Advanced Manufacturing Processes Laboratory

The Advanced Manufacturing Processes Laboratory (AMPL) is a one-story structure in TA-I, Building 878, with a basement that includes research and support space. Operations at the AMPL are typically laboratory and small-scale operations involving materials technology, fabrication, prototyping, and process research. Operations include, but are not limited to, development of processes utilizing plastics and organics, nonexplosive powders, adhesives, potting compounds, ceramics, glass, laminates, microcircuits, lasers, machine shop equipment, electronic fabrication, multichip modules, thin-film brazing and deposition, and plating. Other activities include materials characterization, mechanical measurement and calibration, and mechanical engineering.

<u>**Facility Changes since SWEIS Analysis**</u>

According to data and information compiled during the preparation of this SA, there have been no substantial changes to the AMPL since the 1999 SNL/NM SWEIS analysis.

<u>**Operations since SWEIS Analysis**</u>

Operations at the AMPL remain substantially the same as those analyzed in the SWEIS. Recent values for staffing and expenditures are below levels used in the SWEIS EOA analysis. Hazardous waste generation has exceeded the SWEIS EOA level for every year from FY1999 through 2003. Operational hours exceeded the SWEIS estimate in 2003.

2.2.1.2 Explosive Components Facility

The Explosive Components Facility (ECF) is a low-hazard, nonnuclear facility used for explosives testing, located in TA-II in Building 905. The facility is a self-contained, secure site designed to provide maximum protection for adjacent facilities and the environment. The complex includes a main building, explosive storage magazines, and service drives and parking areas.

The ECF consolidates numerous ongoing activities relating to SNL/NM’s mission in energetic component research, testing, development, and quality control to enhance safety and productivity.

Specific activities at the ECF include physical and chemical testing of explosives, pyrotechnics, and propellants. The ECF also continues to support stockpile surveillance of these energetic materials. R&D at the ECF involves advanced explosive components, neutron generators, and batteries.

<u>**Facility Changes since SWEIS Analysis**</u>

According to data and information compiled during the preparation of this SA, there have been no substantial changes to the ECF since the 1999 SNL/NM SWEIS analysis.

<u>**Operations since SWEIS Analysis**</u>

Operations at the ECF remain substantially the same as those analyzed in the SWEIS. Annual neutron generator tests have been less than half of the estimated number used in the SWEIS EOA analysis. Explosive testing, chemical analysis, and battery tests are also at or below estimates used in the SWEIS

EOA analysis. However, in 2004, the SWEIS EOA levels were exceeded for explosives inventories, explosives consumption of bare UNO 1.1 and 1.4, hazardous waste generation, facility personnel, and expenditures.

2.2.1.3 Integrated Materials Research Laboratory

The Integrated Materials Research Laboratory (IMRL), in TA-I, Building 897, is comprised of office space and laboratory space within a four-story concrete building with a full basement and mechanical penthouse.

The IMRL provides offices and laboratory space for conducting materials and advanced components research, including lab studies in chemistry, physics, and alternative energy technologies. Materials studied at the IMRL include: ceramics; organic polymers; advanced metallic alloys; semiconductors for electronic and photonic applications; high temperature superconductors; metals with properties tailored for improved resistance to friction, wear, corrosion and erosion; and laser, optical, and dielectric materials. Biological research is focused on the interface between materials science and biology, including the science of integration of biomolecular processes, biological principles, biomimetic materials, and biomolecular function into nano- and micro-scale systems.

Research at the IMRL enables development of new materials for government and industrial needs. The facility integrates research from the atomic scale, through the development of electronic devices, to full scale mechanical components. The experimental work is augmented by advanced computer modeling and simulation techniques.

Facility Changes since SWEIS Analysis

There have been no substantial changes to the IMRL since the 1999 SNL/NM SWEIS analysis. Co-located with some of IMRL's existing facilities for nanoscale science research microfabrication, the Gateway to Sandia Facility will provide office and laboratory space for Center for Integrated Nanotechnologies (CINT) Gateway users. The Gateway to Sandia Facility is part of CINT (see Section 2.2.7.3).

Operations since SWEIS Analysis

Operations at the IMRL remain substantially the same as those analyzed in the SWEIS. Recent values for operational hours, depleted uranium inventory, staffing, and expenditures are at or below levels used in the SWEIS EOA analysis. Hazardous waste generation exceeded the SWEIS EOA level for FY1999, FY2000, FY2001, and 2004.

2.2.1.4 Microelectronics Development Laboratory

The Microelectronics Development Laboratory (MDL) is located in TA-I, Building 858, and is a two-story structure with a basement, cleanrooms, offices, numerous storage areas, and light laboratories. The light labs provide work environments primarily for wafer test equipment, die packaging, scanning electron microscopy, device radioactive source exposure, and device inspection.

The MDL supports R&D in state-of-the-art microelectronics production methods. Projects performed in the MDL may combine manufacturing techniques currently available only at the prototype level.

Activities include R&D on microelectronic devices for nuclear weapon applications, which entail fabrication (integrated circuits, microsensors/controllers, and micromachines), study and improvement of silicon semiconductor processing, product development for microelectronic systems, corrosion studies, and development of new processes and prototypes, including miniature fuel cells and fuel processors.

The MDL also supports ongoing efforts between the NNSA and the Department of Defense (DoD) to employ the equipment and expertise available at the national laboratories in the development of advanced, cost-effective, nonnuclear munitions.

Facility Changes since SWEIS Analysis

Under the SWEIS, the MDL was assessed in two configurations. One configuration covered expansion of the existing MDL, and the other included the MDL as part of the Microsystems and Engineering Science Applications (MESA) Complex, an integration of SNL/NM capabilities to support the areas of stockpile stewardship and management, the Stockpile Life Extension Program, and the Defense Program's Enhanced Surety Campaign. Major components of the MESA Complex are being constructed adjoining the MDL. By sharing modernized equipment with the MDL, the MESA Complex will integrate activities of both the MDL and the Compound Semiconductor Research Laboratory (CSRL). Although MESA was included in the SWEIS EOA, subsequent changes to the planned capabilities of the facility required DOE to prepare a separate Environmental Assessment (EA) for MESA (DOE/EA-1335) in September, 2000. MESA is discussed in detail in Section 2.2.11.1.

As part of the MESA renovation package in 2002, several of the MDL's primary facility and safety systems were upgraded. A new acid exhaust system was installed, the hydrochloric acid and sodium hydroxide bulk storage tanks were replaced with a new chemical distribution system, upgrades to the process chilled water system were completed, and an emergency generator was installed. In addition, a new hazardous gas bunker was constructed to replace the current bunker in the basement of the MDL. The MESA project also installed approximately 35 new tools in the MDL.

Operations since SWEIS Analysis

Operations at the MDL and MESA remain substantially the same as those analyzed in the SWEIS. Recent values for microelectronic devices and systems produced, LLW generated, natural gas consumption, and staffing, are at or below levels used in the SWEIS EOA analysis. Annual process water consumption and process wastewater generation have exceeded the SWEIS EOA level at times during the past five years. Electrical use slightly exceeded EOA levels in FY1999, FY2000, and 2004. MDL expenditures have been approximately 5 times greater than SWEIS estimates for the 1999 through 2003 period, and more than 8 times as much in 2004 due to MESA upgrades. Hazardous waste generated exceeded SWEIS estimates in FY2000, and greatly exceeded the SWEIS estimate in 2004, due to a one-time waste minimization effort to reduce chemical inventories.

2.2.1.5 Neutron Generator Production Facility

The Neutron Generator Facility, now known as the Neutron Generator Production Facility (NGPF), is a low-hazard, nonnuclear facility located in TA-I; the complex includes buildings 700, 702, 857, 870, 879, and 905. The NGPF is situated in Building 870, a two-story structure with a basement. Most processing and assembly operations take place in this building, although various support operations occur elsewhere, such as at the ECF.

Operations at the NGPF include fabrication of neutron generators and prototype switch tubes. SNL/NM provides experimental testing and production-lot sample testing of explosive neutron generators and 100-percent functional testing of electronic neutron generators. Electronic generators are reusable; when tested, they typically do not generate waste. Explosive generators are one-use items that are tested in a protective enclosure; testing results in the generation of classified mixed waste.

Facility Changes since SWEIS Analysis

In FY2000, extensive modifications were made within the tritium envelope in Building 870 which included removal and replacement of gloveboxes, fume hoods, and other equipment. By FY2001, the NGPF and its complex encompassed buildings 700, 857, 870, 879, and portions of 905. In FY2001, security upgrades were performed at buildings 870 and 700.

Building 857B modifications were completed in June 2001 as part of the Rapid Reactivation Project (DOE 1999a). Building 857 was expanded through the construction of an approximately 15,000-gross-square-foot (gsf) addition to support ancillary processes to be moved from Building 870. The new space includes a vault-type room with electrical and mechanical rooms and a process equipment chase; office, lobby, restroom, locker, and break room space are included as transition space between the existing Building 857 and the added area. Construction took place immediately north of Building 857 in a previously disturbed location in SNL/NM's TA-I.

The most significant transfer of process activities involved the relocation of the following activities from the NGPF (Building 870) to the Building 857 addition:

- Abrasive blast—Surface preparation and cleaning of generator parts and assembly fixtures
- Metal flame spray—Metal coatings deposited on neutron generator subassemblies
- Encapsulation—Vacuum encapsulation of electrical components with epoxy resins
- Mold assembly—Assembly and inspection of encapsulation molds and fixtures
- X-ray—Digital x-rays of completed tubes and generators for acceptance testing
- Mold preparation—Cleaning and preparation of encapsulation molds and fixtures prior to processing
- Machining processes—Milling and machining neutron generator parts
- Conformal coating—Application of a protective coating to external surfaces of neutron generators
- Generator assembly—Assembly operations, in-process tests, and resistance welding completed prior to preparation for encapsulation
- Neutron generator final assembly—Assembly of neutron tubes and ferroelectric generators
- Joining and welding—Furnace and Research Foundation brazing; tungsten, plasma-inert-gas, and laser welding and marking; and final product inspections

Other NGPF changes include modification of floor space and installation of a braze hydrogen furnace in Building 870, and transfer of an existing furnace from Building 870 to Building 700.

Production capabilities in the Advanced Manufacturing Prototyping Facility, Building 700, were added in 2002. This included installing the capacity to allow crews to perform neutron tube development work in parallel with production activities within the NGPF. Installation of a tritium exhaust system was the major modification performed for this activity.

An approximately 10,000-ft^2 addition to the south side of Building 700 was completed in 2003, consisting of a highbay, light lab, office space, and associated support areas. This addition allows neutron generator development work to be performed in a separate area from the production work.

In 2005, the NNSA prepared the *Final Environmental Assessment for the Proposed Consolidation of Neutron Generator Tritium Target Loading Production* (DOE 2005a). Under the proposed action, two production loaders would be relocated from Los Alamos National Laboratory (LANL) to Building 870. Until at least 2008, only one loader would be installed and used while the other remains in storage. Minor modifications would be made to two rooms and associated gas and electric lines.

Operations since SWEIS Analysis

Operations at the NGPF remain substantially the same as those analyzed in the SWEIS. Recent values for neutron generator production, tritium emissions, process water consumption, process wastewater generated, and facility staffing are at or below levels used in the SWEIS EOA analysis. Tritium inventories exceeded SWEIS estimates in FY1999, FY2000, and 2002. Tritium consumption exceeded the SWEIS estimate in 2004. LLW generation exceeded SWEIS estimates in FY2001, 2002, and 2004. LLMW generation exceeded SWEIS estimates in FY2001, 2002, 2003, and 2004. Hazardous waste generation exceeded SWEIS estimates in 2003 and 2004. Expenditures have ranged from five to twelve times the SWEIS estimate over the 1999-2004 time period.

The operating levels specified under the 2008 timeframe and the SWEIS EOA are sufficient to replace units and maintain current stockpile levels. By prebuilding units during periods of low production to reduce peaks of high production, it is possible to stabilize at the operating levels projected in the SWEIS. These operating levels can then be supported within the existing facility by rearranging and relocating certain operations. The tritium envelope must be expanded to provide space for increased tube exhaust and processing capacity. Two additional product testers will be required, making it necessary to also expand the tester area. These expansions will be accommodated by relocating offices, conference rooms, and some neutron generator operations to the AMPL (Building 878). This will also free up space in the NGPF for additional brazing capacity.

2.2.2 Physical Testing and Simulation Facilities

2.2.2.1 Centrifuge Complex

The Centrifuge Complex is a low-hazard, nonnuclear facility comprised of an indoor centrifuge and an adjacent outdoor centrifuge, located in TA-III, Building 6526.

The Centrifuge Complex is used for acceleration testing of large objects, such as weapon systems, satellite systems, reentry vehicles, and rocket motors. The facility is also used by SNL Energy and Environment programs to certify transportation technology designs.

For continuous acceleration tests, objects are attached to the end of a boom that rotates around a central shaft. A superfuge capability provides for the combination of acceleration, spin, and vibration.

Facility Changes since SWEIS Analysis

An EA and Finding of No Significant Impact (FONSI) published for the Test Capabilities Revitalization (TCR) in 2003 describes renovation and modifications at the Centrifuge Complex that are scheduled between 2004 to 2014. These renovations include:

- Improvements to data acquisition capabilities.
- General site and infrastructure improvements to address water and sewer needs, paving, soil contamination (hydraulic fluid), and demolition of substandard buildings.
- Major renovations to Building 6526, which houses a 29-ft centrifuge, to include security and code compliance upgrades.
- Construct a 2,500 ft^2 addition to Building 6526 to consolidate work/storage spaces now located in substandard buildings that will be demolished (DOE 2003b).

Operations since SWEIS Analysis

Operations at the Centrifuge Complex remain substantially the same as those analyzed in the SWEIS. The number of annual impact tests, explosives consumption, generation of hazardous waste, facility staffing, and expenditures are all within estimates used in the SWEIS EOA analysis.

2.2.2.2 Drop/Impact Complex

The Drop/Impact Complex is a low-hazard, nonnuclear facility, comprised of two drop towers: a 185-ft tower (next to a hard surface) and a 300-ft tower (next to a water-filled pool). The complex is located in TA-III, Building 6510. A 600-ft long rocket sled track, located at the end of the pool opposite the tower, supports rocket-accelerated impact tests into the pool.

The 185-ft drop tower is used to drop test items weighing up to 9,000 lb onto prepared surfaces such as dirt, reinforced concrete, or steel plates. A cable stretched over the top of the tower to anchors on the ground allows test items weighing up to 2,000 lb to slide down a carriage, and be released, in order to fall onto a target. A guide wire system attached to the 185-ft drop tower is used to drop punch-type structural shapes for impact on shipping containers.

Test items weighing up to 3,000 lb can be targeted into the water pool from the 300-ft drop tower and either dropped or accelerated by rocket-assisted pull-down to strike the water at velocities of up to 600 feet per second (ft/s) and at 30° to 90° angles. Submersion tests, conducted in the water pool, can include detonation of explosive charges up to 1 lb to test blast effects.

Facility Changes since SWEIS Analysis

To facilitate experiments involving liquid natural gas (LNG) burns, several vacant buildings adjacent to the water pool were removed. An LNG storage tank with pipeline was constructed in 2004. A cryogenic pipeline was also installed in 2004 to support the LNG burns. Insulation was installed on facility equipment for fire protection.

Operations since SWEIS Analysis

Operations at the Drop/Impact Complex remain substantially the same as those analyzed in the SWEIS, with the addition of LNG tests now performed at the facility. Material inventories, emissions, and process requirements are also within parameters analyzed in the SWEIS EOA with two exceptions. One exception is in Other Hazardous Material Inventory because LNG was not tracked in the SWEIS, nor in subsequent annual reviews, because it was not used until 2004. The other exception is that explosives consumption of bare UNO 1.3 and bare UNO 1.4 exceeded the SWEIS EOA levels in FY1999, FY2000, FY2001, and 2002.

2.2.2.3 Sled Track Complex

The Sled Track Complex consists of numerous buildings and structures in TA-III, including buildings 6741, 6736, 6743, 6742, 6743-A/B, 6747, 6744, 6745, 6746, and 6751. The main building is divided into a control room, a workshop area, and a highbay assembly area. The Sprint Building and the Explosives Assembly and Rocket Motor Conditioning Facility provide support to activities in the main building.

The main sled track is a 10,000-ft concrete beam supporting two continuously-welded steel rails at a 22-in. gauge with a 1-ft^2 trough (cast in the concrete beam between the rails). For recoverable sleds, scoops are attached underneath the sled, which drag against water in the trough, thus providing a controllable braking mechanism. The complex also includes a rocket launcher with a 70-ft launch rail. Located just southeast of the main sled track, the rail is used to launch test items into targets. A portable 10-ft beam mounted on a trailer can also be used at the Sled Track Complex to launch free-flight, rocket-powered, parachute test vehicles.

The Sled Track Complex provides a controlled environment for high-velocity impact, aerodynamic, and acceleration testing of small and large items used to simulate high-speed impacts of weapon shapes, substructures, and components to verify design integrity, performance, and fuzing functions. The facility is also used to subject weapon parachute systems to aerodynamic loads to verify parachute design integrity and performance. The complex also provides the capability to verify designs in transportation technology, reactor safety, and Defense Program transportation systems.

Facility Changes since SWEIS Analysis

An EA and Finding of No Significant Impact (FONSI) published for the TCR in 2003 describes the renovation of the Sled Track Complex that is scheduled between 2004 and 2014. These renovations include:

- Replace the track-side cabling and provide the target handling area.
- Renovate multiple buildings to extend their useful life by 25 years and remove substandard buildings.
- Upgrade of test and site infrastructure including instrumentation, data acquisition capabilities, and power and communications.
- Complete site improvements, including drainage, grading, and paving (along south 5,000 ft of track) and track repairs (concrete, clamps, rails, and alignment) (DOE 2003b).

Operations since SWEIS Analysis

Operations at the Sled Track Complex remain substantially the same as those analyzed in the SWEIS. The number of tests conducted at the Sled Track Complex is within the number analyzed in the SWEIS EOA. Material inventories, consumption, emissions, and process requirements are also within parameters analyzed in the SWEIS, with the exception of solid rocket propellant consumption that was not tracked in the SWEIS. Solid rocket propellant consumption is expected to increase from 1,000 lb/yr in 2004 to 3,000 lb/yr by 2009.

2.2.2.4 Terminal Ballistics Facility

The Terminal Ballistics Facility (TBF) is a low-hazard, nonnuclear facility that includes a main building, two smaller buildings, and four explosive storage magazines. The facility is located in TA-III, Building 6750. The main building houses a small machine shop, office space, a control area, and an indoor firing range. An ancillary building is used for the assembly of large propellant charges and for temperature conditioning of propellants. The four magazines can be used for the storage of propellants and explosives.

The outdoor, large-caliber gun range has a 155 millimeter (mm) “Long Tom” artillery piece permanently mounted in a revetment adjacent to the main building.

The TBF provides secure, remote, indoor and outdoor test facilities for ballistics studies and solid-fuel rocket motor tests. Indoor testing of firearms and projectiles is conducted from a fixed stand to provide controlled firing of ammunition (≤ 20 mm). Various guns may be used for projectile or penetration tests, with targets placed up to ~1,000 ft south of the main building.

For outdoor thrust tests, a rocket is oriented vertically on the static test stand, with the nose resting on a load cell (to measure thrust force during the propellant burn cycle). Spin rockets are tested using a horizontal fixture with a load cell. Munitions testing performed outdoors in explosive-rated chambers may use both explosives and chemicals.

Facility Changes since SWEIS Analysis

In 2004, two thermobaric test chambers and one 500-gallon (gal) liquid nitrogen (LN_2) tank were installed at the TBF.

Operations since SWEIS Analysis

In 2004, operations at the TBF included 100 projectile impact test series and 25 propellant test series. The TBF also performed 130 test series in support of both thermobaric (30 tests) and outdoor explosives testing (100 tests).

Both explosive material inventories and consumption rates exceeded SWEIS EOA values in 2004. This is due to increased activities at the TBF in support of programs involved with Work-for-Others Projects supporting homeland security and defense missions not planned at the time of the SWEIS publication. Hazardous waste emissions from open burning, and expenditures reported in 2004 also exceeded SWEIS EOA values, as well as expenditures in FY2001, 2002, and 2003.

While the quantities of individual explosive materials and explosive material consumption exceed SWEIS EOA values by factors of between 9 and 32, the total increase in quantities for explosive material inventory and consumption from the SWEIS EOA are 1,051 kilograms (kg) and 1,072 kg, respectively. These quantities are small in comparison to site-wide inventories and consumption (the SWEIS EOA value for explosives consumption at the Aerial Cable Facility [ACF] Complex alone is more than 25,000 kg).

2.2.3 ACCELERATOR FACILITIES

2.2.3.1 Advanced Pulsed-Power Development Laboratory

In 2001, the Advanced Pulsed-Power Research Module was formally renamed the Advanced Pulsed-Power Development Laboratory (APPDL). The APPDL is located in TA-IV, Building 963, and is used to evaluate new pulsed-power components and component alignments, to develop future accelerators and improve performance of existing accelerators. The APPDL also serves as a test-bed for other projects and can be used for conducting general pulsed-power research. The APPDL currently uses three accelerators: 1) Dielectric Cavity Adder, 2) Switch Test-Bed, and 3) the System Assessment Test-Bed Program.

The Dielectric Cavity Adder and Switch Test-Bed share a common 120,000-gal insulator oil tank. The System Assessment Test-Bed Program has its own 54,000-gal insulator oil tank. The total insulator oil tank capacity at APPDL is approximately 225,000 gals.

Activities at the APPDL involve the study of power storage, high-voltage switching, and power flow for advanced applications. APPDL activities also support the development of technologies to enhance current facility capabilities or new designs.

Facility Changes since SWEIS Analysis

According to data and information compiled during the preparation of this SA, there have been no substantial changes to the APPDL since the 1999 SNL/NM SWEIS analysis.

In CY2001, SNL/NM installed a new oil tank for the APPDL, which accounts for the increase in insulator oil at the facility (SNL/NM 2003b).

Operations since SWEIS Analysis

During 2004, the APPDL operations included 978 accelerator shots; this is within the level of activity analyzed in the SWEIS EOA. The 2004 information on material inventories, consumption, emissions, and process requirements were below parameters analyzed in the SWEIS EOA, with the exception of Other Hazardous Material, Hazardous Waste, and facility personnel.

In 2004, the APPDL reported a spike in hazardous waste generation due to an internal oil release to secondary containment trenches. Roughly 95 percent of the 30,000 gal release was reclaimed and there was no release to the environment. The 2,100 kg of wastes reported was due largely to the cleanup materials used. Although not *Resource Conservation and Recovery Act* (RCRA)-regulated, this waste was reported as hazardous waste.

2.2.3.2 High Energy Radiation Megavolt Electron Source III

The High Energy Radiation Megavolt Electron Source III (HERMES III) is housed in the Simulation Technology Lab located in TA-IV, Building 970. This multifloor building with a basement accommodates offices, shop areas, administrative areas, storage areas, and lab space.

HERMES III is a high-energy, inductive voltage adder accelerator, producing an intense electron beam that, when it interacts with a grounded bremsstrahlung converter, generates intense gamma-ray output with 18-mega-electron volt (MeV) endpoint voltage. HERMES III can provide high-fidelity simulation over very large areas, with applications including electronics testing for component and weapon system development, to ensure the operational reliability of weapon systems in radiation environments. HERMES III may also be operated in a reverse-polarity mode for experiments on extraction ion diodes and radiography R&D. The accelerator is also used to study radiation transport through matter, radiation deposition in materials, damage to beyond-design-life components and circuits, and research into damage mitigation.

Facility Changes since SWEIS Analysis

According to data and information compiled during the preparation of this SA, there have been no substantial changes to HERMES III since the 1999 SNL/NM SWEIS analysis.

Operations since SWEIS Analysis

During 2004, operations at HERMES III included 532 accelerator shots. This level of activity is substantially less than that analyzed in the SWEIS EOA. 1999 through 2004 information on material inventories, consumption, air emissions, and process requirements were also within parameters analyzed in the SWEIS EOA.

2.2.3.3 Radiographic Integrated Test Stand

The Radiographic Integrated Test Stand (RITS) is an evolving facility located in TA-IV, Building 970. The mission of the RITS is to provide the underlying science and technology for pulsed power-driven flash radiographic x-ray sources for the NNSA. Flash x-ray radiography is a penetrating diagnostic to discern the internal structure in dynamic experiments to investigate the behavior leading to nuclear weapon initiation. Short (~50-nanosecond [ns] duration) bursts of very high intensity x-rays from millimeter-scale source sizes are required at a variety of voltages to address this mission. RITS was designed and is used to develop the accelerator technology needed for these experiments and serves as the principal test stand to develop the high intensity electron beam diodes which generate the required x-ray sources. It has evolved from a single induction cavity (RITS-1 at 1.5 MeV) through three (RITS-3 at 5.5 MeV) to six (RITS-6 at ~11 MeV) cavities to address the breadth of this mission. Expansion to more than six cavities is not anticipated, but multiple-pulse operation is contemplated.

The facility includes the accelerator and an exposure (test) cell. The accelerator will, in its anticipated configuration, be 60 feet wide, 30 feet long, and 16 feet high. Routine radiation exposures are performed in the heavily shielded exposure cell.

Facility Changes since SWEIS Analysis

Though analyzed in the SWEIS, the RITS did not begin operation until 2002. The RITS incorporated portions of the Sandia Accelerator & Beam Research Experiment Facility, while other portions were dismantled and decommissioned. There have been no substantial changes to the RITS from the configuration analyzed in the 1999 SNL/NM SWEIS.

Operations since SWEIS Analysis

RITS operations in 2004 included approximately 600 accelerator shots. Material inventories, consumption, emissions, and process requirements have remained within parameters analyzed in the SWEIS EOA since the beginning of operations in 2002.

2.2.3.4 Repetitive High Energy Pulsed-Power Unit I

The Repetitive High Energy Pulsed-Power Unit I (RHEPP I) facility includes a Marx generator, a pulse-forming line, a linear induction voltage adder, and a vacuum diode load. RHEPP I is housed in Building 986, located in TA-IV. The RHEPP I system consists of a 150-kilowatt (kW) power supply, four stages of linear induction voltage addition, and the vacuum diode.

RHEPP I was the first SNL/NM RHEPP-type accelerator used for basic technology development of the RHEPP technical concept. It is now used for applications at lower energies including technology development and some experimental work with materials and organic sterilization processes. RHEPP I also supports technology development for continuous operation of pulsed-power systems that demonstrate high-average-power, ion-beam outputs at energies up to 1 MeV and power up to 45 kW, suitable for industrial applications.

Facility Changes since SWEIS Analysis

According to data and information compiled during the preparation of this SA, there have been no substantial changes to RHEPP I since the 1999 SNL/NM SWEIS analysis.

Operations since SWEIS Analysis

Since the SWEIS, the number of operations, material inventories, consumption, emissions, and process requirements have been within parameters analyzed in the SWEIS EOA.

2.2.3.5 Saturn

The Saturn accelerator in TA-IV, Building 981, is housed in a multifloor facility comprised of a laboratory building (highbay, office space, shop areas, light labs, a mechanical room, radiation exposure cell, and basement), storage tanks, and transfer systems for large quantities of transformer oil and deionized water.

The Saturn accelerator produces x-rays to simulate the radiation effects of nuclear weapon detonation on electronic and material components, as a pulsed-power and radiation source, and as a diagnostic test-bed. Areas of application include satellite systems, Strategic Defense Initiative space assets, and reentry vehicle and missile subsystems. Activities at Saturn support stockpile stewardship programs in the development and survivability testing of nuclear weapon subsystems and components by providing hostile radiation environmental testing, including simulating the x-rays produced by a nuclear weapon detonation.

Facility Changes since SWEIS Analysis

According to data and information compiled during the preparation of this SA, there have been no substantial changes to Saturn since the 1999 SNL/NM SWEIS analysis.

Operations since SWEIS Analysis

Since the SWEIS, the number of accelerator shots, material inventories, consumption, emissions, and process requirements have been within the parameters analyzed in the SWEIS EOA. 2004 hazardous waste volumes exceeded the SWEIS EOA threshold because of the addition of some beryllium-contaminated items to overall waste volumes.

2.2.3.6 Short-Pulse High Intensity Nanosecond X-Radiator

The Short-Pulse High Intensity Nanosecond X-Radiator (SPHINX) accelerator facility is a concrete-shielded enclosure adjacent to the Saturn accelerator in TA-IV, Building 981. The accelerator consists of an 18 stage, low-inductance Marx generator, two oil pulse-forming lines, a vacuum pulse-forming line, and radiation barriers. The radiation barrier is a concrete-shielded enclosure with a movable skyshine shield attached to the top of the transmission line/diode.

SPHINX provides radiation environments for testing DOE components of nuclear weapons and for confirming codes used in the certification of nuclear weapons components. SPHINX can operate in two distinct modes—as a bremsstrahlung x-ray source and as an electron beam source. Current activities at SPHINX involve the R&D associated with high-shot-rate, hot x-ray effects simulation to test components that require small area exposure. The electron beam mode is used to support development work for tactical and strategic satellite systems.

Facility Changes since SWEIS Analysis

According to data and information compiled during the preparation of this SA, there have been no substantial changes to SPHINX since the 1999 SNL/NM SWEIS analysis.

Operations since SWEIS Analysis

Since the SWEIS, the level of activity has been within the number of shots per year analyzed in the SWEIS EOA. Material inventories, consumption, emissions, and process requirements have remained within SWEIS analysis parameters.

2.2.3.7 Tera-Electron Volt Energy Superconducting Linear Accelerator

The Tera-Electron Volt Energy Superconducting Linear Accelerator (TESLA) facility is located in TA-IV, Building 961. TESLA was formerly known as the Magnetically Insulated Transmission Experiment accelerator. The facility is comprised of a single-story building divided into two sections: a highbay area and an office/lab area. The accelerator consists of two oil tanks, a water tank, and a concrete-shielded test cell. The test cell includes a vacuum storage inductor, a magnetically controlled plasma opening switch, and an electron beam load. Each oil tank contains 10,000 gal of transformer oil and a Marx generator.

The TESLA facility operates to test plasma opening switches for pulsed-power drivers. The primary operating mode of TESLA produces a pulse that lasts ~40 ns, with 150 kilojoules of electrical energy and 700-kiloamperes peak diode current at a peak voltage of 5 MV or less. TESLA produces ionizing radiation in the vacuum chamber region in the form of intense prompt radiation (bremsstrahlung). In this primary operating mode, an ion beam is not produced, except incidentally in the plasma opening switch.

Facility Changes since SWEIS Analysis

According to data and information compiled during the preparation of this SA, there have been no substantial changes to TESLA since the 1999 SNL/NM SWEIS analysis.

Operations since SWEIS Analysis

Since the SWEIS, the number of shots per year, material inventories, consumption, emissions, and process requirements have been within parameters analyzed in the SWEIS EOA with a few exceptions: TESLA has doubled its insulating oil inventories to its 20,000 gallon capacity over the past five years. This exceeds the SWEIS EOA value of 10,000 gal. Quantities of hazardous waste have also consistently exceeded SWEIS values and the number of full-time equivalents (FTEs) exceeded the SWEIS EOA in 2003 and 2004.

2.2.3.8 Z Accelerator

The Z Accelerator (commonly referred to as the Z-Machine) is housed within Building 983, TA-IV. Operational support facilities are located peripherally about the accelerator high bay and include:

- Lab/office areas
- Hardware assembly areas
- Fluid transfer, processing, and storage facilities (water, oil, and gas)
- System and component testing facilities
- Maintenance, modification, and fabrication areas (welding and machining facilities)
- Accelerator control and data acquisition facilities
- Laser triggering and backlighter facilities
- Sub-grade operational areas (minus 10’, 12’, and 25’ levels)
- Dive support facilities
- Equipment and ready-spares storage facilities
- Plant mechanical rooms

The multi-use Z-Machine supports R&D efforts for both the Inertial Confinement Fusion (ICF) and High-Energy/Density Physics (HEDP) programs. Operating on the principle of pulsed power, the Z-Machine stores electrical energy over a period of minutes, then releases that energy in a single intense and concentrated, nano-second-scale pulse that can be directed at a target.

Experiments fielded on the Z-Machine support studies of radiation transport, radiation drive symmetry, radiation hydrodynamics, hydrodynamic instabilities, shock physics, equations of state, opacity, and capsule implosion physics. These studies relate directly to both near-term stockpile stewardship, and an NNSA decision to achieve high yield for weapon physics tests and a warm x-ray environment for radiation-effects studies. For radiation-effects research, the Z-Machine provides x-ray line radiation generated by imploding z-pinches that can simulate the materials' response to an unshielded x-ray threat from a weapon.

Facility Changes since SWEIS Analysis

In early 2002, NNSA/SSO approved environmental documentation for SNL/NM to refurbish and reconfigure the Z-Machine to facilitate near-term experimental activities and future long-range testing needs. The Z-Machine Refurbishment (known as the ZR Project) would be accomplished within the existing structure and peripheral support facilities.

The proposal included modifications to both design and capability of the accelerator necessary to increase the current shot rate of approximately 200 shots/year to as many as 400 shots/year (assuming funding and mission need require it). Electrical current available to the experimental load would increase from the present 20 mega amps (MA) to approximately 26 MA. In addition, the Z-Machine would have an improved diagnostic infrastructure. Refurbishment of the accelerator would provide a 60-percent increase in shot capacity, a 30-percent increase in available current, a doubling of stored energy, and more than a two-fold improvement in precision over what is available in the present configuration.

Operations since SWEIS Analysis

The total number of experiments fielded on the Z-Machine to date have remained within the level of activity analyzed in the SWEIS EOA. Material inventories, consumption, emissions, and process requirements have generally been within parameters analyzed in the SWEIS EOA with some key exceptions. These exceptions include the inventory of depleted uranium (DU) used in Isentropic Compression Experiments and an apparent increase of hazardous waste volume, both of which exceeded parameters originally analyzed in the SWEIS EOA. The increase in hazardous waste volume was not due to an actual increase in production, but rather a reclassification of routinely produced solid wastes suspected of being contaminated with beryllium. The vast majority of beryllium-contaminated wastes produced as a result of accelerator operations are not RCRA-regulated hazardous waste, but require special handling procedures to prevent personnel exposure. As a result of these special handling requirements, beryllium-contaminated solid waste is processed through the SNL Hazardous Waste Management System and is not distinguished from RCRA-regulated hazardous wastes.

2.2.4 REACTOR FACILITIES

2.2.4.1 Annular Core Research Reactor Facility (Pulse Configuration)

The Annular Core Research Reactor (ACRR) facility is located in TA-V, Building 6588, and is part of a larger complex that includes two other major structures. The ACRR facility comprises the reactor room, lowbay, control room, building utilities, several small laboratories, and support staff offices. Important design features of the ACRR include a small pool-type reactor that is under approximately 18 ft of water, cranes for the remote handling of irradiated experiment packages, and a high-efficiency particulate air (HEPA)-filtered, ventilated highbay.

In the pulse configuration, the ACRR is a water-moderated and reflected low-power research reactor that uses enriched uranium dioxide-beryllium oxide (UO_2BeO) fuel elements, arranged in a closely packed hexagonal lattice, around a central experiment cavity. The highbay is constructed of concrete block walls, reinforced by vertical steel columns that support a sheet-metal roof, which serves as a confinement structure rather than a containment structure.

The ACRR facility (pulse configuration) provides neutron and sustained gamma environments for the evaluation of experiments, including those for Defense Program testing of component electronics, and reactor safety research.

Reactor features include a dry cavity in the central core region and a radiography tube. The facility is capable of producing high-energy neutrons in the dry cavity over a very short time period. Four types of experiments can be conducted in the ACRR pulse configuration mode: (1) irradiation of solids within the radiography tube or other dry cavity, (2) radiography experiments, (3) irradiation of solids or gases within the pool and within or adjacent to the core, and (4) irradiation of solids or gases within the dry central cavity or other dry cavity.

Facility Changes since SWEIS Analysis

The 1999 SNL/NM SWEIS analyzed two modes of operation for the ACRR: pulse configuration and medical isotope production configuration. In 2001, the ACRR was reconfigured for pulse mode when the medical isotope program was suspended. An SA to the SWEIS was prepared to address potential environmental effects of reestablishing long term pulse mode testing capabilities at the ACRR in support of defense programs. NNSA determined that additional pulse mode testing, including the production of small quantities of radioisotopes and support to other nuclear research programs, would not result in any significant impact to the environment.

There have been no substantial changes to the ACRR (pulse configuration) since the 1999 SNL/NM SWEIS analysis.

Operations since SWEIS Analysis

Some operational data reported have exceeded values in the ACRR SA, specifically, in numbers of operating days, inventory of nuclear material, and in the number of facility personnel FTEs.

2.2.4.2 Gamma Irradiation Facility

At the time the SWEIS was prepared, the existing Gamma Irradiation Facility was known as the GIF. Planning was well advanced for building and operating a new facility, which was called the New GIF in the SWEIS. The SWEIS did include projected operating parameters for the New GIF, but this facility did not come on-line until 2002. The original GIF was taken out of operation after that time. The operational comparisons in this SA are only for the originally-termed New GIF, which is now simply known as the GIF.

The GIF is located in TA-V, Building 6588, and is a single-story structure consisting of a central highbay with an ancillary lowbay. The highbay houses three concrete test cells and a J-shaped water pool. The pool can store cobalt 60 (Co-60) or equivalent gamma-ray thermal sources in the form of pins that can be shared between the in-cell irradiation facilities and the in-pool irradiation facilities.

The GIF has three irradiation cells. Test Cell 3 is an experiment cell with two source elevators and a movable wall for large vehicle access. Test Cells 1 and 2 are irradiation cells for use with a high-intensity, adjustable Co-60 array. The design includes the capability to add lead lining to reduce gamma backscatter and to provide a high-fidelity cell. GIF capabilities include studies in thermal and radiation effects, weapons component degradation, nuclear reactor material and components, and other nonweapon applications.

At the GIF, gamma-irradiation experiments vary in test configuration, dose, and dose-rate level. The GIF is divided so that two types of irradiation experiments (in-cell dry and in-pool wet) can be performed. General features and enhanced capabilities of the GIF include configurable radiation sources, shielded windows for experiment observation during irradiation, and remote manipulators for experiment or source handling. The GIF also provides in-pool irradiation fixtures to vary experiment configurations and overhead traveling cranes.

Typically, irradiations performed in these facilities are at high dose rates and are of short to intermediate durations, lasting less than a day. At the in-pool facilities, radioactive sources are held in an irradiation fixture in deep water, where they remain stationary. Experiment canisters containing test units are immersed in the pool and positioned in preset locations in the irradiation fixture.

Facility Changes since SWEIS Analysis

Though analyzed in the SWEIS, the current GIF did not begin operation until 2002. There have been no substantial changes to the GIF from the configuration analyzed in the 1999 SNL/NM SWEIS.

Operations since SWEIS Analysis

GIF material inventories, consumption, emissions, and process requirements have been within the parameters analyzed in the SWEIS EOA since the beginning of operations. Only personnel FTEs and expenditures have exceeded parameters.

2.2.4.3 Hot Cell Facility

The Hot Cell Facility (HCF) is a Hazard Category 3, nonreactor nuclear facility in an underground structure located in TA-V, Building 6580.

The HCF remains in a standby status. Work to modify the HCF from its original mission (support to Defense Program testing) to support the DOE Isotope Production and Distribution Program was discontinued with the suspension of the medical isotope production program. SNL/NM and NNSA are assessing future applications for the HCF.

Facility Changes since SWEIS Analysis

The HCF remains in standby status. If operations, as previously planned and analyzed at the HCF, resume, the facility configuration would remain substantially the same as that analyzed in the 1999 SNL/NM SWEIS.

Operations since SWEIS Analysis

Since termination of the medical isotopes production project, SNL/NM has proposed to use the HCF in support of several industrial entities for various space, nuclear, electric propulsion, and power concepts.

Since 2002, portions of the HCF have been used to handle and store low-enriched uranium in support of two studies utilizing a critical assembly, which is a small, temporary experimental device for studying controlled nuclear fission reactions, designed to investigate phenomena associated with criticality. The studies would be conducted in the Sandia Pulsed Reactor (SPR) Facility and would provide benchmarks for the effect of fuel enrichment in the context of criticality concerns. The two separate configurations are the Burnup Credit Critical Assembly and the Seven Percent Critical Experiment. All values reported in 2004 are within SWEIS thresholds, with the exception of inventories held for these experiments that were not reported previously in the SWEIS because they were not in inventory at that time.

2.2.4.4 Sandia Pulsed Reactor Facility

The Sandia Pulsed Reactor (SPR) Facility is located in TA-V, Building 6590, and consists of a reactor control room, reactor building, and auxiliary equipment and buildings to support reactor operations. Several storage vaults are available for storing reactor, fissionable, and radioactive materials. The reactor building is a large, thick walled, steel-reinforced concrete structure in the shape of a cylinder, covered with a hemispherical shell.

Currently, the reactors and spare fuel materials are being stored in an underground vault. When operational, the SPR-II and SPR-III fast burst reactors provide near-fission spectrum radiation environments for test support of defense and nondefense activities. The primary facility mission has been to produce high-neutron fluence or pulsed high-neutron doses for testing electronic subsystems and components.

Critical assemblies can be built in the SPR Facility for short-term experiments on nuclear energy. Safety elements incorporated into the operation of these small assemblies (typically less than 1 megawatt) are similar to those of the SPR. The assemblies are temporary, with a much lower operational power and lower potential for dispersion of radioactive material.

Facility Changes since SWEIS Analysis

According to data and information compiled during the preparation of this SA, there have been no substantial changes to the SPR since the 1999 SNL/NM SWEIS analysis.

Operations since SWEIS Analysis

The SPR has been in a non-operational mode (with respect to reactor operations) since 2000. All data reported since 1999 have been below SWEIS EOA values. The SPR, which had been in a non-operational mode since 2000, was reactivated in December 2005, and began campaign test operations in January 2006. Current plans call for the SPR to continue operations through the end of September 2006, after which the reactor would be shut down and possibly shipped off-site.

2.2.5 Outdoor Test Facilities

2.2.5.1 Aerial Cable Facility Complex

The ACF Complex is located in the CTF, in a portion of the Cibola National Forest withdrawn from the public domain for the exclusive use of KAFB and DOE. The complex contains buildings 9831, 9832, 9834, 9020, and 9027. The ACF utilizes a series of cables stretched across Sol Se Mete Canyon. Test objects released from the maximum height of 600 ft above the valley floor can achieve gravitationally accelerated velocities of up to 190 ft/s.

Capabilities at the ACF include precision testing of full-scale air-deliverable weapon systems, verification of design integrity and performance, and impact testing for container compliance (10 CFR 71). The ACF supports SNL/NM Energy Programs for transportation package certification and design verification of transportation technology.

The aerial cable is used to test missile warning receivers, decoys, and jammers. Test hardware installed in trolleys traverse the cable in captive flight. Threat missiles, launched at various ranges from the cable, are laser tracked while the warning receiver, decoy, or jammer responses are recorded relative to the missile’s position.

Facility Changes since SWEIS Analysis

According to data and information compiled during the preparation of this SA, there have been no substantial changes to the ACF since the 1999 SNL/NM SWEIS analysis. As part of the TCR project, new cables and equipment have been added. A new control/office building was also constructed and a “catch box” was redesigned and reconstructed.

Operations since SWEIS Analysis

Since 1999, material inventories, consumption, emissions, and process requirements have all been within parameters analyzed in the SWEIS EOA, except for expenditures in 2004.

2.2.5.2 Explosives Applications Laboratory

The Explosives Applications Laboratory (EAL) is located at the CTF in Building 9930. The complex includes lab space and explosives storage bunkers. The EAL is used for the design, assembly, and testing of explosive experiments in support of SNL-wide programs. The EAL supports field test arming and firing, warhead development, development of emergency destruct systems, and the development of explosive components and systems.

Facility Changes since SWEIS Analysis

According to data and information compiled during the preparation of this SA, there have been no substantial changes to the EAL since the 1999 SNL/NM SWEIS analysis. In 2004, a new storage building was constructed. Milling equipment upgrades also took place in 2004.

Operations since SWEIS Analysis

The number of explosive tests, material inventories, consumption, emissions, and process requirements have been at or below parameters analyzed in the SWEIS EOA with the following exceptions: film developer/fixer inventories from FY2001 through 2003, bare UNO 1.2 consumption in FY2000, bare UNO 1.4 consumption in 2003, and hazardous waste generation in 2002.

2.2.5.3 Lurance Canyon Burn Site

The Lurance Canyon Burn Site includes facilities within an area of approximately 220 acres of the Cibola National Forest Withdrawn Area in the CTF.

Concrete pools are used at the site for conducting open burn tests. A reinforced concrete pool is used for fire-testing large objects weighing up to 140 tons and can accommodate objects as large as railroad cars. A square, steel pool, used for fire testing intermediate-sized objects, has a metal test stand in the center flanked by two instrumentation towers. Smaller pools meet other specific test requirements. Two enclosed fire test facilities, the Small Wind Shield and the Fire Laboratory for the Authentication of Models and Experiments (FLAME), are also at the site.

The Lurance Canyon Burn Site has two double-walled, aboveground, enclosed tanks; one contains water for open pool tests, and the other contains a water/propylene glycol mixture that circulates within the walls of the FLAME for cooling during tests. Additional water is stored in two underground, nonpotable water tanks. Jet fuel for open pool tests is stored in an aboveground tank.

The Lurance Canyon Burn Site is used for fire testing weapons, weapon components, and shipping containers, in aviation fuel fires, propellant fires, and wood fires, to verify design integrity and performance.

Open pool fires are used to simulate transportation accidents, which may involve pooling of spilled motor oil or gasoline. Because of its volatility, gasoline is not used as a test fuel. Aviation fuel produces the same test results, with less danger to site personnel. Most tests use JP-8 aviation fuel, a distillate blend of gasoline and kerosene stocks.

To evaluate the vulnerability of weapons and satellites to accident scenarios, such as a missile fire on a launch pad, some tests may use rocket propellant. Propellants are ignited on a steel plate on the ground, and test objects are supported above the propellants. Rocket propellant fires last up to 10 minutes, with up to 3,000 lb of propellant consumed, depending upon the test object size.

Fuel-air mixture tests are conducted to qualify electronic equipment according to National Electrical Code standards. Electronic equipment is operated in an explosive atmosphere to evaluate whether the equipment will cause a spark that could ignite fuel vapors. Wood fire or crib tests are conducted to meet U.S. Department of Transportation requirements for explosive component shipping containers.

Facility Changes since SWEIS Analysis

In 2004 a 25,000-gal JP-8 fuel tank was officially closed at the site; this tank is scheduled for removal in 2005. A newly-approved 5,000 gal tank was installed in 2005.

Operations since SWEIS Analysis

During 2004, there were 67 JP-8 burns, consuming 4,500 gal of fuel. Although the number of burns exceeded the SWEIS EOA value, the amount of fuel expended on a per- burn-basis was significantly less than the EOA value for fuel. Since 1999, material inventories, consumption, emissions, and process requirements have remained at or below parameters analyzed in the SWEIS EOA. Hazardous waste volumes have equaled SWEIS EOA values since 1999.

2.2.5.4 Thunder Range Complex

The Thunder Range Complex was used from 1969 through 1993 to support development, safety, reliability, and certification tests of Atomic Energy Commission/DOE weapon systems.

Located in the CTF, the Thunder Range Complex is generally bounded on the north by Magazine Road, although a triangular area north of this road (North Thunder Range) is also part of the permitted parcel. The complex is bounded on the southeast by a fence along Isleta Road. The portion of the complex closest to the Isleta Pueblo is approximately one-half mile north of that boundary.

The complex includes buildings 9927, 9928, 9929, 9965, and 9966. Three structures are currently being used by SNL/NM. These are located on the northeastern side of the Thunder Range Complex, south of Magazine Road.

Located southwest of the Thunder Range Complex is the Conventional High Explosives & Simulation Test Site, which is also shown on maps as Chestnut Site or Range. The Chestnut Range is used for explosives tests. Although SNL/NM explosives testing activities have ceased at the Thunder Range Complex, Chestnut Range continues to be used as an active explosives testing site by the USAF and its contractors.

Test capabilities at the Thunder Range Complex include disassembly and evaluation, and calibration and verification of special nuclear and nonnuclear systems. Capabilities also involve cleaning, physical examination, measurement, sampling, photography, and data collection. Previously, SNL has also used portions of the Thunder Range Complex for ground-truthing activities, such as radar return collection studies. This involves the use of targets such as vehicles or passive calibration sources (corner reflectors) placed on the ground surface. SNL/NM personnel have used optical instruments in the past to observe explosive tests done by the USAF at the Chestnut Range. Project plans call for continued observation of some future tests on a nonparticipatory basis. The amount and scope of these observations will be determined by funding.

Facility Changes since SWEIS Analysis

According to data and information compiled during the preparation of this SA, there have been no substantial changes to the Thunder Range Complex since the 1999 SNL/NM SWEIS analysis.

Operations since SWEIS Analysis

No SNL-related outdoor explosive testing, shock-tube testing, or equipment disassembly is underway at the Thunder Range Complex. Future activities at Thunder Range are still in the planning stage.

Projections are unavailable at this time. Material inventories, consumption, emissions, and process requirements remain within analysis parameters in the SWEIS EOA.

2.2.6 Selected Infrastructure

2.2.6.1 Hazardous Waste Management Facility

The Hazardous Waste Management Facility (HWMF) is a low-hazard facility located south of TA-I that consists of two permanent buildings (958 and 959), the Waste Packaging Building and the Waste Storage Building. The facility includes supply sheds, a covered and bermed waste storage area, a catchment pond, offices, and self-contained storage structures.

The HWMF is responsible for the safe handling, packaging, short-term storage, and shipment (for recycling, treatment, or disposal) of all nonradioactive waste regulated by RCRA, except explosive waste and other hazardous and toxic waste. Hazardous waste is tracked from the point of generation to final disposal through "cradle to grave" documentation at each waste-handling step. Each waste item received at the HWMF is labeled with a unique bar code, linking the item to the original disposal request. An individually coded waste item typically is a bottle, plastic bag, or other small item that contains chemical materials.

Nonradioactive, hazardous chemical waste that is generated at SNL/NM and its associated satellite facilities (e.g., the Advanced Materials Laboratory located at the University of New Mexico, Albuquerque) is collected and transported to the HWMF for packing and short term storage prior to offsite transportation for recycling, treatment, or disposal at a licensed facility. The waste is typically not stored for more than 365 days. No radioactive material or explosive material is managed at the HWMF.

Facility Changes since SWEIS Analysis

The HWMF is currently exploring the possibility of moving facility operations from their current TA-II location to the Radioactive and Mixed Waste Management Facility (RMWMF) in TA-III. This move would result in a combined waste management facility that would handle radioactive, mixed, and hazardous waste in one location, providing for greater efficiency in SNL/NM's overall management of waste.

Operations since SWEIS Analysis

The RCRA Part B Permit for the HWMF was due for renewal in 2002. SNL/NM has submitted a RCRA Part B Permit Application for this renewal. The application was revised in 2004 and resubmitted for review by the New Mexico Environment Department, but has not yet been issued. When issued, the RCRA Part B Permit may change some aspects of operations at the HWMF; however, the operational parameters of the facility are expected to remain generally the same.

Operations at the HWMF have remained at a single shift. While 2004-processed RCRA wastes were within permitted capacity, waste volumes exceeded the volumes estimated in the SWEIS EOA. This was due to a temporary increase in legacy waste received from the ER Project. Other material inventories, consumption, and emissions have been within the SWEIS EOA parameters since 1999 with the exception of the propane inventory in 2003 and hazardous waste in 2004.

2.2.6.2 Radioactive and Mixed Waste Management Facility

The Radioactive and Mixed Waste Management Facility (RMWMF) compound, located in the southeastern portion of TA-III in buildings 6920, 6921, and 6925, is designed as a centralized area for receipt, characterization, treatment, repackaging, storage, and shipment of mixed and low-level radioactive waste (LLW) and hazardous waste regulated by RCRA. The RMWMF includes separate storage for reactive waste, flammable waste, and compressed gas cylinders; outdoor LLW and mixed waste storage areas (paved and unpaved); and a synthetic-lined retention pond to hold site surface-water runoff. The retention pond is located west of the RMWMF and also collects water from fire control activities and storm-water runoff.

The maximum storage capacity at the RMWMF compound is approximately 285,000 ft^3. In addition to the storage at the RMWMF, other storage areas are used, including seven of the earth-covered Manzano storage bunkers. On average, the earth-covered bunkers each provide 2,000 ft^2 of storage space.

SNL/NM operates the RMWMF for receipt, characterization, compaction, treatment (if necessary), repackaging, certification, and storage of LLW, transuranic (TRU) waste, and mixed waste. The RMWMF treats and stores waste until disposal or treatment sites are identified that can accept the waste. Waste volumes vary, depending on the storage time before the waste is shipped for disposal. This facility enables SNL/NM to handle and store the waste in compliance with applicable requirements of federal, state, and local environmental regulations, DOE directives, and offsite waste acceptance criteria. The facility also allows SNL/NM to prepare the waste for shipment, treatment, and disposal in accordance with specific waste certification, packaging, and transport requirements.

Facility Changes since SWEIS Analysis

According to data and information compiled during the preparation of this SA, there have been no substantial changes to the RMWMF since the 1999 SNL/NM SWEIS analysis.

Operations since SWEIS Analysis

Quantities of radioactive waste managed (including newly generated and legacy waste) have been below SWEIS values since 2002. Reported radioactive air emissions exceeded SWEIS EOA values in 2003. This exceedance occurred from a one-time treatment of highly tritiated oil from the NGPF and emissions returned to levels below the SWEIS EOA in 2004 (SNL/NM 2006a).

2.2.6.3 Steam Plant

The Steam Plant (Building 605) includes five operational boilers with supporting systems that supply steam to SNL/NM TA-I for heating purposes, freeze protection, domestic hot water, and humidification. For most TA-I buildings, steam is the only heating source; thus, during the winter, the plant operation is critical to the missions of these facilities. Three of the five boilers have reached or exceeded their design life.

In addition to providing the steam supply system to all of TA-I, the Steam Plant has several other functions. Steam is essential to other programmatic missions, such as those at the Primary Standards Lab and the MDL. During nonstandard hours at SNL/NM, the Steam Plant provides monitoring for building-critical alarms to all major buildings, and services (such as Telecon) for emergency maintenance problems at all SNL/NM facilities and utility distribution systems.

The plant currently uses diesel fuel for the emergency generator and emergency lighting of the boilers during natural gas interruptions.

Facility Changes since SWEIS Analysis

Boiler 3 was retrofitted with flue gas recirculation in 2000, while boilers 1 and 2 were retrofitted in 2001. Retrofitting the boilers resulted in a reduction of the emission factor from 280 to 100 pounds per million standard cubic feet (lb/M ft^3) of natural gas burned. Nitrogen oxide (NO_x) emissions from the Steam Plant boilers with flue gas recirculation have since been reduced by 68 percent.

As currently planned, the Steam Plant will reduce its production as facilities install stand-alone boilers as part of a utilities modernization effort. Eventually, as new buildings include their own heating systems, the Steam Plant will be shut down and decommissioned.

Operations since SWEIS Analysis

Most recent material inventories, consumption, emissions, and process requirements have been within the parameters analyzed in the SWEIS EOA. Exceptions for 2002 were steam distribution and inventory of water-treatment chemicals. The 2002 spike in water treatment chemicals inventory was immediately after completion of the retrofit of boilers 1 and 2. In 2003 and 2004, exceptions include the increases in the inventory of water treatment chemicals and propane.

2.2.6.4 Thermal Treatment Facility

The Thermal Treatment Facility (TTF) (Building 6715), located in the northeast corner of TA-III, consists of a square burn pan enclosed by a grated metal cage. A remotely operated metal lid can be raised or lowered to cover the burn pan. The cage is centered on a steel-lined concrete pad that is surrounded on three sides by an earthen berm. Note: The TTF is not related to the Thermal Test Complex (TTC) under construction in TA-III.

The TTF was built to support the Light-Initiated High Explosive Facility with onsite treatment of explosive-contaminated waste that does not comply with transportation requirements. The Light-Initiated High Explosive Facility was decommissioned in 1992 and is scheduled to be fully operational again in 2006.

The TTF has the capability to thermally treat (burn) small quantities of waste explosive substances, waste liquids (water or solvents contaminated with explosive substances), and waste items (rags, wipes, and swabs) contaminated with explosive substances. No radioactive waste is treated at the TTF.

The ash that results from a treatment event is generally determined to be hazardous waste (some waste may contain silver), and is collected and managed as such prior to transmittal to the HWMF for handling and disposal at an approved site.

Facility Changes since SWEIS Analysis

In 2003, a new propane burner system was installed at the TTF, replacing the existing system. This "in-kind" replacement was installed to improve efficiency and reliability.

Operations since SWEIS Analysis

Waste generation, material inventories, consumption, emissions, and process requirements have been at or within SWEIS EOA values since 1999. However, the amount of waste treated, the number of open burns, and the open burn events of waste products exceeded the SWEIS EOA in 2004.

2.2.7 NEW AND PLANNED FACILITIES

2.2.7.1 Micro and Engineering Science Application (MESA) Complex

The MESA project involves renovation of and upgrades to the MDL, construction of three new facilities, relocation of the activities currently conducted at the CSRL and several other buildings to the new facilities, and demolition of the CSRL, all in TA-I.

Collectively, the new facilities, together with the MDL, are known as the MESA Complex. When completed, the MESA Complex is expected to be about 377,000 gsf in size and will be divided into three facilities (DOE 2000a):

- Microsystems Fabrication (MicroFab) Facility—87,650 gsf, with an additional 8,200 gsf renovation to the existing MDL. New buildings include the single-story MicroFab Cleanroom, the single-story connection to the MDL containing the process support laboratories, and the single-story Central Utility Building. As of December 2005, construction was complete, with approval to start operations anticipated for June or July 2006 (SNL/NM 2005f).
- Microsystems Integration Laboratory (MicroLab)—128,185 gsf. Buildings include the three-story Workspace building; the one-story, high-bay, Design and Education Center; and the three-story Laboratory building. As of December 2005, construction was 99 percent complete, with approval to start operations anticipated for May or June 2006 (SNL/NM 2005f).
- Weapons Integration Facility (WIF)—This includes two buildings: a classified (WIF-C) portion of approximately 114,340 gsf (two components, three and four stories, plus a single-story Central Utility Building) and an unclassified portion (WIF-U) of approximately 37,745 gsf (two stories). As of December 2005, construction was 66 percent complete, with occupancy anticipated in December 2007 (SNL/NM 2005f).

CSRL Demolition

The CSRL is in Building 893, which is a 127,574 gsf single-story building with an equipment penthouse on the roof. Demolition of the CSRL is anticipated to take place from January 2007 through January 2008 (SNL/NM 2005f) and will generate up to 2,300 tons of standard construction waste, primarily concrete, steel, and plastics (Table 2.2-2). Current plans are to dispose of this waste in the KAFB construction waste landfill; alternatively, the waste could be transported to the City of Albuquerque (CABQ) Cerro Colorado or Rio Rancho construction waste landfills. Materials would be recycled as appropriate. The CSRL demolition activities will also generate approximately 45,455 kg (50 tons or 100,000 lbs) of asbestos waste, which would be removed and managed according to existing SNL/NM asbestos management processes (Table 2.2-2). Asbestos waste would be transported to the Kerrs Mountainair Monofill facility for disposal. Some hazardous wastes (for example, chemically contaminated piping, fume hoods, exhaust ducts, scrubbers, etc.) may be generated during decontamination, decommissioning, and demolition of the CSRL. While waste quantities cannot be accurately estimated prior to the initial survey, a facility of this size might be expected to contain approximately 22 kg of solid hazardous waste and approximately 200.6 liters (L) (53 gal) of liquid hazardous waste, most of which would be sulfuric acid and sodium hydroxide from the acid waste neutralization system (Table 2.2-2). Waste would be segregated, characterized, and prepared for treatment or disposal as appropriate through SNL/NM's hazardous waste management program.

MDL Modifications

Under the MESA project, replacement of the MDL Acid Exhaust System would result in the generation of approximately 941 kg (2070 lbs) of hazardous waste and 16,523 kg (36,350 lbs) of non-hazardous construction waste (Table 2.2-2).

The MDL bulk storage tanks for the Deionized Water Plant and acid waste neutralization system will also be decontaminated, decommissioned and demolished under the existing SNL/NM program.

Operations

Operations currently conducted at the CSRL would be relocated to the new MESA Complex facilities described and more fully integrated with the operations of the existing MDL. The production capacity of the MESA Complex (including R&D) would remain at approximately 7,500 silicon/specialty alloy wafers per year. It is estimated that approximately 650 employees will be located at the MESA complex, most of whom would be relocated from several existing SNL/NM facilities. Approximately 45 new employees resulting from program growth will be located throughout the MESA complex

Table 2.2-2 provides a comparison of emissions, waste, and water use without and with the MESA Complex operational.

2.2.7.2 Processing and Environmental Technology Laboratory

Processing and Environmental Technology Laboratory (PETL) is a 151,000-ft^2, state-of-the-art materials research and process development laboratory that began operations in September 2000. The facility is located in TA-I (Building 701) and was designed to improve SNL/NM abilities to carry out chemically intense research while enhancing the capabilities needed to perform research at the nanoscale using highly sensitive optical and electromechanical equipment. Laboratories and utility infrastructure were designed with a modular layout, providing staff the ability to rapidly reconfigure research environments in response to the dynamics of accelerating scientific and technological advances.

PETL's primary mission is to advance materials and process sciences R&D. Facility contributions range from research and understanding at the atomic level, to developing nuclear weapons components and evaluating the lifecycle and reliability of the nuclear stockpile. Other national security programs include materials research in sensors used in treaty verification to warning systems for chemical and biological attacks. PETL achievements in the areas of materials and process sciences provide critical support to

Table 2.2-2. Comparison of Estimated Annual Emissions, Water Use, and Wastes for Baseline and with MESA Project

	Baseline Projection (without MESA)	MESA Project Construction and Operational Projections
	Construction and Demolition	
Air Emissions/Conformity		
Construction - FY2004	NA	4.16 tons CO
Construction - FY2005	NA	2.12 tons CO
Construction - FY2006	NA	0.50 tons CO
CSRL Demolition	NA	0.04 tons CO
Hazardous Waste		
Acid Exhaust System Upgrade	941 kg (1 ton)	941 kg (1 ton)
CSRL Demolition	NA	22 kg (48.4 lb) + 200.6 L (53 gal)
Bulk Storage Tank Demolition	NA	None
Total Construction/Demolition	NA	963 kg (1.1 tons) + 200.6 L (53 gal)
Asbestos	NA	45,455 kg (50 tons)
Non-Hazardous Waste		
Acid Exhaust System Upgrade	16,523 kg (36,350 lb)	16,523 kg (18 tons)
CSRL Demolition	NA	2.1M kg (2,300 tons)
Bulk Storage Tank Demolition	None	None
Total Construction/Demolition	16,523 kg (36,350 lb)	2.12M kg (2,328 tons)
	Operations	
Air Emissions	Passes screen [a]	Passes screen [a]
Hazardous Waste	8,649 kg (9.51 tons)	12,135 kg (13.35 tons)
Low-Level Radioactive Waste	382 kg (840.4 lb)	477 kg (1,049.4 lb)
Water Use	302M L (79.8M gal)	375M L (99M gal)
Wastewater Discharge	302M L (79.8M gal)	299M L (79M gal)
Non-hazardous Waste [b]	77,876 kg (85.67 tons)	83,698 kg (92.07M gal)

Source: DOE 2000a
CSRL = Compound Semiconductor Research Laboratory
gal = gallons
kg = kilogram
L = liter
lb = pound
M = million
[a] Theoretical release of the entire inventory does not cause the Threshold Emission Value to be exceeded.
[b] Includes recycled materials

DOE energy and environmental programs including advanced processes for efficient manufacturing and environmentally conscious manufacturing, and catalysts for improved energy conversion.

Materials research at PETL will play a major role in enabling new developments in microsystems, nanotechnologies, nanoscale diagnostics, science-based materials processes, materials self-assembly, materials aging and reliability, materials and process modeling, and development of advanced methodologies for information detection, extraction, and analysis.

2.2.7.3 Center for Integrated Nanotechnologies

Construction is complete for the CINT Core Facility and the establishment of the CINT Gateway to Sandia Facility within existing space at the IMRL. The CINT Core Facility has been constructed on DOE-owned property north of the entrance to KAFB on Eubank Boulevard, and The Gateway to Sandia Facility will be established in existing space within the existing IMRL at TA-I.

The CINT Core Facility has been constructed on 20 acres of DOE-owned parcel of land on the west side of Eubank Boulevard, north of the entrance to KAFB. This one-story facility is approximately 96,000 ft^2 in size. It includes clean rooms for nanofabrication, characterization, and lithography, as well as laboratories for general purpose chemistry, biology, electronic, and physical measurement activities. No construction or renovation is required to establish CINT Gateway to Sandia Facility activities within the IMRL as these activities share existing laboratory space (DOE 2003a).

Table 2.2-3 provides a comparison of emissions, waste, and water use without and with the CINT Core Facility operational, as reported in the CINT EA (DOE 2003a). Gateway to Sandia Facility operations are encompassed within IMRL operational parameters.

A subsequent NEPA Checklist, prepared in 2006, revised values for CINT water use and wastewater generation to address changes in ventilation and air conditioning requirements for the facility. The new annual quantities are 10.6M gal/yr for water use and 3.6M gal/yr for wastewater discharge (DOE 2006).

Table 2.2-3. Comparison of Estimated Annual Emissions, Water Use, and Wastes for Baseline and with CINT Core Facility Operational

	Baseline Projection (without CINT)	CINT Project Construction and Operational Projections
	Construction and Demolition	
Air Emissions/Conformity	NA	6.63 tons CO
Construction Debris	NA	810 tons (73,636 kg)
	Operations	
Solid Waste	NA	24,600 lb (11,182 kg)
Hazardous Waste	NA	2,640 lb (1,200 kg)
Water Use		
Potable	393,600 gal (1.5M L)	470,400 gal (1.78M L)
Process	NA	2.24M gal (8.47M L)
Wastewater Generation		
Potable	393,600 gal (1.5M L)	470,400 gal (1.78M L)
Process	NA	2.24M gal (8.47M L)

Source: DOE 2003a
CO = carbon monoxide
gal = gallons
kg = kilogram
L = liter
lb = pound
M = million

2.2.7.4 Ion Beam Laboratory

SNL/NM is currently designing a replacement Ion Beam Laboratory (IBL) facility in TA-I. The IBL facility will use accelerated ions for a breadth of activities within the nuclear weapons mission of the NNSA.

The proposed new accelerator laboratory would be 27,000 gsf and would replace a temporary building constructed in 1956 (Building 884) that currently houses the IBL facility. All of the equipment in the current IBL would be relocated to the new building, except two of the older accelerators that would be replaced with new, commercially-available instruments to greatly improve the ability to develop, analyze, and evaluate micro- and nanotechnologies for future weapon components. One new accelerator would be a commercial 3-megavolt Pelletron electrostatic accelerator that has less than 100 volts energy definition, and this accelerator would be coupled to a new commercial nuclear microscope. The other new accelerator would be a self-contained commercial nanoprobe system that would operate at 200 kilovolts.

The new IBL would involve only an incremental increase in the current scope of environmental effects. For example, the additional shielding in the new IBL would mitigate increases in exposure resulting from the increased radiation output of the new Pelletron accelerator (using various deuterium beam-induced nuclear reactions to measure light elements). The same is true for new analyses of radiological materials samples, which would be kept at trace levels; since these analyses would occur in new shielded areas, exposures would not increase compared to current operations.

Construction of the IBL is scheduled to start in late 2006. Decontamination and demolition of the existing laboratory (Building 884) and beginning of operations at the new IBL are scheduled for mid-2008.

2.2.7.5 Facility Modifications under Test Capabilities Revitalization

The Test Capabilities Revitalization (TCR) includes renovation and upgrade of several existing facilities in TA-I, TA-III, and CTF, including the Centrifuge Complex, Sled Track Complex, and ACF Complex, as described above. TCR involves construction, modification, renovation, and demolition activities, as well as modifications to operational parameters at some test facilities. Table 2.2-4 provides a comparison of emissions, waste, and water use without and with completion of TCR.

2.3 BALANCE OF PLANT

Activities at numerous SNL/NM facilities not described in Section 2.2 were discussed in the 1999 SNL/NM SWEIS as “balance of plant.” Changes to balance-of-plant activities since the 1999 SNL/NM SWEIS are documented in hundreds of NEPA checklists as well as several EAs that have been completed since 1999. Environmentally important parameters of these activities are found in the Environmental Information Document CY2003 Update, in SWEIS Annual Reviews, and Annual Site Environmental Reports. Individual screening reviews for each resource area in Chapter 3 of this SA summarize these parameters.

Table 2.2-4. Comparison of Estimated Annual Emissions, Water Use, and Wastes for Baseline and with Completion of TCR

	Baseline Projection (without TCR)	TCR Construction and Operation
	Construction and Demolition	
Air Emissions/Conformity	NA	Less than 2 tons CO
Asbestos	NA	117 yd^3 or 47,385 lb (89 m^3 or 21,539 kg)
Non-hazardous Waste	NA	8,108 tons (73,636 kg)
	Operations	
Air Emissions	Passes screen	Passes screen
Hazardous Waste	4,715 lb (2,143 kg)	9,914 lb (4,506 kg)
Radioactive Waste	NA	1,000 lb (455 kg)
Mixed Waste	NA	2,100 lb (955 kg)
Water Use	1,339,000 gal (5,068,666 L)	2,130,000 gal (8,063,684 L)
Wastewater Discharge	539,300 gal (2,041,473 L)	870,500 gal (3,295,201 L)
Non-hazardous Waste	851,504 lb (387,047 kg)	857,684 lb (389,856 kg)

Source: DOE 2003b
TCR = Test Capabilities Revitalization
CO = carbon monoxide
gal = gallons
kg = kilogram
L = liter
lb = pound
m^3 = cubic meter

2.4 ENVIRONMENTAL CONDITIONS

This section identifies major changes and new information regarding the environmental conditions for areas occupied by or surrounding SNL/NM since the issuance of the 1999 SNL/NM SWEIS. In this context, the term “environment” is taken to mean both the natural environment (e.g., soil, water, biological and ecological resources) and the human environment (e.g., population, demographics).

2.4.1 NATURAL ENVIRONMENT

There have been no substantial changes to the natural environment since the 1999 SNL/NM SWEIS, with the exception of ER Project activities that have resulted in remediation of some sites. Areas of groundwater contamination identified in the SWEIS persist, although levels of contamination are generally lower (Section 3.5.1.).

2.4.2 HUMAN ENVIRONMENT

The human environment within and surrounding SNL/NM is largely unchanged in character, although continued growth in the Albuquerque area has increased population. Development at Mesa del Sol, a planned community west of TA-III, was anticipated in the 1999 SNL/NM SWEIS to be well underway by 2005; a recent agreement between the State of New Mexico and developers suggest that development will begin in 2006.

2.5 REGULATIONS

This section presents changes in Federal laws, regulations, State of New Mexico regulations and agreements, and selected environment, health and safety DOE orders, manuals and policies that have occurred since the 1999 SNL/NM SWEIS and that are applicable to SNL/NM. Also, new missions and projects were examined to determine if they caused requirements issued before the final 1999 SNL/NM SWEIS to become applicable. This examination did not identify newly applicable requirements.

2.5.1 FEDERAL STATUTES AND REGULATIONS

Clean Air Act (CAA) of 1970, as Amended (42 U.S.C. § 7401 et seq.)

The CAA establishes air quality standards to protect public health and the environment from the harmful effects of air pollution. The act requires establishment of national standards of performance for new stationary sources of atmospheric pollutants, emissions limitations for any new or modified structure that emits or may emit an air pollutant, and standards for emission of hazardous air pollutants. In addition, the CAA requires that specific emission increases be evaluated to prevent a significant deterioration in air quality.

Since the 1999 SNL/NM SWEIS, the U.S. Environmental Protection Agency (EPA) has issued two final rules changing measurements of National Ambient Air Quality Standards, which measures six criteria pollutants (carbon monoxide, nitrogen dioxide, lead, ozone, sulfur dioxide, and particulate matter) for all areas of the United States. The first rule changed the 8-hour ozone standard to a 1-hour ozone standard, and the second rule established particulate matter (PM) 2.5 measurement standards for particles with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$). Previously, particulate matter measurements were only for PM_{10}. All SNL/NM air quality permits that require measurement of ozone and PM_{10} will be modified to meet the requirements of the new regulations as the permits come up for renewal. The permit modifications will require SNL/NM to now measure for the 1-hour ozone standard and to measure for both the PM_{10} and $PM_{2.5}$ standards.

Clean Water Act (CWA) of 1948, as Amended (33 U.S.C. §1251)

The goals of the CWA are to restore and maintain waters of the U.S. in order to protect human health and safety and to provide for the protection and propagation of fish, shellfish, and wildlife. The act authorizes regulations that establish limitations and permitting requirements for hazardous substances being discharged from point sources, dredge or fill operations at wetlands and other waters of the U.S., stormwater discharges from industrial runoff, and oil discharges. Key elements of the act include nationally applicable, technology-based effluent limitations set by the EPA for specific industry categories, and water quality standards set by states.

A Spill Prevention Control and Countermeasures (SPCC) Plan is required under the CWA. SNL/NM's SPCC Plan was revised in 2003 to incorporate changes to 40 CFR 112 that EPA made in 2002. These oil pollution prevention regulations were promulgated under the authority of the CWA. The focus of these regulations is to protect specifically defined waterways, or "navigable waters of the United States" from potential oil contamination. "Navigable waters" is a broad term that includes rivers, lakes, oceans, and water channels (tributaries) such as streambeds and arroyos that connect to a river. This applies to the Tijeras Arroyo, which discharges to the Rio Grande.

EPA's revised oil storage regulations that encompass equipment and containers with a capacity of 55 gal (previously 660 gal) or more has expanded SNL/NM's list of regulated items to over 700 (effective August 17, 2004), the majority of which are transformers. Also in 2002, the State of New Mexico passed oil storage regulations that required the registration of all oil storage tanks with a storage capacity greater than 1,325 gal but less than 55,000. All oil containment sites with regulated containers must be equipped with secondary spill containment. Secondary containment structures include concrete-lined basins, retaining walls, containment reservoirs, earthen berms, sloped pads, trenches, and containment pallets.

SNL/NM's SPCC Plan describes oil storage facilities and the mitigation controls in place to prevent inadvertent discharges of oil. Facilities at SNL/NM subject to the regulations include:

- Oil storage tanks (underground storage tanks and above-ground storage tanks)
- Bulk storage areas (multiple containers)
- Temporary or portable tanks

Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 (42 U.S.C § 11001)

EPCRA, also known as SARA Title III, requires under Section 313 that facilities meeting certain standard industrial classification code criteria submit an annual toxic chemical release inventory report (*Toxic Chemical Release Reporting: Community Right to Know* [40 CFR Part 372]). For covered facilities, a report describing the use of, and emissions from, Section 313 chemicals stored or used onsite and meeting threshold planning quantities, must be submitted to the EPA and the New Mexico Emergency Management Bureau every July for the preceding calendar year. For SNL/NM, all research operations are exempt under provisions of the regulation, and only pilot plans, production, or manufacturing operations at SNL/NM are reported.

In October 2005, the EPA submitted for public comment the Toxics Release Inventory Burden Reduction Proposed Rule which would reduce the reporting burden associated with the Toxics Release Inventory reporting requirements. If adopted as currently written, the proposed rule would increase eligibility for the Form A Certification Statement for non-Persistent Bioaccumulative and Toxic Chemicals by raising the eligibility threshold to 5,000 pounds for the "annual reportable amount" of a toxic chemical. It would also, for the first time, allow limited use of Form A for persistent bioaccumulative and toxic chemicals where total releases are zero and the annual reportable amount does not exceed 500 pounds. This means facilities that report low amounts of chemicals to the Toxic Release Inventory would benefit from this rule by being allowed to use the shorter Form A, thus reducing their reporting burden. The Form A is easier to complete than the longer Form R because there are fewer information fields to complete and fewer mathematical calculations to perform.

The public comment period for the proposed rule extended through mid-January of 2006. It is possible that the final rule could come out before 2008, affecting SNL/NM Toxic Release Inventory reporting requirements.

2.5.2 EXECUTIVE ORDERS

Greening the Government through Efficient Energy Management (EO 13123) (June 3, 1999)

Under Executive Order (EO) 13123, each Federal agency must reduce energy consumption, water consumption, and greenhouse gas emissions, as well as incorporate energy efficiency and use of renewable energy products to meet specific target reductions established in the order. Each year, each agency is required to develop an annual implementation plan to meet the requirements of the order, propose energy, water, and emissions reducing projects in its annual budget submission, and measure and report on its progress in meeting the goals of the order in its annual report. All proposed projects must use life-cycle cost analysis when making decisions about their investments in products, services, construction, and other projects to lower Federal government costs and reduce energy and water consumption.

Greening the Government through Leadership in Environmental Management (EO 13148) (April 21, 2000)

EO 13148 requires the head of each Federal agency to integrate environmental accountability and management into programs, policies, and procedures to meet pollution prevention and source reduction targets established in the order. Specifically, the order calls for the reduction of Toxic Release Inventory releases and off-site transfers of toxic chemicals for treatment and disposal; reduction of use of selected toxic chemicals, hazardous substances, and pollutants, or generation of hazardous and radioactive waste types; and development of a plan to phase out the procurement of Class I ozone-depleting substances for all non-excepted uses. To monitor progress, the order requires that each agency establish and implement environmental compliance audit programs and policies. The environmental management concept also extends to the surrounding environment, as the order states that each agency should implement cost-effective, environmentally sound landscaping practices and programs to reduce adverse impacts to the natural environment.

Greening the Government through Federal Fleet and Transportation Efficiency (EO 13149) (April 21, 2000)

Under EO 13149, each Federal agency operating more than 20 vehicles must reduce its consumption of petroleum to meet established targets in the order. Measures to meet these reduced targets include improvements in fleet fuel efficiency and increased use of alternative fuel vehicles and alternative fuels. Agencies shall report their efforts in their annual budget submission.

Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186) (January 10, 2001)

EO 13186 requires each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement, within 2 years, a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service to promote the conservation of migratory birds.

2.5.3 DOE Policies, Manuals, and Orders

DOE Policy 141.1, DOE Management of Cultural Resources (May 2, 2001)

The purpose of this policy is to ensure that DOE programs, including the NNSA, and field elements integrate cultural resources management into their missions and activities and to raise the level of awareness and accountability among DOE (including NNSA) contractors concerning the importance of DOE's cultural resource-related legal and trust responsibilities.

DOE Policy 141.2, Public Participation and Community Relations (May 2, 2003)

This policy is intended to ensure that public participation and community outreach are integral and effective parts of DOE activities and that decisions are made with the benefit of significant public perspectives. This policy provides a mechanism for bringing a broad range of stakeholder viewpoints and community values into DOE's decision-making early in the process. This early involvement enables DOE to make more informed decisions and build mutual understanding and trust between DOE, the public it serves, and the communities which host its facilities.

DOE Order 151.1C, Comprehensive Emergency Management System (November 2, 2005).

This order establishes policy and assigns and describes roles and responsibilities for the DOE Emergency Management System. The Emergency Management System provides the framework for development, coordination, control, and direction of all emergency planning, preparedness, readiness assurance, response, and recovery actions.

DOE Order 231.1A, Change 1, Environment, Safety, and Health Reporting (June 3, 2004)

This order implements a record keeping and reporting program to ensure the use of common definitions, consistent recording procedures, and timely reporting practices for DOE employee and all contractor and subcontractor occupational fatalities, injuries, and illnesses. Additionally, this order seeks to ensure the timely collection, reporting, analysis, and dissemination of information on environment, safety, and health (ES&H) issues as required by law or regulations or as needed to ensure that the DOE and NNSA are kept fully informed on a timely basis about events that could adversely affect the health and safety of the public or workers, the environment, the intended purpose of DOE facilities, or the credibility of the DOE.

DOE Manual, 231.1-1A, Change 1, Environment, Safety, and Health Reporting Manual (September 9, 2004)

This manual supplements DOE O 231.1A and provides detailed requirements for DOE reporting, including time schedules for reporting and data elements to be reported. The amending order clarifies responsibilities pertaining to occupational injury and illness recordkeeping and recording; requires quarterly reconciliation of occupational injury and illness data; and provides clarification on data elements that must be reported and reconciled with local data records.

DOE Manual 231.1-2, Occurrence Reporting and Processing of Operations Information (August 19, 2003)

This manual provides detailed information for reporting occurrences and managing associated activities at DOE facilities, including NNSA facilities. It complements DOE O 231.1A, Environment, Safety, and Health Reporting and its use is required by that Order. Information gathered in response to the requirements in this order and manual is used for analysis of DOE's performance in environmental protection and the safety and health of its workers and the public. This information is also used to develop lessons learned and document events that impact DOE operations.

DOE Manual 411.1-1C, Safety Management Functions, Responsibilities, and Authorities Manual (December 31, 2003)

This manual defines safety management functions, responsibilities, and authorities for DOE senior management with responsibilities for line, support, oversight, and enforcement actions in order to ensure that work at DOE facilities and sites is performed in a manner that adequately protects the worker, the public, and the environment. The goal of performing work safely is reflected in the guiding principles and core management functions established in DOE P 450.4, Safety Management System Policy, dated October 15, 1996, and is codified in the DOE Acquisition Regulations, found at Title 48 of the CFR, §§ 970.5204-2, and 970.5223-1 (48 CFR 970.5204-2 and 970.5223-1).

DOE Order 414.1C, Quality Assurance (June 17, 2005)

The order seeks to ensure that DOE, including NNSA, products and services meet or exceed customers' expectations through the implementation of a quality assurance management system.

DOE Order 420.1A, Facility Safety (May 20, 2005)

This order establishes facility safety requirements for DOE/NNSA for nuclear safety design, criticality safety, fire protection, and natural phenomena hazards mitigation.

DOE Order 420.2B, Safety of Accelerator Facilities (July 3, 2004)

This order establishes accelerator-specific safety requirements which, when supplemented by other applicable safety and health requirements, will serve to prevent injuries and illnesses associated with DOE or NNSA accelerator operations.

DOE Order, 425.1C, Startup and Restart of Nuclear Facilities (March 13, 2003)

This order establishes the requirements for the DOE, including the NNSA, for startup of new nuclear facilities and for the restart of existing nuclear facilities that have been shut down.

DOE Order 430.2A, Departmental Energy and Utilities Management (April 15, 2002)

This order requires DOE to meet or exceed the goals of all laws, Executive orders, and Federal regulations for energy efficiency, use of renewable energy, and water conservation at DOE buildings, laboratories, and production facilities while increasing the use of clean energy sources using a life cycle cost-effective approach.

DOE Order 435.1, Change 1, Radioactive Waste Management (August 28, 2001)

The objective of this order is to ensure that all DOE radioactive waste is managed in a manner that is protective of worker and public health and safety and the environment.

DOE Order 450.1, Change 1, Environmental Protection Program (January 15, 2005)

The objective of this order is to implement sound stewardship practices that are protective of the air, water, land, and other natural and cultural resources impacted by DOE operations and by which DOE cost effectively meets or exceeds compliance with applicable environmental, public health, and resource protection laws, regulations, and DOE requirements. This objective is to be accomplished by implementing Environmental Management Systems at DOE sites. An Environmental Management System is a continuing cycle of planning, implementing, evaluating, and improving processes and actions undertaken to achieve environmental goals. These Environmental Management Systems must be part of Integrated Safety Management Systems established pursuant to DOE P 450.4, Safety Management System Policy, dated October 15, 1996.

DOE Policy 450.7, Environmental Safety and Health (ES&H) Goals (August 2, 2004)

The purpose of this policy is to establish ES&H goals for DOE personnel and its contractors. These goals are designed to establish Departmental ES&H expectations for: 1) DOE and contractor personnel ES&H behaviors and attitudes in the conduct of their daily work activities, and 2) operational performance regarding worker injuries and illnesses, regulatory enforcement actions, and environmental releases.

DOE Order 451.1B, Change 1, NEPA Compliance Program (September 28, 2001)

The purpose of this Order is to establish DOE internal requirements and responsibilities for implementing NEPA, the Council on Environmental Quality Regulations Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and the DOE NEPA Implementing Procedures (10 CFR Part 1021). The goal of establishing the requirements and responsibilities is to ensure efficient and effective implementation of DOE's NEPA responsibilities through teamwork. A key objective is to control the cost and time for the NEPA process while maintaining quality.

DOE Order 452.1C, Nuclear Explosive and Weapon Surety Program (September 20, 2005)

This order addresses requirements and responsibilities for planned nuclear explosive operations to prevent accidents and inadvertent or unauthorized use of nuclear explosives.

DOE Order 452.2B, Safety of Nuclear Explosive Operations (August 7, 2001)

This order establishes responsibilities and requirements to ensure the safety of routine and planned nuclear explosive operations and associated activities and facilities.

DOE Order 460.1B, Packaging and Transportation Safety (April 4, 2003)

This order establishes safety requirements for proper packaging and transportation of DOE/NNSA offsite shipments and onsite transfers of hazardous materials. This order requires compliance with Department of

Transportation regulations in 49 CFR 171-180 and type B radioactive material packaging certified by either DOE/NNSA or the Nuclear Regulatory Commission.

DOE Order 460.2A, Departmental Materials Transportation and Packaging Management (December 22, 2004)

The order establishes requirements and responsibilities for management of DOE/NNSA materials transportation and packaging to ensure the safe, secure, efficient packaging and transportation of materials, both hazardous and non-hazardous.

DOE Order 461.1A, Packaging and Transfer or Transportation of Materials of National Security Interest (April 26, 2004)

This order establishes requirements and responsibilities for offsite shipments of naval nuclear fuel elements, Category I and Category II special nuclear material, nuclear explosives, nuclear components, special assemblies, and other materials of national security interest.

DOE Order 470.4, Safeguards and Security Program (August 26, 2005)

This order establishes nine objectives concerning assurance of appropriate levels of protection against unauthorized access, theft, espionage, and other hostile acts that may cause adverse impacts on national security, health and safety, or the environment.

DOE Order 470.2B, Independent Oversight and Performance Assurance Program (October 31, 2002)

The order establishes the Independent Oversight Program, and is designed to enhance the DOE safeguards and security, cyber security, emergency management, and ES&H programs by providing DOE and contractor managers, Congress, and other stakeholders with an independent evaluation of the adequacy of DOE policy and the effectiveness of line management performance in safeguards and security, cyber security, emergency management, ES&H, and other critical functions as directed by the Secretary.

DOE Order 5480.19 Ch 2, Conduct of Operations Requirements for DOE Facilities (October 23, 2001)

This order provides requirements and guidelines for departmental elements, including the NNSA, to use in developing directives, plans, and/or procedures relating to the conduct of operations at DOE facilities. Specific to environmental concerns, the Environment, Safety and Health Department (EH-1), acting as the independent element responsible for assuring the protection of the public, workers, and the environment from DOE operations, shall:

1. Develop, and maintain policies necessary to implement and sustain effective DOE-wide conduct of operations of facilities and associated equipment/systems;
2. Develop, promulgate, and maintain guidance materials and conduct training and workshops, as necessary, for line management to implement the above policies and procedures;
3. Monitor appraisal reports relative to conduct of operations at DOE facilities to review implementation of this Order to identify needed requirements, and

4. Provide interpretation to the requirements of this order upon request.

2.5.4 State and Local Requirements

New Mexico Environmental Oversight and Monitoring Agreement

This agreement, known as the Agreement in Principle, between the DOE and the state of New Mexico, provides DOE technical and financial support to the New Mexico Environment Department DOE Oversight Bureau for independent environmental oversight, monitoring, access and emergency response at SNL/NM, LANL, the Waste Isolation Pilot Plant, and the Lovelace Respiratory Research Institute. The original agreement was signed in 1990, extended for five years in 1995, and another five years in 2000. A third extension was signed in 2005, but only for a period of two years. In 2007, the agreement will be reevaluated. Given the foreseen scope of work change between SNL/NM and LANL, it is expected that the single Agreement in Principle will be divided into two agreements, with one of the agreements covering LANL alone (Volkerding 2005).

Sandia National Laboratories Consent Order

A Compliance Order on Consent (Consent Order) was signed by the New Mexico Environment Department, DOE, and SNL/NM on April 29, 2004, pursuant to the New Mexico Hazardous Waste Act. The Consent Order contains environmental investigation and corrective action requirements for SNL/NM, primarily by establishing schedules and deliverables. The Consent Order also provides for integration of corrective action requirements with the Hazardous Waste Facility Permit, requires compliance with CERCLA § 120(h) in any land transfer, and provides for stipulated penalties. Although the Consent Order does not apply to radionuclides, the requirements of the Consent Order do apply to the hazardous waste component of mixed waste. By signing the Consent Order, SNL/NM did not agree to any admission of any liability, or any Findings of Fact or Conclusions of Law. The Consent Order identifies three areas of groundwater contamination (Burn Site, TA-V, and Tijeras Arroyo Groundwater) requiring characterization and the completion of a Corrective Measures Evaluation. Groundwater cleanup levels for these areas of concern are defined in Section VI.K.1.a of the Consent Order as the more restrictive of EPA maximum contaminant levels (MCLs) or Water Quality Control Commission standards (SNL/NM 2004a). The Consent Order also imposes certain groundwater monitoring requirements for the Mixed Waste Landfill and for perchlorate in certain existing wells and in all new wells.

While there have been a number of amendments to state and local environmental regulations, including new fee regulations since the 1999 SNL/NM SWEIS, none of the amendments significantly changed existing legal requirements or enforcement remedies.

2.5.5 Land Use Permits

DOE land use permits refer to properties within the boundaries of KAFB, which are leased by DOE for SNL/NM use by DOE. In general, land use permits are granted by KAFB for a period of five years. DOE negotiates land use permit renewals on a staggered-year schedule with a certain number of permits renewed each year. This staggered approach is used because some permits may need to be modified due to land use changes, and other permits may need to be terminated because the land is no longer needed by SNL/NM. In addition, new permits may be obtained for new land uses. Table 2.5-1 lists permit activity from 2000 through 2005.

Table 2.5-1. DOE/SNL Land Use Permit Activity from 2000 to 2005

Years	FY2000	FY2001	2002	2003	2004	2005	Total Permit Activity By Type
New Permits	0	3	3	0	0	2	8
Permit Modifications	0	6	10	14	2	2	34
Permit Renewals	11	1	6	8	10	16	52
Permit Terminations	0	1	1	0	3	3	8
Total Permit Activity by Year	11	11	20	22	15	23	102

Sources: SNL/NM 2001c, SNL/NM 2002b, SNL/NM 2003a, SNL/NM 2004b, SNL/NM 2005c.

Land use and therefore land use permits are expected to change little in the foreseeable future.

3.0 SCREENING REVIEW

Chapter 2 provides a discussion of changes in site activities that could result in changes in environmental impacts, changes in the characteristics of the SNL/NM or its environs, and changes in legal and regulatory requirements or guidance. This chapter describes the process for performing the initial screening analysis and discusses those technical discipline areas for which detailed analysis is not necessary to determine if the potential impacts of new and modified projects are within the scope of the impacts analysis of the 1999 SNL/NM SWEIS.

3.1 METHODOLOGY

A three-step review and analysis approach was used in developing this SA:

1. Perform initial screening analyses of activities, changed circumstances, and new regulations, as described in Chapter 2. This screening analysis will determine, without further detailed analysis, which specific impact areas clearly remain within the scope of environmental consequences established in the 1999 SNL/NM SWEIS (i.e., that adverse impacts are not more adverse than or beneficial impacts are not more beneficial than those discussed in the 1999 document). This chapter presents those impact areas that are within the screening criteria and thus require no further consideration.
2. Perform more detailed analyses of impact areas that do not pass the screening criteria (Step 1) to determine whether the impacts remain within the envelope of consequences established in the 1999 SNL/NM SWEIS. These detailed analyses are presented in Chapter 4.
3. For those impacts that are outside the envelope of consequences established in the 1999 SNL/NM SWEIS, determine whether the incremental change in environmental consequences is significant, as defined in NEPA regulations. This is included with the analysis presented in Chapter 4.

The following sections present the initial screening review, as described in Step 1, for each resource area analyzed in the 1999 SNL/NM SWEIS.

3.2 LAND USE AND VISUAL RESOURCES

Various land ownership documents and land use agreements define the areas used by SNL/NM. SNL/NM activities are conducted for DOE and other DOE-approved entities within the boundaries of KAFB.

3.2.1 LAND USE

Land use designations within KAFB have remained essentially the same as those described in the 1999 SNL/NM SWEIS. KAFB continues to share lands and infrastructure with several entities, including DOE and SNL/NM. KAFB comprises approximately 51,560 acres of land and includes lands owned by the DOE, DoD, and portions of the Cibola National Forest withdrawn for use by the USAF and DOE (SNL/NM 2004). Most of the land is under the control of the USAF which includes land donated to KAFB by the CABQ. Table 3.2-1 shows ownership of lands at KAFB.

Table 3.2-1. KAFB Land Ownership

Owner	Acreage	Percent of KAFB
USAF	25,586	49
USFS (withdrawn by USAF)	15,891	31
USFS (withdrawn by DOE)	4,595	9
DOE Fee Land	2,938	6
BLM (withdrawn by USAF)	2,549	5
Total Acreage	51,559	100

Source: SNL/NM 2004a
BLM = Bureau of Land Management
DOE = Department of Energy
KAFB = Kirtland Air Force Base
USAF = United States Air Force
USFS = United States Forest Service

Since publication of the 1999 SNL/NM SWEIS, the total acreage of DOE-owned land is unchanged. The five SNL/NM TAs cover approximately 2,560 acres of land within the boundary of KAFB. Table 3.2-2 compares the total acreage of DOE fee-owned land currently within the KAFB boundary to acreage at the time of the 1999 SNL/NM SWEIS.

Table 3.2-2. 1999 and 2004 Comparison of DOE Fee-Owned Land within the KAFB Boundary

Area	Approximate Acreage	
	1999	2004
Technical Area 1	350	360
Technical Area 2	210	210
Technical Area 3	1,890	1,860
Technical Area 4	85	80
Technical Area 5	25	50
Tijeras Arroyo drainage area	280	280
DOE/Albuquerque and Coronado Club (closed)	10	10
Eubank Boulevard development area	85	85
Total DOE Fee-Owned Land	2,935	2,935

Source: SNL/NM 2004a, SNL/NM 2006b, DOE 1999
DOE = Department of Energy
KAFB = Kirtland Air Force Base

The USAF and DOE are the principal land users within KAFB. DOE owns only a small portion of the land it needs and is required to conduct many of its activities under permit on land owned or withdrawn by the USAF. SNL/NM facilities and operations make up a majority of DOE's land use requirements on KAFB. Other DOE-funded activities make up the remainder.

Based on the screening analyses for selected facilities, environmental impacts of land use would be within the envelope of consequences established in the 1999 SNL/NM SWEIS analysis for the EOA. No detailed analysis is required.

3.2.2 VISUAL RESOURCES

Visual resources include natural and man-made physical features that give a particular landscape its character and value. Criteria used in the analysis of visual resources include scenic quality, visual sensitivity, and distance and/or visibility zones from key public viewpoints.

The surrounding visual characteristics of SNL/NM consist of mostly flat, gently sloping grassland to the west and mountainous terrain to the east. Key landforms that dominate views in the general area include the Four Hills formation, the Manzanita Mountains, and the Manzano Mountains further south. From areas of Albuquerque nearest KAFB, views to the east and southeast are limited by the Four Hills formation and surrounding foothills of the Manzano Area. Views to the south partially consist of KAFB facilities, the Albuquerque International Sunport, and open rangeland. In general, the terrain features associated with the western portion of KAFB are not particularly distinctive. The eastern half, however, exhibits greater visual variety due to its mountain and canyon topography. Most SNL/NM facilities are well within the KAFB boundary and away from public view. Because of their location and the surrounding terrain characteristics, most facilities are not visible from roads and areas with public access (DOE 1999).

Development on KAFB is the most apparent alteration affecting visual quality. Development is most apparent within the TAs. TA-I, TA-II, and TA-V are the most densely developed. TA-III and TA-IV contain more open space; however, development in these areas is still apparent.

In the 1999 SNL/NM SWEIS, SNL/NM initiated Campus Design Guidelines which contain a set of principles and guidelines that provide a framework for the physical development and redevelopment of SNL/NM sites (DOE 2004). This effort has continued since the issuance of the 1999 SNL/NM SWEIS.

Operations and new facility development since the issuance of the 1999 SNL/NM SWEIS have occurred well within the boundary of KAFB and have been, or will be, developed in or near already developed areas.

3.2.3 SUMMARY

Based on the screening analyses for selected facilities, environmental impacts on visual resources would be within the envelope of consequences established in the 1999 SNL/NM SWEIS analysis for the EOA. No detailed analysis is required.

The extent of DOE land and USAF-permitted acreage currently available for use by SNL/NM facilities on KAFB remain the same. Similarly, operations remain consistent with industrial/research park uses and have no foreseeable effects on established land-use patterns or requirements. New SNL/NM facilities, upgrades, and other actions since 1999 do not require changes to current land ownership or classification status because these activities would take place in or near existing facilities, within previously disturbed or developed areas, or on land already under DOE control.

No additional impacts to visual resources are anticipated that would adversely change the overall appearance of the existing landscape, obscure views, or alter the visibility of SNL/NM structures. New facilities, expansions, and upgrades would be planned at or near existing facilities and in areas with common scenic quality. The efforts initiated by SNL/NM to incorporate campus-style design would continue.

The construction and operation of off-site facilities are in areas where operations/missions are consistent with surrounding usage and are unlikely to cause additional long-term impacts to land use or visual resources.

3.3 INFRASTRUCTURE

The 1999 SNL/NM SWEIS detailed all aspects of the SNL/NM site infrastructure: buildings, services, maintenance, utilities, material storage, and transportation systems and corridors that support the operations of a facility, as well as water, sanitary sewer, storm drain, steam, fossil fuels, chilled water, electrical transmission, electrical distribution, communications, roads, and parking areas that support the TAs and other DOE facilities at KAFB (DOE 1999a). Since completion of the 1999 SNL/NM SWEIS, new facilities and facility modifications have increased certain aspects of SNL/NM infrastructure such as sanitary sewers, storm drains, roadways and transportation access, parking areas, and electrical transmission and distribution lines; however, none of these increases has had a significant overall impact.

SNL/NM, physically located within the boundaries of KAFB, is dependent on and limited by KAFB infrastructure capacity for basic utility needs such as water, wastewater discharge, electricity, and natural gas. Baseline data from the 1999 SNL/NM SWEIS (baseline year 1996) along with current (baseline year 2004) and projected (through 2008) data for these utility quantities are detailed in Table 3.3-1.

3.3.1 WATER

SNL/NM facilities were not metered for water use until 2000. Water use estimates in the 1999 SNL/NM SWEIS were calculated by adding the amount of wastewater, which is measured at six wastewater monitoring stations, to total estimated water losses from evaporation, irrigation, the steam plant, and other miscellaneous sources. Using the SWEIS methodology, 2004 water consumption was calculated to be 524.9M gal/year (yr), or 25.9M gal/yr (5.2 percent) above the 1999 SNL/NM SWEIS EOA with MESA of 499M gal/yr. Metered water use over the 2001 through 2004 period has ranged from 362 to 450M gal/yr. This SA screening analysis uses the SWEIS methodology for calculating water use for consistency with the SWEIS analysis, and because the quantities yield a more conservative analysis (i.e., quantities have been greater than those reported by water metering).

Water consumption projections for 2008, which include the new CINT and MESA facilities, show water use increasing to 555.3M gal/yr. This is an 11 percent increase over the water consumption under the 1999 SNL/NM SWEIS EOA of 499M gal/yr. CINT, which will be operational by 2006, is expected to use 10.6M gal/yr. MESA is projected to use 19.2M gal/yr by 2007 and into 2008 (DOE 2000a, DOE 2003a). While the 2008 projected water consumption amount of 555.3M gal/yr is above the bounding 1999 SNL/NM SWEIS EOA with MESA of 499M gal/yr, the combined SNL/NM projected water use total plus other KAFB water total (for baseline year 1996) of 1.3B gal/yr is still below, or 65 percent of, the 1999 SNL/NM SWEIS KAFB water infrastructure capacity of 2B gal/yr.

Table 3.3-1. Annual Utility Use at SNL/NM and KAFB Capacities

Utility	1999 SNL/NM SWEIS Baseline	Percent of Capacity	1999 SNL/NM SWEIS EOA with MESA	Percent of Capacity	SNL/NM SWEIS SA (2004)	Percent of Capacity	SNL/NM 2008 (projected)	Percent of Capacity	Total KAFB Capacity
Water Use	440M gal	22	499M gal	25	524.9M gal	26	555.3M gal	28	2,000M gal
Wastewater	292M gal	34	326M gal	38	365M gal	43	368M gal	43	850M gal
Electricity	197,000 MWh	27	198,000 MWh	27	207,672 MWh	28	211,408 MWh	29	735,840 MWh
Natural Gas	475M ft^3	21	481M ft^3	21	651M ft^3	28	655M ft^3	28	2,300M ft^3

Sources: DOE 1999a SNL/NM 2004b, DOE 2000a, DOE 2003a
EOA = Expanded Operations Alternative
ft^3 = cubic feet
gal = gallon
KAFB = Kirtland Air Force Base
M = million
MWh = megawatt-hours
SA = Supplement Analysis
SNL/NM = Sandia National Laboratories/New Mexico
SWEIS = Site-Wide Environmental Impact Statement

For 2004, wastewater discharge at 365M gal/yr is 13 percent above the 1999 SNL/NM SWEIS EOA. Similarly, the 2008 projected wastewater amount of 367M gal/yr is 13 percent above the 1999 SNL/NM SWEIS EOA. However, combining the 368M gal/yr 2008 SNL/NM projected wastewater amount with the 1996 KAFB wastewater amount of 256M gal/yr, both SNL/NM and the KAFB facilities remain 27 percent below the total KAFB capacity of 850M gal/yr.

3.3.2 Natural Gas

Natural gas usage has increased over the level used in the 1999 SNL/NM SWEIS analysis. The original projection of 481M ft^3 has increased to 651M ft^3 or an increase of approximately 170M ft^3. While numerically this may appear to be a large increase, this still only represents a 28 percent of utilization of existing natural gas capacity.

3.3.3 Electricity

Electricity usage has increased over the level used in the 1999 SNL/NM SWEIS analysis by approximately 10M kWh (5 percent), from 198,000 MWh to 207,672 MWh.. This usage is still only 28 percent of system capacity.

3.3.4 Summary

Based on the screening analyses for selected facilities, environmental impacts of water use, natural gas, and electricity would all be within the envelope of consequences established in the 1999 SNL/NM SWEIS analysis for the EOA.

Current and predicted water, natural gas, and electricity usage for 2008, are above levels analyzed in the 1999 SNL/NM SWEIS EOA, but substantially below infrastructure capacities. Wastewater discharge is below the level analyzed for the SWEIS EOA. There would be no additional impacts to infrastructure beyond those described in the 1999 SNL/NM SWEIS. No detailed analysis is required.

3.4 GEOLOGY AND SOILS

The evaluation of past, current, and expected impacts to geology and soils at SNL/NM performed for the 1999 SNL/NM SWEIS was extensive. All changes in mission or actions taken since development of the SWEIS would clearly be within the envelope of impacts evaluated, or would have little or no effect on geology or soils. Some minor impacts to geologic resources have occurred due to construction activities to upgrade existing facilities. Several facilities have been constructed or expanded in heavily developed areas on disturbed land that currently contains buildings and structures. The CINT Core Facility has been constructed on a large parcel (a 20-acre DOE-owned parcel) of land on the west side of Eubank Boulevard, north of the entrance to KAFB. The CINT complex 2003 Final EA assumes the entire 20-acre parcel would be disturbed. With the exception of the 183,000 ft^2 that would be needed to accommodate the building, parking lot, utilities, drainage, and other permanent features, the site would be restored using native or adapted plant species. Previous surveys discussed in the Environmental Information Document Calendar Year 2003 Update and the SNL/NM SWEIS identified no impacts to the geology and soils in the areas of the proposed CINT Project. No prime farmlands exist at SNL/NM. Because the areas under construction are all in industrially developed areas, and are being restored to pre-construction conditions, the impacts from construction activities are minor.

SNL/NM's ER Project was created under the DOE Office of Environmental Management (EM) to identify, assess, and remediate sites potentially contaminated by past spills, releases, and disposal activities. Waste generated from SNL/NM ER sites included RCRA-hazardous waste, LLW, mixed RCRA, mixed LLW, *Toxic Substances Control Act* (TSCA) waste (primarily polychlorinated biphenyls [PCBs] with some asbestos), and industrial solid waste. The number of ER sites has decreased since the close of 1999 when there were 146 regulated ER sites remaining on SNL/NM's RCRA Part B Operating Permit and 4 sites were proposed for no further action (NFA). At the close of 2004, the number of ER sites had decreased to 125; three sites were being actively remediated; and 41 sites were proposed for NFA. At SNL/NM, surface site characterization, remediation, and closure have been completed at a number of sites since 1999. Therefore, a minor beneficial impact to geology and soils has been realized since issuance of the 1999 SNL/NM SWEIS.

A large cleanup under the ER Project was the excavation of the Chemical Waste Landfill (CWL). This project began September 30, 1998, and was completed in February 2002. During this time over 52,000 cubic yards of soil and debris were excavated and most were disposed of at the Corrective Action Management Unit (CAMU), adjacent to the CWL, for treatment and/or placement in the containment cell for long-term management. Approximately 70 cubic yards of soil were disposed off site due to radiological activity above CAMU acceptance criteria. Additionally, a minor amount of soil contaminated with PCB compounds was disposed of offsite after the CAMU stopped accepting waste. Backfilling of the CWL to four feet below ground surface was completed in February 2004. Clean-up activities in the site operational boundary area adjacent to the CWL were completed in February 2004 and closure activities continued in 2005. Removal of waste from the CWL, backfilling and capping of the CWL with clean material, and deposition of CWL waste in the CAMU, which has a containment cell design, has resulted in improved soil conditions at SNL/NM since the 1999 SNL/NM SWEIS.

According to the 1999 SNL/NM SWEIS, Albuquerque is in a region expected to experience moderate earthquakes that could result in damage to buildings, depending on the quality of construction. Since the 1999 SNL/NM SWEIS, three earthquakes have occurred within a 100-mi radius of Albuquerque. The epicenter of the closest earthquake was 52 mi west of Albuquerque, had a Richter scale magnitude of 3.0, and occurred in May 2004. The other two earthquakes were of magnitude 2.4 and 3.5 and occurred 81 and 54 mi south of Albuquerque, respectively. In the Albuquerque area, the largest magnitude earthquake of the century, a recorded magnitude 4.7, occurred on January 4, 1971. SNL/NM buildings did not receive any appreciable damage from this event.

The SNL/NM ER Project commissioned a new geologic investigation of the KAFB area in 2002. The resulting report, entitled *Geologic Investigation: An Update of Subsurface Geology on Kirtland Air Force Base, New Mexico* reported three new fault structures: EOD Hills, M-M', and EOD faults (SNL/NM 2004a). According to the report, however, none of these three faults is considered to be a major fault by current standards. As such, there is no change to the overall seismic risk at SNL/NM.

All of the changes in mission or actions taken since development of the 1999 SNL/NM SWEIS would clearly be under the umbrella of impacts evaluated in the document.

3.5 WATER RESOURCES AND HYDROLOGY

3.5.1 GROUNDWATER QUALITY

The groundwater beneath the SNL/NM and adjacent areas is the source of drinking water for SNL/NM, KAFB, adjacent portions of the Albuquerque, and the Pueblo of Isleta. The ER Project investigates the nature and extent of groundwater contamination from past activities. All known groundwater contamination is the result of past activities. No current or planned future activities are expected to adversely impact groundwater quality. Investigations or remediation of these sites is ongoing (SNL/NM 2005c). Contamination of groundwater remains an adverse impact as discussed in the 1999 SNL/NM SWEIS (DOE 1999a).

Groundwater sampling conducted in 2004 indicates that some contaminants exceed regulatory limits. The EPA regulates drinking water constituents by setting MCLs. The New Mexico Water Quality Control Commission regulates drinking water constituents by establishing maximum allowable concentrations (MACs). Major findings of the 2004 sampling are as follows:

- Trichloroethylene concentrations at TA-V are consistent with or demonstrate a slight decrease over previous sampling periods.
- Chloride, fluoride and sulfate exceeded the MACs, but were not detected above the assigned MCLs.
- Arsenic levels were measured in excess of seven times the MCL.
- Chromium was routinely detected in some wells and is thought to be a result of corrosion of the stainless steel well screens used in these wells. The stainless steel corrosion product is in a particulate form. As such, the chromium is unlikely to migrate in the groundwater so as to present a hazard.
- Uranium-234 concentrations exceeded the DOE drinking water guideline; however, the exceedance is attributed to natural elevated uranium content in the underlying bedrock. Although the uranium concentration detected exceeds DOE guidelines, it is below the MCL for total uranium.

3.5.2 GROUNDWATER QUANTITY

Potable water to KAFB and SNL/NM facilities is supplied by on-site production from 10 wells. Groundwater production volumes for 1999 to 2004 are approximately 1.1B gal/yr (SNL/NM 2001a, 2001b, 2002a, 2003a, 2004b, 2005c). This SA estimates the total water use based upon the sewer system discharges and calculated water losses due to evapotranspiration, irrigation, etc (see Section 3.3.1). In 2004, wastewater flows for SNL/NM facilities were 365M gal/yr(SNL/NM 2005c). System water losses are calculated at 438,000 gal/day (159,870,000 gal/yr). Thus, water use is estimated according to the following calculation:

Wastewater Discharge	+	*Water Losses*	=	*Estimated Annual Water Use*
365,000,000 gal/yr	+	*159,870,000 gal/yr*	=	*524,870,000 gal/yr*

In August 1995, an MOU was signed between the State of New Mexico, the CABQ, the USAF, Public Service Company of New Mexico, and the U.S. DOE Office of Energy Efficiency and Renewable Energy which outlined a partnership for water conservation at KAFB and SNL/NM (DOE 1995a). The objective of the partnership was to develop a water resource management plan, install water efficient technologies, and implement efficient landscape irrigation practices, such as xeriscaping. The suggested goal was to reduce water use at KAFB and SNL/NM facilities by 30 percent. In the 1999 SNL/NM SWEIS, the DOE projected SNL/NM water use to be 499M gal/yr under the EOA. The estimated annual water use for 2004 is approximately 105 percent of the amount projected in the SWEIS. This has fallen short of the water conservation goal outlined in the 1995 MOU with the CABQ.

The calculation for projected water use builds upon the baseline year information from SNL/NM's 2004 facility operations. Of the selected facilities/facility groups evaluated (Table 2.2-1), only the MDL showed an operational increase in water use. All projections are assuming continuous maximum occupancy and status quo water conservation efforts. DOE projected water use under the No Action Alternative to be between 440-463M gal/yr for SNL/NM activities through 2008. Further, DOE projected water use for the EOA in the 1999 SNL/NM SWEIS to be 499M gal/yr through 2008 (DOE 1999a). Given the above referenced facilities, the projected water use through 2008 is estimated to be 555.3M gal/yr, 56.3M gal/yr above the EOA projected water use calculated in the 1999 SNL/NM SWEIS (DOE 1999a).

3.5.3 SURFACE WATER QUALITY

Surface discharges are releases of water and water-based compounds made to roads, open areas, or impoundments. Past sampling results from 1998 and 1999 have shown a presence of metals such as zinc, magnesium, and iron elevated above the benchmark values (SNL/NM 2001a). No unusual characteristics were observed in 2001, 2002, and 2003 (SNL/NM 2002a, 2003a, 2004b). No monitoring was required in 2000 (SNL/NM 2001b). Monitoring results in 2004 identified elevated levels of total suspended solids (TSS) and magnesium (SNL/NM 2005c). Albuquerque's semiarid climate with sparse vegetative cover and high erosion rates naturally produce high TSS levels. SNL/NM has reduced TSS levels in developed areas through best management practices, such as retention and detention ponds, landscaping conducive to infiltration, and lining of storm drain channels for erosion reduction. All monitoring points show elevated levels of magnesium even though they are separated by several miles and collect runoff from several different drainage areas. The presence of zinc, magnesium, and iron is likely due to natural conditions associated with rocks and soils derived from the igneous/metamorphic complex of the Manzanita Mountains.

The 1999 SNL/NM SWEIS identified oil and grease runoff and increased frequency of outdoor testing to be sources of contaminants of concern (DOE 1999a). No levels of water quality constituents exceeded the projections identified in the 1999 SNL/NM SWEIS (DOE 1999a).

3.5.4 SURFACE WATER QUANTITY

Review of surface water quantity was completed according to the methodology outlined in the 1999 SNL/NM SWEIS (DOE 1999a), which determined the SNL/NM contributions to the Rio Grande due to storm water runoff and discharges to the Southside Water Reclamation Plant. Extended drought conditions have resulted in reduced surface water flows. Surface water flows peaked in 2004 due to near normal levels of precipitation (SNL/NM 2005c).

3.5.4.1 Storm Water Runoff

Changes at SNL/NM since 1999 have resulted in only minor net differences in impervious surfaces, such as building and parking lot areas. These differences did not significantly change the developed area of SNL/NM from the 0.72 mi^2 area. Excess surface water runoff continues to be 100,000 to 700,000 ft^3/yr as estimated in EOA of the 1999 SNL/NM SWEIS (DOE 1999a).

3.5.4.2 Discharge to Sanitary Sewer

In the 1999 SNL/NM SWEIS, the projected annual wastewater discharge was 326M gal under the EOA. The estimated maximum discharge in 2004 is 365M gal/yr. The analysis includes the integration of the CINT and MESA facilities into the SNL/NM operations. The review of the 2008 projected discharge in relation to the 1999 SNL/NM SWEIS EOA has established that the SWEIS analysis is sufficient for projected wastewater discharge. The analysis for wastewater projections through 2008 is discussed further in Section 3.12.3.

3.5.5 SUMMARY

Groundwater quality remains an issue at SNL/NM despite continued remediation. However, the concentrations of contaminants do not indicate a worsening of the situation projected in the 1999 SNL/NM SWEIS analysis.

Projected 2008 groundwater use exceeds the projected quantities in the 1999 SNL/NM SWEIS analysis by approximately 10 percent. Aquifer drawdown due to groundwater use was identified as an adverse environmental impact in the 1999 SNL/NM SWEIS. Present and projected SNL/NM operations continue to adversely impact groundwater resources; water use is a resource area analyzed in detail in Chapter 4.

No sampling results indicate surface water contamination from SNL/NM activities.

SNL/NM's contribution to surface water quantity though stormwater runoff and discharges is unchanged from that analyzed in the 1999 SNL/NM SWEIS. In 2004, the wastewater discharge was 365M gal/yr or 12 percent higher than those projected in the SWEIS under the EOA. This quantity is projected to increase slightly to 368M gal by 2008. As the incremental increase in wastewater discharge is a small percentage of wastewater treatment plant capacity, the SNL/NM wastewater discharge environmental impacts would be within the envelope of those discussed in the 1999 SNL/NM SWEIS (see Section 3.12.3).

3.6 BIOLOGICAL AND ECOLOGICAL RESOURCES

The purpose of this section is to determine if changes in site facilities or activities since the 1999 SNL/NM SWEIS, or planned changes prior to 2009, have or may result in impacts to biological and ecological resources.

3.6.1 TERRESTRIAL RESOURCES

The terrestrial communities at the SNL/NM site have changed very little since the issuance of the 1999 SNL/NM SWEIS. Land disturbance has primarily been associated with new facility and infrastructure development. Much of the areas associated with new facility and infrastructure development are areas that were previously disturbed or were adjacent to existing facility areas. Major changes at SNL/NM are described in Chapter 2 of this SA.

Potential impacts to terrestrial resources include the displacement of wildlife and vegetation, an increase in the abundance of weedy vegetation species, and noise-related disturbance of wildlife.

3.6.1.1 Vegetation

There are four major habitat types at the SNL/NM site: grassland, woodland, riparian, and altered. Much of the unaltered habitats receive minimal disturbance from site operations.

Altered habitat at SNL/NM and KAFB includes buildings and the areas surrounding buildings, field testing areas, training areas, a golf course, residential areas, roadways, utilities, runways, and taxiways. The vegetation in this habitat type varies greatly, including bare ground and manicured landscapes, but the bulk of this habitat is comprised of non-native, weedy species of plants. Increasingly, efforts are underway to reseed altered areas with native plant species to assist the natural revegetation process (SNL/NM 2004a).

The 1999 SNL/NM SWEIS indicated that any impacts to vegetation should be short-term and minimal. The grama grass cactus (*Pediocactus papyracanthus*), was listed as a USFS sensitive species in the 1999 SNL/NM SWEIS, and the SWEIS indicated that this cactus could possibly be destroyed by fire during testing operations at the Lurance Canyon Burn Site (DOE 1999a). Since release of the 1999 document, the grama grass cactus has been removed as a USFS sensitive species (USFWS 2005). Additional information on threatened, endangered, and sensitive species is discussed in Section 3.6.3.

3.6.1.2 Wildlife

Each of the major habitat types within the KAFB boundary supports a variety of wildlife species. Bird communities are particularly dynamic; some resident bird species remain on-site throughout the year, and many migratory bird species frequent SNL/NM. Some common wildlife species at SNL/NM include coyote (*Canis latrans*), deer mouse (*Peromyscus leucopus*), rock squirrel (*Spermophilus variegates*), common raven (*Corvus corax*), American robin (*Turdus migratorius*), and the house finch (*Carpodacus mexicanus*) (SNL/NM 2004a).

The 1999 SNL/NM SWEIS indicated that there should be only short-term and minimal impacts to wildlife present at SNL/NM. Wildlife species that reside on, or utilize KAFB are generally representative of wildlife species found in the areas surrounding KAFB. Additionally, KAFB likely contains a greater density and diversity of wildlife than that of adjacent lands due to large areas of relatively undisturbed habitat. Additional information on threatened, endangered, and sensitive species is presented in Section 3.6.3.

3.6.2 AQUATIC RESOURCES

Six wetlands are designated as United States Army Corps of Engineers (USACE) jurisdictional wetlands. Coyote Springs is the largest natural wetland onsite and consists of four separate seep areas. Five small unnamed springs occur around the Four Hills. Three support wetland vegetation and the other two are rock seeps and do not support wetland vegetation, but may provide surface water to wildlife (SNL/NM 2004a). The Lurance Canyon Burn Site Spring is the only spring or wetland on land used by SNL/NM.

The 1999 SNL/NM SWEIS indicated that there would be no impacts to springs or wetlands. The selected facilities in Chapter 2 of this document indicate that no new facility or infrastructure development would occur in the areas of springs or wetlands.

3.6.3 Threatened, Endangered and Sensitive Species

Fifteen threatened, endangered and other species of concern were identified as potentially occurring in Bernalillo County (USFWS 2005). Of the 15, four of these species (Table 3.6-1) have been documented on KAFB (SNL/NM 2005c).

Table 3.6-1. Threatened and Endangered Species Observed at KAFB

Species		Federal Status	State Status
American peregrine falcon	*Falco peregrinus anatum*	Species of Concern	Threatened
Bell's vireo	*Vireo bellii*	---	Threatened
Baird's sparrow	*Ammodramus bairdii*	---	Threatened
Gray vireo	*Vireo vicinior*	---	Threatened

Source: SNL/NM 2005

Of the state-listed threatened and endangered wildlife species, only the gray vireo is known to regularly breed on site. The American peregrine falcon is listed as a species of concern by the USFWS (USFWS 2005). No nesting of this species has been observed, and only a small amount of American peregrine falcon nesting habitat exists on KAFB (SNL/NM 2004a). The 1999 SNL/NM SWEIS indicated that the American peregrine falcon should not be affected by SNL/NM operations.

No plant species currently listed as threatened or endangered is known to occur at KAFB. The Santa Fe milkvetch (*Astragalus feensis*) has been observed at the SNL/NM site and is listed in the New Mexico Rare Plants List (New Mexico Rare Plant Technical Council 2005 and SNL/NM 2004a).

Information on facilities and operations in Chapter 2 of this document indicates that no new facility or infrastructure development should take place in areas where threatened, endangered, or species of concern are known to occur.

3.6.4 Summary

The 1999 SNL/NM SWEIS indicated minimal to no impacts to biological and ecological resources as a result of the implementation of the EOA. A review of recent data and the facilities and operations described in Chapter 2 indicate that actions since the issuance of the 1999 SNL/NM SWEIS do not create new conditions or substantial changes relevant to biological and ecological resources.

Since the 1999 SNL/NM SWEIS, SNL/NM has developed an Ecology Program to address data gaps on information for many species, seasons, and land areas. The Ecology Program was developed to provide guidance and support on a variety of animal and plant issues. The goals of the Ecology Program are to assist SNL/NM and DOE/NNSA in maintaining ecological compliance, as well as preserving and protecting the ecological resources occurring on SNL/NM lands. In addition, SNL/NM continues to conduct terrestrial and ecological surveillance to detect the possible deposition or migration of contaminants to offsite locations and to determine the impact, if any, to SNL/NM's environment (SNL/NM 2005c). These programs will effectively help reduce future impacts to biological and ecological resources by identifying and monitoring sensitive resources, surveying sites being considered for development to ensure that sensitive species will not be affected, and by follow-up monitoring of developed sites to gauge the degree to which biological and ecological resources have been affected.

3.7 CULTURAL RESOURCES

Cultural resources are prehistoric or historic archaeological sites, buildings, structures, districts, or other places or objects considered to be important to a culture or community for scientific, historical, traditional, religious, or other reasons. Cultural resources primarily addressed in the 1999 SNL/NM SWEIS and in this SA are those that have been determined eligible or potentially eligible for inclusion in the National Register of Historic Places (NRHP). To be eligible for the NRHP, a resource must be associated with events or persons significant in our past, embody distinctive construction characteristics, or yield information important in prehistory or history. In addition to meeting one of these criteria of importance, a resource must also retain integrity for its period of significance.

3.7.1 NEW CULTURAL RESOURCE SURVEYS AND HISTORIC BUILDING INVENTORIES

Since completion of the SNL/NM SWEIS, extensive cultural resource studies have been conducted within the boundaries of KAFB to inventory resources, document them, and evaluate them for significance and eligibility for listing on the NRHP. These studies, which include both archaeological resources and architectural properties, have been more thorough than many studies conducted before the 1999 SNL/NM SWEIS.

Archaeological surveys of 100 percent of the area within the five DOE-owned TAs were conducted in the 1990s, thus no new surveys have been conducted since the 1999 SNL/NM SWEIS. In addition, portions of these technical areas had been surveyed for specific projects. There are no known archaeological sites within these five TAs (SNL/NM 2004a).

Extensive archaeological surveys have been conducted of the remainder of KAFB since the 1999 SNL/NM SWEIS. The areas surveyed include all USFS-owned lands withdrawn to USAF and DOE, all BLM-owned lands withdrawn to USAF, and all USAF-owned lands. The TAs, the main facility and housing of the base, and some ER Project sites were the only areas excluded. These surveys were much more comprehensive than those conducted before the 1999 SNL/NM SWEIS. Table 3.7-1 compares the current knowledge about known archaeological sites with the information presented in the 1999 SNL/NM SWEIS.

The types of archaeological sites identified on KAFB have remained consistent with those known at the time of the 1999 SNL/NM SWEIS. The number and density of sites have increased overall due to the comprehensive nature of the recent surveys. The patterns of geomorphic and topographic distribution of archaeological sites have changed somewhat since the 1999 SNL/NM SWEIS. While prehistoric and historic sites are still clustered in four major areas, as shown in the 1999 SNL/NM SWEIS (DOE 1999a), the clusters now have slightly wider boundaries (SNL/NM 2004a). The cluster at the headwaters of Arroyo del Coyote is the same. The cluster at the Joint Operating Agreement Area has expanded into the southern portion of the CTF. The cluster located along Tijeras Arroyo has extended slightly to the west.

Table 3.7-1. Known Prehistoric and Historic Archaeological Sites by Land Owner

Land Owner	Number of Archaeological Sites			
	All Known Sites		NRHP Eligible or Potentially Eligible Sites	
	1999 SNL/NM SWEIS	Current	1999 SNL/NM SWEIS	Current
DOE	0	0	0	0
USAF (includes BLM withdrawn areas)	130	267	86	168
USFS, Withdrawn to DOE	41	48	35	42
USFS, Withdrawn to USAF	110	183	68	142
Leased to DOE by State of New Mexico	3	3	3	3
Leased to DOE by Pueblo of Isleta	0	1	0	1
TOTALS	284	502	192	356

Sources: DOE 1999a, KAFB 2004
BLM = Bureau of Land Management
DOE = Department of Energy
NRHP = National Register of Historic Places
SNL/NM = Sandia National Laboratories/New Mexico
SWEIS = Site-Wide Environmental Impact Statement
USAF = United States Air Force
USFS = United States Forest Service

The cluster located at the southern margin of the Four Hills at the lower end of Arroyo del Coyote saw the most change. It is now expanded to include the eastern margin along Four Hills all the way up to the northern boundary of KAFB, and also extends west almost to the TA-III boundary.

Information on architectural properties was limited at the time of the 1999 SNL/NM SWEIS (DOE 1999a). In TA-I, 52 buildings had been evaluated and none were found to be eligible or potentially eligible for the National Register of Historic Places (NRHP). In the diamond-shaped area that was originally identified as TA-II, the entire TA was determined to be eligible as a district, with three buildings individually eligible and 32 buildings contributing to the district eligibility. SNL/NM conducted extensive documentation of the buildings and the buildings were all demolished (SNL/NM 2004a).

Architectural inventories of buildings and structures within the five technical areas have been undertaken since the SWEIS, focusing on those buildings that reach the 50-year age criterion. Eighty-one buildings in TA-I have been recorded since the 1999 SNL/NM SWEIS and some of them evaluated; 2 are eligible for the NRHP (one of which has been extensively documented and demolished), 22 are not eligible, 6 are of historical interest, and the remaining buildings have not been evaluated. Within the new TA-II boundaries, only one building has been evaluated and it is not eligible. Within TA-III, 77 buildings or structures have been evaluated and found not eligible for listing on the NRHP. Eligible properties in TA-III include the Sled Track (the track and six buildings), Centrifuge Complex (two centrifuge facilities and two support structures), Mechanical Shock Facility (one building), Vibration and Acoustics Facility (two buildings), and Water Impact Facility (building, tower, and associated structures). Four buildings in TA-IV have been evaluated for NRHP-listing; three are not eligible and one is eligible. At TA-V only one building has been evaluated and it is not eligible (SNL/NM 2004a; DOE 2003b).

SNL/NM facilities that are located outside of the technical areas and have been evaluated for NRHP-eligibility include the ACF Complex and the Lurance Canyon Burn Site. Both of these facilities are located within the CTF on USFS-owned land withdrawn to DOE. At the ACF Complex, 16 buildings have been determined not eligible. Three buildings and the aerial cables themselves have been determined eligible. Fifteen buildings at the Burn Site, slated for demolition, were evaluated and determined not eligible (Ullrich 2006). The SNL/NM facilities at Thunder Range have been evaluated and none of them are eligible. Building 9972, the Radar Cross Section Facility, has been evaluated and was determined eligible.

A Traditional Cultural Property (TCP) is a place or object that is significantly associated with the cultural practices and beliefs that are rooted in a community's history and are important in maintaining the cultural identity of the community. Consultations with Tribes were conducted during preparation of the SWEIS; no specific TCPs were identified at that time. Since then, some project-specific consultations have occurred; however, there are still no specific TCPs identified for KAFB (KAFB 2006).

3.7.2 Determination of Need For Detailed Analysis

The analysis in the SNL/NM SWEIS for the EOA projected that impacts to cultural resources would be low to negligible due to 1) the absence of archaeological sites on DOE-administered land, 2) the nature of the cultural resources found on KAFB, 3) compliance with applicable regulations and established procedures for the protection and conservation of cultural resources on lands administered by the DOE and on lands administered by other agencies and used by the DOE, and 4) the largely non-destructive nature of SNL/NM activities conducted near cultural resources. This assessment remains the same for activities proposed through 2008 at SNL/NM.

Almost the entire KAFB has now been surveyed for archaeological resources and many more archaeological sites have been identified, though there are still none identified on DOE-owned lands. The types of archaeological sites on KAFB have remained the same, and the areas where sites are clustered have remained essentially the same with some minor expansions. Many additional DOE buildings have been recorded and evaluated, resulting in more buildings being identified as NRHP-eligible. Although there are more known cultural resources to be considered during planning, DOE procedures implemented prior to SNL/NM activities taking place, which are basically unchanged since the SWEIS, continue to ensure that potential impacts to NRHP-eligible cultural resources would be considered prior to initiating activities, and identified impacts would be avoided or mitigated. The abundance of information now available on site locations and eligible buildings also would make planning for activities more effective, as activities could be planned ahead to avoid or reduce impacts.

The legislation presented in the SNL/NM SWEIS that addresses federal agencies' obligations to cultural resources still apply to the DOE at SNL/NM. However, there have been some deletions, changes, and additions to these obligations. The *Religious Freedom Restoration Act of 1992* (42 USC 2000bb) was revoked in 1997 and should not have been included in the SWEIS. The *National Historic Preservation Act of 1966* (16 USC 470, as amended) and the regulations implementing Section 106 of the Act (36 CFR Part 800) have both been revised multiple times since the 1999 SNL/NM SWEIS. The revisions include 1) encouragement to federal agencies to combine NEPA compliance and Section 106 compliance into a better-integrated process; 2) expanded requirements for tribal consultation and participation; 3) removal of the Advisory Council on Historic Preservation from review of routine undertakings; and 4) greatly expanded program alternatives to substitute for 36 CFR Part 800. Executive Order 13084, *Consultation and Coordination with Indian Tribal Governments* (63 FR 27655), was revoked and replaced with Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments* (65 FR 67249), which was signed on November 6, 2000. This Executive Order requires agencies to establish regular and meaningful consultation with tribal officials in the development of policies that have tribal implications. The DOE revised its *Tribal Government Policy* in early 2000 to include Executive Order 13084, and it was signed into policy before Executive Order 13175 was established.

These regulatory revisions do not require changes in the operations of the DOE and SNL/NM cultural resource programs. Proposed undertakings will continue to undergo review by the DOE (and the USAF and USFS if applicable) to determine if NRHP-eligible cultural resources could be affected by the undertaking. The DOE and the New Mexico State Historic Preservation Officer (SHPO) will consult on measures that can be implemented to mitigate or avoid any potential adverse effects. Consultation between the DOE and interested Tribes will take place as required.

The types of activities to be conducted outdoors through 2008 have not changed from those analyzed in the SNL/NM SWEIS. The analysis for the EOA for five facilities with the most potential to impact archaeological sites determined that the potential for impacts would be low to negligible. The potential impacts analyzed were from production of explosive testing debris and shrapnel, off-road vehicle traffic, and unintended fires and fire suppression. As shown with the SWEIS EOA analysis, any increase in the frequency of these activities through 2008 would not increase the potential for impacts above low to negligible.

Based on data and information currently available, no new construction is proposed in undisturbed areas through 2008. Proposed new construction only includes additions to existing buildings, which by definition are constructed in areas thoroughly disturbed by construction of the original buildings. Proposed construction includes construction of additions, renovation, and demolition of existing buildings, primarily through the TCR program. These activities would have adverse impacts to certain buildings that have already been determined NRHP-eligible. Additional buildings, which have not yet been evaluated and would be affected by these activities, would also likely be evaluated as eligible and would be adversely impacted. However, DOE would continue to follow federal laws and regulations and DOE policy that require the agency to identify the effects a project may have on eligible cultural resources and consider options to avoid, reduce, or mitigate those effects. When adverse effects will occur to significant resources as a result of a project, DOE would consult with the New Mexico SHPO to identify measures to mitigate the adverse effect. The consultation process, ensures that these impacts are consistent with, and within the bounds of, those described for the EOA in the SWEIS.

3.7.3 SUMMARY

Based on the screening analyses for selected facilities, environmental impacts on cultural resources would be within the envelope of consequences established in the 1999 SNL/NM SWEIS analysis for the EOA. No detailed analysis is required.

Overall, the impacts projected for proposed future activities through 2008 at SNL/NM would not exceed the envelope of consequences established for the EOA in the SWEIS.

3.8 AIR QUALITY

3.8.1 NON-RADIOLOGICAL AIR QUALITY

Bernalillo County has been designated as a maintenance area under the CAA for carbon monoxide (CO) emissions and is in attainment for other federally regulated pollutants. The New Mexico Administrative Code (NMAC), Title 20, Part 11.04, (20 NMAC 11.04), entitled General Conformity, implements Section 176(c) of the CAA, as amended (42 U.S.C 7401 et seq.), and regulations under 40 CFR 51, Subpart W, with respect to conformity of general Federal action in Bernalillo County. 20 NMAC Part 11.04.II.1.2, paragraph B, establishes the emission threshold of 100 tons/yr (TPY) of CO at SNL/NM that would trigger the requirement to conduct a conformity analysis.

The SNL/NM SWEIS (DOE 1999a) examined approximately 465 chemicals used at 12 major SNL/NM facilities as potential components of routine emissions. Occupational exposure limits (OEL), a time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect were identified for each of these chemicals, and a conservative “screening” value of the OEL divided by 100 was established for determining whether emissions factors for each chemical should be developed. This “screening” value is called the threshold emission value (TEV).

The initial screening was based on total inventory (in essence, this screening assumed that the entire quantity of a given chemical would be emitted). A chemical passed the screen if a theoretical release of the entire inventory did not cause the TEV to be exceeded. Facility-specific emissions factors were developed for those chemicals that did not pass the initial screening. After applying facility-specific emissions factors, chemicals were screened again to determine whether the TEV was exceeded. Chemicals also passed this screen if the TEV was not exceeded.

A determination as to whether a conformity analysis is required for each facility is presented with respect to construction and operation. Chemical emissions and criteria pollutant emissions are addressed and compared with the EOA presented in the 1999 SNL/NM SWEIS.

3.8.1.1 Reestablishing Long-Term Pulse Mode Testing Capability at the ACRR

Construction Air Conformity

No increase in air emissions is anticipated to result from reestablishing long-term pulse mode testing capability at the ACRR. No heavy equipment or construction vehicles would be used at the facility; therefore, no associated CO emissions would result requiring a conformity analysis.

Air Emissions

No radiological air emissions or chemical emissions were identified in the SWEIS for the ACRR and none are expected when reestablishing long-term pulse mode testing capability (DOE 2001a).

3.8.1.2 Center for Integrated Nanotechnologies

Construction Air Conformity

Trucks and construction equipment would generate CO emissions. Total CO releases for this project are anticipated to be approximately 6.63 tons throughout the life of the construction project, which is substantially below the 100 TPY threshold; therefore, a conformity analysis is not required (DOE 2003a). Adding 6.63 TPY of CO to the 2003 total CO emissions of 20 TPY is well below the estimated CO emissions for construction activities of 132 TPY for the EOA presented in the 1999 SNL/NM SWEIS (DOE 1999a). Fugitive dust generated during construction would be mitigated using dust control procedures.

Air Emissions

The air quality assessment found that the CINT would not adversely affect the ambient air quality in the region. Additionally, the hazardous air pollutant (HAP) analysis completed for the proposed CINT showed compliance with the Albuquerque Environmental Health Department (AEHD) HAP policy for all potential HAP impacts (AEHD 2000).

The HAP emissions associated with the proposed action were initially compared to the OEL divided by 15 to determine if modeling was required, as outlined by the AEHD Hazardous Air Pollutant Policy (dated April 16, 1998). Based on this evaluation, emissions of HAPs from CINT operations do not require modeling. However, HAP modeling was conducted to ensure that emissions of HAPs from CINT operations would not adversely affect the surrounding air quality. Modeled HAP impacts were compared to the ambient threshold of the OEL divided by 100. The maximum 8-hour impacts do not exceed 1/100 of the OEL; therefore compliance with the AEHD HAP policy is demonstrated.

Potential maximum criteria pollutant impacts would occur along the fence line or just beyond the fence line to the west of the proposed emission source. Potential impacts of nitrogen dioxide (NO_2), oxides of sulfur (SO_x), and PM_{10} exceeded the EPA Significance Levels, which requires further cumulative modeling. The purpose of 20 NMAC 11.41 is to show that a source will not cause or significantly contribute to air pollution in violation of any National Ambient Air Quality Standards (NAAQS).

Cumulative modeling was completed to determine if the proposed CINT contributed to an exceedance of the NAAQS for NO_2, SO_2, and PM_{10}. The criteria pollutant impacts from the proposed CINT, combined with background concentrations are below the NAAQS. Thus, compliance with the NAAQS, and therefore 20 NMAC 11.41, has been demonstrated. The maximum total potential impacts would occur to the west of the proposed CINT, along the KAFB fence line (DOE, 2003).

3.8.1.3 Neutron Generator Tritium Target Loading Production

Construction Air Conformity

No increase in air emissions is anticipated to result from the proposed consolidation of the Neutron Generator Tritium Target Loading Production at the NGPF. No heavy equipment or construction vehicles would be used during facility modifications; therefore, no associated CO emissions would result requiring a conformity analysis.

Air Emissions

As required by the permits, SNL/NM-wide HAPs usage may not exceed 10 TPY for any single HAP or 25 TPY for any combination of HAPs. Based on chemical inventory and usage, a conservative estimate of approximately 3.6 TPY of HAP and 35.3 TPY of volatile organic compound emissions could be released from the NGPF. This estimate assumes that the entire chemical inventory contained within the building would be released. Tritium target loading operations do not involve the use of hazardous chemicals, causing no change in emissions from those described in the SWEIS.

The current criteria pollutant emissions from the standby generators are extremely low in comparison to permit limitations (DOE 2005a) and therefore would contribute minimally to the criteria pollutant concentrations presented in the SWEIS.

3.8.1.4 MESA Complex

Construction Air Conformity

Based on the proposed schedule, construction activities are anticipated to last approximately 3 years. CO releases in any given year are anticipated to be substantially below the 100 TPY threshold; therefore a conformity analysis is not required.

Demolition activities would last approximately one month. These activities would generate a total of approximately 0.04 tons of CO over this time. Therefore, a conformity analysis is not required (DOE 2000a).

Fugitive dust generated during construction would be mitigated using dust control procedures.

Air Emissions

The additional personnel required for program growth would be transferred from other SNL/NM operations. MESA is not expected to require hiring of new employees, and therefore would not result in an increase of CO emissions from additional employee vehicles. Consequently, an air conformity analysis is not required.

Anticipated air emissions and the resulting consequences were analyzed using the same methodology used for the analyses supporting the SNL/NM SWEIS (DOE 1999a). With the completion of the Conceptual Design Report for MESA (DOE 2000a), more precise projections of chemical inventories and the resulting air emissions are possible. A list of chemicals projected to be present at the MESA Complex was evaluated to determine whether release of the entire inventory of each chemical would exceed the TEV. The initial screening identified 15 chemicals for which process knowledge would be needed to determine whether additional air emissions modeling would be required. For each of these chemicals, an emission rate was calculated based on process knowledge, equipment specifications, and other specific information. In all cases, these refined emission estimates were below the threshold emission values; therefore, additional dispersion modeling was not required, and no degradation of air quality is anticipated.

3.8.1.5 Test Capabilities Revitalization

Construction Air Conformity

Construction of TCR consisting of the TTC and Cask Testing Facility (not constructed, but possible for the future), and demolition of the Radiant Heat Facility contribute less than 2 tons of air emissions from construction equipment and demolition. Assuming the entire 2 tons of emissions is CO, then this amount is substantially below the 100 TPY threshold requiring a conformity analysis; therefore a conformity analysis is not required.

Fugitive dust generated during construction and demolition is mitigated using dust control procedures.

Air Emissions

A list of chemicals projected to be present at the TTC and the Cask Testing Facility was evaluated to determine whether release of the entire inventory of each chemical would exceed the TEV. The initial screening identified 16 chemicals at the Cask Testing Facility and 3 chemicals at the TTC for which process knowledge would be needed to determine whether additional air emissions modeling would be required. For each of these chemicals, an emission rate was calculated based on process knowledge, equipment specifications, and other specific information. In all cases, these refined emission estimates were below the threshold emission values; therefore, additional dispersion modeling was not required, and no degradation of air quality is anticipated (DOE 2003b). The emissions from chemicals that would be used in large quantities at the TTC, including beryllium, depleted uranium, and lithium, would be well below the TEV.

3.8.1.6 MESA Technology and Operations Prototype

The chemicals proposed to be moved to and used at the MESA Technology and Operations Prototype (TOP) would include small quantities of solvents, epoxies, and solders. None of the solvents were identified as HAPs by an SNL/NM air quality specialist. The estimated annual usage of chemicals include nitrogen (liquid and gas) (35,000 gals), solvents (5 gals), epoxy/adhesives (1 lb), solder (1 lb), and flux (1 gal).

3.8.1.7 Thermal Treatment Facility (TTF)

Air modeling for the TTF has indicated that the facility historically produces a maximum of 17 lb of carbon monoxide annually, which is well below the Ambient Air Quality Standards of 13.1 lbs per hour (SNL/NM 2005a) and substantially below the 100 TPY threshold requiring a conformity analysis.

The propane burners at the TTF are ignited and operated for a minimum of 30 minutes to completely burn the waste. The alternatives assume that the TTF consumes 2 gals of propane to operate for 30 minutes.

Projected annual treated waste in the SWEIS EOA is 1,200 lbs requiring 120 lbs of propane. Therefore, 60 burns are required to treat the 1,200 lbs of waste. During 2004, 2,181 lbs of waste were treated by the TTF requiring 1,356 lbs of propane (SNL/NM 2005b). This represents more than a tenfold increase in propane usage producing approximately 192 lbs of carbon monoxide annually, well below the Ambient Air Quality Standards of 13.1 lbs per hour. Although the facility burned significantly more propane in

2004 than the projection presented for the SWEIS EOA, the resulting carbon monoxide emissions would not cause or contribute to air pollution in violation of any NAAQS.

3.8.1.8 Other New Facilities

There are minimal non-radiological emissions from the Joint Computational Engineering Laboratory, Z Accelerator Modification and Refurbishment, International Programs Buildings, Auxiliary Hot Cell Facility, and Ion Beam Materials Research Laboratory. These facilities contain offices or small laboratories that have little or no non-radiological emissions.

3.8.2 RADIOLOGICAL AIR QUALITY

Radiological air quality is discussed in Section 3.9.1.

3.8.3 SUMMARY

Based on the screening analyses for selected facilities, environmental impacts of non-radiological air contaminants would be within the envelope of consequences established in the 1999 SNL/NM SWEIS analysis for the EOA. No detailed analysis is required.

3.9 HUMAN HEALTH AND WORKER SAFETY

The screening analysis for human health and worker safety compared the status of current SNL/NM missions to those that were evaluated in the 1999 SNL/NM SWEIS. The chemical and radiological emissions for SNL/NM were reviewed to determine if there were any significant increases or decreases in key indicators that could potentially impact human health and worker safety. Key indicators for human health and worker safety (air emissions, worker doses, and injury/illness rates) were evaluated for the time period since the issuance of the 1999 SNL/NM SWEIS and compared to the impacts described in the SWEIS.

3.9.1 HUMAN HEALTH

Radiological and nonradiological hazardous materials released from SNL/NM facilities reach the environment and people through different transport pathways. Of the transport pathways that could potentially impact human health, only the air exposure pathway from air emissions provides a complete exposure pathway. Soils, groundwater, and surface water exposure do not provide complete exposure pathways and are not expected to lead to radiological or nonradiological exposure to public receptors.

Table 3.9-1 provides a comparison of the cumulative effective dose equivalent (EDE) to Maximally-Exposed Individual (MEI) from radiological air emissions for each year to the SWEIS values. The MEI dose for each year is less than those predicted in the SWEIS. Table 3.9-2 provides a comparison of the Collective Population Dose from radiological emission for each year to the SWEIS values. The Collective Population Dose for each year is less than those predicted in the SWEIS. Nonradiological chemical air emission values were also reviewed and were not significantly different from the values predicted in the SWEIS. Based on the information in Chapter 2, new emission sources are not expected to increase the impacts on public health.

Table 3.9-1. Comparison of Maximally Exposed Individual (MEI) Doses from Radioactive Air Emissions

Dose per Calendar Year (mrem/yr)					SWEIS Total MEI Dose (mrem/yr)
1999	2000	2001	2002	2003	
7.7×10^{-4}	3.5×10^{-3}	3.0×10^{-3}	2.1×10^{-3}	2.2×10^{-3}	5.1×10^{-1}

Source: SNL/NM 2005b
MEI = Maximally Exposed Individual
mrem/yr = millirems per year
SWEIS = Site-Wide Environmental Impact Statement

Table 3.9-2. Comparison of Collective Population Dose from Radioactive Air Emissions

Collective Dose to Population within 50-mile Radius of SNL/NM per Calendar Year (person-rem/yr)					SWEIS Collective Dose to Affected Population (person-rem/yr)
1999	2000	2001	2002	2003	
2.2×10^{-2}	8.0×10^{-2}	6.8×10^{-2}	6.8×10^{-2}	9.5×10^{-2}	15.8

Source: SNL/NM 2005b
SWEIS = Site-Wide Environmental Impact Statement

3.9.2 WORKER SAFETY

SNL/NM operations are required to be in compliance with the DOE and Occupational Safety and Health Administration (OSHA) requirements for worker health and safety. DOE ES&H programs regulate the work environment and seek to minimize the likelihood of work-related exposures, illnesses, and injuries. In addition, SNL/NM's Occupational Radiation Protection Program complies with 10 CFR 835, *Occupational Radiation Protection,* and DOE-N-441.1, *Radiological Protection for DOE Activities*, which provide requirements for protection of onsite workers and visitors.

Table 3.9-3 provides a comparison of the average, maximum and collective radiation-badged worker doses for each year to the SWEIS values. Table 3.9-4 provides a comparison of the nonfatal injury/illness case rates and lost workday case rates for Sandia Corporation employees to the SWEIS values. The doses and rates for this period have remained relatively constant, indicative of a stable occupational health and safety environment. Based on the information in Chapter 2, future projects are not expected to change the occupational health and safety environment in the next five years.

Table 3.9-3. Comparison of Average, Maximally Exposed Individual (MEI) and Collective Radiation-Badged Worker Doses

Parameter	Calendar Year					1999-2003 Average	SWEIS 5-year Average
	1999	2000	2001	2002	2003		
Average dose to workers (mrem/yr)	68	84	50	45	43	58	42
Dose to MEI (mrem/yr)	603	720	472	425	417	527	723
Collective dose to workers (person-rem/yr)	7.34	7.81	5.30	4.95	10.49	7.66	12

Source: SNL/NM 2005b
MEI = Maximally Exposed Individual
mrem/yr = millirems per year
SWEIS = Site-Wide Environmental Impact Statement

Table 3.9-4. Comparison of Nonfatal Injury/Illness and Lost Work Day Case Rates

Parameter	Calendar Year					Maximum SWEIS Values
	1999	2000	2001	2002	2003	
Nonfatal Occupational Injury/Illness Rates (per 100 workers/year [per 200,000 hours])	3.5	3.6	4.2	3.3	3.6	4.1
Lost Work Day Case Rates (per 100 workers/year [per 200,000 hours])	1.5	1.4	1.3	1.8	1.3	2.0

Source: SNL/NM 2005b
SWEIS = Site-Wide Environmental Impact Statement

3.9.3 SUMMARY

Based on the screening analyses for selected facilities, environmental impacts of human health and safety would be within the envelope of consequences established in the 1999 SNL/NM SWEIS analysis for the EOA. No detailed analysis is required.

3.10 ACCIDENTS

NEPA requires that an agency evaluate reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement. An EIS informs the decision-maker and the public about the chances that reasonably foreseeable accidents associated with the proposed action and alternatives could occur, and their potential adverse consequences. An accident is considered bounding if no reasonably foreseeable accident can be found with greater consequences. An accident is reasonably foreseeable if the analysis of occurrence is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason (40 CFR 1502.22[b][4]).

An accident is a sequence of one or more unplanned events with potential outcomes that endanger the health and safety of workers and the public. An accident can involve a combined release of energy and hazardous materials (radiological or chemical) that might cause prompt or latent health effects. The sequence usually begins with an initiating event, such as a human error, equipment failure, or a natural event, such as an earthquake, followed by a succession of other events that could be dependent or independent of the initial event, which dictate the accident’s progression and the extent of materials released. Initiating events fall into three categories:

- Internal initiators normally originate in and around the facility, but are always a result of facility operations. Examples include equipment or structural failures and human errors.
- External initiators are independent of facility operations and normally originate from outside the facility. Some external initiators affect the ability of the facility to maintain its confinement of hazardous materials because of potential structural damage. Examples include aircraft crashes, vehicle crashes, nearby explosions, and toxic chemical releases at nearby facilities that affect worker performance.
- Natural phenomena initiators are natural occurrences that are independent of facility operations and occurrences at nearby facilities or operations. Examples include earthquakes, high winds, floods, lightning, and snow. Although natural phenomena initiators are independent of external facilities, their occurrence can involve those facilities and compound the progression of the accident.

If an accident were to occur involving the release of radioactive or chemical materials, workers, members of the public, and the environment could be at risk. Workers in the facility where the accident occurs could be particularly vulnerable to the effects of the accident because of their location. The offsite public could also be at risk of exposure to the extent that meteorological conditions exist for the atmospheric dispersion of released hazardous materials.

3.10.1 Radiological Accident Scenarios

This analysis compares current facility operations and radionuclide inventories against those in the 1999 SNL/NM SWEIS (DOE 1999b) to determine if the accident scenarios evaluated in the 1999 SNL/NM SWEIS remain applicable and bounding for current and future operations, or if detailed technical evaluation of the accident risks of the current and future operations is needed. Table 3.10-1 shows the radiological accident scenarios analyzed in the 1999 SNL/NM SWEIS EOA. For SNL/NM facilities with the potential for radiological accidents, the following section discusses each facility's current operations and radionuclide inventories and compares these against the analysis in the 1999 SNL/NM SWEIS.

3.10.1.1 Neutron Generator Production Facility

In 2005, NNSA prepared the Final Environmental Assessment for the Proposed Consolidation of Neutron Generator Tritium Target Loading Production (DOE 2005a). Under the Proposed Action evaluated in the EA, it is anticipated that the total tritium inventory, including all sources for Building 870, would be less than 12,000 Curie (Ci) at any given time. In order to be conservative, the EA analyzed a maximum tritium inventory for the Proposed Action of 15,999 Ci. This can be compared to the tritium inventory that was 4,880 Ci under the No Action Alternative in the EA, to give a maximum 3.28-fold increase in tritium inventory.

Table 3.10-1. Potential Impacts of Radiological Facility Accidents under the 1999 SNL/NM SWEIS Expanded Operations Alternative

Facility	Accident ID	Scenario	Frequency (per year)	Additional Latent Cancer Fatalities to 50-Mile Population	Increased Probability of Latent Cancer Fatality	
					Maximally Exposed Individual	Noninvolved Worker
Annular Core Research Reactor – Medical Isotopes Production Configuration	AM-1	Airplane crash – collapse of bridge crane	6.3×10^{-6}	2.0×10^{-3}	2.4×10^{-7}	7.4×10^{-5}
	AM-3	Rupture of waterlogged fuel element	1.0×10^{-2} to 1.0×10^{-4}	4.9×10^{-4}	5.4×10^{-8}	3.8×10^{-6}
	AM-4	Rupture of one molybdenum-99 target	1.0×10^{-4} to 1.0×10^{-6}	3.9×10^{-4}	4.3×10^{-8}	3.0×10^{-6}
	AM-5	Fuel handling accident – irradiated element	1.0×10^{-4} to 1.0×10^{-6}	4.9×10^{-3}	6.1×10^{-7}	7.6×10^{-5}
	AM-6	Airplane crash and fire in reactor room with unirradiated fuel and targets present	6.3×10^{-6}	1.6×10^{-6}	1.0×10^{-10}	4.9×10^{-8}
	AM-7	Target rupture during Annular Core Research Reactor to Hot Cell Facility transfer	$<1.0\times10^{-6}$	3.9×10^{-4}	4.9×10^{-8}	1.4×10^{-5}
Hot Cell Facility – Medical Isotopes Production	HM-1	Operator error – molybdenum-99 target processing	1.0×10^{-1} to 1.0×10^{-2}	3.8×10^{-5}	3.3×10^{-9}	1.6×10^{-7}
	HM-2	Operator error – iodine-125 target processing	1.0×10^{-1} to 1.0×10^{-2}	1.6×10^{-6}	1.0×10^{-10}	4.2×10^{-9}
	HM-4	Fire in steel containment box	1.0×10^{-2} to 1.0×10^{-4}	2.6×10^{-3}	2.4×10^{-7}	2.3×10^{-6}
Hot Cell Facility – Room 108 Storage	HS-1	Fire in Room 108, average inventories	3.3×10^{-5}	2.1×10^{-3}	1.8×10^{-7}	2.0×10^{-7}
	HS-2	Fire in Room 108, maximum inventories	2.0×10^{-7}	7.9×10^{-2}	6.6×10^{-6}	7.4×10^{-6}
Sandia Pulsed Reactor	S3M-2	Control element misadjustment before insert	1.0×10^{-4} to 1.0×10^{-6}	1.2×10^{-3}	1.5×10^{-7}	2.5×10^{-4}
	S3M-3	Failure of a fissionable experiment	1.0×10^{-4} to 1.0×10^{-6}	7.9×10^{-3}	8.4×10^{-7}	3.8×10^{-1}
	SS-1	Airplane crash into North Vault storage vault	6.3×10^{-6}	9.2×10^{-3}	5.8×10^{-7}	5.5×10^{-4}
	S4-1	Control-element misadjustment before insert	1.0×10^{-4} to 1.0×10^{-6}	2.2×10^{-3}	2.7×10^{-7}	4.7×10^{-4}

Table 3.10-1. Potential Impacts of Radiological Facility Accidents under the 1999 SNL/NM SWEIS Expanded Operations Alternative (continued)

Facility	Accident ID	Scenario	Frequency (per year)	Additional Latent Cancer Fatalities to 50-Mile Population	Increased Probability of Latent Cancer Fatality	
					Maximally Exposed Individual	Noninvolved Worker
Annular Core Pulsed Reactor-II, Defense Programs	AR-1	Uncontrolled addition of reactivity	$<1.0\times10^{-6}$	7.3×10^{-3}	9.3×10^{-7}	1.2×10^{-4}
	AR-2	Rupture of waterlogged fuel element	1.0×10^{-1} to 1.0×10^{-2}	1.3×10^{-3}	1.7×10^{-7}	1.2×10^{-5}
	AR-4	Fire in reactor room with experiment present	1.0×10^{-4} to 1.0×10^{-6}	9.0×10^{-3}	1.0×10^{-6}	1.4×10^{-4}
	AR-6	Airplane crash, collapse of bridge crane	6.3×10^{-6}	5.9×10^{-3}	8.4×10^{-7}	2.2×10^{-4}

Source: DOE 1999b

As can be seen in Table 5.4.8-4 of the 1999 SNL/NM SWEIS, the contribution of the NGPF to the site-wide earthquake radiological impacts under the EOA represents 0.06 percent of the overall additional latent cancer fatalities (LCFs) in the 50-mile population (5.1×10^{-5} additional LCFs out of a total of 0.075 LCFs from all radiological SNL/NM facilities). For increased probability of an LCF to the MEI, the NGPF contributes 0.018 percent of the overall SNL/NM result (1.4×10^{-9} out of a total of 7.7×10^{-6} for all radiological SNL/NM facilities). A 3.28-fold increase in tritium inventory for the Neutron Generator Production Facility would have no effect on the calculated overall SNL/NM site-wide earthquake radiological impact.

Therefore, the increase in tritium inventory in the NGPF would not change the conclusions in the 1999 SNL/NM SWEIS and detailed technical evaluation for this facility is not warranted.

3.10.1.2 Annular Core Research Reactor Facility (Pulse Configuration)

The 1999 SNL/NM SWEIS analyzed two modes of operation for the ACRR: pulse configuration and medical isotope production configuration. In 2001, the ACRR was reconfigured for pulse mode when the medical isotope program was suspended. A supplement analysis to the SWEIS (DOE 2001) was prepared to address potential environmental effects of reestablishing long-term pulse-mode testing capabilities at the ACRR in support of defense programs. DOE determined that additional pulse-mode testing, including the production of small quantities of radioisotopes and support to other nuclear research programs, would not result in any significant impact to the environment.

The accident scenarios listed in Table 3.10-1 under the heading of “Annular Core Research Reactor – Medical Isotopes Production Configuration” and their impacts would no longer be applicable to this facility. Since there have been no substantial changes to the ACRR (pulse configuration) since the 1999 SNL/NM SWEIS analysis, the accident scenarios listed in Table 3.10-1 under the heading of “Annular Core Pulsed Reactor-II, Defense Programs” and their impacts (which includes the bounding accident scenario for this facility) are still applicable to this facility.

Therefore, the current and future operations at the ACRR would not change the conclusions in the 1999 SNL/NM SWEIS and detailed technical evaluation for this facility is not warranted.

3.10.1.3 Hot Cell Facility

The HCF remains in a standby status. Work to modify the HCF from its original mission (DOE Defense Programs testing) to support the DOE Isotope Production and Distribution Program was discontinued with the suspension of the medical isotope production program. As part of these modifications, the inventory of radioactive materials in the HCF has been substantially reduced from that analyzed in the 1999 SNL/NM SWEIS. SNL/NM and DOE are assessing future applications for the HCF.

The accident scenarios listed in Table 3.10-1 under the header of “Hot Cell Facility – Medical Isotopes Production” and their impacts would no longer be applicable to this facility. The accident scenarios listed in Table 3.10-1 under the header of “Hot Cell Facility – Room 108 Storage” (which includes the bounding accident scenario for this facility and the overall bounding accident scenario for SNL/NM) are still applicable to this facility. However, their impacts would be substantially reduced from those shown in Table 3.10-1 because of the reduction in potential source term.

Therefore, the current and future operations at the HCF would not change the conclusions in the 1999 SNL/NM SWEIS and detailed technical evaluation for this facility is not warranted.

3.10.1.4 Sandia Pulsed Reactor Facility

Since there have been no substantial changes to the SPR Facility since the 1999 SNL/NM SWEIS analysis, the accident scenarios listed in Table 3.10-1 for the SPR Facility and their impacts (which includes the bounding accident scenario for this facility) are still applicable to this facility.

Therefore, the current and future operations at the SPR Facility would not change the conclusions in the 1999 SNL/NM SWEIS and detailed technical evaluation for this facility is not warranted.

3.10.2 Chemical Accident Scenarios

The bounding chemical accident in the 1999 SNL/NM SWEIS was a catastrophic release of 80 pounds of arsine from the MESA Complex, under the conservative assumption that all arsine is stored in one location. Current operation plans for the MESA Complex do not include any scenarios where an inventory of 80 pounds of arsine would be stored in one location. Only a single 40-pound cylinder of arsine would be purchased at a time, and cylinders of arsine would always be stored in separate cabinets.

Therefore, the actual bounding chemical accident for the MESA Complex would be a release of 40 pounds of arsine. The consequences of this accident scenario would be less than those presented in the 1999 SNL/NM SWEIS (Table 5.4.8-7). Therefore, the current and future operations at the MESA Complex would not change the conclusions in the 1999 SNL/NM SWEIS and detailed technical evaluation for this facility is not warranted.

3.10.3 Explosive Accident Scenarios

The bounding facility explosive accident scenario presented in the 1999 SNL/NM SWEIS was an explosion in a cryogenic hydrogen tank that is located northwest of the MDL Building 858, with a storage capacity of approximately 493,000 standard cubic feet (SCF). Current operational plans indicate that cryogenic tanks would still be located in this area, but that this area has space for only two hydrogen tube trailers. These trailers would have individual storage capabilities of 100,000 and 125,000 SCF, for a total storage capacity of 225,000 SCF.

Therefore, the actual bounding explosive accident would be an explosion in cryogenic tanks with a storage capacity of approximately 225,000 SCF. The consequences of this accident scenario would be less than those presented in the 1999 SNL/NM SWEIS. Therefore, the current and future operations would not change the conclusions in the 1999 SNL/NM SWEIS and detailed technical evaluation of facility explosive accidents is not warranted.

3.11 TRANSPORTATION

The method of screening for transportation is to examine parameters reported in the 1999 SNL/NM SWEIS to determine if significant changes in environmental impacts are expected based on the changes described in Chapter 2. There are three types of parameters that would provide evidence of transportation impact changes: 1) site workforce, which would affect traffic-related impacts; 2) volumes of consumables and waste, which would be indicative of the numbers of shipments and traffic impacts from those shipments; and 3) the character of shipments with respect to hazardous or radioactive content, which would affect consequences of accidents or radiation dose to the public as opposed to incident-free shipments.

3.11.1 Evaluation of Parameters

Site Employment. The 1999 SNL/NM SWEIS reports a baseline Sandia Corporation employment of 7,652 and an EOA employment of 8,417. According to the latest Ten-Year Comprehensive Site Plan (SNL 2005a), Sandia Corporation employment for 2004 (the current baseline) was 8,294 and the peak year projected employment would be 8,665 in 2007, with a slight decrease in employment after 2007. Therefore, the number of employees would increase by 4.3 percent. However, total commuters would include contractors and subcontractors in addition to employees. As stated in Section 1.1, SNL/NM presently has a total workforce of approximately 11,300. Assuming the number of contractors/subcontractors also would increase by 4.3 percent, the overall workforce is projected to peak at approximately 11,800. No data exist to separate KAFB traffic from SNL traffic entering or within KAFB boundaries. Two intersections near TA-I would be anticipated to carry a majority of SNL/NM workers traveling to TAs-I, -II, and -IV. Average weekday traffic volume (two-way) on Wyoming Boulevard south of the Gibson Boulevard intersection is 16,211 vehicles per day. Traffic entering the intersection of G Avenue and 20th Street from the east (traveling from the direction of the Eubank gate) is 20,066 average weekday traffic volume (Parsons Brinckerhoff 2005).

Volumes of Consumables and Waste. Table 2.2-1 reports curies or masses of various consumables from the 1999 SNL/NM SWEIS and for the baseline year 2004. Based on data in that table, consumables for the facilities described in Chapter 2 decreased in 2004 from 80 percent to nearly 100 percent compared to the SWEIS values under the EOA. As described in Section 3.12, waste generation quantities that are transported offsite for disposal are projected to be at or below the SWEIS EOA values.

Character of Shipments. Given that the overall mission of SNL has not significantly changed, the same types of materials and waste shipped in 1996 or 1997 (the primary baseline years for SWEIS transportation data) are expected to be shipped from 2005 to 2009. Furthermore, the regulations for such shipping are essentially unchanged, leading to similar constraints on what can be shipped.

3.11.2 Determination of Need for Detailed Analysis

The site workforce of employees, contractors, and subcontractors is projected to peak at approximately 11,800. Table 5.4.9-4 in the 1999 SNL/NM SWEIS projects the EOA for daily SNL/NM commuters at 14,940 vehicles, so each member of the workforce could drive singly to work and not exceed the EOA. Therefore, a detailed analysis is not required. Moreover, the 500 additional employees, contractors, or subcontractors expected to be added to the 2004 workforce level would not be expected to noticeably affect traffic on KAFB, through the KAFB gates, or on Albuquerque streets near KAFB. This is because 1) some employees would carpool, 2) not all commuters would travel the same route or use the same gate, and 3) not all commuters would travel at the same time.

The quantities of consumables identified in Table 2.2-1 cannot be directly correlated to the numbers of receipts without additional data and analysis. In addition, these are not the only receipts for the facilities of interest. Nevertheless, the large decreases in consumable quantities appear to indicate that the overall number of materials receipts to SNL/NM will decrease. This decrease would result in less traffic both on and off SNL/NM and KAFB. Fewer trucks carrying dangerous materials reduces the probability of an accident releasing such materials. Further examination of receipts is not warranted.

Similarly, the waste quantities identified in Section 3.12 cannot be directly correlated to the numbers of waste shipments. However, the waste quantities projected for 2005 through 2008 do not exceed the EOA and therefore the number of waste shipments is not expected to exceed the numbers analyzed in the 1999 SNL/NM SWEIS.

3.11.3 SUMMARY

The projected workforce can be correlated to commuting vehicles. The expected daily commuting vehicles do not exceed the EOA. Given that the character of the shipments has not significantly changed from the SWEIS baseline years, quantitative evaluation of population dose or accident consequences per shipment is not needed. Based on the screening analyses for selected facilities, environmental impacts on transportation would be within the envelope of consequences established in the 1999 SNL/NM SWEIS analysis for the EOA. No detailed analysis is required.

Screening can be based solely on the change in the numbers of shipments. The number of shipments is not projected to increase; therefore, no detailed analysis of transportation is required.

3.12 WASTE GENERATION

The method of screening for waste generation is to compare the types and quantities of waste generated and projected to be generated by SNL/NM operations (excluding ER Project and decommissioning activities) with the waste generation analysis reported as the EOA in the 1999 SNL/NM SWEIS. Projection methodology is explained when the projections are discussed in the following subsections.

Table 3.12-1 presents the waste generation quantities for 1999 through 2008. Table 3.12-1 also lists the maximum annual quantity of waste presented in the 1999 SNL/NM SWEIS for the EOA (i.e., bounding quantity) for LLW, LLMW, TRU, mixed TRU, hazardous, municipal solid wastes, and wastewater. The 1999 SNL/NM SWEIS EOA quantities did not account for ER Project wastes and wastes resulting from decommissioning and decontamination activities; therefore, ER project waste quantities are not reflected in Table 3.12-1. Two other waste streams generated by ongoing operations, biohazardous and nonhazardous chemical wastes, so they are not included in Table 3.12-1, but are discussed in Section 3.12.3.

Table 3.12-1. Actual and Projected Waste Quantities for 1999 through 2008

Waste type	SWEIS EOA [a]	1999	2000	2001	2002	2003	2004	2005 [b]	2006 [b]	2007 [b]	2008 [b]
Low-level (ft^3)	9,897	10,403 [c]	12,097 [d]	12,997 [e]	6,297 [f]	7,527 [g]	6,450 [h]	9,476	9,476	9,482	9,482
Low-level mixed (ft^3)	318 (4,954 kg)	71.6 [i] (1,115 kg)	59.8 [i] (931 kg)	77.4 [i] (1,205 kg)	313 [i] (4,875 kg)	102 [i] (1,588 kg)	282 [j] (4,392 kg)	118 (1,838 kg)	118 (1,838 kg)	118 (1,838 kg)	118 (1,838 kg)
TRU (ft^3)	26	48 [k]	48 [k]	0 [k]	<1 [k]	<1 [k]	0 [j]	0	0	0	0
Mixed TRU (ft^3)	37	24 [k] (51.7 kg)	24 [k] (51.7 kg)	1 [k] (2.15 kg)	0 [k]	0 [k]	0 [j]	0	0	0	0
Hazardous (kg)	93,514	75,481	41,881	36,970	30,245	118,387	52,800	50,992	52,192	55,650	55,650
Solid waste (M kg^3)	1.1	1.33 [c]	1.18 [d]	1.02 [e]	2.11 [f, l]	1.03 [g]	1.08 [h]	1.1	1.1	1.1	1.1
Wastewater (M gal)	326	292 [c]	292 [d]	292 [e]	292 [f]	292 [g]	365 [h]	365	368	368	368

[a] Source: DOE 1999b
[b] Source: TtNUS 2006
[c] Source: SNL/NM 2001a
[d] Source: SNL/NM 2001b
[e] Source: SNL/NM 2002a
[f] Source: SNL/NM 2003a
[g] Source: SNL/NM 2004b
[h] Source: SNL/NM 2005c
[i] Source: SNL/NM 2004a, p.12-21
[j] Source: SNL/NM 2005b
[k] Source: SNL/NM 2005a
[l] Quantity includes KAFB solid waste, only the combined quantity was available. When Kirtland solid waste was reported separately in 2003 and 2004, the quantities were 1.4M and 1.5M kilograms, respectively.
ft^3 = cubic feet
SWEIS EOA = Site-Wide Environmental Impact Statement Expanded Operations Alternative
TRU = transuranic

3.12.1 RADIOACTIVE WASTES

SNL/NM continues to generate LLW and LLMW in its ongoing operations. TRU and mixed TRU wastes are not generated by current operations and are not expected to be generated by the new facilities that are expected to be operational by 2008. However, these wastes are still actively managed at the RMWMF while awaiting shipment to offsite disposal facilities.

As shown in Table 3.12-1, the quantities of LLW generated in 1999, 2000, and 2001 exceeded the quantity projected under the EOA in the 1999 SNL/NM SWEIS. The quantities generated in 2002, 2003, and 2004 were well under the SWEIS quantity. The projections for 2005 through 2008 were based on the average amounts generated from 1999 through 2004 and adjusted for the expected activity increases or decreases at SNL/NM facilities, which are presented in Table 2.2-1 and projected the new facilities described in Chapter 2. The quantities projected for 2005 through 2008 are about 96 percent of the SWEIS quantity (TtNUS 2006); therefore, the 1999 SNL/NM SWEIS impacts analysis is considered sufficient for LLW.

The annual generation of LLMW from 1999 through 2004 did not exceed the 1999 SNL/NM SWEIS bounding quantity. For 2005 through 2008, the annual generation is projected to be less than that generated in 2004 and would remain steady at about 118 cubic feet (1,838 kg, using an average density of 550 kg/m^3 [DOE 1999b, Appendix H]), which is about 37 percent of the SWEIS quantity (TtNUS 2006). Since the quantities projected for 2005 through 2008 are less than the amount projected in the 1999 SNL/NM SWEIS, the 1999 SNL/NM SWEIS impacts analysis is considered sufficient for LLMW.

3.12.2 HAZARDOUS WASTE

The 1999 SNL/NM SWEIS analysis projected the annual maximum quantity of hazardous waste generated at SNL/NM operating facilities to be 93,514 kg. As presented in Table 3.12-1, SNL/NM has generated less than that amount each year except in 2003. Hazardous waste generation for 2005 through 2008 was projected based on the average generation during the period from 1999 through 2004 and adjusted for increasing and decreasing activity levels at the selected facilities (see Table 2.2-1) and the new facilities described in Chapter 2. For 2005-2008, the annual generation is projected to be highest in 2007 and 2008, at 55,650 kg, which is about 60 percent of the SWEIS EOA quantity (TtNUS 2006). Since the quantities projected for 2005-2008 are less than the amount projected in the 1999 SNL/NM SWEIS, the impacts analysis of the 1999 SNL/NM SWEIS is considered sufficient for hazardous waste.

3.12.3 OTHER WASTES

3.12.3.1 Solid Waste

As shown in Table 3.12-1, SNL/NM generated 1.02M to 2.11M kg/yr of solid waste from 1999 through 2004. The highest amount was generated in 1999. (The quantity reported for 2002 in Table 3.12-1 includes KAFB solid waste because SNL's Solid Waste Transportation Facility processes solid waste for both SNL and KAFB and a separate quantity was not reported.) Since 1999, SNL has continued waste minimization and recycling efforts that have decreased the volume of solid waste. Solid waste generation for 2005 through 2008 was projected based on an average from years 1999, 2000, 2001, 2003, and 2004. This average was then increased to account for the new facilities described in Chapter 2. Peak generation is expected in 2007 and 2008 at approximately 1.1M kg/yr (TtNUS 2006). The 1999 SNL/NM SWEIS impact analysis was based on the baseline year 1996 generation of 1.1M kg and an assumption that solid waste generation would not increase during the years 1999 through 2008. Because the solid waste generation rate projected for 2005 to 2008 is not more than the baseline year's generation rate, the impacts analysis in the 1999 SNL/NM SWEIS is considered sufficient for solid waste.

3.12.3.2 Wastewater

The 1999 SNL/NM SWEIS analysis projected the annual maximum quantity of wastewater discharged at SNL/NM to be 322M gal without MESA and 326M gal with MESA. SNL/NM discharges wastewater to the CABQ sewer system via permitted outfalls. The wastewater discharge permits require the wastewater to meet certain quality standards, but does not restrict the volume of discharge. The volume of wastewater is indirectly restricted by water consumption capacity (see Section 3.3.). As presented in Table 3.12-1, SNL/NM discharged approximately 292M gal annually from 1999 through 2003. In 2004, SNL/NM wastewater volume increased to 1,000,000 gal/day (SNL/NM 2005c), an annual discharge rate of up to 365M gal. For a conservative estimate of future wastewater volume, the 2004 maximum volume was used. Wastewater discharges for 2005 through 2008 were projected based on the 2004 discharge rate of 365M gal and adjusted for increasing and decreasing activity levels at SNL facilities. For 2005 through 2008, the annual discharge projections increase to 368M gal, 14 percent over the SWEIS EOA (TtNUS 2006). The wastewater discharged from SNL/NM is treated at Albuquerque's Southside Water Reclamation Plant which receives about 60M gal of wastewater per day and has the capacity to receive up to 76M gal/day (CABQ 2006). The peak projected SNL/NM discharge rate would increase the wastewater discharge by an average of 8,000 gal/day. Wastewater quality will continue to be continuously monitored and will be sampled as required by the CABQ in accordance with outfall permits. Since the quantities projected for 2005 through 2008 are within the capacity of SNL/NM infrastructure and the downstream treatment plant, the impacts analysis of the 1999 SNL/NM SWEIS is considered sufficient for wastewater.

3.12.3.3 Biohazardous Waste

SNL/NM generates biohazardous waste at its medical facilities and biological safety laboratories. The 1999 SNL/NM SWEIS EOA analysis projected the annual maximum quantity of biohazardous waste generated at SNL/NM facilities to be 4,071 kg. The quantities of biohazardous waste generated at SNL/NM have fallen from a 1997 level of 2,463 kg to 510 kg in 2004 (SNL/NM 2005c). With more biological safety laboratories in CINT becoming operational and additional employees being served by the medical facilities, the generation rate would rise, but NNSA does not expect it to approach the SNL/NM SWEIS EOA level.

3.12.3.4 Nonhazardous Waste

Nonhazardous chemical waste is generated at SNL/NM through ongoing operations and ER Project activities. This waste stream is composed of non-regulated waste that is processed at the HWMF. The 1999 SNL/NM SWEIS stated that 125,112 kg would be generated by ER Project activities and that the maximum quantity generated by operations would be 92,290 kg. The 2004 quantity generated by ER Project activities and operations (separate quantities were not available) was 194,273 kg (SNL/NM 2005c). NNSA expects this amount to decrease as the ER Project is completed.

3.12.4 SUMMARY

With the exception of wastewater, waste quantities are within those analyzed in the 1999 SNL/NM SWEIS EOA. Based on the screening analyses for selected facilities, the adequacy of SNL/NM infrastructure, and CABQ wastewater treatment plant capacity, the environmental impacts of waste would be within the envelope of consequences established in the 1999 SNL/NM SWEIS analysis for the EOA. No detailed analysis is required.

3.13 NOISE AND VIBRATION

3.13.1 REESTABLISHING LONG-TERM PULSE MODE TESTING CAPABILITY AT THE ACRR

No noise above background levels is expected from reestablishing long-term pulse mode testing capability at the ACRR.

3.13.2 CENTER FOR INTEGRATED NANOTECHNOLOGIES

Construction activities would generate noise produced by heavy construction equipment, trucks, and power tools. In addition, traffic and construction noise is expected to increase during construction onsite and along offsite local and regional transportation routes used to bring construction material and workers to the site. These construction noise levels would contribute to the ambient background noise levels for the duration of construction, after which ambient background noise levels would return to pre-construction levels. Table 3.13-1 presents peak attenuated noise levels expected from operation of construction equipment including peak noise levels at the source and at distances of 50, 100, 200, and 400 feet.

Table 3.13-1. Peak Attenuated Noise Levels (in decibels [dBA]) Expected from Operation of Construction Equipment

Source	Peak Noise Level	Distance from Source			
		50 ft	100 ft	200 ft	400 ft
Heavy trucks	95	84-89	78-83	72-77	66-71
Dump trucks	108	88	82	76	70
Concrete mixer	108	85	79	73	67
Jackhammer	108	88	82	76	70
Scraper	93	80-89	74-82	68-77	60-71
Bulldozer	107	87-102	81-96	75-90	69-84
Generator	96	76	70	64	58
Crane	104	75-88	69-82	63-76	55-70
Loader	104	73-86	67-80	61-74	55-68
Grader	108	88-91	82-85	76-79	70-73
Dragline	105	85	79	73	67
Pile driver	105	95	89	83	77
Forklift	100	95	89	83	77

Source: DOE 2000c

3.13.3 Neutron Generator Tritium Target Loading Production

No noise above background levels is expected from neutron generator tritium target loading production at the NGPF.

3.13.4 MESA Complex

The onsite and offsite acoustical environments may be impacted during construction and operation of MESA. Construction activities at the proposed facility would generate noise produced by heavy construction equipment, trucks, and power tools, and percussion from pile drivers, hammers, and dropped objects. The levels of noise would be representative of levels at large-scale building sites. Relatively high and continuous levels of noise would be produced by heavy equipment operations during the site preparation phase of construction. However, after this time, heavy equipment noise would become more sporadic and brief in duration. The noise from trucks, power tools, and percussion would be sustained through most of the building erection and equipment installation activities on the proposed facility site. As construction activities reach their conclusion, sound levels on the proposed facility site would decrease to levels typical of daily facility operations. Traffic noise is expected to increase during construction onsite and along offsite local and regional transportation routes used to bring construction material and workers to the site.

Operations under MESA would have a negligible effect on background noise levels and would not increase the number of impulse noise events. Operation of the facility would generate some noise, caused particularly by site traffic and mechanical systems associated with operation of the facility, e.g., cooling systems, transformers, engines, pumps, boilers, steam vents, paging systems, and materials-handling equipment. In general, sound levels are characterized as typical of a light industrial setting, within the range of 50 to 70 A-weighted decibels (dBA), and any effects are considered to be negligible when compared to ambient levels. Effects upon residential areas are attenuated by the distance from the facility.

3.13.5 Test Capabilities Revitalization

Construction and demolition activities would generate noise produced by heavy construction equipment, trucks, and power tools. In addition, traffic and construction noise is expected to increase during construction onsite and along offsite local and regional transportation routes used to bring construction material and workers to the site. These construction noise levels would contribute to the ambient background noise levels for the duration of construction, after which ambient background noise levels would return to pre-construction levels.

Operation of the facility would generate some noise, caused particularly by site traffic and mechanical systems associated with the operation of the facility, e.g., cooling systems, transformers, engines, pumps, boilers, steam vents, paging systems, and materials-handling equipment. In general, sound levels are defined as being characteristic of a light industrial setting within the range of 50 to 70 dBA.

3.13.6 Other New Facilities

Operation of other new facilities, including the Joint Computational Engineering Laboratory, Z Accelerator Modification and Refurbishment, MESA TOP, International Programs Buildings, Auxiliary Hot Cell Facility, and Ion Beam Materials Research Laboratory, would generate some noise, caused particularly by site traffic and mechanical systems associated with the operation of each facility, e.g., cooling systems, transformers, engines, pumps, boilers, steam vents, paging systems, and materials-handling equipment. In general, sound levels are defined as being characteristic of a light industrial setting within the range of 50 to 70 dBA.

3.13.7 SUMMARY

Based on the screening analyses for selected facilities, environmental impacts of noise would be within the envelope of consequences established in the 1999 SNL/NM SWEIS analysis for the EOA. Noise levels remain within levels characteristic of a light industrial setting. Activities projected through 2008 are consistent with those analyzed in the 1999 SNL/NM SWEIS EOA. No detailed analysis is required.

3.14 SOCIOECONOMICS

For socioeconomic analysis purposes, the region of influence (ROI) is defined as the area in which the principal direct and secondary socioeconomic effects of site actions are likely to occur and are expected to be of the greatest consequence for local jurisdictions. The region of influence for this SA is comprised of a four-county area (Bernalillo, Sandoval, Torrance, and Valencia counties) including Albuquerque. The ROI includes most of the residential distribution of Sandia Corporation employees and contractor personnel. It also encompasses the probable location of future offsite contractor operations and indirect economic activities. This is the same ROI that was analyzed in the 1999 SNL/NM SWEIS.

Additionally, the 1999 SNL/NM SWEIS used data from the 1990 U.S. Census for demographic and housing data and data from the mid-1990s for economic data. This analysis uses demographic and housing data from the 2000 U.S. Census and compares it to the 1990 data. This analysis also uses the most recently available data for economics and education and compares the information to the similar 1999 SNL/NM SWEIS data.

3.14.1 POPULATION

Despite a 21.7 percent increase in population in the four-county ROI, the demographic characteristics of the population surrounding SNL/NM are very similar to the 1999 SNL/NM SWEIS. From 1990 to 2000, the population of the four-county ROI grew by 21.7 percent, from 599,416 to 729,649 (Table 3.14-1). In 2004, the U.S. Census Bureau estimated the ROI population to have grown another 7 percent to 781,447, of whom 75.9 percent (593,765) reside in Bernalillo County. The Mid-Region Council of Governments (MRCOG), which covers the ROI plus the southern portion of Santa Fe County, projects that the population of the four-county ROI will increase to 800,527 by 2005, to 866,531 by 2010, and 931,296 by 2015, which are annual increases between 1 and 2 percent (MRCOG 2005a).

Other area demographics, such as percent of population by age, education level, and below the poverty line, show little change over the 1990 through 2000 time period, with the exception of median household income for the ROI, which has increased by $12,758, from $12,935 to $25,693, since 1990 according to the U.S. Census.

Table 3.14-1. Historic and Projected Population in the Region of Influence

	1990	2000	2004	2010	2020	2030
ROI	599,416	729,649	781,447	866,531	986,035	1,132,617
New Mexico	1,515,069	1,819,046	1,862,837	2,090,678	2,380,802	2,691,578

Sources: MRCOG 2005a, BBER-UNM 2006
ROI = Region of Influence

3.14.2 EMPLOYMENT

Within the ROI, the unemployment rate was 6.4 percent in 1990 and decreased to a low of 4.5 in 2000. 2004 estimates show a 1 percent increase in the unemployment rate since 2000 (Table 3.14-2). Within the Albuquerque area, Sandia Corporation is the fourth largest employer (AED 2005). A study of SNL/NM's economic impact on central New Mexico during FY2003 found that 32,300 direct, indirect, and induced jobs were supported by SNL/NM's operations during the year (SNL/NM 2004a).

Table 3.14-2. Region of Influence Employment and Unemployment for 2004

	Civilian Labor Force	Employment	Unemployment	Unemployment Rate (Percent)
ROI Total (2004)	391,796	371,283	36,195	5.5
ROI Total (2000)	370,229	354,925	15,304	4.5
ROI Total (1990)	305,429	288,040	17,389	6.4

Source: BLS 2005
ROI = Region of Influence

Approximately $603M in direct salaries and wages were paid during FY2003 to Sandia Corporation employees. Additionally, approximately $758M in contract payments were made in FY2003, with 32 percent, or $245M, paid to New Mexico businesses. SNL/NM's impact on New Mexico's economy is approximately three times the total of the money that Sandia Corporation spends for salaries, contract payments and other purchases, approximately $5.7 billion (SNL/NM 2004a). Under the EOA, economic activity generated by SNL/NM through 2008 was expected to be $4.33 billion (DOE 1999b).

3.14.3 SUMMARY

The EOA in the 1999 SNL/NM SWEIS projected a Sandia Corporation workforce of 8,417. Under the September 2005 NNSA Ten-Year Comprehensive Site Plan for SNL/NM, future Sandia Corporation employment is projected to plateau at 8,658 FTEs in FY2007 and decrease slightly through FY2009. Any additional SNL/NM workforce needs are expected to be met by limited-term employees, on-site contractors, and resident visitors (SNL/NM 2005a).

The temporary increase projected for Sandia Corporation employment in 2006 would be an increase of 241 employees, or a 2.8 percent increase, over the EOA projected in the 1999 SNL/NM SWEIS. While the final number of Sandia Corporation FTEs is unknown, compared to total employment in the ROI, housing available for rent and sale, and increased number of new housing permits, the impact of the 241 additional FTEs would be negligible within the ROI.

3.15 ENVIRONMENTAL JUSTICE

Pursuant to Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, environmental justice analyses identify and address any disproportionately high and adverse human health or environmental effects on minority or low-income populations. Adverse health effects may include bodily impairment, infirmity, illness, or death. Adverse environmental effects include socioeconomic effects, when those impacts are interrelated to impacts on the natural or physical environment.

Disproportionately high and adverse human health effects are identified by assessing these three factors:

- Whether the adverse health effects, which may be measured in risks or rates, are significant or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death.
- Whether health effects occur in a minority population or low-income population affected by cumulative or multiple adverse exposures from environmental hazards.
- Whether the risk or rate of exposure to a minority population or low-income population to an environmental hazard is significant and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group.

The CEQ identifies minority and low-income populations when either (1) the minority or low-income population of the affected area exceeds 50 percent or (2) the minority or low-income populations in the affected area is meaningfully greater (i.e., 20 percentage points greater) than the minority population percentage in the general population or appropriate unit of geographical analysis (CEQ 1997). The geographic area of comparison for this analysis is the State of New Mexico. Demographic information from U.S. Census Bureau was used to identify minority and low-income populations in the 50-mile ROI analyzed in the 1999 SNL/NM SWEIS. Information on locations and numbers of minority and low-income populations was obtained from the 2000 U.S. Census. Figure 3.15-1 identifies areas of environmental justice concern within the ROI.

3.15.1 MINORITY POPULATIONS

According to 1990 census data, 280,360 minority individuals from an approximate total population of 609,500 resided in the 50-mile ROI. In comparison, 2000 census data show 360,344 minority individuals from a total population of 721,779 in the 50-mile ROI. Figure 3.15-2 shows the census block groups containing greater than 49 percent minority individuals using 2000 census data.

In 2000, 326,004 persons identified themselves as being of Hispanic origin in the 50-mile ROI, which represent 45 percent of the ROI population (Census 2006a). In 1990, approximately 228,800 persons identified themselves as being of Hispanic origin (37.5 percent) (DOE 1999b).

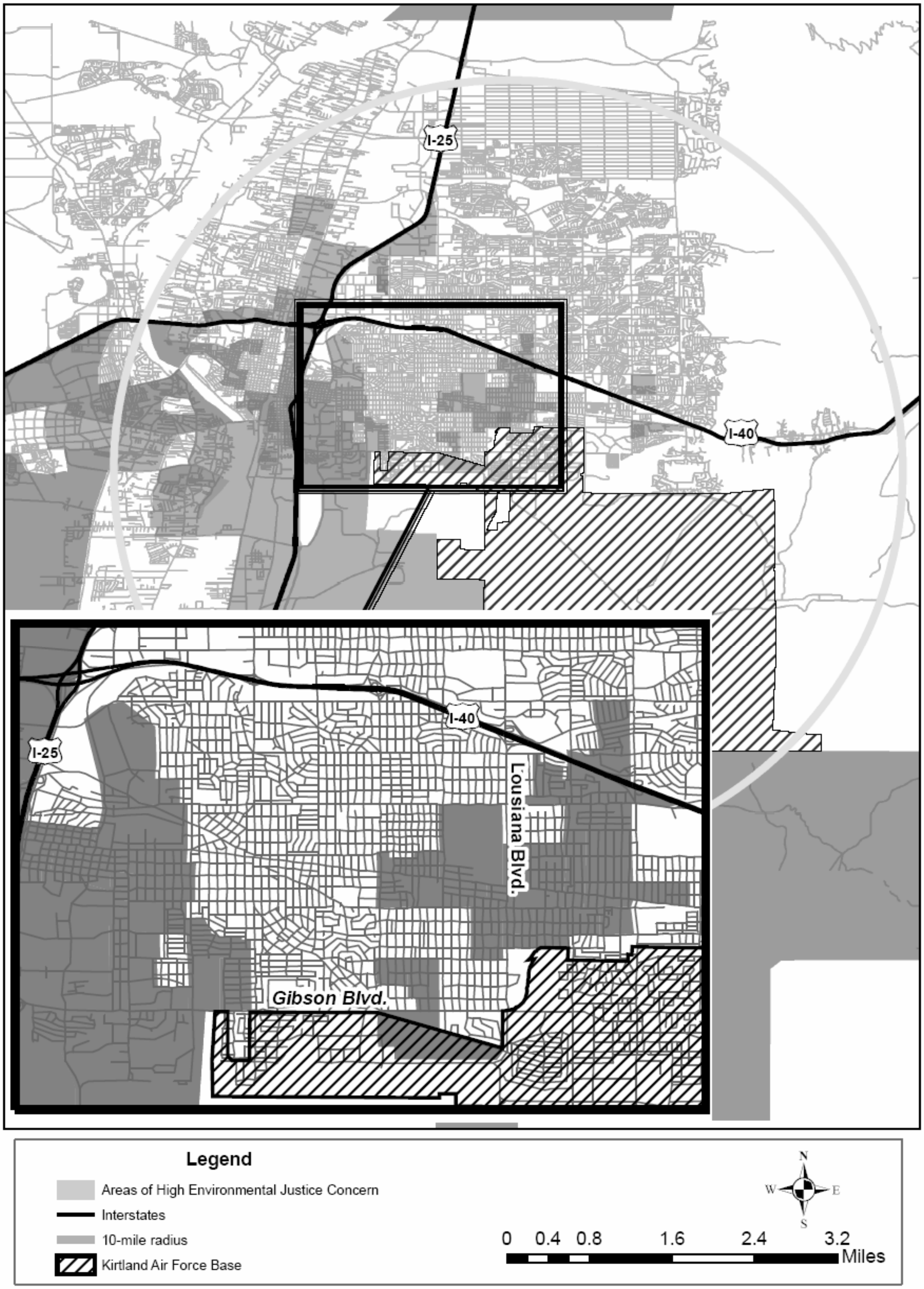


Figure 3.15-1. Areas of High Environmental Justice Concern near SNL/NM

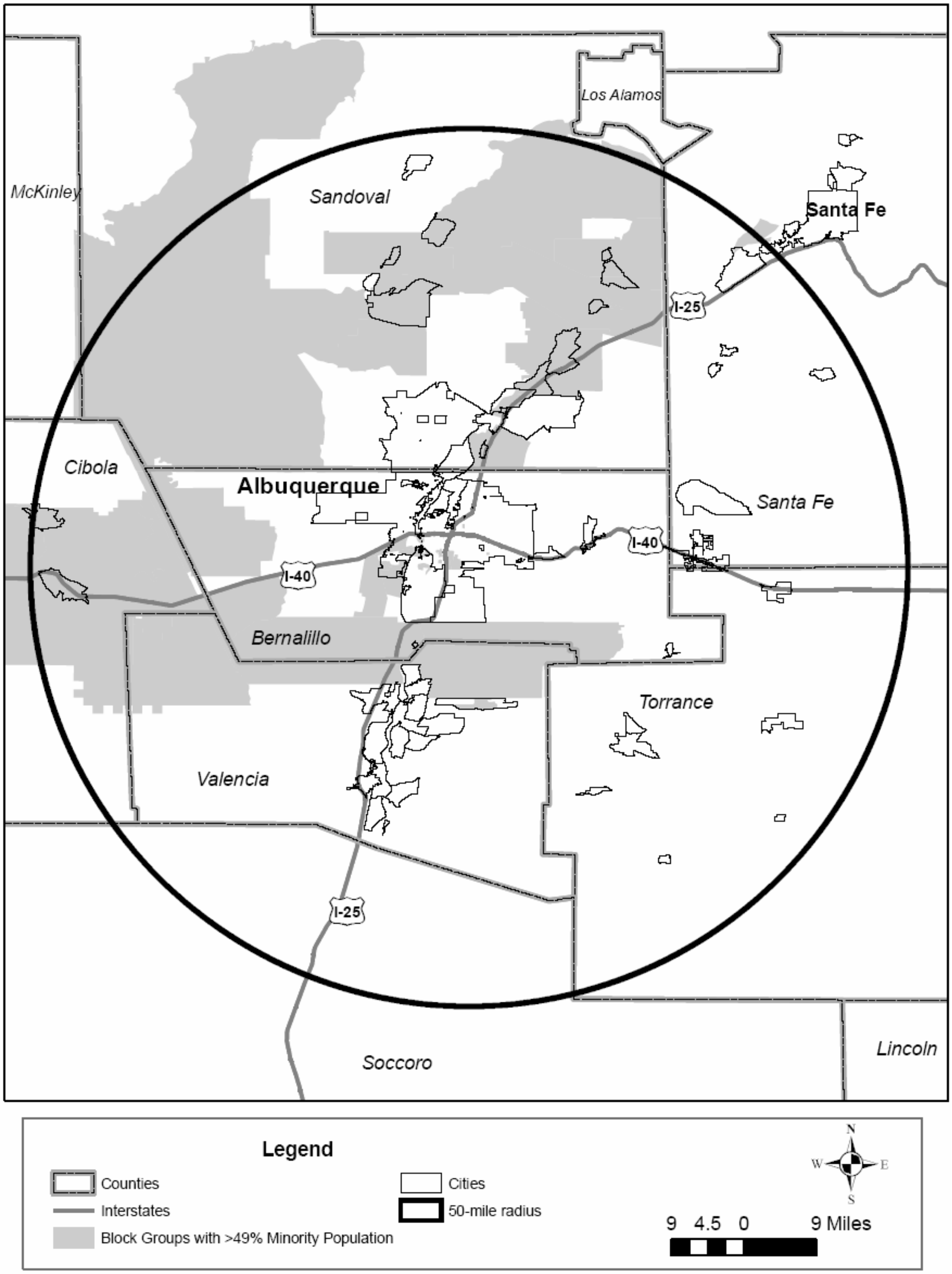


Figure 3.15-2. Areas of High Minority Populations within the 50-mile ROI

3.15.2 LOW-INCOME POPULATIONS

The Bureau of the Census characterizes persons in poverty (low-income person) as those whose incomes are less than a statistical poverty threshold. In 1989, the average weighted threshold for a family of four was $12,674 (DOE 1999b). In 2000, the average weighted threshold for a family of four was $17,603 (Census 2006b). Approximately 85,330 persons within the ROI were identified as being low-income in 1990. In comparison, 95,363 persons were identified as being low-income in 2000. Figure 3.15-3 shows the census block groups containing more than 21 percent population below the poverty level.

3.15.3 SUMMARY

In general, SNL/NM operations have no known disproportionately high or adverse health or environmental impacts on minority or low-income populations within the ROI. An area of concern described in the 1999 SNL/NM SWEIS included water resources and hydrology. However, impacts resulting from these resources would affect all communities within the ROI, therefore no disproportionately high and adverse impacts to minority- or low-income communities exist for this resource area. No additional impacts have been identified in this SA. There is no indication that impacts to environmental justice population would exceed those reported in the 1999 SNL/NM SWEIS.

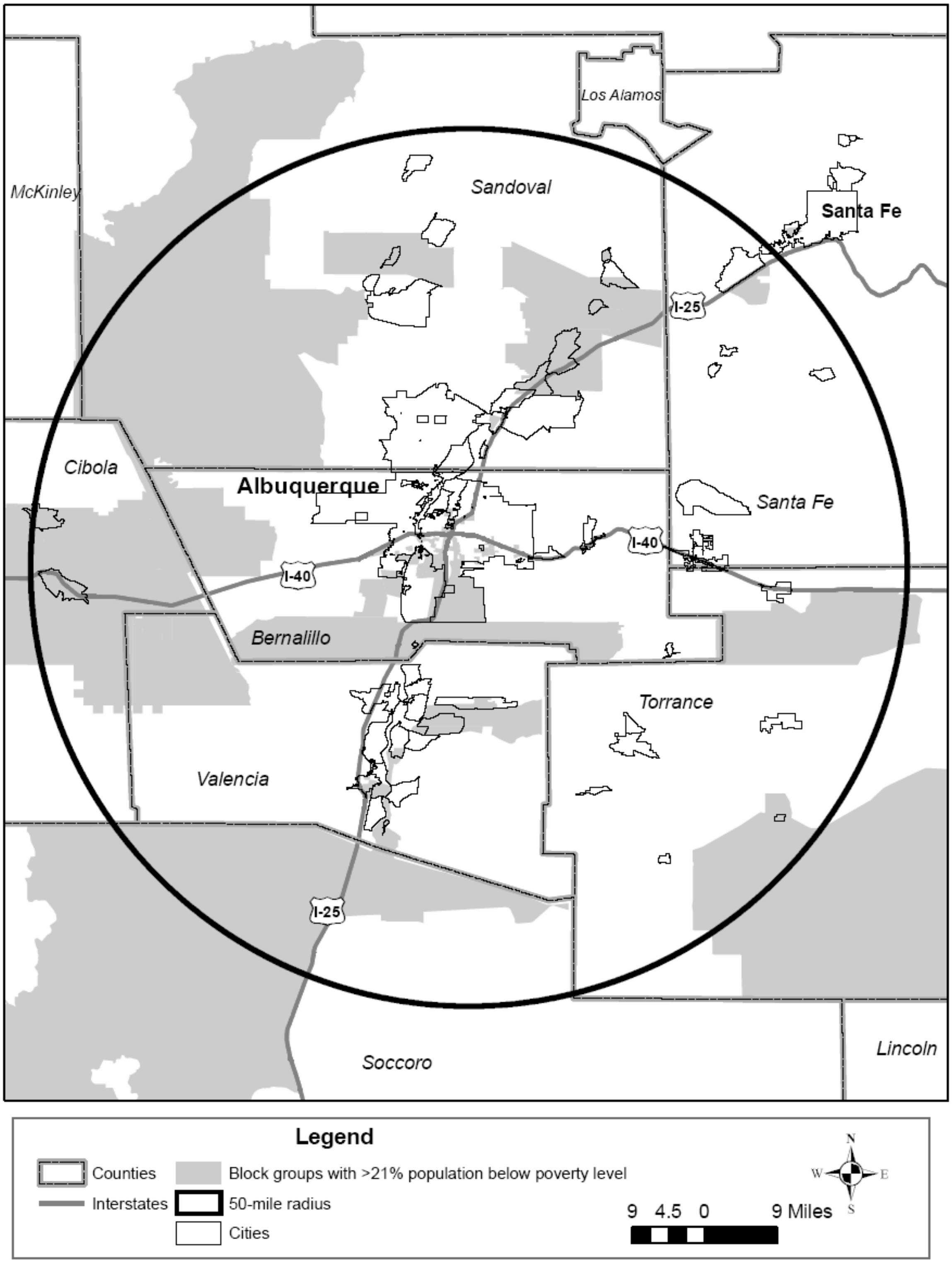


Figure 3.15-3. Areas of Disproportionate Low-Income Populations within the 50-mile ROI

4.0 DETAILED CONSEQUENCE ANALYSIS

This chapter presents more detailed analyses for technical disciplines that did not pass the initial screening criteria described in Section 3.1, as Step 1, thus requiring further analysis. It also presents a summary of the cumulative impacts for both the ROI and SNL/NM activities. The only resource area requiring investigation beyond Step 1 was groundwater.

4.1 GROUNDWATER QUANTITY

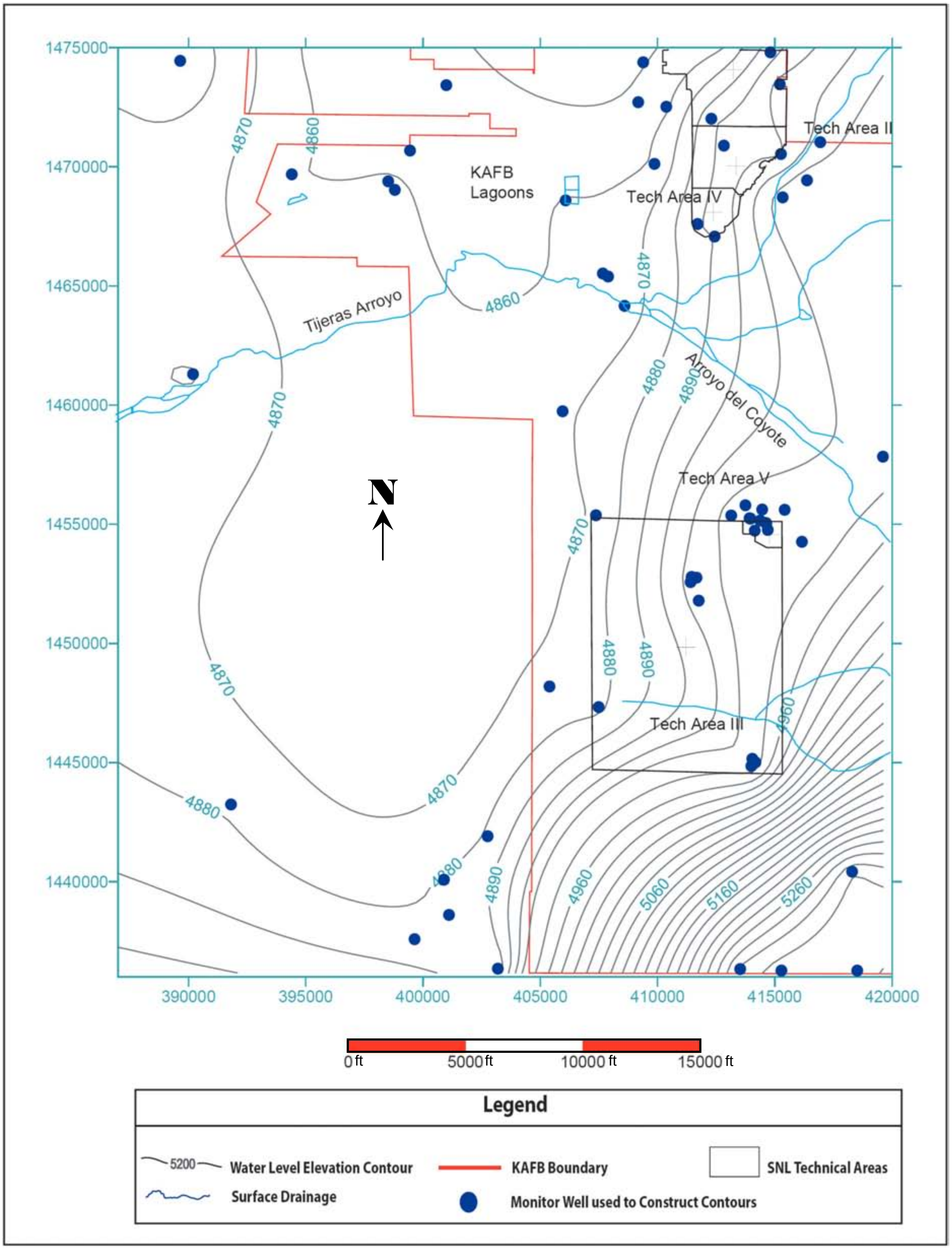
Groundwater levels east of the Tijeras fault complex are approximately 100 to 150 feet below the surface. The water table west of the Tijeras fault complex and the Sandia fault are approximately 500 feet or more below the surface (SNL/NM 2005c). The aquifer system on the east side of the Tijeras fault complex is not well understood due to the complex geology and the limited number of wells available to characterize the system. Figure 4.1-1 depicts the elevation contours of the regional groundwater table.

Over 142 wells are used to monitor groundwater levels, and are sampled monthly or quarterly by SNL/NM, KAFB, CABQ, or the U.S. Geological Survey (USGS). Although water levels may fluctuate over the course of the year in response to seasonal recharge and groundwater withdrawal, the overall level of the regional aquifer within the basin continues to decline at about one foot/yr (SNL/NM 2005c). Water levels vary across SNL/NM and KAFB relative to recharge rates. Water levels in the southeast border, near McCormick Ranch, show the largest declines while water levels in the northeast portion of KAFB are actually rising (SNL/NM 2005c).

A shallow groundwater system (SGWS) exists in the northern part of KAFB in the vicinity of TAs-I, -II and -III, and extending southward to the location of former KAFB sewage lagoons. The eastward extent of the SGWS is under the KAFB Landfill and southeast to the KAFB Golf Course. The water level trends for the shallow groundwater system indicate a decrease in water level elevations in the western portion of KAFB (SNL/NM 2005c). Figure 4.1-2 depicts the water elevation contours for the SGWS.

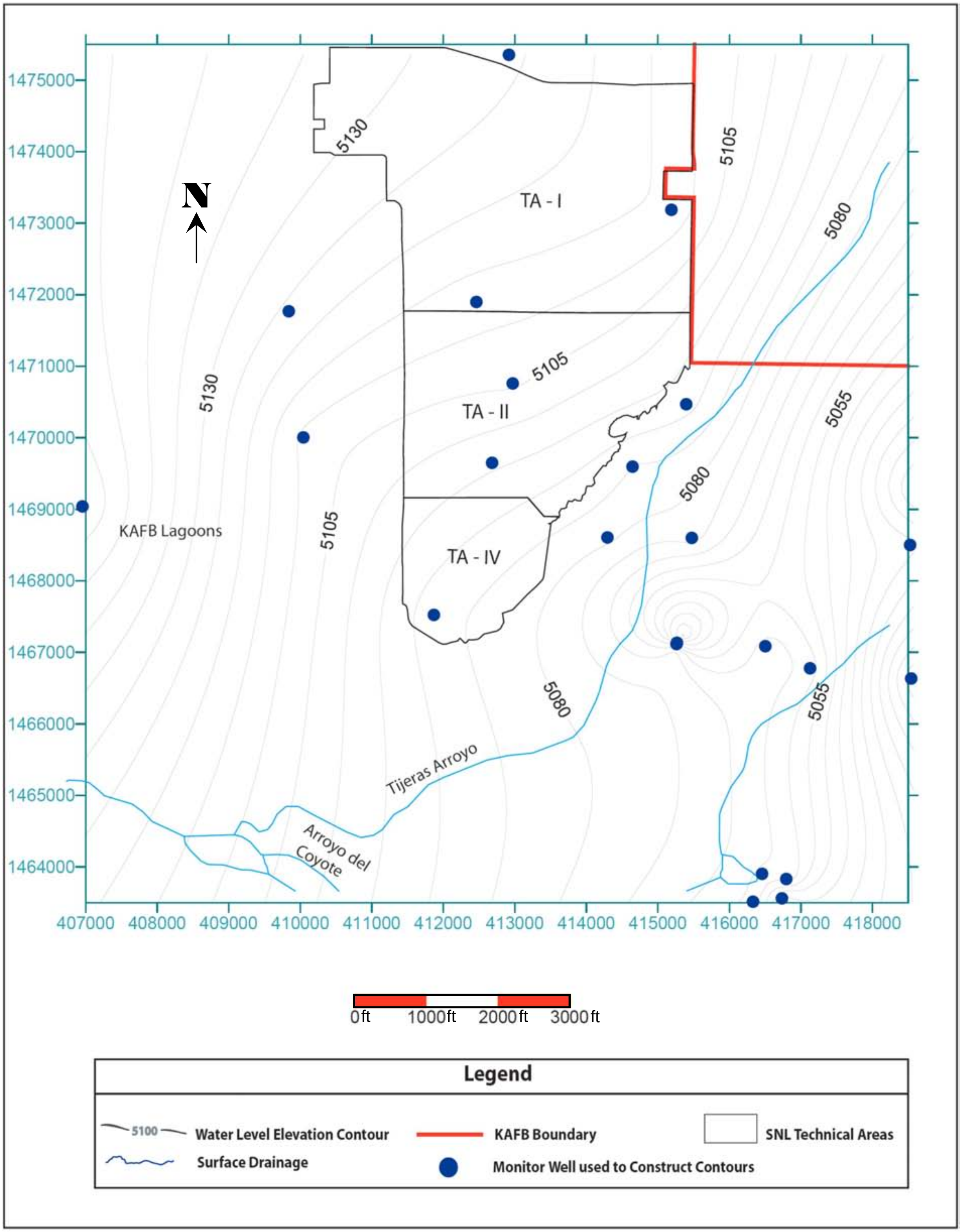
4.1.1 CITY OF ALBUQUERQUE WATER RESOURCES

Since the mid-1940s, groundwater withdrawals in the vicinity of Albuquerque have resulted in water level declines in excess of 120 ft (USGS 2004a). The USGS (1995) estimated the aquifer is being depleted at a rate that is twice that of the recharge to the aquifer from the Rio Grande and other sources. As a result, the reliance on the regional Albuquerque-Belen aquifer as the sole drinking water source for the city, including SNL/NM and KAFB, is unsustainable. The CABQ has projected a shortage of groundwater resources beginning in 2020 due to overpumping (USGS 1995). In 1997, the Albuquerque City Council adopted the Water Resource Management Strategy to address efficient use of all the city’s water resources (CABQ 1997). The policies include proceeding with the development of the city’s surface water supplies, establishment of a ground water drought reserve, support of regional water resources planning and management, pursuit of the conjunctive use of available water resources, and the pursuit of the acquisition of new water supplies as needed (CABQ 1997).



Source: SNL/NM 2005c

Figure 4.1-1. Elevation Contours of the Regional Groundwater Table



Source: SNL/NM 2005c

Figure 4.1-2. Elevation Contours of the Shallow Groundwater System (SGWS)

The CABQ proposes to protect the aquifer for use as a drought reserve, and facilitate the combined use of groundwater and surface water (CABQ 1997). These projects, collectively referred to as the San Juan-Chama Drinking Water Project, are proposed to reduce the dependency on groundwater resources (CABQ 2005a). The North I-25 Industrial Recycling and Northside Non-Potable Surface Water Reclamation Projects have been completed. The Drinking Water Supply Project is the construction of a diversion of about 97,000 acre-feet/yr of San Juan-Chama and Rio Grande surface water that is scheduled for completion in 2007. The Southside Water Reclamation Plant is designed to provide safe surface water directly to the municipal water supply and is scheduled to be completed in 2008. With the implementation of the San Juan-Chama Drinking Water Project, the city projects the need for pumping groundwater would be substantially reduced to approximately 67,500 acre-feet/yr by 2060 (CABQ and U.S. Bureau of Reclamation [BOR] 2004), which would reduce aquifer drawdown from 3-5 ft/yr to 1-3 ft/yr (Stomp 2006). For the period 1994 to 2020, the USGS projects the overall annual aquifer withdrawal for the city to range between 98,700 acre-ft/yr to 177,000 acre-ft/yr (32,200 to 57,700M gal/yr) (USGS 1995). Implementation of the San Juan-Chama Drinking Water Project is projected to supply approximately 70 percent of the city's future water use (CABQ 1997).

In August 1995, an MOU was signed between the State of New Mexico, the CABQ, the U.S. Air Force, Public Service Company of New Mexico (PNM), and the U.S. DOE Office of Energy Efficiency and Renewable Energy which outlined a partnership for water conservation at KAFB and SNL/NM (DOE 1995a). The suggested goal was to reduce water use at KAFB and SNL/NM facilities by 30 percent. CABQ has exceeded water conservation goals, allowing for continued growth and development in the community (Table 4.1-1). Mesa del Sol, a proposed 9,000-acre development west of KAFB, will be a series of business parks and neighborhoods. Phase I of the development will be 3,000 acres consisting of approximately 8,000 homes and 6M square-feet of commercial and industrial space. Phase I is projected to take 10 to 15 years to complete (Albuquerque Journal 2005a and 2005b). CABQ water resources are allotted to support this planned community, made possible through the implementation of city-wide water conservation practices (Stomp 2006). Mesa del Sol is projected to impact CABQ water resources in Phase II of the development (Robinson 2006).

Table 4.1-1. 1999 through 2004 Annual Groundwater Withdrawals

Year	KAFB Withdrawal, including SNL/NM (M gal)	CABQ Withdrawal (M gal)
1999	1,220	30,972.09
2000	1,380	32,602.20
2001	1,240	32,929.22
2002	1,260	33,254.24
2003	1,070	33,417.25
2004	1,110	33,580.26
Total (1999-2004)	7,280	196,754.26
Number of wells	10	90+

Sources: SNL/NM 2001a, 2001b, 2002a, 2003a, 2004b, 2005c; USGS 1995; CABQ 2005b
CABQ = City of Albuquerque
KAFB = Kirtland Air Force Base
M gal = million gallons
SNL/NM = Sandia National Laboratories/New Mexico

4.1.2 SUMMARY

The 1999 SNL/NM SWEIS identified groundwater drawdown as a significant impact of SNL/NM operations. Section 3.3.1 identified an 11-percent increase in SNL/NM's projected 2008 water use over the amount calculated in the SWEIS. This increase in water use would result in a 0.03-ft/yr increase in the aquifer drawdown rate in the KAFB area. However, improvement in the overall water-supply situation in the CABQ through the San Juan-Chama Drinking Water Project is expected to reduce the overall drawdown rate within the regional aquifer. Therefore, the increase in drawdown rate from SNL/NM's increased water usage would be lessened and would fall within the envelope of consequences established in the 1999 SNL/NM SWEIS analysis.

4.2 CUMULATIVE IMPACTS

In accordance with the Council on Environmental Quality regulations, a cumulative impact analysis in an EIS includes "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time." (40 CFR Part 1508.7).

The cumulative impact analysis for this SA includes: 1) an examination of the cumulative impact analysis in the 1999 SNL/NM SWEIS; 2) a review of past, present, and reasonably foreseeable actions for other federal and non-federal agencies; 3) a summary of impacts identified in this SA; and 4) a summary of the cumulative impacts and changes since the 1999 SNL/NM SWEIS was issued.

Past and present actions associated with activities of the DOE/NNSA on and near KAFB are described in the *Additional DOE Facilities within the Boundaries of KAFB* (DOE 2005b). Reasonably foreseeable future actions of SNL/NM are described in Chapter 2 of this SA. Reasonably foreseeable future actions for the region impacted by SNL/NM were also reviewed and included in the analysis.

4.2.1 OTHER DOE FACILITIES AT KAFB

Six DOE facilities correspond to those facilities originally included in the 1999 SNL/NM SWEIS, Chapter 6, "Cumulative Effects Analysis". Table 4.2-1 shows the original names/designations as identified in the 1999 SNL/NM SWEIS and corresponding current facility names. A seventh facility, the Lovelace Respiratory Research Institute, was included in the SWEIS but is no longer operated by DOE facility. The 1999 SNL EIS impact analysis is still considered bounding for the other DOE facilities at KAFB.

General activities at these DOE facilities are consistent with those described in SWEIS Chapter 2, "SNL/NM Operations," and Chapter 3, "Alternatives for Continuing Operations at SNL/NM." Potential impacts to resources as described in the SWEIS remain largely representative of the types of impacts resulting from operations in these DOE facilities (DOE 2005b).

Table 4.2-1. 1999 SNL/NM SWEIS and Current Facility Names

Facility Name as Identified in the SWEIS	Current Facility Name
DOE/Albuquerque Operations Office (DOE/AL)	National Nuclear Security Administration (NNSA) Service Center
Energy Training Center (ETC)	Energy Training Center (ETC)
Transportation Safeguards Division (TSD)	Office of Secure Transport (OST)
Central Training Academy (CTA)/Nonproliferation and National Security Institute (NNSI)	National Training Center (NTC)
Ross Aviation, Inc.	NNSA OST, Aviation Operations Branch (AOB)
Federal Manufacturing & Technology/New Mexico (AlliedSignal)	Honeywell Federal Manufacturing & Technology/New Mexico (FM&T/NM)

Source: DOE 2005b
DOE = Department of Energy
SWEIS = Site-Wide Environmental Impact Statement

4.2.2 Land Use and Visual Resources

Major land use and visual resources changes in the ROI include land development in the KAFB vicinity. This includes lands belonging to the CABQ, Bernalillo County, the State of New Mexico, USFS, and the Pueblo of Isleta. Cumulative land use and visual resources effects take into consideration the use of open land, adequacy of buffer zones surrounding site activities, and any potential conflicts between existing or projected onsite and offsite programs and operations. There is the presence of small incremental effects to land use and visual resources resulting from DOE, SNL/NM, and KAFB operations; however, these would not significantly contribute to impacts resulting from other past, present, or reasonably foreseeable actions taken by public and private entities in the ROI. Facilities and operations outlined in Chapter 2 would not create significant cumulative land use issues or visual resources impacts.

4.2.3 Infrastructure

Infrastructure needs within the ROI area, specifically in Albuquerque, are affected by an increase in population. Water and energy conservation measures should help lessen this impact. Other activities of note in the Albuquerque area and at KAFB include DoD activities at KAFB, SNL/NM activities, and other DOE activities at KAFB. This SA does not conclude that any of these activities will overwhelm the water, wastewater, or electricity capacity of the CABQ.

4.2.4 Soils

Cumulative impacts related to soils would be limited. Development of undisturbed areas would cumulatively add to impervious surfaces, thus lessening infiltration of rainwater to the subsurface in the local area. Areas of soil contamination resulting from SNL/NM activities are distinct from other onsite areas of soil contamination, such as USAF facilities or Environmental Restoration Program (ERP; previously Installation Restoration Program [IRP]) sites. Remediation of contaminated soils, however, is expected to have a positive cumulative impact.

4.2.5 WATER RESOURCES AND HYDROLOGY

SNL/NM has implemented monitoring and assessment programs to evaluate groundwater resources for contamination. No additional areas of contamination have been identified since the SWEIS. All known groundwater contamination is the result of past activities. Contaminant levels observed between 1999 and 2004 are consistent with past investigations, indicating a status quo or slight decrease in contaminant concentrations (SNL/NM 2005c).

KAFB has ten production wells that provide potable water to KAFB and SNL/NM. Adjacent to these wells are the Ridgecrest production wells for the CABQ. These wells draw from the Santa Fe aquifer system, in the regional Albuquerque-Belen Basin aquifer, the same aquifer system that is the exclusive source of potable water for communities north and south of SNL/NM, including Albuquerque and Rio Rancho. As explained in Section 4.1, an excess of withdrawal over recharge has resulted in a continuing decline in groundwater levels in the regional aquifer. Water level declines vary throughout KAFB, depending upon local recharge rates. Areas with the largest levels of decline are in the southeast section and the smallest levels of decline are in the northeast portion of KAFB.

The CABQ has sustained groundwater production levels while accommodating growth and development. Implementation of a city-wide water conservation program has resulted in a reduction of average per person water use (Stomp 2006). The impact analysis performed for the SWEIS determined that SNL/NM would account for 12 percent of projected groundwater withdrawal in the immediate vicinity of KAFB over the period 1998 through 2008 (DOE 1999b). However, SNL/NM water use has exceeded the projections in the SWEIS. The localized impact of groundwater withdrawal to support SNL/NM activities is determined to be 15 percent of projected groundwater withdrawal over the period 2004 to 2008. The impact to the Albuquerque-Belen Basin aquifer due to projected SNL/NM usage would be increased from 1 percent to 1.24 percent. This analysis does not consider projected savings resulting from water conservation measures implemented by SNL/NM. As with the SWEIS, this analysis tends to overestimate the SNL/NM contribution to basin-wide withdrawal.

The Drinking Water Supply Project, which includes the San Juan-Chama Diversion Dam, is scheduled to be fully operational in 2008 (see Section 4.1). This project would allow the CABQ to meet its normal water demands from surface water rather than groundwater resources. The City projects that the Drinking Water Supply Project will provide approximately 70 percent of the city's water needs (CABQ 1997). Groundwater withdrawals would only be used to supplement normal demands. Upon implementation of the Drinking Water Supply Project, the proportionate contribution to declining groundwater levels from SNL/NM activities would increase, although overall impacts to the Albuquerque-Belen Basin aquifer would decrease due to a reduced rate of groundwater decline.

Storm water runoff from SNL/NM facilities could potentially combine with other local runoff contributors during storm events. The presence of contamination in surface soils, on paved surfaces, or from any discharges, could result in cumulative impacts to the surface water resource. Analysis of surface water samples identified elevated levels of TSS and magnesium. Elevated TSS levels are attributed to drought conditions and elevated levels of magnesium are attributed to naturally high rates of erosion, especially in remote areas. No activities analyzed in this SA are projected to increase the quantity of contaminants available for transport by surface water.

4.2.6 BIOLOGICAL AND ECOLOGICAL RESOURCES

Because of the restricted access and limited planned development at KAFB, there has been a beneficial impact on biological and ecological resources. Fragmentation of wildlife habitat in portions of KAFB will continue because of the presence and activities of DOE, SNL/NM, and KAFB; however, management activities, if funded, such as wildlife habitat improvement, wildlife management plans, biomonitoring, and restricted pedestrian and vehicular access will assist in the mitigation of any impacts to biological and ecological resources. Facilities and operations outlined in Chapter 2 could create cumulative biological and ecological resources impacts, which would be mitigated by the management activities listed above.

4.2.7 CULTURAL RESOURCES

The potential impacts on cultural resources projected for proposed future activities through 2008 at SNL/NM would not exceed the envelope of consequences established for the EOA in the 1999 SNL/NM SWEIS. Activities conducted by any agency in the ROI would remain essentially the same through 2008 as those analyzed in the SWEIS. Thus, as was determined in the SWEIS, there would be no appreciable incremental adverse effects resulting from past, present, or reasonably foreseeable future activities through 2008.

4.2.8 AIR QUALITY

The ROI for air quality impacts at SNL/NM is defined as the maximum extent of a source's "significant" impact. The maximum extent of impact of the primary major stationary source at SNL/NM is approximately a 15 mi radius about the Steam Plant. The Criteria Pollutant Monitoring Station (CPMS) located in the northeast corner of TA-I measures the concentrations of criteria pollutants emitted in and around the ROI. Table 4.2-2 presents a comparison of the percent of the New Mexico Ambient Air Quality Standards (NMAAQS) and NAAQS standards for the SWEIS cumulative impact criteria pollutant concentrations versus the 2004 CPMS measured concentrations.

With the exception of ozone, lead, and annual sulfur dioxide measurements, the concentrations of criteria pollutants presented in the SWEIS are greater than or equal to those measured by the CPMS in 2004. The increased lead concentration may result from the storage of batteries, electrodes, and electronics found in close proximity to the CPMS. The increased ozone may be a result of increased vehicular traffic in and around the ROI.

Cumulative impacts to air quality incorporating projected emissions from additional sources and planned construction, may increase the carbon monoxide and particulate matter concentrations during the demolition and construction phase, above those measured during 2004. In addition, increased vehicular traffic may increase ozone concentrations above those measured during 2004, although better emission controls on future vehicles and maintenance and inspection programs may reduce ozone concentrations.

Cumulative impacts to air quality are not expected to increase above those measured during 2004 with the addition of emissions from new or planned facilities except for short periods during construction of the facilities. Criteria pollutant concentrations from current and projected emissions are not expected to exceed the NMAAQS or NAAQS.

Table 4.2-2. Cumulative Criteria Pollutant Concentrations in SNL/NM SWEIS versus 2004 CPMS Data

Criteria Pollutant	Averaging Time	Units	NMAAQS Standard	NAAQS Standard	SWEIS		2004 CPMS	
					Percent of NMAAQS	Percent of NAAQS	Percent of NMAAQS	Percent of NAAQS
Carbon Monoxide	1 Hour	ppm	13.1	35	65	24	57	21
	8 Hours	ppm	8.7	9	33	32	25	24
Nitrogen Dioxide	24 Hours	ppm	0.1	NA	44	NA	36	NA
	Annual	ppm	0.05	0.053	28	26	26	25
Sulfur Dioxide	3 Hours	ppm	NA	0.5	NA	6	NA	1
	24 Hours	ppm	0.1	0.14	6	4	6	4
	Annual	ppm	0.02	0.03	3	2	5	3
Ozone	1 Hour	ppm	0.12	0.12	86	86	65	65
	Annual	ppm	NA	0.08	NA	41	NA	86
PM_{10}	24 Hours	$\mu g/m^3$	NA	150	NA	36	NA	33
	Annual	$\mu g/m^3$	NA	50	NA	30	NA	25
$PM_{2.5}$	24 Hours	$\mu g/m^3$	NA	65	NA	NA	NA	36
	Annual	$\mu g/m^3$	NA	15	NA	NA	NA	61
Lead	30 Days	$\mu g/m^3$	NA		NA	NA	NA	NA
	Any Quarter	$\mu g/m^3$	1.5	1.5	0.07	0.07	0.13	0.13

Sources: DOE 1999b, SNL/NM 2005c
SWEIS = Site-Wide Environmental Impact Statement
CPMS = Criteria Pollutant Monitoring Station
NMAAQS = New Mexico Ambient Air Quality Standards
NA = not applicable
NAAQS = National Ambient Air Quality Standards
ppm = parts per million
PM_{10} = Particulate matter 10 microns in diameter
$PM_{2.5}$ = Particulate matter 2.5 microns in diameter
$\mu g/m^3$ = micrograms per cubic meter

4.2.9 HUMAN HEALTH AND WORKER SAFETY

The location of SNL/NM, adjacent to Albuquerque and co-located with KAFB, other DOE facilities, and private industry, makes it possible that cumulative environmental effects exist. The potential for SNL/NM to contribute significantly to the cumulative effects from all present, past, and reasonably foreseeable future activities within the ROI was examined qualitatively and quantitatively in the 1999 SNL/NM SWEIS. The cumulative impacts reported in the 1999 SNL/NM SWEIS predict no additional fatal cancers in the population and a very low increased lifetime risk of cancer to individuals from radiological air emissions. Similarly, minimal health effects would be expected from the cumulative risks associated with chemical air quality.

As described in Section 3.9, the human health impacts from the proposed action do not exceed those identified in the 1999 SNL/NM SWEIS. The presence of these small incremental effects to human health resulting from SNL/NM operations would not significantly contribute to impacts resulting from any other identified past, present, or reasonably foreseeable actions taken by public and private entities in the ROI.

For worker injury and illness, there is no evidence that current and planned missions at SNL/NM would result in impacts to future occupational safety and health risks exceeding the limits of those proposed in the 1999 SNL/NM SWEIS. The occupational health and safety of workers at SNL/NM is site-specific and would not be affected by other activities occurring within the ROI.

4.2.10 TRANSPORTATION

The SNL/NM ROI for cumulative transportation impacts is identified as the surrounding counties for commuting and material receipts and beyond this immediate vicinity for waste shipments. The region's population is projected to increase by about 75,000 people from 2004 to 2010 (see Section 3.14). The projected increase in SNL/NM's workforce and therefore commuters is 500, less than 1 percent of the overall growth. The number of shipments of materials and waste are projected to decrease or be the same as that analyzed in the 1999 SNL/NM SWEIS.

The transportation screening analysis indicated a decrease in the number of shipments of materials being received and the amount of waste to be transported offsite is not projected to increase beyond the 1999 SNL/NM SWEIS EOA quantities. The projected number of commuting vehicles is also within the 1999 SNL/NM SWEIS EOA amount. There is no indication that cumulative future traffic and transportation impacts would exceed those reported in the 1999 SNL/NM SWEIS.

4.2.11 WASTE GENERATION

SNL/NM disposes of all its waste streams offsite, so the region of influence extends beyond the immediate vicinity. The generation rate for all waste streams except wastewater are within the EOA bounding limits presented in the 1999 SNL/NM SWEIS. Disposal capacity is available for DOE radioactive wastes at the Nevada Test Site (DOE 2002b, 2005c) and the Waste Isolation Pilot Plant in Carlsbad, New Mexico (DOE 1997). The EPA has determined that treatment and disposal capacity exists for the nation's hazardous waste (EPA 2006). The remaining waste streams, solid waste and wastewater, are disposed of nearby and so population growth in the area and the subsequent increase in solid waste and wastewater were reviewed for cumulative impacts. The region's population is projected to grow 8.8 percent from 2004 to 2010 (see Section 3.14). The population growth rate for the CABQ is projected to be 1.3 percent annually for the near future (Gregory 2006). The permit for the Rio Rancho landfill, the regional landfill where SNL/NM and KAFB solid waste is disposed, was renewed for 20 years in 2005. An expansion of the landfill is also planned (KRQE 2005). Albuquerque's Southside Water Reclamation Plant, which receives wastewater from SNL/NM, receives about 60M gal of wastewater per day and has the capacity to receive up to 76M gal/day (CABQ 2006); thus it is operating at 79 percent capacity. SNL/NM also uses the KAFB Construction and Demolition Landfill for its construction and demolition waste. As of 2005, this landfill has about 30 years of capacity remaining (Watkins 2005).

The 1999 SNL/NM SWEIS cumulative impact analysis is considered sufficient for all waste types with established EOA bounding quantities.

4.2.12 NOISE

Cumulative impacts from noise generated from demolition, construction, and operation of new and planned facilities would contribute to the ambient background noise levels. In general, sound levels would increase during demolition and construction of a facility and, upon completion, return to noise levels characteristic of a light industrial setting within the range of 50 to 70 dBA. No noise-related cumulative impacts are anticipated.

4.2.13 Socioeconomics

The recent growth in central New Mexico, which has resulted in regional economic and population changes, would be expected to continue as a result of growth in the private sector. Changes in the population and employment in the ROI from future potential activities at KAFB would have no discernable impact on population growth and a small impact on total employment; however any additional SNL/NM workforce needs are expected to be met by limited-term employees, onsite contractors, and resident visitors. The SWEIS cumulative impact analysis is sufficient for socioeconomics.

4.2.14 Environmental Justice

This SA has identified no cumulative impacts within any resource area beyond those identified in the 1999 SNL/NM SWEIS. Because there have been no substantial changes in the distribution of minority and low-income populations, the SWEIS cumulative impact analysis is sufficient for determination of environmental justice impacts.

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5.0 CONCLUSIONS

The Council on Environmental Quality regulations require that supplemental EISs be issued when “the agency makes substantial changes to the proposed action” or there are “significant new circumstances or information relevant to the environmental concerns and bearing on the proposed action or its impacts”. This SNL/NM SWEIS SA was written to determine whether either case applies to continued operations at SNL/NM such that a supplemental EIS should be prepared.

This SA evaluates whether changes from actions foreseen in 1999, plus new and modified proposals and projects, present a significantly different picture of the likely consequences of continued operation of SNL/NM than was presented in the 1999 SNL/NM SWEIS and ROD. This evaluation focused on determining whether the impacts of SNL/NM operations, as identified today, would be within the limits of impacts identified in the 1999 SNL/NM SWEIS and, if not, whether the additional impacts would be significant.

Chapters 3 and 4 of this SA evaluated a set of new and modified operations and facilities and other changes and concluded that no supplementation is needed for any resource area. The analyses performed for this SA indicate that the environmental impacts of current and projected SNL/NM operations are within the envelope of consequences established in the 1999 SNL/NM SWEIS.

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6.0 REFERENCES

AED 2005	Albuquerque Economic Development, "Largest Employers," www.abq.org, 2005.
AEHD 2000	Albuquerque Environmental Health Department, *Permit Modeling Guidelines.* City of Albuquerque, Environmental Health Department, Air Quality Division, Permitting Section, Albuquerque, NM. March 2000.
Albuquerque Journal 2005a	"Business, Resident Plans Take Root at Massive Mesa Del Sol". D. Velasco. May 26, 2005. http://www.abqjournal.com/AED/35427outlook05-26-05.htm
Albuquerque Journal 2005b	"Officials Hail Road to Mesa Del Sol". O. Uyytebrouck. October 1, 2005. http://www.abqjournal.com/AED/394751metro10-01-05.htm
BBER-UNM 2006	Bureau of Business and Economic Research (BBER)-University of NM, "BBER Revised Population Projections for NM and Counties," 2006.
BLS 2005	U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics for Bernalillo, Sandoval, Torrance and Valencia Counties – All Years, http://www.bls.gov, Accessed December 1, 2005.
CABQ 1997	City of Albuquerque (CABQ). Water Resources Management Strategy: Evaluation of Alternatives and Strategy Formulation. February 1997.
CABQ and BOR 2004	CABQ-Public Works Department and the U.S. Bureau of Reclamation (BOR). Final Environmental Impact Statement, City of Albuquerque Drinking Water Project. 2004.
CABQ 2005a	About the San Juan-Chama Drinking Water Project. 2005. http://www.sjcdrinkingwater.org/
CABQ 2005b	Water Source Assessment and Protection. 1994-2005. http://www.cabq.gov/waterquality/resources/sources.html
CABQ 2006	Wastewater Reclamation – Wastewater Utility – City of Albuquerque. Available online at http:www.cabq.gov/wastewater. Accessed February 1, 2006.
DOE 1995a	Department of Energy, *Memorandum of Understanding Between the State of New Mexico and City of Albuquerque and the United States Air Force and Public Service Company of New Mexico and the United States Department of Energy Office of Energy Efficiency and Renewable Energy , Joint Statement of Work, Federal Government Water Use Efficiency in Albuquerque, New Mexico*. August 1995. http://www.sandia.gov/aqua/mou.htm
DOE 1997	Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement Summary. DOE/EIS-0026-S-2. Carlsbad, New Mexico. September 1997.

DOE 1999a — Department of Energy, *Rapid Reactivation Project Environmental Assessment*, DOE/EA-1264. U.S. Department of Energy, Kirtland Area Office, Albuquerque, NM. February 1999.

DOE 1999b — Department of Energy, *Sandia National Laboratories/New Mexico Site-Wide Environmental Impact Statement*, DOE/EIS-0281. U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM. October 1999.

DOE 2000a — Department of Energy, *Environmental Assessment for the Microsystems and Engineering Sciences Applications Complex*, DOE/EA-1335. U.S. Department of Energy, Kirtland Area Office, Albuquerque, NM. September 2000.

DOE 2000b — Department of Energy, *Support Agreement between Department of the Air Force, 377th Air Base Wing and Department of Energy, Albuquerque Operations Office*, DE-GM04-99AL66008. U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM. October 12, 2000.

DOE 2000c — Department of Energy, *Draft Site-Wide Environmental Impact Statement for the Oak Ridge Y-12 Plant, DOE/EIS-0309*. Oak Ridge Operations Office, Oak Ridge, TN. December 2000.

DOE 2001a — Department of Energy, *Supplement Analysis, Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico, Reestablishing Long-Term Pulse Mode Testing Capability at the Annular Core Research Reactor, Sandia National Laboratories, New Mexico*, DOE/EIS-0281-SA-01. U.S. Department of Energy, Kirtland Area Office, Albuquerque, NM. May 2001.

DOE 2002a — Department of Energy, *Supplement Analysis, Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico, Isentropic Compression and Flyer Plate Experiments Involving Plutonium at the Z and Saturn Accelerators*, DOE/EIS-0281-SA-02. U.S. Department of Energy, Kirtland Area office, Albuquerque, NM. September 2002.

DOE 2002b — Supplement Analysis for the Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada, DOE/EIS-0243-SA-01. July 2002.

DOE 2003a — Department of Energy, *Final Environmental Assessment for the Center for Integrated Nanotechnologies at Sandia National Laboratories/New Mexico*, DOE/EA-1457. U.S. Department of Energy, Sandia Site Office, Albuquerque, NM. March 2003.

DOE 2003b — Department of Energy, *Final Environmental Assessment for the Test Capabilities Revitalization at Sandia National Laboratories/New Mexico*, DOE/EA-1446. U.S. Department of Energy, Office of Kirtland Site Operations, Albuquerque, NM. January 2003.

DOE 2004 — *Supplement Analysis, Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico, Installation of a Petawatt Laser System in TA-IV*, DOE/EIS-0281-SA-03, U.S. Department of Energy, Sandia Site Office, Albuquerque, NM, August 2004.

DOE 2005a	National Nuclear Security Administration, *Final Environmental Assessment for the Proposed Consolidation of Neutron Generator Tritium Target Loading Production*, DOE/EA-1532. U.S. Department of Energy, National Nuclear Security Administration, Sandia Site Office, Albuquerque, NM. June 2005.
DOE 2005b	National Nuclear Security Administration, *Additional DOE Facilities within the Boundaries of KAFB*. U.S. Department of Energy, National Nuclear Security Administration, Sandia Site Office, Albuquerque, NM. October 2005.
DOE 2005c	Mixed Low-Level Waste at the Nevada Test Site. DOE/NV-920-Rev1, September 2005.
DOE 2006	Department of Energy, *Increased Water Usage at the Center for Integrated Nanotechnologies (CINT)*, NEPA Checklist. U.S. Department of Energy, National Nuclear Security Administration, Sandia Site Office, Albuquerque, NM. April 6, 2006.
EPA 2006	US Environmental Protection Agency. 2006. Capacity Assurance. Available online at http://www.epa.gov/eaposwer/hazwaste/tsds/capacity. Updated on January 19, 2006. Accessed on February 17, 2006.
Gregory 2006	Gregory, J. Albuquerque's Environmental Story. Available online at http://www.cabq.gov/aes/s5pop.html. Accessed February 18, 2006.
KAFB 2004	Kirtland Air Force Base, *Draft Integrated Cultural Resources Management Plan, Kirtland Air Force Base, New Mexico*, NMCRIS No. 90828. U.S. Air Force, Kirtland Air Force Base, 377th Air Base Wing, Environmental Management Division, Albuquerque, NM. November 2004.
KAFB 2006	Kirtland Air Force Base, *RE: quick (loaded) question*, Electronic mail message from Valerie Renner to Kathy Roxlau. U.S. Air Force, Kirtland Air Force Base, 377th Air Base Wing, Environmental Management Division, Albuquerque, NM. January 11, 2006
KRQE 2005	KRQE News 13. 2005. State allows Rio Rancho landfill to expand. Available online at http://www.krqe.com/expanded.asp?RECORD_KEY[News]=ID&ID%5BNews%5D=10658. Accessed on January 11, 2006.
MRCOG 2005	Mid-Region Council of Governments, Regional Statistics, Table: County Population History and Forecasts for Counties in MRCOG Region, http://www.mrcog-nm.gov/regional_statistics.htm, Last updated November 30, 2005. Accessed December 1, 2005.
New Mexico Rare Plant Technical Council 2005	New Mexico Rare Plant Technical Council, *New Mexico Rare Plants*. New Mexico Rare Plants Home Page, Albuquerque, NM. 2005, Latest Update: 18 January 2006. http://nmrareplants.unm.edu.

Parsons Brinckerhoff 2005	Parsons Brinckerhoff, Inc. *Transportation Study Component of the 2005 SNL/NM Master Plan.* Facilities Planning and Project Development, Sandia National Laboratories/ New Mexico, Albuquerque, NM. January 2005.
Robinson 2006	Robinson, Roy. Utilities Director, CABQ. Personal Communication, February 15, 2006.
SNL 2005a	Sandia National Laboratories, *Final Sandia National Laboratories Ten-Year Comprehensive Site Plan, FY2006-FY2015*, SAND2005-5924P. Sandia National Laboratories, Albuquerque, NM. September 2005.
SNL/NM 2001a	Sandia National Laboratories/New Mexico, *1999 Annual Site Environmental Report, Sandia National Laboratories, Albuquerque, New Mexico*, SAND2000-2228. Sandia National Laboratories, Albuquerque, NM. February 2001.
SNL/NM 2001b	Sandia National Laboratories/New Mexico, *Calendar Year 2000 Annual Site Environmental Report, Sandia National Laboratories, New Mexico*, SAND2001-2761. Sandia National Laboratories, Albuquerque, New Mexico. September 2001.
SNL/NM 2001c	Sandia National Laboratories/New Mexico, *SWEIS Annual Review – FY2000*, SAND2001-2526. Sandia National Laboratories, Albuquerque, NM. September 2001.
SNL/NM 2002a	Sandia National Laboratories/New Mexico, *Calendar Year 2001 Annual Site Environmental Report, Sandia National Laboratories, New Mexico*, SAND2002-2415. Sandia National Laboratories, Albuquerque, NM. September 2002.
SNL/NM 2002b	Sandia National Laboratories/New Mexico, *SWEIS Annual Review – FY2001*, SAND2002-3205. Sandia National Laboratories, Albuquerque, New Mexico. September 2002.
SNL/NM 2003a	Sandia National Laboratories/New Mexico, *Calendar Year 2002 Annual Site Environmental Report, Sandia National Laboratories, New Mexico*, SAND2003-2549. Sandia National Laboratories, Albuquerque, NM. September 2003.
SNL/NM 2003b	Sandia National Laboratories/New Mexico, *SWEIS Annual Review – CY2002*, SAND2003-3535. Sandia National Laboratories, Albuquerque, NM. October 2003.
SNL/NM 2004a	Sandia National Laboratories/New Mexico, *Sandia National Laboratories/New Mexico Environmental Information Document – Calendar Year 2003 Update*, SAND2004-5058. Sandia National Laboratories, Albuquerque, NM. October 2004.
SNL/NM 2004b	Sandia National Laboratories/New Mexico, *Calendar Year 2003 Annual Site Environmental Report, Sandia National Laboratories, New Mexico*, SAND2004-2813. Sandia National Laboratories, Albuquerque, NM. September 2004.
SNL/NM 2005a	Sandia National Laboratories/New Mexico, *Sandia National Laboratories/New Mexico Facilities and Safety Information Document, Calendar Year 2003 Update, Vol. I and II*, SAND2005-0125. Sandia National Laboratories, Albuquerque, NM. January 2005.

SNL/NM 2005b Sandia National Laboratories/New Mexico, *Calendar Year 2004 Information Update for the Five-Year Assessment of the Sandia National Laboratories/New Mexico Site-Wide Environmental Impact Statement*. Sandia National Laboratories, Albuquerque, NM. October 2005.

SNL/NM 2005c Sandia National Laboratories/New Mexico, *Calendar Year 2004 Annual Site Environmental Report, Sandia National Laboratories, New Mexico*, SAND2005-4594. Sandia National Laboratories, Albuquerque, NM. September 2005.

SNL/NM 2005d Sandia National Laboratories/New Mexico, *2004 Annual Site Environmental Report Summary Pamphlet,* SAND2005-4178. Sandia National Laboratories, Albuquerque, NM. July 2005.

SNL/NM 2005e Sandia National Laboratories/New Mexico, *NEPA Checklist for Design & Construction of the Design Engineering and Sciences Integration for Generating Neutrons (DESIGN) Facility*, SNA05-0789. Sandia National Laboratories, Albuquerque, NM. September 2005.

SNL/NM 2005f Sandia National Laboratories/New Mexico, *RE: MESA*, Electronic mail message from Christopher Hall to Joseph Guerrero. Sandia National Laboratories, Albuquerque, NM. December 8, 2005.

SNL/NM 2005g Sandia National Laboratories/New Mexico, *RE: SNL/NM Response to Information Requests from TTNUS in Support of the 5-Year SNL/NM SWEIS Supplement Analysis,* letter from Joseph Guerrero to Susan Lacy (NNSA/SSO). Sandia National Laboratories, Albuquerque, NM. December 6, 2005.

SNL/NM 2006a Sandia National Laboratories/New Mexico, *RE: SNL/NM Response to Information Requests from TTNUS in Support of the 5-Year SNL/NM SWEIS Supplement Analysis*, letter from Joseph Guerrero to Susan Lacy (NNSA/SSO). Sandia National Laboratories, Albuquerque, NM. February 21, 2006.

SNL/NM 2006b Sandia National Laboratories/New Mexico, *RE: SWEIS SA Questions*, Electronic mail message from Chris Catechis, Sandia National Laboratories, to Ross Dimmick, Tetra Tech NUS. Sandia National Laboratories, Albuquerque, NM. August 9, 2006.

Stomp 2006 Stomp III, J.M., P.E. Water Resources Director, CABQ. Personal Communication, February 10, 2006.

TtNUS 2006 Tetra Tech NUS, Inc., Waste Generation Data Calculation Package

Ullrich 2006 Ullrich, Rebecca A. E-mail from Rebecca A. Ullrich to Katherine Roxlau. Sandia National Laboratories/New Mexico, Albuquerque. March 30, 2006.

USFWS 2005 United States Fish and Wildlife Service, *Endangered Species List.* U.S. Fish and Wildlife Service, Southwest Region 2, New Mexico Ecological Services Field Office. 2005. http://www.fws.gov/ifw2es/newmexico

USGS 1995 USGS. Simulation of Ground-Water Flow in the Albuquerque Basin, Central New Mexico 1901-1994, with Projections to 2020. 1995.

USGS 2004a	USGS. Simulation of Flow in the Albuquerque Ground-water Basin, New Mexico, 1901-1994, with Projections to 2020. Prepared in cooperation with the City of Albuquerque Public Works Department. 1993.
Watkins 2005	Watkins, E. C. 2005. Air Force Construction Debris Landfill. Electronic mail message from E.C. Watkins, KAFB to J. Guerrero, SNL/NM. December 28, 2005.