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COVER SHEET

RESPONSIBLE AGENCY: U.S. DEPARTMENT OF ENERGY (DOE)

COOPERATING AGENCY: U.S. AIR FORCE

TITLE: Final Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico (DOE/EIS-0281)

CONTACT: For further information concerning the Final Site-Wide Environmental Impact Statement (SWEIS), contact

Julianne Levings, NEPA Document Manager
U.S. DOE, Albuquerque Operations Office
P.O. Box 5400, Albuquerque, NM 87185
Telephone: 1-888-635-7305, Fax: 505-845-6392

For further information by way of electronic mail, contact

www.nepanet.com

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

Carol Borgstrom, Director
Office of NEPA Policy and Assistance (EH-42)
U.S. DOE, 1000 Independence Avenue SW, Washington, DC 20585
Telephone: 202-586-4600 or leave a message at 1-800-472-2756

Abstract: The DOE proposes to continue operating the Sandia National Laboratories/New Mexico (SNL/NM) located in central New Mexico. The DOE has identified and assessed three alternatives for the operation of SNL/NM: (1) No Action, (2) Expanded Operations, and (3) Reduced Operations. The Expanded Operations Alternative is the DOE's preferred alternative (exclusive of the Microsystems and Engineering Sciences Applications Complex configuration). Under the No Action Alternative, the DOE would continue the historical mission support activities SNL/NM has conducted at planned operational levels. Under the Expanded Operations Alternative, the DOE would operate SNL/NM at the highest reasonable levels of activity currently foreseeable. Under the Reduced Operations Alternative, the DOE would operate SNL/NM at the minimum levels of activity necessary to maintain the capabilities to support the DOE mission in the near term. Under all of the alternatives, the affected environment is primarily within 50 miles (80 kilometers) of SNL/NM. Analyses indicate little difference in the environmental impacts among alternatives.

Public Comments: The Draft SWEIS was released to the public for review and comment on April 16, 1999. The comment period ended on June 15, 1999, although late comments were accepted to the extent practicable. All comments were considered in preparation of the Final SWEIS¹. The DOE will use the analysis in this Final SWEIS and prepare a Record of Decision on the level of continued operation of SNL/NM. This decision will be made no sooner than 30 days after the Notice of Availability of the Final SWEIS appears in the *Federal Register*.

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

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SUMMARY

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Summary Acronyms, Abbreviations and Units of Measure

ac	acre
BLM	Bureau of Land Management
CFR	<i>Code of Federal Regulations</i>
CSRL	Compound Semiconductor Research Laboratory
CWL	Chemical Waste Landfill
DOE	U.S. Department of Energy
DU	depleted uranium
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration (Project)
ERPG-2	Emergency Response Planning Guideline Level 2
FR	<i>Federal Register</i>
ft	foot/feet
ft ³	cubic feet
FY	fiscal year
IRP	Installation Restoration Program
KAFB	Kirtland Air Force Base
kg	kilogram
kw	kilowatt
LCF	latent cancer fatality
LLMW	low-level mixed waste
LLW	low-level waste
MDL	Microelectronics Development Laboratory
MEI	maximally exposed individual
MESA	Microsystems and Engineering Sciences Applications
mi	mile
mrem	millirem
mrem/yr	millirems per year
MWh	megawatt hour
MTRU	mixed transuranic
NAGPRA	<i>Native American Graves Protection and Repatriation Act</i>

Note: Italics are used to denote formal names or titles of acts, published documents, or computer models.

NEPA	<i>National Environmental Policy Act</i>
NESHAP	<i>National Emissions Standards for Hazardous Air Pollutants</i>
NOI	Notice of Intent
OEL	occupational exposure limits
PCB	polychlorinated biphenyl
PM ₁₀	particulate matter less than 10 microns in diameter
R&D	research and development
RCRA	<i>Resource Conservation and Recovery Act</i>
rem	Roentgen equivalent, man
ROD	record of decision
ROI	region of influence
SNL/NM	Sandia National Laboratories/New Mexico
SWEIS	Site-Wide Environmental Impact Statement
TA	technical area
TCE	trichloroethene
TCP	traditional cultural property
TRU	transuranic
U.S.C.	<i>United States Code</i>
USAF	U.S. Air Force
USFS	U.S. Forest Service

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 (°F)	subtract 32, then multiply by 5/9	Celsius (°C)	Celsius (°C)	multiply by 9/5, then add 32	Fahrenheit (°F)
kelvin (°k)	subtract 273.15	Celsius (°C)	kelvin (°k)	Multiply by 9/5, then add 306.15	Fahrenheit (°F)
Note: 1 sievert = 100 rems					

Metric Prefixes			
PREFIX	EXPONENT CONVERTED TO WHOLE NUMBERS	PREFIX	EXPONENT CONVERTED TO WHOLE NUMBERS
atto-	$10^{-18} = 0.000,000,000,000,000,001$	deka-	$10^1 = 10$
femto-	$10^{-15} = 0.000,000,000,000,001$	hecto-	$10^2 = 100$
pico	$10^{-12} = 0.000,000,000,001$	kilo-	$10^3 = 1,000$
nano-	$10^{-9} = 0.000,000,001$	mega-	$10^6 = 1,000,000$
micro-	$10^{-6} = 0.000,001$	giga-	$10^9 = 1,000,000,000$
milli	$10^{-3} = 0.001$	tetra-	$10^{12} = 1,000,000,000,000$
centi	$10^{-2} = 0.01$	peta-	$10^{15} = 1,000,000,000,000,000$
deci-	$10^{-1} = 0.1$	exa-	$10^{18} = 1,000,000,000,000,000,000$
Note: $10^0 = 1$			

SUMMARY

PURPOSE AND NEED

As directed by the President and Congress, the U.S. Department of Energy (DOE) provides stewardship and management of our country's nuclear weapons stockpile. In addition, the DOE has national security, energy resources, environmental quality, and science and technology mission lines, which it supports at a number of facilities across the United States (Table S-1). The DOE directs and funds Sandia National Laboratories/New Mexico (SNL/NM) activities in support of its programs and missions (Figure S-1). In turn, SNL/NM's facilities and operations are designed to meet the requirements of the programs, projects, and activities assigned to the laboratory.

The DOE will need to continue to meet its responsibilities for national security, energy resources, environmental quality, and science and technology at SNL/NM. The DOE needs to continue to fulfill its responsibilities as mandated by statute, Presidential Decision Directive, and congressional authorization and appropriation, while meeting this need in a manner that protects human health and the environment. This Site-Wide Environmental Impact Statement (SWEIS) evaluates the environmental impacts associated with alternative levels of operation (see Proposed Action and Alternatives section of this Summary) at SNL/NM that will meet these responsibilities.

As part of the DOE's strategy for implementing the *National Environmental Policy Act* (NEPA) (42 United States Code [U.S.C.] §4321), the Department prepares a SWEIS to examine environmental impacts of operations at multi-program sites (10 Code of Federal Regulations [CFR] §1021.330). In May 1977, the DOE (formerly Energy Research & Development Administration) prepared the *Environmental Impact Assessment, Sandia Laboratories, Albuquerque, New Mexico* for the operation of SNL/NM (ERDA 1977). Since that time, site programs and activity levels have changed. Based on these changes and SNL/NM's status as a multi-program site, the DOE has performed a thorough environmental analysis of ongoing SNL/NM operations and proposed operations to 2008. This SWEIS is the result of that analysis. The U.S. Air Force (USAF) participated as a cooperating agency in preparing this SWEIS.

PUBLIC INVOLVEMENT

Scoping Process

Figure S-2 shows a timeline for the preparation of the SNL/NM SWEIS. A public scoping period began after the publication of the Notice of Intent (NOI) on May 30, 1997 (62 Federal Register [FR] 29332), and continued until July 14, 1997. The NOI informed the public that the DOE intended to prepare a SWEIS on SNL/NM operations and invited other Federal agencies, Native American tribes, state and local governments, and the public to participate in the scoping process.

The DOE presented information on its SWEIS proposal at public scoping meetings on June 23, 1997, in Albuquerque, New Mexico. The public was invited to present oral and/or written comments at the meetings or by mail, facsimile, electronic mail, or telephone. Twenty-nine individuals and organizations submitted requests for information or presented oral or written comments. These comments (see Table 1.7-1) covered a range of issues, including the following:

- impacts of SNL/NM operations on natural and cultural resources, including air, groundwater, surface water, biological and ecological resources, and Native American cultural and religious sites;
- SNL/NM mission, policy, management, and alternatives for future operations;
- methods to be used for analyzing impacts and impartiality of the SWEIS;
- socioeconomic impacts including those affecting minority, low-income, and Native American populations (environmental justice);
- cleanup of known contamination or waste discharge and compliance with environmental regulations;
- potential seismic effects;
- health and safety of onsite workers and the surrounding community;
- impacts from SNL/NM operations on land use;
- level of public involvement in SWEIS preparation; and
- relationship of SNL/NM operations to city and county transportation planning policies.

These comments were distributed to experts for each resource or issue area to ensure that they were considered during the preparation of the SWEIS.

Table S–1. DOE Mission Lines and DOE Office Mission Statements

DOE MISSION LINE	DOE OFFICE	MISSION STATEMENT
<i>National Security</i>	Defense Programs	To ensure the safety, reliability, and performance of nuclear weapons without underground testing
	Nonproliferation & National Security	To support DOE activities related to nonproliferation, nuclear safeguards and security, classification and declassification, and emergency management
	Fissile Materials Disposition	To reduce the global nuclear danger associated with inventories of surplus weapons usable fissile materials
<i>Energy Resources</i>	Nuclear Energy	To support the successful decontamination and decommissioning of nuclear reactor sites; certify next-generation nuclear power plants; ensure the availability of industrial and medical isotopes and radioisotope power systems for space exploration
	Fossil Energy	To enhance U.S. economic and energy security
	Energy Efficiency	To lead the nation to a stronger economy, a cleaner environment, and more secure future through development and deployment of sustainable energy technologies
<i>Environmental Quality</i>	Environmental Management	To develop a clear national cleanup strategy with a strong commitment to results that will gain the trust and confidence of Congress, the states, Native American tribes, and the public
	Civilian Radioactive Waste Management	To develop, construct, and operate a system for spent nuclear fuel and high-level radioactive waste disposal, including a permanent geologic repository, interim storage capability, and transportation system
	Environment, Safety, & Health	To protect the environment and the health and safety of workers at DOE facilities and the public
<i>Science & Technology</i>	Science & Technology	To manage and direct targeted basic research and focused, solution-oriented technology development
	Science	To improve and advance the science and technology foundations and effective use and management of DOE laboratories
	Basic Energy Science	To advance the scientific and technical knowledge and skills needed to develop and use new and existing energy resources in an economically viable and environmentally sound manner

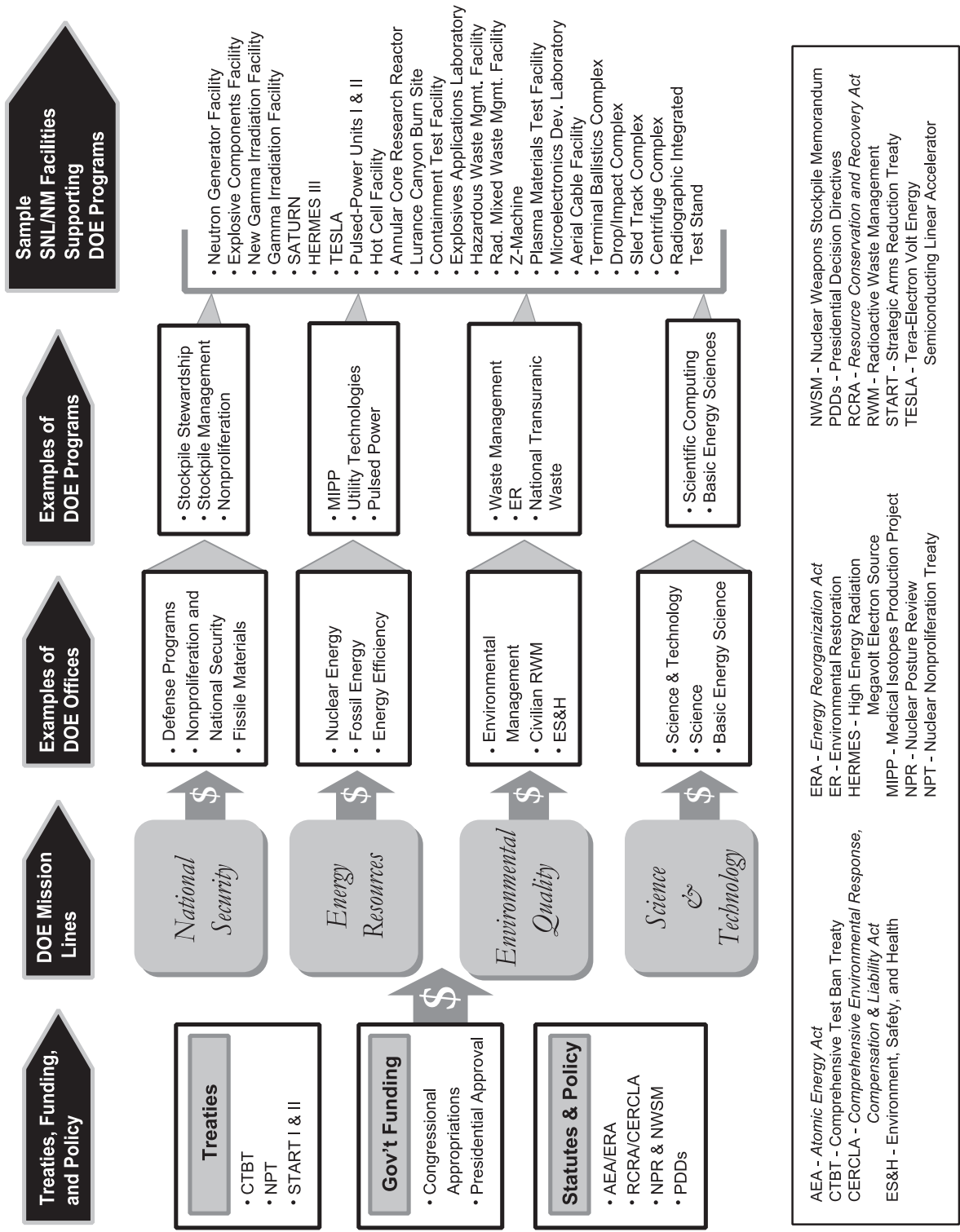


Figure S-1. DOE Funding of SNL/NM
The DOE's funding flows through various DOE offices to SNL/NM.

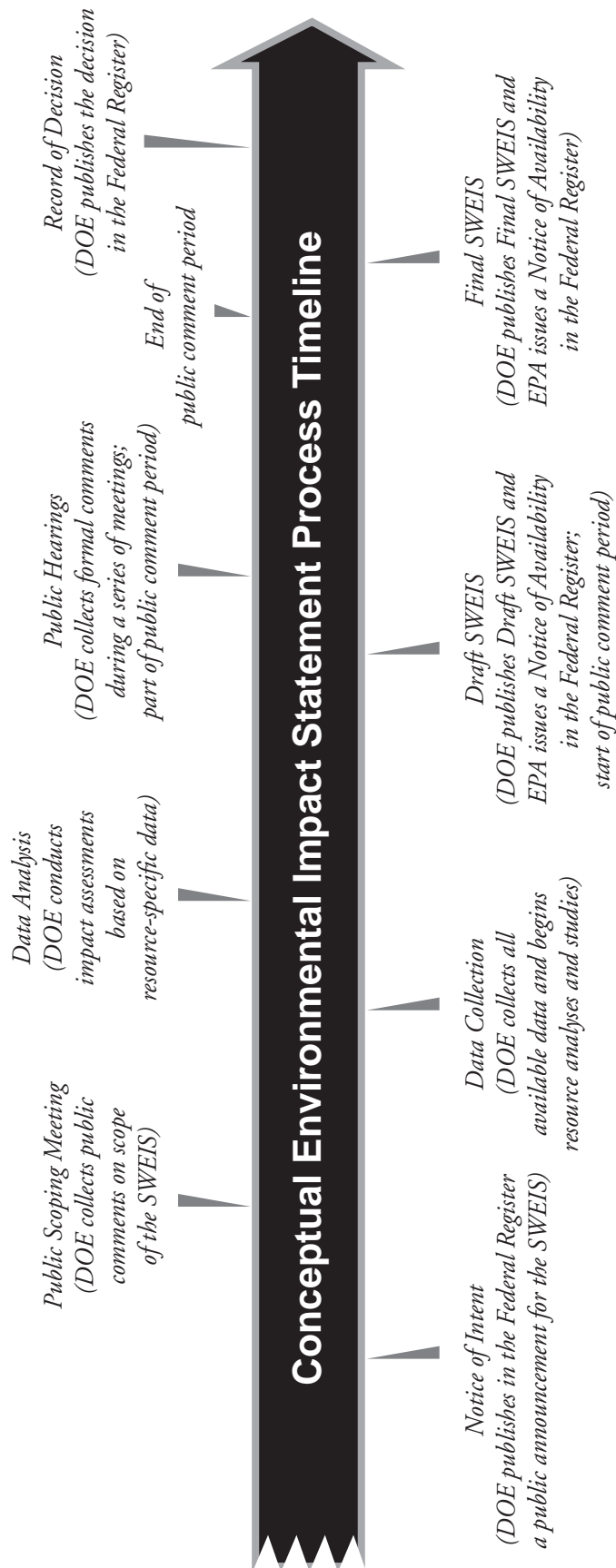


Figure S-2. Site-Wide Environmental Impact Statement Preparation Timeline
SWEIS preparation will follow the typical NEPA timeline.

Public Comment Process

The DOE released the Draft SWEIS in April 1999 for review and comment by the state of New Mexico, Native American tribes, local governments, other Federal agencies, and the general public. The formal public comment period lasted 60 days, ending on June 15, 1999. A total of 29 individuals and organizations requested information or made written or oral comments.

The DOE considered all comments, including those it received after the end of the comment period, to evaluate the accuracy and adequacy of the Draft SWEIS and to determine whether it needed to correct, clarify, or otherwise revise the SWEIS text. The DOE gave equal weight to spoken and written comments, all of which were reviewed for content and relevance to the environmental analysis in the SWEIS. Changes to the Draft SNL/NM SWEIS are described in the Summary of Changes section at the end of this Summary and in Section 1.7.5 of the Final SNL/NM SWEIS.

Commenters raised several topics that the DOE has addressed in the Summary of Comments and Responses section of this Summary.

PROPOSED ACTION AND ALTERNATIVES

The DOE proposes to continue operating SNL/NM and managing its resources in a manner that meets evolving DOE mission lines and that responds to the concerns of affected and interested individuals and agencies.

The DOE identified three alternatives—No Action, Expanded Operations (the DOE's Preferred Alternative), and Reduced Operations—that would meet its purpose and need for agency action and support existing and potential future program-related activities at SNL/NM.

No Action Alternative

Under the No Action Alternative, ongoing DOE and interagency programs and activities at SNL/NM would continue the status quo, that is, operating at planned levels as reflected in current DOE management plans. In some cases, these planned levels include increases over today's operating levels. This would also include any recent activities that have already been approved by the DOE and have existing NEPA documentation.

Expanded Operations Alternative

Under the Expanded Operations Alternative, DOE and interagency programs and activities at SNL/NM would increase to the highest reasonable activity levels, as set forth in this SWEIS, that could be supported by current facilities and their potential expansion and construction of new facilities for future actions specifically identified in the SWEIS. In this Final SWEIS the Expanded Operations Alternative has two potential configurations for the Microelectronics Development Laboratory (MDL) facility. In the first configuration, the SWEIS analyzed the expansion of operations in the existing MDL (analyzed in the Draft SWEIS). In the second configuration, the SWEIS presents the available information on the developing proposal for the Microsystems and Engineering Sciences Applications (MESA) Complex, including impacts from the construction and operation of the facility (see Sections 3.3 and 5.4) adjacent to the existing MDL. The DOE has included in the second configuration of the Expanded Operations Alternative all available programmatic and environmental information on the MESA Complex based on its approved Microsystems and Engineering Sciences Applications Complex Conceptual Design Plan (SNL/NM 1999).

The conceptual design for the MESA Complex will be finalized in the December 1999 timeframe with the issuance of the Conceptual Design Report currently under preparation. Thus, because the information on the MESA Complex in this SWEIS is preliminary and incomplete (based on the Conceptual Design Plan), and was added after issuance of the Draft SWEIS for public review and comment, the DOE has determined that an additional NEPA review will be conducted for the construction and operation of the proposed MESA Complex after the conceptual design is finalized. Based on the current configuration for the proposed MESA Complex, the DOE will prepare an environmental assessment to determine whether an environmental impact statement is required and will include the opportunity for public participation. The decision whether or not to construct and operate the MESA Complex will be made following the additional NEPA review. The DOE did not include the MESA Complex as a "Projects Under Consideration" in the Draft SWEIS because the DOE had not then decided to proceed with conceptual design for the project. Once the DOE decided to go forward with conceptual design, however, it elected to present the information it had gathered thus

far from the ongoing conceptual design. Nothing in the Final SNL/NM SWEIS is intended to influence the findings of any subsequent NEPA review of the MESA Complex. Similarly, the Record of Decision (ROD) based on the Final SWEIS will not affect the DOE's eventual decision with respect to the MESA Complex. Any decision to construct and operate the MESA Complex will be based solely on a NEPA review specific to the MESA Complex.

While the DOE will not make a decision on MESA based on this SWEIS, construction and operation of the MESA Complex is nonetheless presented in the SWEIS. The DOE has elected to share with the public such information as it has assembled in the course of its ongoing conceptual design of the MESA Complex to give the public an idea of the additional consequences that could potentially occur at SNL/NM should the project go forward (see Section 5.4, Expanded Operations Alternative). Because conceptual design is ongoing, environmental impact information is also incomplete and preliminary and may differ from what will be presented in the subsequent environmental assessment.

Reduced Operations Alternative

Under the Reduced Operations Alternative, DOE and interagency programs and activities at SNL/NM would be reduced to the minimum level of operations needed to maintain SNL/NM facilities and equipment in an operational readiness mode.

The NOI (62 FR 29332) proposed that the No Action and Expanded Operations Alternatives be considered in the SWEIS (see Chapter 14); however, a third alternative, the Reduced Operations Alternative, was added to show a broader range of alternatives and respond to comments received from the public during the scoping process (Section 1.7).

The SWEIS analyzes the environmental impacts of activities at SNL/NM associated with these three alternatives, as well as activities common to all alternatives including maintenance support and material management. The alternatives are more fully described in Chapter 3.

Preferred Alternative

The DOE did not present a Preferred Alternative in the Draft SNL/NM SWEIS. The DOE has now selected the Expanded Operations Alternative (exclusive of the

MESA Complex) as its Preferred Alternative. Under the Expanded Operations Alternative, the DOE would expand operations at SNL/NM as the need arose (until 2008), subject to the availability of congressional appropriations, to increase the level of existing operations to the highest reasonable foreseeable activity levels that are analyzed in the SWEIS. The Preferred Alternative would only implement expansion at the existing MDL, without addition of the MESA Complex.

OBJECTIVE OF THE SWEIS

In the SWEIS, the DOE is examining the environmental impacts of the three alternatives for the continued operation of the laboratory. The objective of the SWEIS is to provide the DOE, other agencies, and the public with the following:

- descriptions of the affected environment, current operation, and potential impacts associated with the continued operation of SNL/NM;
- sufficient information to facilitate routine decisions by the DOE regarding verification of operational status;
- a document that can be used for tiering (linking) NEPA analyses for future proposed actions, to eliminate repetitive discussions of similar issues and focus on the actual issues ready for decisions at each level of environmental review; and
- an understanding of SNL/NM's contribution to cumulative environmental impacts created by SNL/NM, Kirtland Air Force Base (KAFB), other onsite DOE facilities and activities in the Albuquerque area.

The last site-wide NEPA document for SNL/NM was prepared in 1977 (ERDA 1977). Since that time, site programs and activity levels have changed. Recently, the DOE has made decisions on the Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management (DOE 1996a), the Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste (DOE 1997a), the Medical Isotopes Production Project: Molybdenum-99 and Related Isotopes Environmental Impact Statement (DOE 1996b), and the Nonnuclear Consolidation Environmental Assessment (DOE/EA-0792) (DOE 1993). Based on these changes and decisions, the DOE decided that a thorough environmental analysis was needed to describe impacts of ongoing and proposed SNL/NM operations.

DECISIONS TO BE SUPPORTED BY THE SWEIS

The SWEIS will be used to support DOE decisions on the levels of operations at SNL/NM, as well as to serve as a basis for tiering future NEPA analyses and decisions regarding specific activities, as needed.

No sooner than 30 days after the Final SWEIS is issued, the DOE will prepare a ROD. The ROD will contain the DOE's decisions on future operating levels for SNL/NM. In the ROD, the DOE will explain all factors, including environmental impacts, that the Department considered in reaching its decision and identify the environmentally preferable alternative or alternatives. The DOE may select one of the three alternatives or a combination of the alternatives analyzed in the SWEIS.

Where the DOE has analyzed the environmental impacts at selected facilities for the three levels of operations that comprise the three alternatives, the DOE may choose different activity levels for each of the selected facilities and facility groups in its ROD. The NEPA process is satisfied as long as the department has bounded the environmental impacts for the selected level of operations of each facility. Here, all of the selected activity levels are analyzed in the SWEIS, and any combination of activities between the Reduced and Expanded Operations Alternatives will similarly be bounded by the SWEIS. If mitigation measures, monitoring, or other conditions are adopted as part of the DOE decision, these, too, will be summarized in the ROD.

SNL/NM FACILITIES

SNL/NM provides a diverse set of capabilities that support DOE's mission lines through various programs. The major consideration in deciding to analyze impacts by facility rather than by program was the complexity of the analysis. Any given program may use operations in more than one facility, and many facilities serve multiple programs. An analysis of environmental impacts requires knowledge of particular activities in a particular place over a known span of time in order to project the effect those activities will have on the surrounding environment. A presentation of impacts by program would require that impacts from operations at each facility be subdivided into the contribution from each program using the facility. The resulting impacts would then have to be reassembled by program. The complexity of analysis would greatly increase, and the clarity of the presentation would suffer. Therefore, the DOE chose to group the operations to be analyzed by facility.

To accomplish this objective, the DOE used the results of a detailed questionnaire distributed throughout SNL/NM to develop a database containing pertinent information about the approximately 670 buildings and outdoor test facilities where SNL/NM operations are conducted.

This database was then 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.

Finally, a set of facilities was selected for detailed analysis. Every facility that met one or more of the following criteria was selected:

- be known to have generated an important public concern;
- conduct operations that have the potential to affect the environment, safety, and health;
- be a critical element of one of SNL/NM's principal missions; and/or
- be anticipated to expand over the next 10 years, likely resulting in the need for additional NEPA documentation.

Based on these criteria, the DOE identified 10 facilities or facility groups for in-depth analysis.

- *Neutron Generator Facility*—Manufactures neutron generators, which provide a controlled source of neutrons.
 - *MDL*—Performs research and development (R&D) and fabricates custom and radiation-hardened microelectronics.
- Under the MESA Complex configuration for the Expanded Operations Alternative, the DOE could build a state-of-the-art facility adjoining the MDL. The MESA Complex (a developing proposal) would perform R&D and would fabricate custom and radiation-hardened microsystems, enhancing MDL's existing capabilities. The project would include retooling existing operations. Related infrastructure needs would include laboratories, offices, and gas storage.
- *Advanced Manufacturing Processes Laboratory*—Performs R&D of technologies, practices, and unique equipment and fabricates prototype hardware for advanced manufacturing processes.

- *Integrated Materials Research Laboratory*—Performs R&D of semiconducting and other specialized materials, including silicon processing and equipment development and materials synthesis, growth, processing, and diagnostics.
- *Explosive Components Facility*—Performs R&D and testing of explosives components, neutron generators, batteries, and explosives.
- *Physical testing and simulation facilities group*—Performs physical testing and simulation of a variety of natural and induced environments at four facilities consisting of numerous principal buildings and structures. These facilities include extensive environmental test facilities, such as sled tracks, centrifuges, and a radiant heat facility.
- *Accelerator facilities group*—Performs inertial-confinement fusion research and pulsed-power research at 10 facilities. The accelerators are also used to conduct research on inertial-confinement fusion and particle-beam weapons.
- *Reactor facilities group*—Performs R&D and testing at five experimental and engineering nuclear reactors and electron-beam accelerators in a highly secure, remote research area. Some of these facilities are being converted to production facilities for medical radioactive isotopes.
- *Outdoor test facilities group*—Conducts physics, explosives, and burn testing at five facilities located in remote areas of KAFB.
- *Selected infrastructure facilities group*—Supports steam generation, waste management, and waste disposal activities at four facilities.

The operations within these facilities or facility groups are the basis for differentiating among the three alternatives analyzed in the SWEIS and for any associated environmental impacts among alternatives.

Taken together, these facilities and facility groups represent the majority of exposure risks associated with continuing operations at SNL/NM. They represent

- over 99 percent of all radiation doses to SNL/NM personnel.
- over 99 percent of all 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. The remaining stationary source criteria

pollutants would be associated with backup generators. Hazardous air pollutants or toxic air pollutants are not included, but instead are analyzed on a site-wide basis in the SWEIS.

- all radioactive waste volumes, including medical isotopes production, Environmental Restoration (ER) Project wastes, and hazardous waste, which are accounted for in analyses of infrastructure, radiological air quality, transportation, and waste generation.

Some activities at SNL/NM are not likely to change regardless of which alternative the DOE selects for continued operations. Although included within the analysis of all alternatives, these activities were projected to remain at currently planned levels over the 10-year period analyzed. Examples of these activities are maintenance support, material management and operations, waste management and operations, natural resource management, environmental restoration, and science and engineering work at nonselected (balance of operations) facilities.

AFFECTED ENVIRONMENT

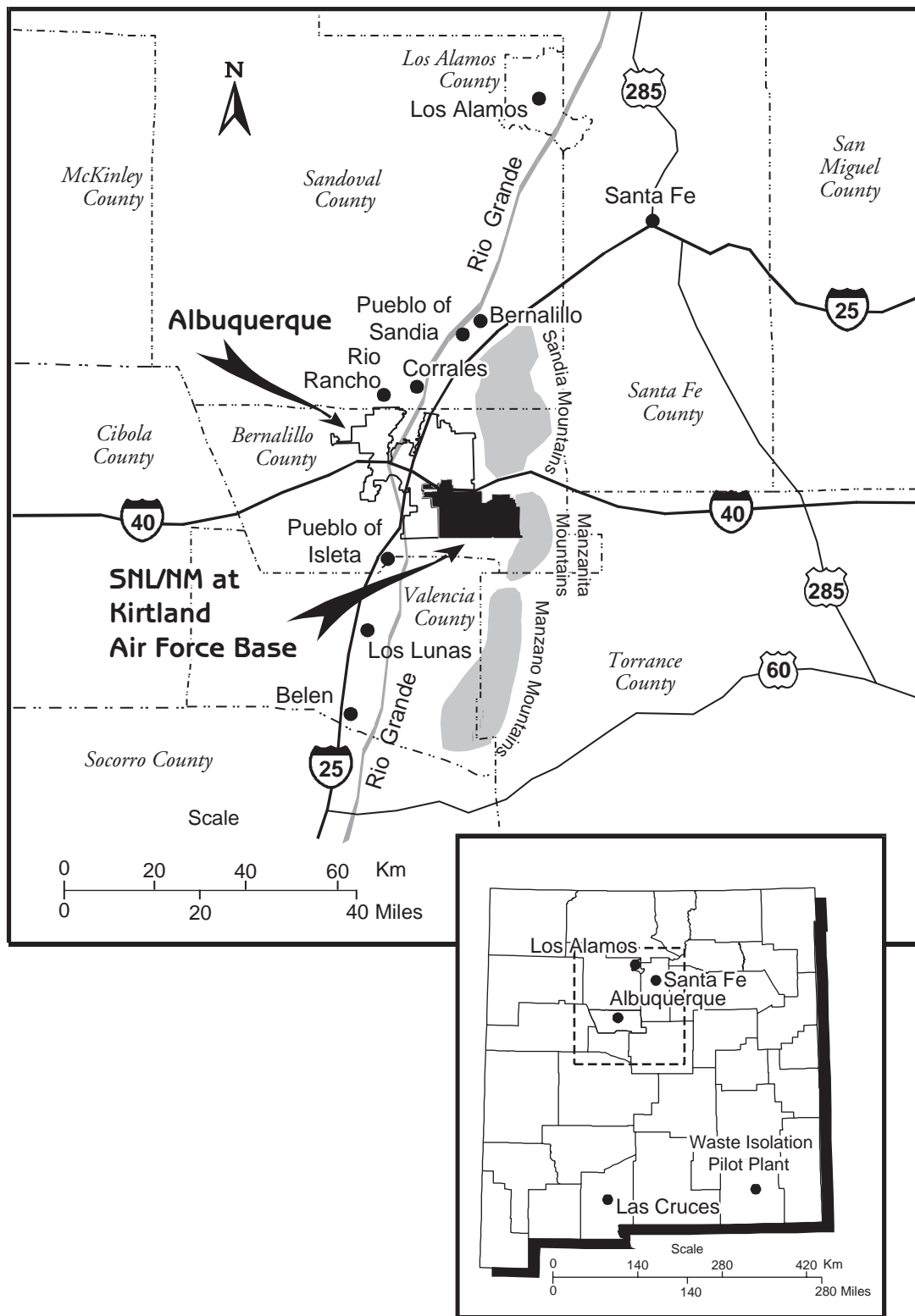
Location

SNL/NM is located on KAFB, approximately 7 mi southeast of downtown Albuquerque, New Mexico (Figure S-3). SNL/NM comprises approximately 8,800 ac of Federal land on KAFB. Albuquerque is in Bernalillo county, in north-central New Mexico, and is the state's largest city, with a population of approximately 420,000. The Sandia Mountains are immediately north and east of the city, with the Manzanita Mountains extending to the southeast. The Rio Grande runs southward through Albuquerque and is the primary river traversing central New Mexico. Nearby communities include Rio Rancho and Corrales to the northwest, the Pueblo of Sandia and town of Bernalillo to the north, and the Pueblo of Isleta and towns of Los Lunas and Belen to the south.

Land Use and Visual Resources

Areas Surrounding KAFB

Areas immediately surrounding KAFB on the north and northwest consist of single-family and multifamily residential neighborhoods, mixed/minor commercial establishments, and light industrial/wholesale operations. The eastern boundary of KAFB almost entirely abuts Cibola National Forest. Some private land, scattered



Source: SNL/NM 1997

Figure S-3. General Location of KAFB
KAFB is located southeast of the city of Albuquerque in Bernalillo county.

residential dwellings, and industrial operations are present northeast of KAFB. Single-family residences are present just beyond the national forest, approximately 1 mi east of the KAFB eastern boundary. The southern portion of KAFB borders a wide expanse of open rangeland owned by the Pueblo of Isleta. To the west, adjacent land consists of the Albuquerque International Sunport (the city's major airport), some city and county open space, and a large parcel of open space for an extensive future planned community known as Mesa del Sol. Under agreements with the Pueblo of Isleta and the state of New Mexico, two areas, encompassing over 9,000 ac adjacent to the southwestern boundary of KAFB, are designated as buffer zones for SNL/NM testing activities.

KAFB Land Ownership

KAFB land is owned primarily by the USAF, DOE, Bureau of Land Management (BLM), and U.S. Forest Service (USFS). The USAF owns the majority of acreage comprising the western half of KAFB. The DOE also owns land in this area, which is occupied almost entirely by SNL/NM facilities. Some land owned by the BLM, also in the southwestern half, has been withdrawn from public access by the USAF. The eastern portion of KAFB, commonly referred to as the Withdrawn Area, consists of more than 20,480 ac of USFS land within the Cibola National Forest that have been withdrawn from public use by the USAF and the DOE in separate actions.

USAF Activities on KAFB

KAFB land occupied by the USAF is used for a wide variety of purposes, including equipment maintenance, research, munitions storage, residential housing, recreational facilities, medical activities, and administration. Two flying wings, one active special operations training wing and one New Mexico Air National Guard fighter wing, operate on KAFB. In addition, large areas of land on KAFB, particularly in the Withdrawn Area, do not support specific facilities or programs, but are used as safety zones for USAF training activities.

SNL/NM Activities on KAFB

SNL/NM facilities and activities are located primarily in five technical areas (TAs) (Figure S-4). TAs-I, -II, and -IV encompass approximately 645 ac. TAs-III and -V encompass approximately 1,900 ac.

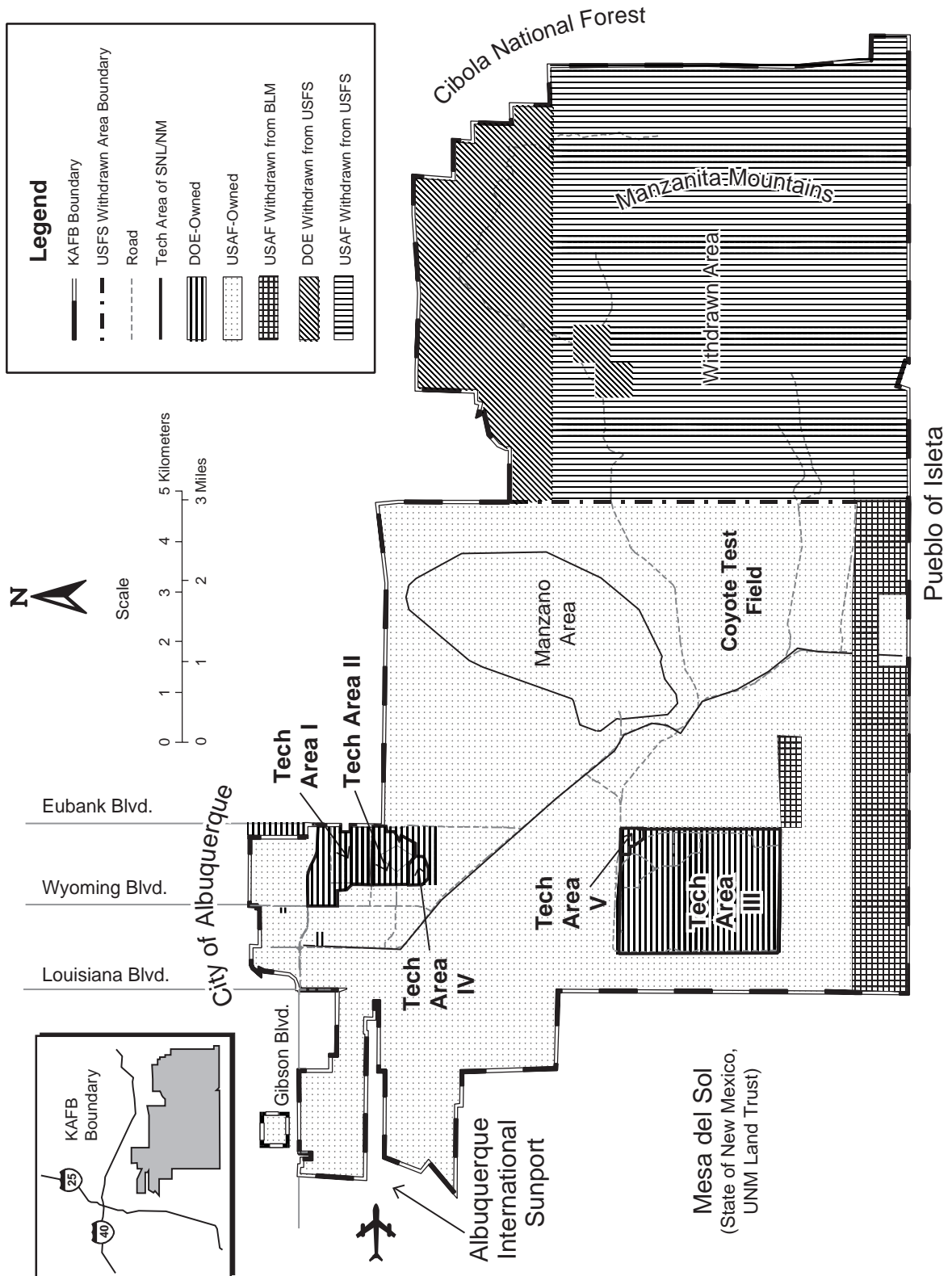
- TA-I is located in the northeast part of KAFB. It is the most densely developed and populated of the TAs, with 370 structures and approximately 6,600 employees. The structures within TA-I consist of laboratories, shops, offices, warehouses, and other storage buildings used for administration, site support, technical support, basic research, defense programs, component development, microelectronics, energy programs, exploratory systems, technology transfer, and business outreach.
- TA-II is immediately south of TA-I. Like TA-I, the area is urbanized but less densely developed, with approximately 750 employees in over 30 structures that consist of several laboratories, limited office space, and numerous storage buildings.
- TA-III is approximately 5 mi south of TA-I in the southwest portion of KAFB. Approximately 200 people work in the area, which is composed of 20 test facilities devoted to large-scale physical testing and simulation of a variety of natural and induced environments. Over 150 structures are located within TA-III, most of which are grouped in small units separated by extensive open spaces.
- TA-IV is immediately south of TA-II. TA-IV is urbanized but less densely developed than TA-I, with approximately 550 employees occupying about 70 structures. The area is primarily an R&D site for pulsed-power sciences and particle-beam fusion accelerators.
- TA-V is adjacent to the northeast corner of TA-III. TA-V consists of about 35 closely grouped structures where experimental and engineering nuclear reactors are located. Approximately 160 personnel work in the area.

(Note: the total of 8,260 personnel includes approximately 600 who have been double counted due to their work in multiple TAs.)

In addition to the TAs, SNL/NM conducts activities in the Coyote Test Field (Figure S-4), a large undeveloped area on KAFB that contains a variety of remote testing sites and facilities. Approximately 173 structures consisting of laboratories, mobile offices, and storage areas are widely dispersed throughout the area.

Infrastructure

Infrastructure consists of buildings, services, maintenance, utilities, material storage, and transportation systems and corridors that support the operations of a facility. Specifically, SNL/NM's



Source: SNL/NM 1997

Figure S-4. Locations of SNL/NM Technical Areas
SNL/NM conducts most operations in five technical areas and the Coyote Test Field.

infrastructure consists of water, sanitary sewer, storm drain, steam, fossil fuels, chilled water, electrical transmission, electrical distribution, communications, roads, and parking that support the TAs and other DOE facilities at KAFB. From 28 to 36 percent of system capacity was used to supply water, wastewater, electricity, and natural gas in 1996.

Geology and Soils

Seismic activity, slope stability, and soil contamination were evaluated in the geology and soils resource sections of the SWEIS. Albuquerque is in a region expected to experience moderate earthquakes that could result in damage to buildings. The largest magnitude earthquake in Albuquerque this century measured 4.7 on the Richter scale.

Most SNL/NM facilities are constructed on level ground or gentle slopes. Slope stability has not been an issue at SNL/NM facilities.

SNL/NM identified 182 locations of potential soil contamination at KAFB resulting from past activities. Of these, 122 have been proposed to the New Mexico Environment Department as requiring no further action because no contamination was found, contaminant levels were below risk- or regulatory-based criteria, or cleanup has been completed. Investigation or cleanup continues at the other sites.

Water Resources

Groundwater beneath KAFB occurs primarily in the Albuquerque-Belen Basin aquifer, the sole source of drinking water for Albuquerque and surrounding communities. At SNL/NM TAs, depth to groundwater is 400 to 500 ft. Basinwide groundwater levels have been decreasing for more than 30 years, the result of groundwater withdrawal by municipal and private wells exceeding the rate of groundwater recharge. In 1996, SNL/NM used 440 million gallons of water. Concentrations of contaminants above Federal drinking water standards have been detected in groundwater near several SNL/NM facilities. Concentrations of trichloroethene (TCE) at two sites are attributed to past SNL/NM waste disposal practices. Petroleum hydrocarbon components detected at a third facility appear to be related to releases at this facility. These contaminated areas are from 3 to 7 mi from the nearest water supply wells.

Surface water at KAFB is almost exclusively intermittent, that is, flowing only during periods of heavy rainfall, typically in the summer “monsoon” season (July through September). Surface water flowing through KAFB could discharge to the Rio Grande, 6 mi downstream from the KAFB boundary.

Biological and Ecological Resources

At least 267 plant species and 195 animal species occur on KAFB. This diversity is due in part to the variety of habitats, which include cliff faces, caves, abandoned mines, and drainages, as well as the four major vegetation associations (grassland, woodland, riparian, and altered habitat). Only one Federally listed threatened or endangered species has been observed on KAFB. This observation was a single sighting of a peregrine falcon (Federally endangered), probably a migrant. Sixteen other animal and two plant species present or observed on KAFB are listed by the Federal government as species of concern or sensitive species, or by the state of New Mexico as threatened or sensitive.

Cultural Resources

Cultural resources at KAFB include prehistoric archaeological sites, which in the Albuquerque area date to before A.D. 1540 (the initiation of Spanish exploration of the area), and historic archaeological sites (sites, buildings, and structures from A.D. 1540 to 1948). Within the boundaries of KAFB and DOE buffer zones are 284 recorded prehistoric and historic archaeological sites. No traditional cultural properties (TCPs) have been identified at KAFB.

Air Quality

Major sources of air emissions in the Albuquerque area are motor vehicles, wood burning stoves and fireplaces, and open burning. The SNL/NM steam plant, which provides heat to a large number of SNL/NM facilities, accounts for more than 90 percent of the total SNL/NM emission of pollutants from fixed facilities regulated by the *Clean Air Act*. All emissions are within permitted levels and result in concentrations of these pollutants that are below standards set to protect health with an ample margin of safety. Actual emissions are only a fraction of permitted levels. Hazardous chemical air emissions are small and are not required to be individually monitored. Vehicle emissions are the dominant source of carbon monoxide from SNL/NM and are a concern because the Albuquerque/Bernalillo

county area is a U.S. Environmental Protection Agency (EPA)-designated “maintenance” area for carbon monoxide. All other sources of carbon monoxide at SNL/NM are small, and the total carbon monoxide emissions are about 3 percent of the total carbon monoxide emissions in the county.

At present, 17 SNL/NM facilities emit radionuclides. The maximum calculated total dose of radiation from atmospheric emissions at all SNL/NM facilities to an individual is 0.007 mrem/yr, which is much lower than the regulatory limit of 10 mrem/yr. This dose is also small compared to an individual background radiation dose from all sources of 360 mrem/yr received by residents of the Albuquerque area.

Human Health and Worker Safety

SNL/NM has the potential of affecting human health from radiological or hazardous materials that could reach either workers or the public. Of the average background radiation dose of 360 mrem/yr, more than 80 percent is from natural sources such as radon. The major nonnatural source of radiation is medical testing, which accounts for 15 percent of the total dose. The maximum 1996 dose estimate from air emissions at SNL/NM facilities for an individual in a publicly accessible area is 0.007 mrem/yr, which is 0.002 percent of the background radiation dose. This dose is associated with an increased lifetime cancer risk of 1 in 285 million. The 1996 collective dose to the population within 50 mi is 0.14 person-rem. Based on current environmental monitoring data, radiation exposures would be unlikely to occur through media such as surface water, soil, groundwater, and natural vegetation.

Nonradiological chemical air pollutants are released from SNL/NM facilities that house chemistry laboratories or chemical operations. Concentrations of these pollutants are below safety levels established for workers in industrial areas and are known to diminish with increasing distance from the sources. Environmental monitoring data indicate that the public is not in contact with chemical contamination through surface water, soil, or groundwater.

Workers in some SNL/NM facilities receive an additional dose of radiation, measured by personal radiation monitoring devices (dosimetry badges). The average annual collective radiation dose to the entire group of radiation workers is 12 person-rem per year, based on 1992 through 1996 data. The annual average collective dose increases the number of additional fatal

Exposure to Radiation

All people are constantly exposed to some form of radiation. This radiation can be from different sources: cosmic from space, medical from X-rays, internal from food, and external from rocks and soil (such as radon in homes). The “Roentgen equivalent man” (rem) unit is a measurement of the dose from radiation and its physical effects and is used to predict the biological effects of radiation on the human body. Therefore, one rem of one type of radiation is presumed to have the same biological effects as one rem of any other type of radiation. This relationship allows comparison of the biological effects of radiological materials that emit different types of radiation. A commonly used dose unit of measure is millirem (mrem), which is equal to 0.001 rem. A person-rem is a unit of collective dose applied to populations or groups of individuals; that is, a unit for expressing the dose when summed across all persons in a specified population or group.

cancers by 4.8×10^{-3} . At this risk level, no additional fatal cancers would be likely to occur within the radiation worker population.

SNL/NM’s nonfatal injury/illness rate has ranged between 2.3 and 4.1 per 100 workers per year from 1992 through 1996. This rate is significantly less than national (7.4 to 8.9) or New Mexico (7.3 to 8.5) private industry rates. SNL/NM had no fatal occupational injuries from 1992 through 1996.

Transportation

Normal transportation activities can affect air quality and cause noise, vibration, and traffic congestion. Transportation activities at SNL/NM involve the receipt, shipment, and transfer of hazardous and nonhazardous materials and waste. The most frequently received hazardous materials are chemicals. In 1997, SNL/NM received more than 25,000 chemical containers in approximately 2,800 shipments.

From 1994 through 1997, SNL/NM had 10 transportation-related incidents involving onsite transfer or offsite shipment or receipt of hazardous material.

None resulted in the release of a hazardous cargo to the environment or exposure of the workforce or the public to hazardous materials.

Waste Generation

Waste management activities consist of managing, storing, and preparing waste for offsite disposal in accordance with applicable Federal and state regulations, permits, and DOE Orders. Wastes generated onsite under current operations include radioactive waste, hazardous waste, biohazardous (medical) waste, asbestos, polychlorinated biphenyls (PCBs), nonhazardous solid waste, and process wastewater. Waste generated in 1996 included 25,600 ft³ of radioactive waste, 48,000 kg of hazardous waste, 52,000 kg of PCBs, and 77,000 kg of asbestos. Additional waste will be generated by the ER Project. Several waste transfer and storage facilities exist at SNL/NM to handle this waste for onsite or offsite disposal.

Noise and Vibration

SNL/NM produces sounds from the detonation of explosives or sonic booms from sled track activities. The distance at which these so-called “impulse” sounds can be heard varies depending on the intensity of the initial blast, meteorological conditions, terrain, and background noise levels. These sounds are sometimes heard beyond the KAFB boundary. In 1996, SNL/NM produced 1,059 impulse noise events, only a small fraction of which were of sufficient magnitude to be heard beyond the KAFB boundary. No offsite damage from ground vibrations was associated with these events.

Socioeconomics

SNL/NM is the fifth-largest private employer in New Mexico. For Fiscal Year (FY) 1997, the SNL/NM payroll in the local four-county region was \$417 million for 6,824 full-time personnel. During the same year, SNL/NM spent approximately \$309 million in procurements in the region. The total operating and capital budget for SNL/NM for FY 1996 was approximately \$1.4 billion, of which an estimated \$877 million was spent in central New Mexico.

Environmental Justice

Presidential Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires identifying and addressing, as appropriate, disproportionately high and

adverse human health or environmental effects of Federal programs, policies, and activities on minority and low-income populations. According to a 1990 report, *Poverty Thresholds*, from the U.S. Bureau of the Census, 49 percent of New Mexico’s population was minority, and 21 percent was listed as in poverty or designated as having low income. Areas near KAFB, with greater than the state average of minority population border KAFB to the northeast, west, and south. Areas near KAFB, with greater than the state average of low-income populations, are to the south and west.

ENVIRONMENTAL CONSEQUENCES

This section summarizes, by resource area, the environmental consequences of operating SNL/NM facilities according to the levels of activity specified in the three alternatives. Table S–2 also provides a comparison of impacts across alternatives for each resource area. Table S–3 provides this comparison for accidents.

[Where impacts of the proposed MESA Complex could be projected, they are presented in parentheses. All impacts of the MESA Complex and reasonable alternatives will be analyzed in the Environmental Assessment to be prepared by the DOE and tiered from this Final SWEIS. Also, because of the preliminary nature of conceptual design for this developing proposal, impacts presented in the Environmental Assessment may differ from those presented here.]

Land Use and Visual Resources

No adverse impacts to land resources are expected as a result of the No Action, Expanded Operations, or Reduced Operations Alternatives. The extent of DOE land and USAF-permitted acreage currently available for use by SNL/NM facilities on KAFB would remain approximately the same. Operations would remain consistent with industrial and research park uses and would have no foreseeable effects on established land use patterns or requirements. Buffer zones would continue to remain at their current size and location. New SNL/NM facilities, expansions, and upgrades would be limited and would not require changes to current land ownership or classification status because activities would be planned in or near existing facilities, within already disturbed or developed areas, or on land already under DOE control. (For similar reasons, if implemented, the MESA Complex configuration for the Expanded Operations

Table S-2. Comparison of Potential Consequences of Continued Operations at SNL/NM

RESOURCE AREA	NO ACTION ALTERNATIVE	EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
Land Use	No changes projected in classification or ownership Changes would be minor and transitory. Projected new construction in already developed areas	Same as No Action Alternative Same as No Action Alternative	Same as No Action Alternative Same as No Action Alternative
Visual Resources			
Infrastructure	All projected activities within capacities of existing road, waste management, and utility systems	Same as No Action Alternative	Same as No Action Alternative
Water Use (with MESA)	440-463 M gal/yr	495 M gal/yr (499 M gal/yr)	416 M gal/yr
Geology and Soils	Slope Stability Soil Contamination	Same as No Action Alternative Same as No Action Alternative	Same as No Action Alternative Same as No Action Alternative
Water Resources and Hydrology	Groundwater Quality Groundwater Quantity	Same as No Action Alternative Same as No Action Alternative	Same as No Action Alternative Same as No Action Alternative
	TCE above MCL from SNL/NM disposal activities is present in groundwater beneath the Chemical Waste Landfill (TA-III) and TA-V. Petroleum hydrocarbon components have been detected in groundwater beneath the Lurance Canyon Burn Site. No future activities are anticipated to cause further groundwater contamination.		
	SNL/NM groundwater use is projected to account for 11% of local aquifer drawdown and 1% of basin-wide use. The potential consequence is considered adverse.	SNL/NM groundwater use is projected to account for 12% of local aquifer drawdown and 1% of basin-wide use.	Same as No Action Alternative

Table S-2. Comparison of Potential Consequences of Continued Operations at SNL/NM (continued)

RESOURCE AREA	NO ACTION ALTERNATIVE	EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
<i>Water Resources and Hydrology (continued)</i>	Surface Water Quality	Same as No Action Alternative	Same as No Action Alternative
	Surface Water Quantity	SNL/NM's projected portion of Rio Grande flow is 0.07%.	Same as No Action Alternative
<i>Biological and Ecological Resources</i>	Impacts projected for biological or ecological resources are low to negligible.		
<i>Cultural Resources</i>	Potential for impacts to cultural resources is low to negligible. Explosive testing debris and shrapnel, off-road vehicle traffic, and unintended fires present a low to negligible potential for impacts. SNL/NM security would likely result in continued protection of archaeological sites.		
<i>Air Quality</i>	Stationary Source Criteria Pollutants	Concentrations would be below the most stringent standards, which define the pollutant concentrations below which there are no adverse impacts to human health and the environment.	
		Modeling results (summary)	
Nonradiological Air Quality	Carbon monoxide (8 hours)	57% of standard	
	Lead (quarterly)	0.07% of standard	
	Nitrogen dioxide (annually)	30% of standard	
	Total suspended particulates (annually)	69% of standard	
	Sulfur dioxide (annually)		

Table S-2. Comparison of Potential Consequences of Continued Operations at SNL/NM (continued)

RESOURCE AREA	NO ACTION ALTERNATIVE	EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
Air Quality (continued)	Chemical Pollutants	Concentrations are below regulatory standards and human health guidelines.	Same as No Action Alternative
	Mobile sources (percent of Bernalillo county mobile-source carbon monoxide emissions)	4.6	5.1
Nonradiological Air Quality (continued)	Fire testing facilities	Chemical concentrations are below OEL/100 guideline.	Same as No Action Alternative
	MEI dose	0.15 mrem/yr	0.51 mrem/yr
Radiological Air Quality	Collective ROI dose	5.0 person-rem/yr	15.8 person-rem/yr
	Average individual dose within ROI	6.8x10 ⁻³ mrem/yr	2.16x10 ⁻² mrem/yr
Human Health and Worker Safety	MEI public risk (from radiation)	7.5x10 ⁻⁸ LCF/yr	2.6x10 ⁻⁷ LCF/yr
	ROI population risk to public (from radiation)	2.5x10 ⁻³ LCF/yr	7.9x10 ⁻³ LCF/yr
	Fatal SNL/NM worker occupational injuries	none	Same as No Action Alternative
	Average radiation-badged SNL/NM worker dose (risk)	47 mrem/yr (1.9x10 ⁻⁵ LCF/yr)	Same as No Action Alternative

Table S-2. Comparison of Potential Consequences of Continued Operations at SNL/NM (continued)

RESOURCE AREA	NO ACTION ALTERNATIVE	EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
Nonfatal SNL/NM worker occupational injuries/illnesses	311/yr	326/yr	287/yr
Human Health and Worker Safety (continued)			
Occupational SNL/NM worker chemical exposures	1-2/yr	Same as No Action Alternative	Same as No Action Alternative
Environmental risk to public (from chemical exposures)	<1x10 ⁻⁶ ELCR	Same as No Action Alternative	Same as No Action Alternative
Transportation population risk within ROI (from radiation)	8.3x10 ⁻⁴ LCF/yr (1.7 person-rem)	2.5x10 ⁻³ LCF/yr (4.9 person-rem)	2.0x10 ⁻⁴ LCF/yr (0.4 person-rem)
Transportation			
Total transportation population risk (from radiation)	0.1 LCF/yr	0.33 LCF/yr	4.5 x10 ⁻² LCF/yr
Traffic accident fatalities	0.49/yr	1.3/yr	0.18/yr
Total transportation population risk (from truck emissions)	0.03 LCF/yr	0.06 LCF/yr	0.01 LCF/yr
Management capability (infrastructure)	All projected activities are within capacities of existing facilities and systems.		
Waste Generation (Annual)			
Total radioactive waste	Up to 176 m ³	Up to 289 m ³	Up to 106 m ³
Total chemical waste	Up to approximately 379,000 kg	Up to approximately 441,000 kg (with MESA approximately 443,000 kg)	Up to approximately 306,000 kg

Table S-2. Comparison of Potential Consequences of Continued Operations at SNL/NM (concluded)

RESOURCE AREA	NO ACTION ALTERNATIVE	EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
Noise and Vibration	<p>Impulse noise-producing test activities projected to increase 35% over 1996 level to 1,435 tests by 2008. Effects would be limited to windows rattling or startle reaction. Background noise levels would continue at current levels from generators, air conditioners, and ventilation systems, but increase due to additional vehicular traffic, aircraft noise, and temporary construction projects (range from 50 to 70 dB).</p>	<p>There would be a 250% increase in test activities over 1996 levels, to 2,638 per year, approximately one impulse noise event per hr for an 8-hr work day and a 261-day work year. Only a small fraction of these tests would be of sufficient magnitude to be heard or felt beyond the site boundary. The vast majority of tests expected to be below background noise levels for receptor locations beyond the KAFB boundary and would, therefore, be unnoticed in neighborhoods bounding the site.</p>	<p>Test activities would be 65% less than the 1996 level, 371 tests per year, an average of approximately 1.5 impulse noise tests per day. Only a small fraction of these tests would be of sufficient magnitude to be heard or felt beyond the site boundary. The vast majority of tests expected to be below background noise levels for receptor locations beyond the KAFB boundary and would, therefore, be unnoticed in neighborhoods bounding the site.</p>
	8,035	8,417	7,422
Socioeconomics^{a,b}	<p>SNL/NM total economic activity within the ROI</p> <p>Percent of ROI total economic activity</p>	<p>\$4.13 B/yr</p> <p>10.1</p>	<p>\$3.81 B/yr</p> <p>9.0</p>
Environmental Justice^d	<p>No disproportionately high and adverse impacts to minority or low-income communities are anticipated.</p>	<p>Same as No Action Alternative</p>	<p>Same as No Action Alternative</p>

B: billion
 dB: decibel
 ELCR: excess lifetime cancer risk
 gal: gallon
 hr: hour
 kg: kilogram
 LCF: latent cancer fatality

M: million
 m³: cubic meter
 MCL: maximum contaminant level
 MEI: maximally exposed individual
 MESA: Microsystems and Engineering Sciences Applications
 mmem: millirem

OEL: occupational exposure limit
 ROI: region of influence
 TA: technical area
 TCE: trichloroethene
 TCP: traditional cultural property
 yr: year

a Under one of two configurations within the Expanded Operations Alternative, a developing proposal, still undergoing final conceptual design, the \$300 million MESA Complex could be constructed starting in 2001 and ending in 2003, pending additional NEPA review (an environmental assessment).
 b Bounding analysis is based on parameters presented in DOE 1997i.
 c Section 4.12, Affected Environment, differs slightly, using 6,824 full-time employees. Base year in Section 5.3.12, Environmental Consequences (also see Table 3.6-2), used 7,652 full-time employees.
 d No TCPs have been identified at SNL/NM. If specific TCPs are identified, Native American tribes will be consulted.

**Table S–3. Comparison of Potential Consequences
for Accident Scenarios at SNL/NM**

RESOURCE AREA	NO ACTION ALTERNATIVE	EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
SITE-WIDE EARTHQUAKE			
RADIOLOGICAL IMPACTS			
50-Mile Population (Additional Latent Cancer Fatalities)	8.1x10 ⁻²	7.5x10 ⁻²	7.5x10 ⁻²
Maximally Exposed Individual (Increased Probability of Latent Cancer Fatality)	8.6x10 ⁻⁶	7.7x10 ⁻⁶	7.7x10 ⁻⁶
Noninvolved Worker (Increased Probability of Latent Cancer Fatality)	3.1x10 ⁻²	3.0 x10 ⁻²	3.0x10 ⁻²
CHEMICAL IMPACTS			
Onsite Persons at Risk of Exposure Exceeding ERPG-2 Levels	423	423(306) ^a	Same as No Action Alternative
CATASTROPHIC ACCIDENT SINGLE FACILITY			
RADIOLOGICAL IMPACTS			
ACRR Medical Isotopes Production			
50-mile population (additional latent cancer fatalities)	1.6x10 ⁻⁶ to 4.9x10 ⁻³	Same as No Action Alternative	Same as No Action Alternative
Maximally Exposed Individual (increased probability of latent cancer fatality)	1.0x10 ⁻⁶ to 4.9x10 ⁻⁷	Same as No Action Alternative	Same as No Action Alternative
Noninvolved Worker (increased probability of latent cancer fatality)	4.9x10 ⁻⁸ to 7.6x10 ⁻⁵	Same as No Action Alternative	Same as No Action Alternative
Hot Cell Facility			
50-mile population (additional latent cancer fatalities)	1.6x10 ⁻⁶ to 7.9x10 ⁻²	Same as No Action Alternative	Same as No Action Alternative
Maximally Exposed Individual (increased probability of latent cancer fatality)	1.0x10 ⁻¹⁰ to 6.6x10 ⁻⁶	Same as No Action Alternative	Same as No Action Alternative
Noninvolved Worker (increased probability of latent cancer fatality)	4.2x10 ⁻⁹ to 7.4x10 ⁻⁶	Same as No Action Alternative	Same as No Action Alternative
Sandia Pulsed Reactor			
50-mile population (additional latent cancer fatalities)	1.2x10 ⁻³ to 9.2x10 ⁻³	Same as No Action Alternative	Same as No Action Alternative
Maximally Exposed Individual (increased probability of latent cancer fatality)	1.5x10 ⁻⁷ to 8.4x10 ⁻⁷	Same as No Action Alternative	Same as No Action Alternative
Noninvolved Worker (increased probability of latent cancer fatality)	2.5x10 ⁻⁴ to 3.8x10 ⁻³	Same as No Action Alternative	Same as No Action Alternative

Table S–3. Comparison of Potential Consequences for Accident Scenarios at SNL/NM (concluded)

RESOURCE AREA	NO ACTION ALTERNATIVE	EXPANDED OPERATIONS ALTERNATIVE	REDUCED OPERATIONS ALTERNATIVE
ACRR-Defense Programs Configuration			
50-mile population (additional latent cancer fatalities)	1.3×10^{-3} to 9.0×10^{-3}	Same as No Action Alternative	Not operational
Maximally Exposed Individual (increased probability of latent cancer fatality)	1.7×10^{-7} to 1.0×10^{-6}	Same as No Action Alternative	Not operational
Noninvolved Worker (increased probability of latent cancer fatality)	1.2×10^{-5} to 2.2×10^{-4}	Same as No Action Alternative	Not operational
CHEMICAL IMPACTS			
Technical Area-I			
Persons at risk of exposure exceeding ERPG-2 Levels			
Arsine	409	$409/(558)^a$	Same as No Action Alternative
Chlorine	141	Same as No Action Alternative	Same as No Action Alternative
Phosphine	100	Same as No Action Alternative	Same as No Action Alternative
Thionyl Chloride	55	Same as No Action Alternative	Same as No Action Alternative
EXPLOSIVE IMPACTS			
Technical Area-I			
Distance (feet) to reach 2 psi (Damage to cinder block walls)	617	Same as No Action Alternative	Same as No Action Alternative
Distance (feet) to reach 10 psi (rupture of 50% of eardrums)	210	Same as No Action Alternative	Same as No Action Alternative
Distance (feet) to reach 50 psi (50% fatalities)	101	Same as No Action Alternative	Same as No Action Alternative

ERPG: emergency response planning guideline
 ACRR: Annular Core Research Reactor
 MESA: Microsystems and Engineering Sciences Applications

psi: pounds per square inch
^a Expanded Operations Alternative with MESA Complex configuration

Alternative would have a negligible effect on land or visual resources.) There would be no adverse impacts to visual resources that 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 in or near existing facilities in areas with common scenic quality. Efforts initiated by SNL/NM to incorporate a campus-style design would continue.

Infrastructure

Annual projected utility demands for all alternatives would be well within system capacities. Electrical consumption would range from 185,000 MWh per year (Reduced Operations Alternative) to 198,000 MWh per year (204,000 MWh per year including the proposed MESA Complex under the Expanded Operations Alternative). Projected water usage would range from 416 million gallons to 495 million gallons per year

(499 million gallons per year including the proposed MESA Complex under the Expanded Operations Alternative). Actual water usage probably would be lower because SNL/NM has implemented a conservation program to reduce usage by 30 percent by 2004. Table 5.3.2-1 of Volume I lists the potential reduction, based on 1996 usage. Other infrastructure-related factors, including maintenance, roads, communications, steam, natural gas, and facility decommissioning, would be similar for each alternative and would not be adversely affected by the projected levels of SNL/NM operations. The Expanded Operations Alternative considered a 10-percent increase (see Section 5.5.2), which shows that utility systems supporting SNL/NM maintain adequate capacities.

Geology and Soils

No activities planned for any of the alternatives would present a potential for slope destabilization. Slope instability has not been an issue in past SNL/NM operations and would likely not be a concern in the future. (If implemented, the MESA Complex configuration for the Expanded Operations Alternative would have a negligible effect on geology or soil resources.) Existing soil contamination is being cleaned up through SNL/NM's ER Project, which is scheduled for completion by 2004. Under the Expanded Operations Alternative, there would be the potential for increased deposition of soil contaminants in outdoor testing areas. Potential contaminants would include depleted uranium (DU) fragments, explosive residue, and metals contained in weapons that are used in the tests. SNL/NM performs periodic sampling and radiation surveys in these testing areas. These areas are not accessible to the general public. DU fragments are collected after tests.

Water Resources and Hydrology

Groundwater contamination attributable to known SNL/NM activities is present at three sites: the Chemical Waste Landfill (CWL) in TA-III; beneath the liquid waste disposal system, septic tanks, and leach fields in TA-V; and the Lurance Canyon Burn Site in the eastern portion of KAFB. Investigation and cleanup planning are ongoing at these sites, and any final plans must be approved by the New Mexico Environment Department.

Under a no-cleanup scenario at the CWL, the only contaminant exceeding EPA concentration limits in groundwater would be TCE, which occurs in a plume extending 410 ft from the CWL. TCE would not impact

drinking water supplies because the nearest water supply well is approximately 4 mi from the CWL. The resulting contamination in the aquifer is due to past waste management practices rather than current operations. Groundwater investigation would continue at an additional location where the source of potential contamination has not been identified. Investigation and cleanup at locations with groundwater contamination would continue at the same rate under any of the three alternatives.

The estimated SNL/NM portion of local (in the immediate vicinity of KAFB) aquifer drawdown from 1998 to 2008 would range from 11 to 12 percent for all alternatives. Local drawdown would range from less than 1 to 28 ft across KAFB during this period. The impact resulting from SNL/NM's contribution to drawdown in the aquifer derives from both past and present water usage and is considered to be adverse. This drawdown would not have an immediate effect on other water users, spring flow, or land subsidence. Long-term effects would tend to be reduced by the city of Albuquerque's conversion to surface water use, scheduled to begin in 2004. Water demand under each alternative would be within existing KAFB water rights. (As discussed above, water usage would increase from 495 million gallons per year to 499 million gallons per year if the MESA Complex became operational.)

Potential sources of surface water contamination at SNL/NM would be storm water runoff from ER Project sites (including active testing areas) and runoff from developed areas. However, no contaminants attributable to SNL/NM activities have been detected in surface water samples collected onsite. The elevated levels of naturally occurring metals detected in the storm water samples have not been attributed to SNL/NM. No SNL/NM activities are projected under any of the alternatives that would contribute contaminants to surface water.

SNL/NM has little effect on the quantity of surface water in arroyos or the Rio Grande. The combined excess storm water runoff from SNL/NM facilities and discharge to Albuquerque's Southside Water Reclamation Plant would contribute from 0.06 to 0.07 percent to the annual Rio Grande flow under all alternatives, with no measurable impacts to the Rio Grande.

Biological and Ecological Resources

Beneficial impacts to biological and ecological resources would occur under all alternatives. Restricted access and

limited development and use have benefited biological resources at KAFB. For example, the absence of livestock grazing has improved the quality of the grasslands in relation to the region.

SNL/NM operations in TAs-I, -II, and -V would continue to occur primarily inside buildings. Under all alternatives, small areas of vegetation would be removed (see Section 2.3.5), but this removal would not affect the viability of the plant communities. Proposed activities could result in the local displacement of wildlife. There would be slightly increased levels of noise and activity under the Expanded Operations Alternative. However, data from raptor surveys of KAFB indicate that they have become accustomed to the noise and activities that currently exist, as raptor species at KAFB return to the same nest sites each year. Outdoor activities at TA-III and the Coyote Test Field would continue to affect small localized areas.

Limited site access and management of the biological resources by SNL/NM, KAFB, and the USFS would continue to benefit the animals and plants, including sensitive species on KAFB. (If implemented, the MESA Complex configuration for the Expanded Operations Alternative would have a negligible effect on biological and ecological resources. The MESA Complex would be built in a heavily developed area on land that has been largely disturbed and that currently contains structures.)

Cultural Resources

Restricted access in association with activities at certain facilities would continue to have a beneficial effect on prehistoric and historic archaeological resources because it would protect the resources from vandalism, theft, or unintentional damage. For all three SWEIS alternatives, there would continue to be a potential for impacts to prehistoric and historic archaeological resources. These impacts would derive from explosive testing debris and shrapnel produced as a result of outdoor explosions, off-road vehicle traffic, and unintended fires and fire suppression. However, the potential for impacts due to these factors would be minimal under all three alternatives. (If implemented, the MESA Complex configuration for the Expanded Operations Alternative would have a negligible effect on cultural resources. The MESA Complex would be built in a heavily developed area on land that has been largely disturbed and that currently contains structures.)

As a result of the ongoing consultation with 15 Native American tribes, no TCPs have been identified at

SNL/NM; however, several tribes have requested that they be consulted under the *Native American Graves Protection and Repatriation Act* (NAGPRA) if human remains are discovered within the region of influence. These consultations will continue. If specific TCPs are identified, any impacts of SNL/NM activities on the TCP and any impacts of restricting access to the TCP would be determined in consultation with Native American tribes, and further NEPA review would be conducted, if appropriate.

Air Quality

Concentrations of criteria and chemical pollutants in air would be below regulatory standards and human health guidelines. Maximum concentrations of criteria pollutants from operation of the steam plant, electric power generator plant, boiler and emergency generator in Building 701, and 600-kw-capacity generator in Building 870b would represent a maximum of 96 percent of the allowable regulatory limits of several criteria pollutants (nitrogen dioxide, total suspended particulates, and PM₁₀) at the National Atomic Museum, which is the closest public access area to the SNL/NM boundary.

These standards, in general, are set to provide an ample margin of safety below any pollutant concentration that might be of concern. The methodology used in the criteria pollutant analysis also produces projections that are conservative maximum concentrations.

Based on the analysis of stationary and mobile source emissions, carbon monoxide emissions from SNL/NM would be less than 1996 emissions under any alternative. Emissions would remain below the 10-percent threshold that denotes a regionally significant action in a nonattainment area. As a result, the DOE has determined that a conformity determination under 40 CFR Part 93 Subpart B is not required.

With the exception of one chemical (chromium trioxide), concentrations of noncarcinogenic chemicals emitted from 12 facilities on SNL/NM were projected to be below screening levels based on occupational exposure limit (OEL) guidelines generally referenced to determine human health impacts. Concentrations of carcinogenic chemical emissions would pose little cancer risk (less than 1 in 1 million) to onsite workers or the general public. Chemical emissions would be highest for the Expanded Operations Alternative, although they would still be below levels that would affect public health.

The impact from emissions of criteria pollutants for the No Action and Expanded Operations Alternatives would

be essentially the same. The major source of criteria pollutants (other than mobile sources) would be the steam plant, which supplies steam to the facilities for heating. No increase in floor space is anticipated under the Expanded Operations Alternative; therefore, no increase in steam production would be required. The Reduced Operations Alternative would require less steam, resulting in lower emissions from the steam plant.

(If implemented, under the MESA Complex configuration for the Expanded Operations Alternative, airborne particulate matter levels would be elevated during construction of the MESA Complex. During the operation of the MESA Complex, the number of chemicals of concern would decrease below current levels and slightly lower emissions.)

The radiological dose impacts due to the annual air emissions from SNL/NM facilities during normal operations under each of the alternatives would be much lower than the regulatory National Emissions Standards for Hazardous Air Pollutants (NESHAP) limit of 10 mrem/yr to a maximally exposed individual (MEI). The calculated radiological dose to an MEI would be 0.15 mrem/yr under the No Action Alternative; 0.51 mrem/yr under the Expanded Operations Alternative; and 0.02 mrem/yr under the Reduced Operations Alternative. The dose to an MEI under each alternative would be small in comparison to the average individual background radiation dose of 360 mrem/yr.

The calculated collective dose to the population within 50 mi of SNL/NM from the annual radiological air emissions due to the SNL/NM operations under each alternative would be 5.0 person-rem per year under the No Action Alternative 15.8 person-rem per year under the Expanded Operations Alternative and 0.80 person-rem per year under the Reduced Operations Alternative. The collective dose would be much lower than the collective dose of 263,700 person-rem to the same population from background radiation. (If implemented, the MESA Complex configuration for the Expanded Operations Alternative would not produce radiological emissions.)

Human Health

Routine releases of hazardous radiological and chemical materials would occur during SNL/NM operations. These releases would have the potential to reach receptors (workers and members of the public) by way of different environmental pathways. The levels of exposure to chemicals and radionuclides were assessed for each

environmental medium determined to be a pathway for these releases.

The SWEIS impact analyses identified air as the primary environmental medium with the potential to transport hazardous material from SNL/NM facilities to receptors in the SNL/NM vicinity. In the assessment of human health risk from air emissions, a number of receptor locations and possible exposure scenarios were analyzed. The total composite cancer health risk is the sum of potential chemical and radiation exposures, calculated from the radiation cancer health risk to the MEI, plus the upper bound chemical cancer health risk from a hypothetical worst-case exposure scenario. This very conservative estimate of maximum health risk is greater than any of the individual health risks based on more likely exposure estimates at specific receptor locations.

The composite cancer health risk estimates and the cancer health risk estimates for specific receptor locations are below levels that regulators consider protective of public health. No adverse health effects would be expected from any of the three alternatives for SNL/NM. The small amounts of chemical carcinogens and radiation released from SNL/NM facilities would increase the MEI lifetime risk of cancer by less than 1 chance in 434,000 under the No Action Alternative and by less than a possible 1 chance in 128,000 under the Expanded Operations Alternative. (If implemented, under the MESA Complex configuration of the Expanded Operations Alternative, the public would experience a slight decrease in total lifetime cancer risk due to a decrease in the number of chemicals of concern below current levels and slightly lower emissions.) Noncancer health effects would not be expected based on hazard index values of less than 1. No additional nonfatal cancers, genetic disorders, or latent cancer fatalities (LCFs) would be expected in the population living within a 50-mi radius.

Transportation

The SNL/NM material and waste truck traffic offsite would be projected to increase from 14.5 shipments per day (1996) to 34.4 shipments per day under the Expanded Operations Alternative. However, the SNL/NM truck traffic would comprise less than 0.03 percent of the total traffic, including all types of vehicles entering and leaving the Albuquerque area by way of interstate highways. Therefore, the impact under the Expanded Operations Alternative would be minimal. The total local traffic on roadways would be expected to increase by a maximum of 3.6 percent overall under the

Expanded Operations Alternative.

The overall maximum lifetime fatalities from SNL/NM annual shipments of all types of materials and wastes due to SNL/NM operations were estimated to be 1.7 fatalities under the Expanded Operations Alternative. Of these estimates, 1.3 fatalities would be due to traffic accidents; 0.33 fatalities would be due to incident-free transport of radiological materials and wastes; and 0.06 fatalities would be due to air pollution from truck emissions.

The maximum lifetime LCFs in the population within a 50-mi radius were estimated, based on a population dose of 4.93 person-rem, to be 0.0025 from the annual transport of radiological materials and wastes.

(If implemented, the MESA Complex configuration for the Expanded Operations Alternative would not change the number of shipments of materials and wastes transported. Traffic would not increase because there would be no new employees.)

Waste Generation

Generation of radioactive waste, hazardous waste, process wastewater, and nonhazardous solid waste was reviewed. The goal of the review was to determine the adequacy of existing onsite and offsite storage and treatment and disposal capabilities. Storage capacity for all anticipated waste types would be adequate. Limited onsite hazardous and mixed waste treatment capacity would be within current permit limits. Most hazardous waste would be treated and disposed of offsite within the commercial sector. Commercial offsite capacity is currently adequate and would exceed anticipated future demand.

Recycling of wastes was not included in the modeling to bound actual projected waste quantities. Low-level waste (LLW) and low-level mixed waste (LLMW) (see *Radioactive Waste Categories* text box) would increase by a maximum of 198 and 69 percent, respectively, under the Expanded Operations Alternative. One new operation, the Medical Isotopes Production Project, would be the major contributor to the LLW increase. Capacity currently exists to manage the waste generated from all operations at the Expanded Operations Alternative level.

Trends for all hazardous waste clearly show a significant reduction due to the implementation of pollution prevention protocols at SNL/NM. New procedures and recycling for the solid waste and process wastewater would have similar reduction results on volumes being generated. (If implemented, operation of the MESA

Radioactive Waste Categories

Low-Level Waste (LLW)—Waste that contains radioactivity and is not classified as high-level waste, transuranic waste, or spent nuclear fuel or by-product tailings containing uranium or thorium from processed ore (as defined in Section 11[e][2] of the *Atomic Energy Act* [42 U.S.C. §2011]). Test specimens of fissionable material, irradiated for research and development only and not for the production of power or plutonium, may be classified as LLW, provided that the concentration of transuranic is less than 100 nanocuries per gram.

Low-Level Mixed Waste (LLMW)—Waste that contains both hazardous waste regulated under the *Resource Conservation and Recovery Act* (42 U.S.C. §6901) and low-level waste.

Transuranic Waste (TRU)—TRU waste is waste containing more than 100 nanocuries of alpha-emitting TRU isotopes per gram of waste, with a half-life greater than 20 years, except for (a) high-level radioactive waste; (b) waste that the Secretary of the U.S. Department of Energy has determined, with concurrence of the Administrator of the U.S. Environmental Protection Agency, does not need the degree of isolation required by the disposal regulations; or (c) waste that the U.S. Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61.

Mixed Transuranic Waste (MTRU)—TRU waste that also contains hazardous waste, as defined and regulated under the *Resource Conservation and Recovery Act* (42 U.S.C. §6901).

Complex would generate 0.1 ft³ of LLW, 1,200 kg of hazardous waste, and 3.8 million gallons of wastewater annually.)

Noise and Vibration

The No Action Alternative would enable SNL/NM to operate at current planned levels, which include baseline background noise levels and short-term noise impacts from SNL/NM test activities. By 2008, impulse noise-producing test activities would increase an estimated 35 percent over the 1996 level.

Projections under the Expanded Operations Alternative indicate a 250 percent increase in the number of impulse

Other Waste Categories

Hazardous Waste—Any solid waste (definition includes semisolid, liquid, or gaseous material) having one or more characteristics of ignitability, corrosivity, toxicity, or reactivity or any other waste specifically regulated as a hazardous waste, by the *Resource Conservation and Recovery Act* (RCRA).

Nonhazardous Waste—Chemical waste not defined as a RCRA hazardous waste. The term nonhazardous waste does not necessarily imply the level of protection needed to properly manage the waste.

noise tests over 1996 levels. This increase would result in an average of approximately 1 impulse noise event per hour for an 8-hour work day, based on a 261-day work year.

The projected frequency of impulse noise events for the Reduced Operations Alternative would be 65 percent less than the 1996 levels, resulting in an average of 1.5 impulse noise tests per day.

Only a small fraction of these tests would be loud enough to be heard or felt beyond the site boundary. The vast majority of tests would be below background noise levels for locations beyond the KAFB boundary and would be unnoticed in neighborhoods bounding the site. Ground vibrations would remain confined to the immediate test area. (If implemented, the MESA Complex configuration for the Expanded Operations Alternative would not affect baseline background noise levels and short-term noise events. Temporary increases in noise levels during construction are expected from operation of heavy construction equipment and vehicle traffic.)

Socioeconomics

Direct SNL/NM employment projections range from 7,422 (Reduced Operations Alternative) to 8,417 (Expanded Operations Alternative), in comparison to 7,652 full-time SNL/NM employees in the base year. These employment changes would change regional population, employment, personal income, and other socioeconomic measures in the region by less than 1 percent.

(Under the MESA Complex configuration of the Expanded Operations Alternative, the construction cost of the proposed MESA Complex at the MDL would be

approximately \$300 million. The DOE anticipates that the construction of this facility would employ several hundred short-term workers and would probably result in a small temporary increase in local employment in the region. A substantial portion of the dollars spent for materials would flow through the wholesale and retail trade sectors of the regional economy. The MESA Complex would be designed for 500 to 550 employees. New employees would be unlikely because the DOE would transfer employees working in existing facilities to the new facilities.)

Environmental Justice

Based on the analyses of all resource areas, the DOE would not expect any environmental justice-related impacts from the continued operation of SNL/NM under any of the alternatives. (If implemented, the MESA Complex configuration for the Expanded Operations Alternative would not create any environmental justice-related impacts.)

No TCPs have been identified at SNL/NM. If specific TCPs are identified, Native American tribes will be consulted.

Accidents

At SNL/NM, accidents could occur that would affect workers and the public. Potential accidents with the largest impacts would involve radioactive materials in TA-V facilities and hazardous chemicals in TA-I facilities. In most instances, involved workers (those individuals located in the immediate vicinity of an accident) would incur the largest risk of serious injury or fatality, because, for most accidents, the magnitude of the damaging effects are highest at the point of the accident and diminish with increasing distance. This result would apply, for example, to releases of radioactive and chemical materials, explosions, fires, airplane crashes, earthquakes, and similar events. In some situations, however, the mitigating effects of structural barriers, personal protection equipment, and engineered safety features could offer greater protection for close-in workers than for others in the general vicinity of the accident.

In TA-I, under all three alternatives, there could be numerous situations in laboratory rooms where workers could be accidentally exposed to small amounts of dangerous chemicals. The potential also exists in TA-I for a catastrophic accident, such as an airplane crash into a facility or an earthquake, in which multiple dangerous chemicals could be released and expose onsite individuals

to harmful or fatal chemical concentrations. Large quantities of hydrogen stored in outside areas of TA-I could also explode as a result of a catastrophic event and cause serious injury or fatality to involved workers and other nearby onsite individuals. The probability of a catastrophic chemical or explosive accident with serious consequences is low (less than once in a thousand years). Should such an accident occur, emergency procedures, mitigating features, and administrative controls would minimize its adverse impacts.

Under the Expanded Operations Alternative, the MDL and the Compound Semiconductor Research Laboratory (CSRL) could be configured in one of two ways.

In the first, MDL and CSRL would remain in their present configuration. In the event of a catastrophic accident such as an airplane crash into either facility (but not both), the dominant chemical release would be as much as 106.41 pounds of chlorine from the MDL or as much as 65 pounds of arsine from the CSRL. If one of these accidents were to occur, 141 persons in the vicinity of the MDL or 409 persons in the vicinity of the CSRL could be exposed to concentrations greater than Emergency Response Planning Guideline Level-2 (ERPG-2). In the event of an earthquake, simultaneous release of chemicals are possible and as many as 423 persons could be exposed in TA-I.

In the second configuration, the CSRL would be shut down and the MDL would be reconfigured and become part of the proposed MESA Complex. The chemical inventory and operations that were part of the CSRL missions would be performed in the new MESA Complex. In the event of a catastrophic accident such as an airplane crash into the MESA Complex, the dominant chemical released would be 80 pounds of arsine under the conservative assumption that all the arsine is stored in one location. The option exists for the arsine to be stored in two separate locations containing 40 pounds of arsine each. In this case, a maximum of only 40 pounds of arsine would be released in a catastrophic accident. The catastrophic release of 80 pounds of arsine could result in the exposure of as many as 558 persons, which includes both onsite and offsite individuals. In the event of an earthquake, the new MESA Complex arsine storage facility would remain intact and no arsine would be released. However, other facilities could fail resulting in the exposure of as many as 306 individuals to ERPG-2 concentrations.

The potential for accidents would exist in TA-V that would cause the release of radioactive materials, causing

injury to workers, onsite individuals, and the public. The magnitudes of impacts from the releases of radioactive material from TA-V, due to an accident, would be minimal for all alternatives. If an earthquake occurred, the impacts would range from a 1 in 33 increase in probability of an LCF for a noninvolved worker on the site to 1 in 120,000 for a maximally exposed member of the public. For the entire population residing within 50 mi of SNL/NM, one or two additional LCFs would be expected. Involved workers, as in the case of chemical accidents, would incur the largest risk of injury or fatality in the event of almost any accident because of their close proximity to the hazardous conditions.

Cumulative Effects

Cumulative effects result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions. To conduct this analysis, the DOE examined the effects associated with the Expanded Operations Alternative for SNL/NM (including the preliminary impacts presented for the proposed MESA Complex, where ongoing conceptual design allows impacts to be estimated), and then added the effects of other past, present, and reasonably foreseeable future actions to assess the cumulative effects to various resource areas. These additional effects are primarily because of the presence of USAF and other DOE facilities at KAFB and the environmental effects caused by residents and businesses in the city of Albuquerque.

Other DOE Facilities

There are seven other DOE facilities at KAFB: the DOE Albuquerque Operations Office, Energy Training Complex, Transportation Safeguards Division, Nonproliferation and National Security Institute (formerly the Central Training Academy), Lovelace Respiratory Research Institute (formerly the Inhalation Toxicology Research Institute), Federal Manufacturing and Technology/New Mexico (also known as AlliedSignal), and Ross Aviation, Inc. The potential for environmental impacts from these facilities would be low. These facilities do not have stationary sources of air pollutants designated as "major" by Federal or local air quality regulations. Criteria pollutant air emissions from these facilities were modeled in combination with those for SNL/NM in the 1996 operating permit application required by 20 NMAC 11.42, and potential concentrations of pollutants from these emissions were found to be below levels designed to protect human health with an ample margin of safety. Emissions from

these facilities are expected to be below these maximum potential levels. Hazardous air pollutant emissions are minimal, and only small quantities of chemicals are purchased. Emissions of carbon monoxide from vehicles were included with the analysis for vehicles associated with SNL/NM.

None of the activities at these facilities would pose any significant adverse threat to the environment.

USAF Operations

USAF installations typically generate waste solvents, oils, paints, paint sludges, and some R&D chemical wastes that are regulated as hazardous waste. The KAFB Hazardous Waste Management Plan sets local management procedures for managing hazardous waste and preventing pollution. The plan incorporates Federal, state, and local requirements regarding hazardous waste, and applies to all host and associate organizations that generate hazardous waste on KAFB.

USAF installations typically have numerous sources of air pollutant emissions that are regulated and might require permits for construction and operation. Primary emission sources are steam plants, paint shops, aircraft and ground vehicles, and processes and test activities. KAFB currently has two air permits in effect. The Title V permit application was submitted in December 1995 and remains under review. KAFB also conducts environmental restoration under the USAF's Installation Restoration Program (IRP). There are currently 70 IRP sites and 12 areas of concern.

NonDOE or USAF Operations

A number of other activities in the area surrounding KAFB are not DOE- or USAF-related. The city of Albuquerque and its suburbs form the state's largest metropolitan area with a population over 500,000. Over 400 local manufacturers produce a wide range of products including electronic components, baked goods, computers, construction materials, and heavy trailers. The counties surrounding SNL/NM have numerous existing and planned industrial facilities and residential development (greater than 3/4 acres) with permitted air emissions and discharges to surface waters. These facilities comprise electric generating stations (including Cobisa Power Station), computer chip manufacturers, construction materials industries, and other manufacturing facilities. KAFB has residential and commercial centers onsite, as well as to the north, south, west, and northeast. There are many local and regional influences as well as private and public activities.

Analysis Results

The analysis found that cumulative effects to the environment resulting from SNL/NM activities would be small.

No adverse cumulative impacts to land use would occur. Land in the area surrounding KAFB would continue to be developed at its present rate of growth regardless of the presence of the DOE and SNL/NM. In addition, no adverse impacts to infrastructure would occur. Consumption of natural gas, fuel oil, and electricity at KAFB would decline slightly or remain at recent historic levels. Adequate capacities exist for all utilities.

No adverse cumulative effects to transportation routes would be expected. However, traffic congestion and transportation construction projects would continue to affect local transportation.

Cumulative effects to water resources would be small. Total SNL/NM withdrawal of groundwater would be approximately 1 percent of basin-wide withdrawal and 12 percent of local withdrawal.

Cultural resources would not be adversely affected by SNL/NM or DOE activities. The restricted public access at KAFB would result in the protection of cultural resources.

Cumulative effects to air quality would be small. A comprehensive analysis of air emissions from SNL/NM shows no individual or aggregate emissions of concern to human health. Emissions from KAFB are also unlikely to be of concern to human health because, like SNL/NM, hazardous chemical air emissions are below levels requiring monitoring by the *Clean Air Act* or local air quality regulations. Carbon monoxide emissions from vehicles are the primary air pollutant of concern. Carbon monoxide emissions from SNL/NM and KAFB show decreasing trends and, combined, are less than 10 percent of the total carbon monoxide emissions in the county. There would be no adverse cumulative impacts due to radiological air emissions. In addition, there would be no adverse impacts to human health or safety.

Slight increases in ambient noise levels would occur due to intermittent testing at KAFB; however, no long-term increases in noise or vibration levels would occur.

Beneficial cumulative impacts would result from direct and indirect socioeconomic effects. The DOE expects that overall expenditures and employment at SNL/NM would expand gradually at a steady rate over the next 10 years, which would tend to maintain demographic patterns in the region.

MITIGATION MEASURES

The regulations promulgated by the Council on Environmental Quality to implement the procedural provisions of NEPA require that an environmental impact statement include a discussion of appropriate mitigation measures. Mitigation includes the following (40 CFR §1508.20):

- avoiding an impact by not taking an action or parts of an action;
- minimizing impacts by limiting the degree of magnitude of an action and its implementation;
- rectifying an impact by repairing, rehabilitating, or restoring the affected environment;
- reducing or eliminating the impact by preservation and maintenance operations during the life of the action; and
- compensating for the impact by replacing or providing substitute resources or environments.

Based on the results of the analyses, the DOE does not anticipate implementing additional mitigation measures. The following list contains examples of SNL/NM programs, plans, and projects that are integral to the SWEIS alternatives:

- Environmental Surveillance and Compliance Program (monitors SNL/NM for permit and environmental management requirements)
- Threatened and Endangered Species Habitat Management Plan
- Natural Resource Management Plan (in development)
- Public and worker health studies in and around SNL/NM
- Groundwater Protection Management Program Plan
- Safeguards and Security Program
- Emergency management and response capability enhancement
- Fire Protection Program
- Pollution Prevention and Waste Minimization Programs
- Water and Energy Conservation Programs
- ER Project plans

SUMMARY OF COMMENTS AND RESPONSES

This section contains an overview of comments and responses on the Draft SWEIS. Typically, the following subsections discuss resource areas for which the DOE received multiple comments, often from several commenters. These subsections do not capture all specific comments, but provide the reader with the essence of public concerns on the Draft SWEIS.

In addition to the comments summarized below, the DOE also received comments on other topics. A breakdown of all comments received, by issue category, is presented in Table 1.3–1 of the Comment Response Document, Volume III of this Final SWEIS.

Alternatives

Some commenters took issue with the alternatives evaluated, maintaining that there were not enough differences among alternatives or that the Reduced Operations Alternative should have gone further toward scaling back SNL/NM activities. For example, one commenter stated that the “SWEIS does not clearly distinguish between the alternatives.” Another stated that in “the majority of instances, on a project-by-project basis, there are far more similarities...than there are differences” in operations at facilities among the different alternatives. A commenter also noted that “the Draft SWEIS admits that for some facilities, ‘reduced operations’ would actually be increased operations compared with the base period activities,” and that the DOE should have considered an alternative of “returning all or part of the withdrawn Forest Service lands to public use.” Commenters also noted that the No Action Alternative is described as possibly involving increased activity, which contradicts the concept of no action.

The three alternatives represent the same mission assignments carried out at different levels. Other than the proposed expansion of the MDL to include the MESA Complex (a developing proposal that is still undergoing conceptual design but is presented under one of two configurations in the Expanded Operations Alternative, as discussed in Section 3.3.1.2 of the Final SWEIS), there would be very little construction of new facilities; and, even in those cases, construction would occur largely in previously disturbed areas. Renovations to existing buildings could also occur.

In general, implementation of any of the alternatives would use the existing physical plant. In many cases, the actual changes in levels of activities represent a very small change in relation to current levels, so the change in impacts would be relatively small. The DOE believes the Reduced Operations Alternative accurately reflects the minimal level of operation possible at SNL/NM to maintain the capabilities identified in the Stockpile Stewardship and Management Programmatic Environmental Impact Statement. Some facilities in the Withdrawn Area are unique to the DOE nuclear weapons complex, such as the Lurance Canyon Burn Site and the Aerial Cable Facility. Because of the uniqueness and necessity of the facilities located in the Withdrawn Area, the DOE does not anticipate moving these facilities or suspending activities at them within the time frame analyzed in the SWEIS. For this reason, the DOE does not believe it is reasonable to return all or part of the Withdrawn Area to the public and, therefore, did not analyze it in the SWEIS. The rationale for not considering return of withdrawn lands to public use has been added to the Final SWEIS as Section 3.5.3.

The No Action Alternative in the SWEIS considers SNL/NM activities at currently planned levels of operations. This includes some activities or projects that have been planned and approved, but are not yet operational. This is intended to present a realistic picture of the continuing activity at the current congressionally approved level. If these planned operations are implemented in the future, they could result in increased activity above present levels.

Water Use

A number of comments dealt with reducing the quantity of water used by SNL/NM. One commenter focused on water conservation, stating "I hope that [SNL/NM]... actually implements this 30 percent conservation reduction that is mentioned more than once in the document," and that SNL/NM "should join the rest of us in significant [water] conservation efforts over the next few years." Another commenter asked "can SNL/NM justify expending critical water resources for programs such as those conducted at the Microelectronics Development Laboratory?"

Based on 1996 usage, SNL/NM's goal is to reduce annual water use from 440 million gallons to 308 million gallons by 2004. This goal will be achieved through a variety of conservation efforts, especially at higher water use facilities such as the MDL. The MDL

provides custom and radiation-hardened microelectronics—a critical capability to the nuclear weapons stockpile maintenance program. In part due to SNL/NM's signing of the water conservation memorandum of understanding with the city of Albuquerque and KAFB, the MDL began to implement a series of steps to reduce water use. In 1996, work began on improving the MDL's reverse osmosis water treatment system. The MDL is currently researching a water-recycling project to further reduce water consumption by 70 percent to 80 percent. This project uses sophisticated sensors to monitor the quality of water before it enters the recycling loop, preventing the introduction of contaminants into the recycled water system. Another project originally designed in 1996 would take some of the process wastewater at the MDL and pump it for reuse in an adjacent cooling tower, resulting in savings of approximately 12 million gallons per year.

Groundwater

A number of comments addressed the issue of groundwater quality at SNL/NM, particularly groundwater contamination at the CWL and other locations around KAFB. Several commenters took issue with the SWEIS characterization of areas of groundwater contamination, which indicated the CWL was the only location of groundwater contamination definitely attributable to SNL/NM activities. For example, one commenter stated that he "believes that sufficient data have been developed to support the attribution to known SNL/NM activities [in] other tech areas in addition to [TA]-III as sources of ground water contamination." Another commenter inquired about concentrations of potassium-40 that have "recently been over the DOE guideline in four wells."

The SWEIS presents data from four other locations of known or suspected groundwater contamination, in addition to the CWL, where SNL/NM activities were the possible cause of contamination. Based on groundwater monitoring data published in 1999, the SWEIS has been revised to state that nitrate contamination at TA-V and petroleum hydrocarbon component contamination at the Lurance Canyon Burn Site are the result of SNL/NM activities. The source of TCE contamination at "Sandia North" is still unknown. Concentrations of metals and radioisotopes exceeding groundwater standards, such as potassium-40, have been noted at other locations around KAFB; however, these are naturally occurring elements that appear to be unrelated to human activities.

Surface Water

Several comments focused on the adequacy of surface water sampling and analyses that SNL/NM has performed, the methodology used in the surface water impacts analysis, and exceedance of permit limits in runoff from TAs-I, -II, and -IV. One commenter questioned the conclusions of the analysis, stating that “[t]he two important areas, III and V, have no routine surface water monitoring or surface water monitoring stations,” and that “[t]aking occasional surface water samples at the CWL does not provide the same level of assurance as provided by continuous monitoring.” Another commenter stated “[i]t is...unclear whether relevant analyses were conducted on surface waters (priority pollutants, organic compounds, tritium, gross alpha) in order to determine if water quality concentrations exceeded those known to be toxic or that are protective.” One commenter criticized the comparison of surface water sample analyses to New Mexico Water Quality Control Commission standards, stating the “analysis of impacts to surface water quality was unnecessarily restricted to regulatory limits.” Several commenters took issue with the SWEIS statement that there was no evidence of contamination of runoff from SNL/NM activities. One commenter asserted that this “statement is directly contradicted by SNL/NM own report...The analytical results...show that iron and zinc exceeded permit limits...by a large margin.”

The DOE believes that the sampling program discussed in the SWEIS provides the best available data and methods for determining the contribution of contaminants from SNL/NM facilities. The surface water quality analysis was not restricted to regulatory limits. In addition to regulated constituents, surface water sampling data used in the analysis included 12 metals, 7 anions, 11 explosives, and 7 radionuclides for which there are no regulatory limits. These data provide no evidence of contamination from SNL/NM facilities. As to exceedance of permit limits in runoff from TAs-I, -II, and -IV, low flow at these monitoring stations requires placement of the sample intake tube on the bottom of the drainage channel. This has caused the introduction of a greater amount of suspended solids than is representative of the runoff. During the laboratory analysis of these samples, minerals naturally occurring in the suspended solids, such as zinc and iron, can appear at higher concentrations as well. There are no known SNL/NM activities or discharges to surface water in the areas monitored by these stations that would cause permit exceedances of zinc and iron.

Biology

A number of commenters requested that the SWEIS include more quantitative information about biological resources onsite and the potential impact to these resources and further support of statements made in the SWEIS about beneficial biological impacts of SNL/NM activities. One commenter stated, “[t]he amount of improvement in grassland quality, vegetative productivity, and beneficial changes to the grassland community was not quantified or is without citation.” Another commenter asked “[i]s the quality of grasslands, the reintroduction of the gramma grass cactus, the siting of a raptor, and the absence of contaminant loads of radionuclides in rodents ample enough evidence to apply such a broad sweeping statement to the 60-odd species of plants and animals mentioned in the study?”

Studies and reports used in arriving at the conclusion that “beneficial impacts to biological and ecological resources would occur under all alternatives” were prepared by several entities, including the DOE, SNL/NM, the USAF, and the USFS. These studies and reports are cited in the SWEIS.

Socioeconomics

Socioeconomic comments centered primarily on the definition of the region of influence (ROI). One commenter stated, “[d]efining the SNL/NM socioeconomic [ROI] as Bernalillo, Sandoval, Torrance and Valencia counties overstates, in my view, the socioeconomic impact of SNL/NM in central New Mexico. For example, the northwestern portion of Sandoval county includes the eastern extent of Navajo Indian trust lands and the southernmost part of the Jicarilla Apache Indian Reservation. The socioeconomics of this area are not impacted in the least by SNL/NM’s operations, as would also be the case for most of Torrance county more than a few miles south of the I-40 corridor.” Further, he stated, “by not including the southernmost part of Santa Fe county along I-40 in the ROI, the SWEIS excludes from consideration the burgeoning community of Edgewood, which certainly is home to many SNL/NM employees.”

The current four-county ROI is a reasonable basis for assessing SNL/NM-related socioeconomic impacts because 97.5 percent of SNL/NM employees reside in the four-county area. The analysis performed in the SWEIS mirrors annual studies prepared by New Mexico State University, which are publicly available (*The Economic Impact of Sandia National Laboratories on*

Central New Mexico and the State of New Mexico: Fiscal Year 1996 [DOE 1997b]; *The Economic Impact of Sandia National Laboratories on Central New Mexico and the State of New Mexico: Fiscal Year 1997* [DOE 1998]). These studies provide an excellent basis for comparing economic activity, income, and employment changes resulting from the three alternatives within the four-county area. In addition, refining the analysis to add or subtract parts of other counties would not visibly change the results of the four-county analysis nor the conclusions of this analysis.

Environmental Justice

Comments on environmental justice criticized two aspects of the methodology: the use of a high threshold in defining a minority area, and the logic of stating that there can be no significant environmental justice issues within a particular resource analysis because no significant environmental impacts were identified. One commenter stated “[a] 25 percent minority population threshold was utilized in the [environmental justice] analyses of both the Pantex and Los Alamos National Laboratory SWEIS’, so why is this more sensitive standard not used in the SNL/NM SWEIS? The treatment of Environmental Justice in the Draft SWEIS is nothing more than a whitewash, literally and figuratively, in my opinion.” This commenter further states “[w]ith only a few exceptions mainly in the northeast part of Albuquerque, nearly every 1990 Census tract within the 50-mile radius circle has a population which is at least 25 percent minority, thus warranting scrutiny from an Environmental Justice perspective.” Questioning the logic of the environmental justice analysis, the commenter states “[t]he flow of the arguments is as follows: there are no adverse impacts in the ROI as a whole (for each resource area), so therefore, there can be no disproportionate and adverse impacts for any minority or low income subarea of the ROI...Not true, as minimal knowledge of the history of the Environmental Justice movement would reveal in case after case historically, a large area around, say, an oil refinery appeared environmentally sound, but in neighborhoods immediately adjacent to the refinery, a low income minority population was devastated by contaminants from the facility.”

In determining the threshold for identifying minority populations, the analysis considered the guidance contained in *The Environmental Justice Guidance Under the National Environmental Policy Act* (CEQ 1997). This document suggests identifying areas where “...the

minority population of the affected area exceeds 50 percent.” *Guidance for Incorporating Environmental Justice Concerns in EPA’s NEPA Compliance Analyses* (EPA 1998) also recommends identifying areas where minority populations exceed 50 percent. The DOE recognizes there are different approaches for analyzing environmental justice impacts. However, because the 1990 Census reported New Mexico’s minority population at 49 percent, it was determined that 49 percent should be the threshold. All resources were analyzed on an individual basis for environmental justice impacts and, in addition, five were evaluated in detail (water resources, cultural resources, air quality, human health, and transportation). Only one resource area, water resources, was determined to have adverse impacts, and the impacts affect all communities equally. No disproportionately high and adverse impacts were identified for any of the alternatives.

Cumulative Effects

Many of the comments on cumulative effects centered on questions about accidents. One commenter asked if there was even a remote possibility, “that an airplane crash into [TA-V] could trigger nuclear reactions” at a nearby KAFB munitions storage facility. The commenter further asks “could a severe earthquake in the area result in a similar sequence of events?” Another commenter wanted more specific information on accidents involving large military aircraft at KAFB, particularly accounting for fuel load and cargo capacity, to better understand the potential risks.

A USAF-prepared environmental assessment (USAF 1986) for the munitions storage facility states that the innovative physical design of the facility “all but eliminates” the possibility of a falling aircraft penetrating such a below-ground structure. The aircraft accident analysis did not have to include the impact of aircraft fuel or cargo, because it assumed that the impact of any aircraft, regardless of fuel load or cargo, would create worst-case conditions that would affect all of a building’s hazardous material at risk.

CHANGES TO THE DRAFT SWEIS

The DOE revised the Draft SWEIS in response to the comments received from other Federal agencies; tribal, state, and local governments; nongovernmental organizations; the general public; and internal reviews. The text was changed to provide additional environmental baseline information, correct inaccuracies,

make editorial corrections, and provide additional discussions of technical considerations to respond to comments and clarify text. In addition, the DOE updated information due to events or decisions made in other documents since the publication of the Draft SWEIS for public comment in April 1999.

Where appropriate, the DOE corrected the Final SWEIS in response to comments.

SUMMARY OF CHANGES

Preferred Alternative

The DOE did not present a Preferred Alternative in the Draft SNL/NM SWEIS. The DOE has now selected the Expanded Operations Alternative, exclusive of the MESA Complex, as its Preferred Alternative. Under the Expanded Operations Alternative, the DOE would expand operations at SNL/NM as the need arose (until 2008), subject to the availability of congressional appropriations, to increase the level of existing operations to the highest reasonable foreseeable activity levels that are analyzed in the SWEIS. The Preferred Alternative would only implement expansion at the existing MDL facility, without addition of the MESA Complex.

The Microsystems and Engineering Sciences Applications Complex of the Microelectronics Development Laboratory

In the Draft SWEIS, the MDL was identified as operating as a research, development, and fabrication facility. A single configuration with no new construction was presented and MDL operations were described as focusing on the fabrication of approximately 7,500 silicon-based wafers. In the Final SWEIS, the Expanded Operations Alternative has two configurations: 1) to support R&D and production of silicon-based microelectronic devices; or 2) to support R&D and production of silicon-based microelectronic devices along with producing war reserve microsystems-based components with specialty alloys (such as gallium arsenide and indium arsenide).

Under the first configuration, there would be no construction of new facilities for the expanded wafer production and the CSRL (Building 893) would remain in operation at its present location.

The second configuration (a developing proposal) would result in the construction of a new laboratory and other buildings comprising the MESA Complex.

The MESA Complex configuration (including R&D) would produce a mix of 7,500 silicon/specialty alloy wafers per year. The DOE has identified a need related to the surety improvements in weapon systems incorporating microelectronics, microoptics, and microelectromechanical systems in these silicon/specialty alloy wafers. The estimated \$300 million project would integrate and leverage the scientific and technological capabilities existing separately at the MDL and CSRL in a new laboratory, replacing the outdated CSRL, collocated adjacent to the current MDL. The project would include retooling existing operations. Related infrastructure needs would include laboratories, offices, and gas storage. If the developing proposal for the MESA Complex configuration were to become operational (about 2003), the DOE would phase out and eventually decommission and decontaminate the existing CSRL.

For more information regarding the DOE's NEPA strategy, see Proposed Action and Alternatives Section of this Summary and Section 1.3 of the Final SNL/NM SWEIS.

Microsystems and Engineering Sciences Applications Complex Impacts

The Expanded Operations Alternative analysis presents impacts of constructing and operating the MESA Complex project, primarily water usage and accident scenarios, based on preliminary information from the ongoing conceptual design work.

Water use would increase from 495 million gallons per year to 499 million gallons per year if the MESA Complex became operational; however, the DOE and SNL/NM are committed to reducing SNL/NM-wide water use by 30 percent based on 1996 usage. Accident scenarios are discussed below.

The impacts of chemical accident and site-wide earthquake scenarios have changed, primarily due to changes in ERPG-2 guidelines and the addition of the MESA Complex into one of the configurations under the Expanded Operations Alternative. The ERPG-2 guidelines, for some chemicals, including arsine and phosphine became more restrictive after the Draft SWEIS was published. The stricter guidelines affected which chemical accident scenarios would have the greatest impacts and increased the impacts of the site-wide earthquake chemical releases under all alternatives.

Further, the addition of the proposed MESA Complex into one configuration under the Expanded Operations Alternative, which would include the relocation of CSRL as part of the MESA Complex, affected the dominant chemical accident scenarios.

NEXT STEPS

The SWEIS ROD, which the DOE will publish no sooner than 30 days after the EPA issues the Notice of Availability of the Final SWEIS, will explain all factors, including environmental impacts, that the DOE considered in reaching its decision. In addition, the ROD will identify the environmentally preferred alternative or alternatives.

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