

Sandia National Laboratories/New Mexico Environmental Restoration Project

FINAL END STATE VISION

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EXECUTIVE SUMMARY

This document describes how risk-based end states (RBES) have been incorporated into the past ten years of Environmental Restoration (ER) activity at Sandia National Laboratories/New Mexico (SNL/NM). It is to some degree a re-representation of information that is available in the reports discussed in Chapter 1.0. These reports cover the actual risk-based cleanups and accomplishments at 268 ER sites ranging from large landfills and explosive test areas, to small septic tanks and drainfields, and which are the result of years of coordination with regulators and stakeholders.

SNL/NM is located on Kirtland Air Force Base (KAFB) in Bernalillo County. KAFB is the physical and geographical area that encompasses approximately 52,223 acres in southeast Albuquerque and contains the facilities and infrastructure of the U.S. Department of Energy (DOE), the U.S. Air Force, and more than 100 other tenants. KAFB is bounded on the north and northwest by the growing City of Albuquerque, on the east by the Cibola National Forest, on the south by the Isleta Indian Reservation, and on the west by land owned by the State of New Mexico and the Albuquerque International Sunport. The population of the city is expected to continue to increase, with the result that development is beginning to surround KAFB. This regional context is shown in maps and discussed in Chapter 2.0.

The major ongoing mission of SNL/NM is to ensure that the U.S. nuclear arsenal is safe, secure, and reliable. There continues to be significant federal investment in both infrastructure and programs at KAFB and SNL/NM. The details of the SNL/NM Technical Areas (TAs) and program areas are briefly described in Section 1.2. These TAs are operated in compliance with current environmental laws, and thus have minimal impact to the environment. The majority of the ER sites requiring restoration are a legacy of work conducted in the past. The TAs and Solid Waste Management Units (SWMUs), as well as their relation to the ecological and human use and ownership, are depicted on maps in Chapter 3.0

The number of SNL/NM ER sites to be addressed on the KAFB grew from 117 in 1987 to the current number of 268 (including 203 SWMUs and 65 Areas of Concern [AOCs]) which needed to be addressed at the SNL/NM facility on KAFB. There are three SWMUs and three AOCs that are in active use and that are not scheduled for immediate cleanup. The majority of these sites have been cleaned up; no major fieldwork remains at any site. Four major landfills and numerous smaller sites have been remediated without significant injury.

No Further Action (NFA) proposals have been submitted to the regulators at the New Mexico Environmental Department (NMED) for 229 of the remaining 262 sites. The NMED has approved or accepted 173 of these; the other 56 risk-based NFA proposals are at various stages of the regulatory review and approval process. Fieldwork is more than 90 percent complete and draft NFA proposals are in progress for three of the four SWMUs for which NFA proposals have not yet been submitted. One of these SWMUs is the Chemical Waste Landfill, which is regulated under a closure plan that requires alternative closure documentation. The remaining cleanups involve removal of relatively small areas of contaminated surface and near-surface soils. Further details of the cleanup status are given in Section 1.3. Remediation is complete at all of the AOCs although some reporting requirements remain.

The SNL/NM ER Project made this progress because it had excellent teaming relationships with the regulators and substantial interaction with stakeholders. Public outreach began with

quarterly public meetings in 1992, which continue to be conducted. A Citizens' Advisory Board (CAB), created in the spring of 1995, functioned until 2000 and provided valuable insight into community values and preferences associated with environmental restoration work at SNL/NM. The CAB provided substantial input into the future land-use designations described below. The CAB evolved into the Community Resource Information Office that serves as a coordinator for citizens groups to continue to provide input on topics such as the RBES initiative, but more specifically on long term stewardship at ER sites.

All significant ER sites have been cleaned up to risk-based levels. A risk assessment methodology was negotiated with the NMED while active fieldwork for site characterization was underway. A probabilistic risk approach was proposed to the NMED, but was rejected because a probabilistic approach was considered too complicated and not approved by the U.S. Environmental Protection Agency (EPA). Beginning in 1994, the human health risk assessments were conducted in accordance with the Risk Assessment Guidance for Superfund, with agreement from EPA Region 6. The risk approach used by SNL/NM is detailed in Section 1.3.

The use of risk assessment requires definition of appropriate future land-use scenarios. Future land-use designations for all areas of KAFB were developed in 1995 by a stakeholders group which included representatives of SNL/NM, the DOE, the U.S. Air Force, the U.S. Forest Service, and the EPA, as well as local government officials and citizens. This group considered the issues, opportunities, and constraints of all the KAFB tenants and formalized their agreement in a Baseline for Future Use Options document which fully describes the end state and future land use, as well as the use of risk assessment for cleanup end states. The future land-use designations in this document formed the key assumption for determining the risk-based cleanup levels at all significant ER sites.

By the fall of 2002, the ER Project had addressed the vast majority of SNL/NM sites. The ER Project is currently in the process of finalizing regulatory post-closure requirements for many sites. A Long Term Environmental Stewardship (LTES) Plan was written in 2001 with citizen input, and has been revised to include current status in 2003. A Transition Plan is being written to transfer LTES responsibilities, such as remaining long-term monitoring, to other, permanently funded departments within SNL/NM.

In 2003, a Compliance Order on Consent was negotiated with the NMED (final signatures obtained April 29, 2004) to establish a fixed schedule for completion of regulatory activities, including definition of groundwater requirements and submittal of regulatory documentation associated with completion of the corrective action process for all SWMUs and AOCs managed by the ER Project. The agreed-upon schedule aligns with both the project's Performance Management Plan and with the SNL/NM ER Project fiscal year (FY) 2004 baseline. Regulators have expressed a desire for SNL/NM to adhere to this schedule regardless of new DOE initiatives such as RBES. The Compliance Order has an appropriate risk basis section that is based on future land use. In accordance with this document, the regulators continue to accept risk-based end states for all sites being submitted for NFA.

Three main categories of environmental hazards remain from past operations at SNL/NM: 1) the materials or residuals left in the engineered units, 2) the low levels of contamination detected in four groundwater areas, and 3) the residual contaminants at the NFA sites that were cleaned up to industrial or recreational risk levels only and did not meet the residential risk criteria. Potential exposure to KAFB residents or ecological receptors is minimal, as shown in the

pertinent Conceptual Site Models. These hazards are discussed in greater detail in Chapter 4.0.

The current state is exactly the same as the RBES for sites that have been removed from the permit. The four sites that have a small amount of fieldwork remaining, and have a regulator-approved field plan in place are in essentially the same situation. Instances where the actual cleanup level exceeded the target industrial or recreational level may have occurred because of the use of heavy equipment for soil removal, or the recalculation of residential risk using less stringent assumptions, according to new NMED guidance.

Sites which are currently in the Corrective Measures Evaluation stage, but have not yet attained a decision, may require more fieldwork. There are two probable variances where the planned end state may not be the same as the RBES. The RBES for the Mixed Waste Landfill is to do no further action, but due to public concerns, the regulators will most likely require some type of engineered cover. The RBES for groundwater is to monitor at the KAFB site boundary, which is not cost-effective or allowed by the current regulations. These variances are discussed in Chapter 5.0. Sites under active use that have not yet been cleaned up will remain a liability for DOE. Although there is only preliminary transition guidance currently available for National Nuclear Security Administration sites, the SNL/NM ER project has begun to transition compliance responsibilities to SNL/NM's Environmental Management organization in order to ensure an efficient transition to long-term stewardship after the ER Project is completed in FY 2006.

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ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
bgs	below ground surface
CAB	Citizens' Advisory Board
CAMU	Corrective Action Management Unit
CEARP	Comprehensive Environmental Assessment and Response Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Ci	curies
CME	Corrective Measures Evaluation
CMS	Corrective Measures Study
COC	constituent of concern
COPEC	Constituent of potential ecological concern
CRIO	Community Resource Information Office
CSM	Conceptual Site Model
CWL	Chemical Waste Landfill
DOE	U.S. Department of Energy
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FY	fiscal year
HEAST	Health Effects Assessment Summary Tables
HRS	Hazard Ranking System
HSWA	Hazardous and Solid Waste Amendments
IC	institutional control
IRIS	Integrated Risk Information System
ISB	in situ bioremediation
KAFB	Kirtland Air Force Base
LE	Landfill Excavation
LLW	low-level waste
LOAEL	lowest-observed-adverse-effect level
LTES	Long Term Environmental Stewardship
LTTD	low-temperature thermal desorption
MCL	maximum contaminant level
MNA	monitored natural attenuation
mrem	millirem
MSA	Metropolitan Statistical Area
MWL	Mixed Waste Landfill
NFA	No Further Action
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NOAEL	no-observed-adverse-effect level
NPL	National Priority List
ORNL	Oak Ridge National Laboratory
OSWER	Office of Solid Waste and Emergency Response
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
RAGS	Risk Assessment Guidance for Superfund

ACRONYMS AND ABBREVIATIONS (Concluded)

RBES	risk-based end state
RAP	Remedial Action Proposal
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RfD	reference dose
SF	slope factor
SNL	Sandia National Laboratories
SNL/NM	Sandia National Laboratories/New Mexico
ST	stabilization
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TA	Technical Area
TCE	trichloroethene
TEDE	total effective dose equivalent
VCM	Voluntary Corrective Measure
VE	Vapor Extraction
VOC	volatile organic compound
VZMS	vadose zone monitoring system
WMD	weapons of mass destruction
yr	year

1.0 INTRODUCTION

The Sandia National Laboratories/New Mexico (SNL/NM) Environmental Restoration (ER) Project is responsible for the assessment and, if necessary, the remediation of inactive waste sites. This assessment began formally in 1984 for SNL/NM, when the U.S. Department of Energy (DOE) Albuquerque Operations Office (DOE/AL) initiated the Comprehensive Environmental Assessment and Response Program (CEARP) to identify, assess, and remediate potentially hazardous waste sites. The project was designed to comply with Section 120 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Phase I of the CEARP, "The Installation Assessment" (DOE September 1987a) which identified 117 sites at SNL/NM, was submitted to U.S. Environmental Protection Agency (EPA) by SNL/NM in September 1987.

A similar investigation was conducted by the EPA Region 6 in April 1987 during the Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) (EPA April 1987). These programs ultimately defined a working inventory of Solid Waste Management Units (SWMUs) to be investigated during the course of the ER program at SNL/NM.

In 1987, SNL/NM sites were evaluated by the EPA under the EPA's CERCLA Hazard Ranking System (HRS), a risk-based system for prioritizing site cleanups (DOE September 1987b). Based on the HRS ranking, no SNL/NM sites qualified for cleanup under the CERCLA National Priority List (NPL). For federal facilities that are not listed on the NPL, CERCLA requires compliance with state laws concerning removal and remedial actions.

In 1990, the DOE began to fund SNL/NM to conduct ER work for all locations for which SNL/NM might be responsible. When the ER Project was formally established in 1992, the work was projected to be completed by 2020; 117 sites had been identified for attention. As the ER Project began, minor scoping sampling had been conducted at a few sites, and several groundwater monitoring wells had been installed at two landfill locations. Rapport with regulators and other stakeholders had yet to be established.

Twelve years later, the ER Project is planned for completion in 2006. The expected life-cycle cost has been reduced by more than \$200M. The number of sites to be addressed grew to 268 (including 203 SWMUs and 65 Areas of Concern [AOCs] that were included on SNL/NM's RCRA permit) (EPA August 1993). There are three SWMUs and three AOCs in active use that are not scheduled for immediate cleanup. No Further Action (NFA) proposals have been submitted to the New Mexico Environment Department (NMED) for 229 of the remaining 262 sites. The NMED has approved 169 of these, and the other 52 (risk-based) NFA proposals are at various stages of the regulatory review and approval process. Fieldwork is more than 90 percent complete on the five SWMUs where NFA proposals have not yet been submitted, and draft NFA proposals are in progress for three of these five SWMUs. One of these SWMUs is the Chemical Waste Landfill, which is regulated under a closure plan that requires alternative closure documentation. Remediation is complete at all AOCs.

Four major landfills and numerous smaller sites have been remediated without significant injury. All sites have been characterized, as have four areas of low-concentration groundwater contamination. This progress was due to SNL/NM's excellent teaming relationships with the regulators and substantial interaction with stakeholders. The ER Project has received several

SNL/NM quality awards, seven consecutive years of top ratings from the DOE (1995-2001), and awards from the NMED in 2001 and 2002 for environmental excellence.

In 1991, the ER Project initiated a study to determine whether an Environmental Assessment (EA) or an Environmental Impact Study was appropriate for the ER work. The ER Project began work on an ER-specific EA in 1994; the EA was approved and issued in March 1996 (DOE March 1996). Coincident with this effort, a Program Implementation Plan (SNL/NM February 1994) was developed, which included an evaluation of the similarities and differences of RCRA and CERCLA and identification and evaluation of all laws and statutes that needed to be considered as Applicable or Relevant and Appropriate Requirements (ARARs) for all SNL/NM ER sites. The need for definition of any environmental constraints (because of the requirements of the National Environmental Protection Act [NEPA]) was identified. Biological and cultural-resource surveys were conducted in 1991 and 1995, respectively (Hoagland and Della-Russo February 1995).

Public outreach began with quarterly public meetings in 1992, which continue to be conducted. In the early years of the ER Project, as environmental concerns associated with SNL/NM achieved higher visibility, negative attention from the media and public became more frequent. In response, the ER Project extended invitations to individuals and groups to tour the ER sites and to participate in citizens' groups on specific topics. Early success with involving the stakeholders was achieved through two of these groups—one focused on site prioritization, and one convened to define future land use.

Future land-use designations for all ER sites located on land owned by Kirtland Air Force Base (KAFB) (including the land withdrawn from the U.S. Forest Service) were developed by 1997 by a stakeholders group which included representatives of SNL/NM, the DOE, the U.S. Air Force, the U.S. Forest Service, and the EPA, as well as local government officials and citizens. These future land-use designations were formalized in the Baseline for Future Use Options document (DOE et al. September 1995). This was the first of several successful stakeholder groups convened by the ER Project.

Public participation played a critical role in the eventual permitting (under RCRA) and construction of the first Corrective Action Management Unit (CAMU) in the DOE Complex. In 1993, the EPA issued the "CAMU Rule," which established the option of using a CAMU to facilitate remediations that were hampered by the existing time limits for off-site waste disposal. The ER Project quickly grasped the potential of this rule, and in 1995, established a CAMU Working Group with membership from SNL/NM, the DOE, the EPA, the NMED, and representatives of numerous stakeholder groups. This group met monthly for almost a year, establishing a set of group values, debating the pros and cons of various on- and off-site waste-disposal options, and ultimately reaching agreement on a recommendation to pursue permitting and construction of a CAMU. The CAMU began accepting waste in January 1999.

As the ER Project matured, the national setting for public participation on environmental matters moved toward Site-Specific Advisory Boards, to include members from regulatory agencies, local governments, and citizen stakeholders. The implementation of this concept for SNL/NM was the Citizens' Advisory Board (CAB), which was created in the spring of 1995. The CAB, the membership of which varied from 15 to 20 individuals, served as a sounding board for many ER activities between 1995 and the fall of 2000, and provided valuable insight into community values and preferences associated with environmental restoration work at SNL/NM. The CAB evolved into the Community Resource Information Office (CRIO) that serves as coordinator and clearing-house for topic-specific citizens groups to continue to provide input to the ER Project.

By the fall of 2002, the ER Project had addressed the vast majority of the sites. The ER Project consolidated management and reduced its staff to increase efficiency and facilitate focusing on four project initiatives. These initiatives are landfills, drains and septic systems, groundwater, and miscellaneous sites. The ER Project is currently in the process of finalizing regulatory post-closure requirements for many sites. A Long Term Environmental Stewardship (LTES) Plan was written in 2001 (SNL/NM August 2001) with citizen input, and has been revised to include current status in 2003.

In 2003, a Compliance Order on Consent was negotiated with the NMED to establish a fixed schedule for completion of regulatory activities including definition of groundwater requirements and submittal of regulatory documentation associated with completion of the corrective action process for all SWMUs and AOCs managed by the ER Project. The agreed-upon schedule aligns with both the project's Performance Management Plan and with the SNL/NM ER Project fiscal year (FY) 2004 baseline. The ER Project has begun to transition compliance responsibilities to SNL/NM's Environmental Management organization in order to ensure an efficient transition to long-term stewardship after the ER Project is completed in FY 2006.

1.1 Organization of the Report

The introduction of this report briefly covers the pertinent activities completed by SNL/NM's ER Project which place this document in context. The past, current, and future site missions and activities of SNL/NM are discussed in Section 1.2. The hazards and extent of the environmental contamination resulting from these activities are also summarized. The status of the cleanup program conducted by SNL/NM's ER Project is discussed in Section 1.3. The site cleanup strategy used to remediate approximately 200 sites is explained, and remaining fieldwork is delineated. Detailed discussion of the cleanup strategy, risk assessment methodology, and designated future land use can also be found in Section 1.3.

The next three sections consist of maps showing the Regional Context (Chapter 2.0), the Site-Specific context (Chapter 3.0), and the Hazard-Specific Context (Chapter 4.0). The Regional Context includes the City of Albuquerque and other population centers and lands surrounding KAFB, of which SNL/NM is a tenant. The Site-Specific Context covers the Technical Areas (TAs) and remote test areas that make up SNL/NM .

The Hazard-Specific section has been divided into three sub-categories. Section 4.1 covers the Engineered Units, Section 4.2 covers the Groundwater Units, and Section 4.3 covers the other sites which have already had NFA proposals completed. Conceptual site models and explanatory text are included where appropriate.

Chapter 5.0 discusses known and potential variances between the end state that is expected to result from the presently scheduled ER work and the appropriate risk-based end state.

Chapter 6.0 provides references cited for further detail.

Appendix A contains the currently enforceable regulatory compliance document, the Compliance Order on Consent, that was negotiated with the NMED.

Appendix B contains a detailed list of SNL/NM SWMUs that required investigation under the Hazardous and Solid Waste Amendments (HSWA) module of SNL/NM's RCRA permit.

Appendix C contains a listing of the SNL/NM ER Site Characteristics for Stewardship, which includes the future land-use designations for all ER sites.

Appendix D contains a list of the major documents produced by the ER Project.

1.2 Site Mission

Past, Current, and Future Site Missions

SNL/NM was established on KAFB in 1945 during the Manhattan Project as a division of the Los Alamos Laboratory to provide engineering, design, production, assembly, and field testing of the nonnuclear components of nuclear weapons. Sandia National Laboratories (SNL) became an independent laboratory on November 1, 1949, and opened its facilities in Livermore, California, in 1956. SNL is managed by Sandia Corporation, a subsidiary of Lockheed Martin Corporation, for the DOE's National Nuclear Security Administration.

SNL's current strategic areas of focus include:

- Nuclear Weapons—ensuring the safety of the nuclear weapons stockpile
- Nonproliferation and Assessments—reducing our nation's vulnerability to threats of proliferation and weapons of mass destruction
- Military Technologies and Applications—developing high-impact responses to emerging national security threats
- Energy and Infrastructure Assurance—enhancing the surety of energy and other critical resources

SNL's primary mission is ensuring the U.S. nuclear arsenal is safe, secure, reliable, and can fully support our nation's deterrence policy. SNL also develops technologies and systems that safeguard nuclear materials and monitor the globe for nuclear weapon activities.

SNL's Nonproliferation and Assessments program reduces U.S. vulnerability to weapons of mass destruction (WMD). These include nuclear, biological, and chemical weapons, as well as nonconventional WMDs such as the hijacked civilian airline jets used to commit acts of war against our nation.

The Military Technologies and Applications program develops high-impact responses to national security challenges. SNL's integrated science expertise allows us to develop technologically superior weapons and security systems. From basic research to global intelligence, SNL supports numerous government and industry agencies in combating terrorism and threats against our armed forces and homeland.

The Energy and Infrastructure Assurance program supports SNL's core purpose of helping our nation secure a peaceful and free world through technology. Our goal is to enhance the surety (safety, security, and reliability) of energy and other critical infrastructures.

Strides are being made in the areas of energy research, earth sciences, transportation systems, risk management technologies, environmental stewardship, and nuclear waste management. SNL is also actively working to improve the nation's critical infrastructure surety. We are focusing on infrastructure elements in the areas of transportation, electric power grid, oil and gas distribution, telecommunications, finance and banking, and vital human services.

SNL sees its mission responsibilities growing in several areas beyond SNL's primary nuclear weapons mission, which is always foremost. This growth is in support of other important national security initiatives to meet the current and future threats from the world we exist in today. SNL's ongoing and future mission is to become the laboratory that the U.S. turns to first for technology solutions to the most challenging problems that threaten peace and freedom for our nation and the globe.

Site Operations, Associated Hazards, and Extent of Environmental Contamination

SNL/NM operations are conducted on DOE-owned property assigned for SNL/NM use, and non-DOE-owned property permitted from other federal agencies. SNL/NM's sites located on DOE-owned property comprise 2,937 acres and include five TAs. The sites located on non-DOE-owned property include 5,648 acres of land permitted from the U.S. Air Force, a portion of which are on land withdrawn from the U.S. Forest Service.

SNL/NM consists of five TAs and several additional test areas. These TAs are shown in Figure 1.2-1. Each area has its own distinctive operations. A description of each technical area and potential hazards is given below:

- TA-1 has an employee population of approximately 5000, the largest at SNL/NM. This area is dedicated primarily to the design, research, and development of weapon systems, limited production of weapon system components, and energy programs. It also includes the main library and offices, laboratories, and shops used by administrative and technical staff. Generally, the only potential radioactive releases in TA-1 are tritium from two laboratory sources and activation products, such as argon-41, nitrogen-13, and oxygen-15, from two small accelerators. In accordance with DOE requirements, only small quantities of activation products are released from these stacks annually. Potential sources for nonradioactive effluent include the paint shops, process development laboratory, emergency diesel generator plant, solvent spray booth, foundry, and steam plant. There are 18 ER sites located in this area.
- TA-2 is a 45-acre (1.8-square-kilometer) facility that was established in 1948 for the assembly of chemical high-explosive (HE) main charges for nuclear weapons and later for production-scale assembly of nuclear weapons. Located in TA-2 are a small radioactive material decontamination and storage facility (Building 906), and a storage facility designed to temporarily hold polychlorinated biphenyl (PCB)-contaminated material to be transported to an EPA-licensed disposal facility. An inactive low-level waste (LLW) disposal site and a classified waste landfill have been remediated. There are 18 ER sites located in this area.

**Figure 1.2-1
Location of Kirtland Air Force Base, SNL/NM Technical Areas**

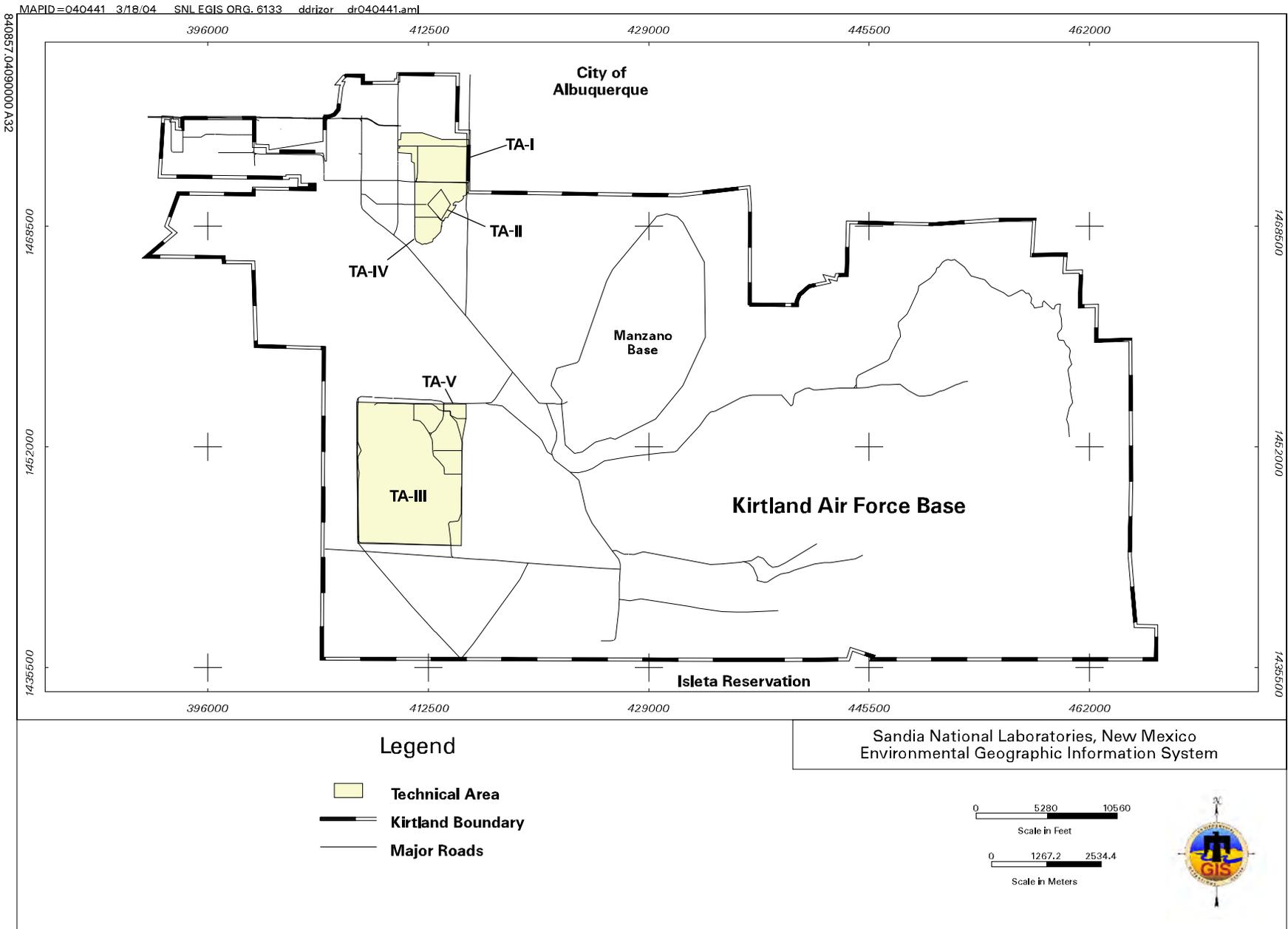


Figure 1.2-1 Location of Kirtland Air Force Base, SNL/NM Technical Areas

- TA-3, located 5 miles (8 kilometers) south of TA-1, is composed of approximately 20 extensive test facilities, including sled tracks, centrifuges and a radiant heat facility, which simulate a variety of extreme environmental conditions. No radioactive effluent is released through normal operations in the area. Other facilities in TA-3 include a paper incinerator, an inactive LLW and mixed waste disposal site, a large melt facility, and a melting and solidification laboratory. There are 37 ER sites located in this area, including the Chemical Waste and Mixed Waste Landfills, and the CAMU.
- TA-4, located 2 miles south of TA-1, consists of several inertial confinement fusion research and pulsed power research facilities. One large accelerator, the Particle Beam Fusion Accelerator-II, was completed in 1985. A large accelerator facility, the Simulation Technology Laboratory, houses seven pulsed power accelerators.
- TA-5 houses several electron beam accelerators, three research reactors in two reactor facilities, an intense gamma irradiation facility, and a hot cell facility. The only airborne releases are air activation products from reactor operations primarily composed of argon-41 and xenon-133.

SNL/NM has additional test areas outside of the five TAs listed above. These areas are located south and east of TA-3 and in the canyons on the west side of the Manzano Mountains. Thunder Range and Coyote Canyon Test Field are such areas. Depleted uranium was used in the past for explosive testing in some of the test areas, and was scattered across the soil surface. In some cases the test areas were surveyed following each test, and contaminated materials were collected and disposed of in accordance with DOE requirements.

The SNL/NM ER Project is responsible for 203 SWMUs and 65 AOCs requiring investigation under the HSWA module of SNL/NM's RCRA permit. The SWMUs on the HSWA permit included sites within the TAs as well as in the remote explosive test areas of KAFB. Types of sites include five old landfills (Chemical Waste Landfill [CWL], Mixed Waste Landfill [MWL], Classified Waste Landfill, Radioactive Waste Landfill, and the SWMU 78 Gas Cylinder Disposal Pit), 14 underground storage tanks, and numerous firing sites associated with past explosive testing. These firing sites contained features such as surface impoundments and scrap yards, burn pits, shallow subsurface dumps, and surface soil contamination. The AOCs are mostly septic tanks and drainfields. The details of the cleanup for these sites are described in Section 1.3. Three active sites that are not scheduled for immediate cleanup are SWMU 83, the Long Sled Track, SWMU 84, the Gun Facilities, and SWMU 240, the Short Sled Track.

Unexploded ordnance, metal and concrete debris, and abandoned test equipment have been removed from many sites. A large variety of hazardous and nonhazardous items were removed during the remediation of the landfills. Surface and subsurface soils have been remediated at many sites, but due to the low levels of constituents of concern (COCs) present in groundwater which do not pose a risk, no groundwater remediation has yet been necessary. COCs that have been successfully remediated from soil include radioactive materials (mainly depleted uranium), metals, explosives, volatile organic compounds (VOCs), semivolatile organic compound (SVOCs), asbestos, and PCBs.

The only remaining hazards are: 1) the materials or residuals left in the engineered units, 2) the low levels of contamination detected in four groundwater areas, and 3) the residual contaminants at the NFA sites that were cleaned up to industrial or recreational risk levels, and

did not meet the residential risk criteria. Details of these hazards are provided in Chapter 4.0 of this document.

1.3 Status of Cleanup Program

Status of Work / Current State / End State

The ER Project is planned to be completed in 2006. A total of 268 sites (including 203 SWMUs and 65 AOCs) needed to be addressed. The regulatory status of these 268 sites is depicted in the flowchart in Figure 1.3-1. Table 1.3-1 lists the individual sites that fall into each of the four categories in the flowchart.

There are three SWMUs and three AOCs in active use that are not scheduled for immediate cleanup. NFA proposals have been submitted to the NMED for 229 of the remaining 262 sites. The NMED has approved or accepted 173 of these NFA proposals. There are 56 (risk-based) NFA proposals at various stages of the regulatory review and approval process. Draft NFA proposals are in progress for three of these five SWMUs. One of these SWMUs is the Chemical Waste Landfill, which is regulated under a closure plan that requires alternative closure documentation. Eighteen of the AOCs have had assessment reports submitted to the NMED, and one has been removed from the permit. The rest of the AOC documents are scheduled for completion in the next year or so.

All SWMUs and AOCs have been characterized, as have an additional four areas of low-concentration groundwater contamination. Four major landfills and numerous smaller sites have been remediated without significant injury. Fieldwork is more than 90 percent complete on the four SWMUs (8, 58, 68 and 91) where NFA proposals will be submitted. These SWMUs are shown in Figure 1.3-2. The small amount of remaining fieldwork has been scheduled for FY 2004, and Voluntary Corrective Action Plans for these areas are now being generated with regulator and stakeholder input. The remaining cleanups involve removal of relatively small areas of contaminated surface and near-surface soils. Remediation is complete at all of the AOCs.

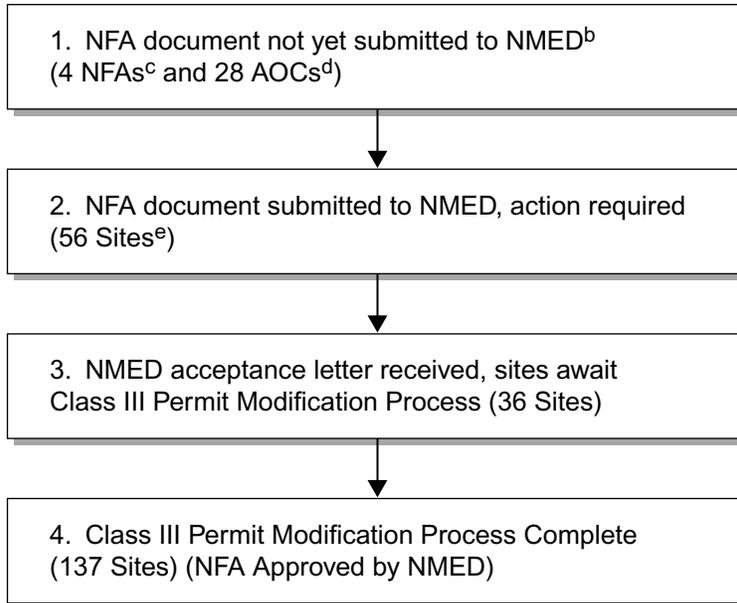
The ER Project was in the process of finalizing the regulatory post-closure requirements for many sites when the first draft of this document was written. In 2003, a Compliance Order on Consent was negotiated with the NMED to establish a fixed schedule for completion of regulatory activities, including definition of groundwater requirements and submittal of regulatory documentation associated with completion of the corrective action process for all SWMUs and AOCs managed by the ER Project. The agreed-upon schedule aligns with both the project's Performance Management Plan and with the SNL/NM ER Project FY 2004 baseline.

The Compliance Order on Consent contains a regulatory requirement to conduct a risk assessment using the residential future land-use scenario for the sites. The residential scenario was not used to drive cleanup, but was only conducted to determine the need for any long-term stewardship activities, such as institutional controls, at the sites. The use of risk in the Compliance Order on Consent is discussed in greater detail under the heading "Risk Assessment Methodology" of this section.

Regulatory Status of 268 Environmental Restoration Sites^a

As of March 2004
(SWMUs and AOCs)

Sandia National Laboratories/New Mexico



Footnotes:

^aSee Table 1.3-1 for individual site listings.

^b6 active sites are not included, 1 additional site, the Chemical Waste Landfill, is under Closure Plan and is not included.

^cDraft NFA proposals begun on 3 of 4 sites.

^dAOCs are Drains and Septic Systems, which have been completely characterized, no remediation is required, and 6-9 reports are sent each quarter to the NMED.

^eThe status of these sites falls into 3 categories:

2a. 16 sites: NMED comments have not yet been received.

2b. 27 sites: A Request for Supplemental Information has been received by SNL/NM, and SNL/NM response is required.

2c. 13 sites: SNL/NM has responded 1 or more times and awaits NMED action.

AOC = Area of Concern

NFA = No Further Action

NMED = New Mexico Environment Department

SNL/NM = Sandia National Laboratories/New Mexico

SWMU = Solid Waste Management Unit

Figure 1.3-1

Table 1.3-1
Regulatory Status of 268 Environmental Restoration Sites
(As of March 2004)

Status		Sites	
NFA document not yet submitted to NMED		4 SWMUs	8, 58, 68, 91
		28 AOCs	276, 1010, 1028, 1031, 1034, 1035, 1036, 1052, 1078, 1079, 1080, 1081, 1083, 1084, 1086, 1087, 1090, 1092, 1095, 1098, 1102, 1104, 1113, 1114, 1115, 1116, 1117, 1120
<hr/>			
SNL/NM Submitted	Awaiting Initial NMED Response	0 SWMUs	
		16 AOCs	1006, 1007, 1009, 1015, 1020, 1024, 1026, 1027, 1029, 1033, , 1093, 1101, 1105, 1108, 1110, 1112
	Received Request for Supplemental Information: SNL/NM Action Required	27 SWMUs	45, 46, 48, 49, 76, 78, 101, 116, 135, 136, 137, 138, 140, 146, 147, 148, 149, 150, 152, 153, 154, 159, 161, 165, 166, 167, 196
	Received and Answered Request for Supplemental Information: NMED Action Required	13 SWMUs	28-2, 1, 3, 4, 5, 52, 96, 187, 226, 227, 229, 233, 234
<hr/>			
SNL/NM Submitted, Received NMED Acceptance Letter		19 SWMUs	2, 9, 18, 26, 30, 33, 35, 66, 87, 94b, 94f, 98, 107, 114, 190, 230, 231, 232, 241
		17 AOCs	TNT Site, 828, 94H, 1001, 1003, 1008, 1014, 1030, 1032, 1072, 1073, 1077, 1082, 1089, 1091, 1096, 1111
<hr/>			
Class III Permit Modification Process Complete (NFA Approved by NMED)		136 SWMUs	6A, 6, 7, 10, 11, 12A, 12B, 13, 14, 15, 16, 17A-H, 19, 20, 21, 22, 23, 25, 27, 28-1, 28-3, 28-4, 28-5, 28-6, 28-7, 28-8, 28-9, 28-10, 31, 32, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 47, 50, 51, 53, 54, 55, 56, 57A, 57B, 59, 60, 61A, 61B, 61C, 62, 63A, 63B, 64, 65A, 65B, 65C, 65D, 65E, 67, 69, 70, 71, 72, 73, 77, 81A, 81B, 81C, 81D, 81E, 81F, 82, 85, 86, 88A, 88B, 89A-C, 90, 92, 93A-C, 94A, 94C, 94D, 94E, 94G, 100, 102, 103, 104, 105, 108, 109, 111, 112, 113, 115, 117, 139, 141, 142, 143, 144, 145, 151, 155, 160, 168, 169, 170, 171, 172, 173, 174, 175, 176, 178, 179, 180, 181, 186, 188, 191, 192, 193, 194, 195, 211, 228A, 228B, 235, 275
		1 AOC	277

Note: The Chemical Waste Landfill is covered under a closure plan. There are 6 active sites (SWMUs 83, 84, 240 and DSS AOCs 1004, 1025, and 1094) which are not scheduled for immediate cleanup under this program.

AOC = Area of Concern.

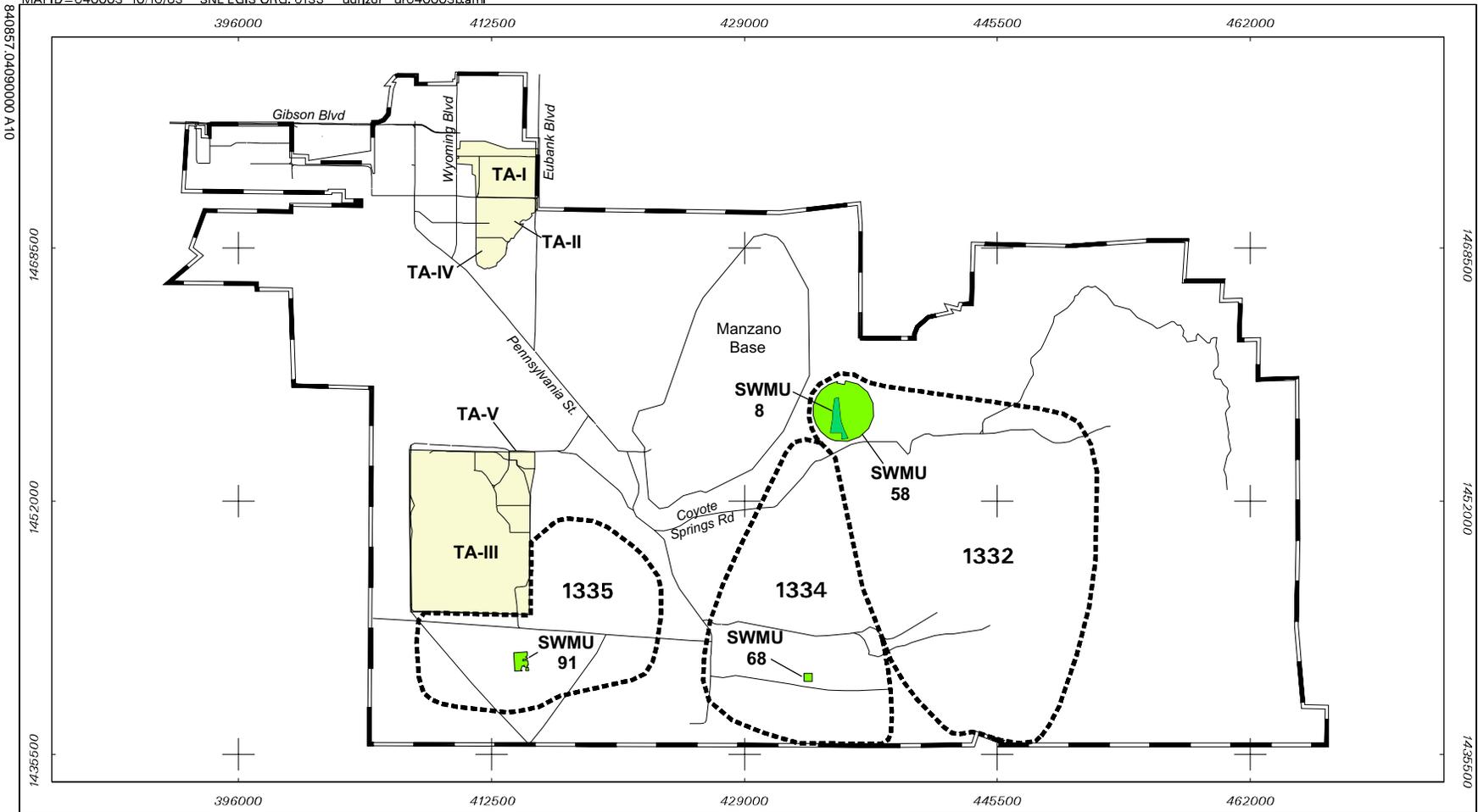
DSS = Drains and Septic Systems.

NMED = New Mexico Environment Department.

SNL/NM = Sandia National Laboratories/New Mexico.

SWMU = Solid Waste Management Unit.

TNT = 2,4,6-Trinitrotoluene.



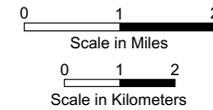
1-11

Legend

- Solid Waste Management Unit
- Technical Area
- Operational Unit Boundary
- Kirtland Boundary
- Roads

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Figure 1.3-2
SWMUs 8,58,68 & 91
OPUNITs 1332, 1334 & 1335



The Compliance Order on Consent is included as Appendix A.

Cleanup Strategy

“One-Pass” Process

A “one-pass” process was incorporated into SNL/NM’s RCRA permit in 1997. Significant effort was invested in the interactions with regulatory staff at all levels, and the productivity of the ER Project (in terms of sites completed and NFA proposals submitted) soared.

On the surface, the “one-pass” process is deceptively simple. The goal is to eliminate all of the standard RCRA documents and review cycles, and replace them with a voluntary process that, in most cases, produces no more than two documents for delivery to the NMED (a Voluntary Corrective Action Plan and an NFA proposal) for regulatory review. The simplicity of the process is deceptive because, although it is straightforward, it relies heavily on rapport and real-time interactions with regulatory staff in order to avoid disconnects in adequacy of sampling, sufficiency of data, agreement on remediation goals, etc.

Obtaining Approval of Risk-Based “No Further Action” Proposals

In order to present a successful proposal for NFA for a contaminated site, several technical “framework” pieces are required. Teaming up-front with the regulators to finalize technical approach and therefore minimize wasted effort and fieldwork, several key documents were generated which the regulators then formally accepted.

Background concentrations of all naturally occurring contaminants, definition of the hydrogeologic framework, and an agreed-upon risk assessment methodology (requiring the definition of future land use) were required for use in support of risk-based NFA proposals. Work on each of these was initiated during 1992 and 1993. Agreement on the suite of naturally occurring contaminants for both soil and groundwater was reached with the NMED by 1994, and a formally documented set of background concentrations for all of these materials was complete by 1997. The site-wide hydrogeologic project completed definition of the geologic, structural, and hydrologic setting of KAFB in 1997 as well.

Negotiating a risk assessment methodology was somewhat more time-consuming, and was accomplished while active fieldwork for site characterization was underway. A probabilistic risk approach was proposed to the NMED, but was rejected because a probabilistic approach was considered too complicated and not approved by the EPA. Beginning in 1994, the human health risk assessments were conducted in accordance with the standard Risk Assessment Guidance for Superfund (RAGS), with agreement from EPA Region 6.

Future land-use designations for all of the land comprising KAFB (including the land withdrawn from the U.S. Forest Service) were developed in 1997 by a stakeholders group which included representatives of SNL/NM, the DOE, the U.S. Air Force, the U.S. Forest Service, and the EPA, as well as local government officials and local citizens. These future land-use designations were formalized in the Baseline for Future Use Options document (DOE et al. September 1995). More details on the future land-use designations are given under the Future Land Use heading of this section. These land-use designations were then used in the risk

assessments for ER sites. Agreement on human health risk assessment was achieved in 1997, and final agreements on ecological risk assessment were achieved in 1999. Of the 195 NFA proposals submitted to the regulators, most have been risk-based.

Risk Assessment Methodology

In 1993, the computer program "PRECIS" was developed by SNL/NM personnel to calculate human health risk. This software calculated risks for various receptors (residential, industrial, and recreational) and for all major pathways including: ingestion (soil, groundwater, and secondary pathways), dermal contact (soil and groundwater), and inhalation (VOCs and dust). The software included both stochastic and nonstochastic calculation options and a sensitivity analysis. However, due to the complex nature of PRECIS, it was never approved by the NMED and never officially used by SNL/NM for human health risk assessment calculations.

Beginning in 1994, the human health risk assessments were conducted in accordance with RAGS (EPA 1989, EPA 1991) with agreement from EPA Region 6 and included the following guidance/methodology:

- All of the available analytical data are included in the risk evaluation (i.e., there is no depth restriction). COCs evaluated include all detected organic compounds and all inorganic and radiological COCs for which samples were analyzed. When the detection limit of an organic compound is too high (i.e., above an acceptable data quality objective [DQO]), the compound is retained. Nondetected organic compounds not included in this assessment were determined to have sufficiently low detection limits. In order to provide conservatism in this risk assessment, the calculation uses only the maximum concentration value of each COC found for the entire site.
- The potential current and future receptors for each site were established based on the "Baseline for Future Use Options" (DOE et al. June 1995). For SNL/NM, the potential scenarios include industrial, recreational, and residential. The industrial and recreational land-use scenarios are the most predominant.
- The exposure pathways evaluated are ingestion of soil, inhalation of VOCs and dust, and ingestion of homegrown produce (for a residential receptor only). The water table at SNL/NM is deep (400 to 500 feet below ground surface [bgs]) and there are no on-site production wells; therefore, exposure to groundwater was not evaluated for most of the sites. In addition, no dermal contact with soil was evaluated for the risk analysis.
- The exposure parameters are obtained from EPA guidance (EPA 1989, EPA 1991). These values represent upper-bound values, generally 90th or 95th percentile values, depending on the data available for each parameter.
- The primary source for toxicity values, both reference dose (RfD) (noncarcinogenic properties) and slope factor (SF) (carcinogenic properties), is Integrated Risk Information System (IRIS) (EPA 2003). If a toxicity value for a given chemical is not available in IRIS, the secondary source is the Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), followed by EPA Regions 9 and 3 (EPA 2002a, EPA 2002b).

- For radiological COCs, the coded equations provided in the computer program “RESRAD” are used to estimate the incremental total effective dose equivalent (TEDE) and cancer risk for individual exposure pathways. Further discussion of this process is provided in the *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD* (Yu et al. 1993).
- The target risk levels for chemicals are a cumulative excess cancer risk of 1E-6 to 1E-4 and a hazard index of 1.0 for noncarcinogens and a total dose of 15 millirem (mrem)/year (yr) for radiological constituents.
- Residential risks were calculated and summarized, but were not a criterion for decision making and were not considered in the decision-making sections.

In 1997, the ecological risk assessments methodology was developed in accordance with EPA and NMED guidance (EPA 1997b, EPA 1998; IT July 1998), with agreement from the NMED, and included the following:

- All available analytical data from the site 0 to 5 feet bgs were included in the risk evaluation. The inorganic analytes are screened against background concentrations and those that exceed the approved SNL/NM background screening levels (Dinwiddie September 1997; Zamorski December 1997) for the area are considered to be constituents of potential ecological concern (COPECs). Nonradiological inorganic constituents that are essential nutrients, such as iron, magnesium, calcium, potassium, and sodium, are not included in this risk assessment as set forth by the EPA (1989). All organic analytes detected within the upper 5 feet of soil are considered to be COPECs for the site. In order to provide conservatism, the assessment is based on the maximum soil concentrations of the COPECs measured in the upper 5 feet of soil at a given site.
- A nonspecific perennial plant was selected as the receptor to represent plant species at the site (IT July 1998). The deer mouse (*Peromyscus maniculatus*) and the burrowing owl (*Speotyto cunicularia*) are used to represent wildlife use. Because of its opportunistic food habits, the deer mouse is used to represent a mammalian herbivore, omnivore, and insectivore. The burrowing owl is used to represent a top predator at this site.
- For nonradiological COPECs, direct uptake from the soil is considered the only significant route of exposure for terrestrial plants. Exposure modeling for the wildlife receptors is limited to food and soil ingestion pathways. Inhalation and dermal contact are considered insignificant pathways with respect to ingestion (Sample and Suter 1994). Drinking water is also considered an insignificant pathway because of the lack of surface water at most SNL/NM sites and the depth to groundwater. Species-specific exposure factors are used in modeling exposures in the wildlife receptors and are presented and justified in the ecological risk assessment methodology document (IT July 1998). The online database from Oak Ridge National Laboratory (ORNL) (ORNL 2003) is used for media (i.e., soil) to food transfer factors.
- For the radiological dose-rate calculations, the deer mouse is modeled as an herbivore (100 percent of its diet as plants), and the burrowing owl is modeled as a

strict predator on small mammals (100 percent of its diet as deer mice). Internal and external dose rates to the deer mouse and the burrowing owl are approximated using modified dose-rate models from the DOE (1995) as presented in the ecological risk assessment methodology document for the SNL/NM ER Project (IT July 1998). Radionuclide-dependent data for the dose-rate calculations were obtained from Baker and Soldat (1992).

- Benchmark toxicity values were established for the plant and wildlife receptors. For plants, the benchmark soil concentrations are based on the lowest-observed-adverse-effect level (LOAEL). For wildlife, the toxicity benchmarks are based on the no-observed-adverse-effect level (NOAEL) for chronic oral exposure in a taxonomically similar test species. Sufficient toxicity information is not available to estimate the LOAELs or NOAELs for some COPECs. The benchmark used for exposure of terrestrial receptors to radiation was 0.1 rad/day. This value has been recommended by the International Atomic Energy Agency (IAEA 1992) for the protection of terrestrial populations. Because plants and insects are less sensitive to radiation than vertebrates (Whicker and Schultz 1982), the dose of 0.1 rad/day should also protect other groups within the terrestrial habitat.

Several additional key SNL/NM risk assessment methodology documents were developed and approved by NMED during this same time period. These include the following:

- “RESRAD Input Parameter Assumptions and Justification” (SNL/NM February 1998a) which summarized all of the exposure parameters used to evaluate the human health radiological risk for implementation into the RESRAD computer code.
- “Ecological Risk Assessment Validation Work Plan” (IT May 1998), and “Results of the Risk Assessment Validation Work Plan” (IT July 1999). This study was to develop site-specific transfer factors (both soil-to-plant, and soil-to-invertebrate) for COPECs commonly found at SNL/NM. However, The site-specific transfer factors were less conservative than the ORNL factors (ORNL 2003) currently used and therefore, ORNL transfer factors are maintained in the ecological risk evaluation.
- “Request for Supplemental Information: Background Concentrations Report, SNL/KAFB” (Dinwiddie September 1997) summarized approved SNL/NM background screening levels for metals and radionuclides in surface and subsurface soils for various geographical areas. “Department of Energy/Sandia National Laboratories Response to the NMED Request for Supplemental Information for the *Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project and the Kirtland Air Force Base Installation Restoration Program Report*” (Zamorski December 1997) summarized approved SNL/NM background screening levels for metals and radionuclides in surface and subsurface soils for the Canyons Study Area.

In 2003, the NMED requested several changes to the human health risk assessment methodology (note some of these changes occurred before the 2002 time frame), which SNL/NM agreed to incorporate. The Compliance Order on Consent (Appendix A) provides more details; it required that the residential future land-use scenario be conducted as a part of the risk assessments.

It should be noted that the residential future land-use scenario was not used to drive cleanup, but was only conducted to determine whether any long-term stewardship actions other than information management were required. All sites that underwent remediation were cleaned up either to the industrial or recreational risk level, which is consistent with the future land-use designations. The sites that passed the residential scenario were then listed in the Compliance Order on Consent as having the “corrective action complete without controls.” If a site did not pass the residential scenario, then the risk-based end state (RBES) was met, and the sites were listed as having the “corrective action complete with controls.”

These revisions resulting from Compliance Order on Consent requirements are summarized below:

- All available analytical data are included in the risk evaluation (i.e., there is no depth restriction). COCs evaluated in this risk assessment include all detected organic compounds and all inorganic and radiological COCs for which samples were analyzed. The inorganic analytes are screened against background concentrations and those that exceed the approved SNL/NM background screening levels (Dinwiddie September 1997; Zamorski December 1997) for the area are considered to be COCs. When the detection limit of an organic compound is too high (i.e., could possibly cause an adverse effect to human health or the environment), the compound is retained. Nondetected organic compounds not included in this assessment were determined to have sufficiently low detection limits to ensure protection of human health and the environment. In order to provide conservatism in this risk assessment, the calculation uses SNL/NM only the maximum concentration value of each COC found for the entire site. For chemicals with significant risk, the upper confidence levels of the mean concentrations are calculated (for both human health and ecological chemicals) and the risks are re-calculated using these concentrations to more accurately represent the concentrations occurring at the site.
- The potential current and future receptors for each site were established based on the “Baseline for Future Use Options” (DOE et al. June 1995). For SNL/NM, the potential scenarios include industrial, recreational, and residential. The industrial and recreational land-use scenarios are the most predominant. These land uses are maintained, however the residential risks are quantified, and the results are discussed in the human health risk assessment (including any decision-making sections).
- The exposure pathways evaluated are ingestion of soil, inhalation of VOCs and dust, and dermal contact with soil for all potential land uses. The ingestion of homegrown produce will no longer be evaluated. The water table at SNL/NM is deep (400 to 500 feet bgs) and there are no on-site production wells; therefore, exposure to groundwater is not evaluated for most of the sites.
- The exposure parameters are obtained from EPA guidance (EPA 1989, EPA 1991). These values represent upper-bound values, generally 90th or 95th percentile values, depending on the data available for each parameter. The NMED chemical-specific dermal absorption values are incorporated, if available. The online database from ORNL (2003) is used for chemical volatilization factors.

- The primary source for toxicity values, both RfD (noncarcinogenic properties) and SF (carcinogenic properties), is the IRIS (EPA 2003). If a toxicity value for a given chemical is not available in IRIS, the secondary source is the HEAST (EPA 1997a), followed by EPA Regions 6, 9, and then 3 (EPA 2002c, EPA 2002a, EPA 2002b).
- For radiological COCs, the coded equations provided in RESRAD computer code are used to estimate the incremental TEDE and cancer risk for individual exposure pathways. Further discussion of this process is provided in the “Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD” (Yu et al. 1993).
- The target risk levels for chemicals are a cumulative excess cancer risk of 1E-5 and a hazard index of 1.0 for noncarcinogens and a total dose of 15 mrem/yr for radiological constituents. In addition, the carcinogenic risk due to exposure to chemicals and radionuclides is summed providing an overall cancer risk for the site (note that there is no target risk level for the summation).

Future Land Use

Future land-use designations were formalized in the Baseline for Future Use Options document developed by a stakeholders group which included representatives of SNL/NM, the DOE, the U.S. Air Force, the U.S. Forest Service, and the EPA, as well as local government officials and citizens (DOE et al. September 1995). The purpose of this document was to “define appropriate short and long term future uses for DOE land and facilities by including significant public input.” This document did include planned land uses outside the site and also anticipated pressures on the boundary of KAFB. Citizens were able to provide input regarding cleanup decisions, existing and new DOE activities. The CAB played a key role as a contributor of public input to the DOE for the evaluation of options for future use of the DOE lands and facilities located on KAFB. Isleta Pueblo was invited to join the CAB and give input on this process, and a member of the Isleta Pueblo participated for a short time. The focus of the CAB was to provide input to the DOE regarding projected future land uses as they relate to cleanup level.

The public’s preferences were considered as answers to the questions were pursued:

- What are the priorities for site cleanup?
- What are the technological options for cleanup and waste disposal?
- What are the preferred land-use options and are they compatible with EPA cleanup levels?
- What could be done to protect the quality of the community’s water and air?
- How clean is clean?

In order to divide a very large volume of information about the DOE facilities and ER sites into more manageable portions, the facilities/sites were grouped into 16 sectors according to geographic and project areas. The sectors were then distributed among seven management

areas based primarily on current land use, which were described in a series of workbooks. These workbooks contained history and background of the various facilities and ER sites, as well as current use.

The map in Figure 1.3-3, Future Land Use Designations, depicts the future land uses for the entire site. The table in Appendix C lists all the ER sites and their characteristics for stewardship, including future land-use designations. The assumptions in this document are consistent with SNL/NM's Ten Year Site Plan.

The EPA and NMED then considered the CAB's preferred use options, ER project date, DOE/SNL/NM mission and other site-specific factors as part of the cleanup level negotiation process.

The Future Land Use Handbook, which was written by a number of stakeholders, did include planned land uses outside the site and also anticipated pressures on the boundary of the KAFB. The Withdrawn Lands portion of the complex (the eastern portion) has been designated "recreational," because this canyon and mountainous area contain fewer facilities than the western half of the complex, which is designated "industrial." Pressure on the western and northern portions of the KAFB boundaries by population growth may result in conversion of U.S. Air Force housing areas to private hands. The ER sites in this portion of KAFB are located much further south and east of these residential areas, are anticipated to continue to be part of the federal complex, and thus have been designated with the industrial future land use.

Expanding Use of Preliminary Remediation Goals

As is common for many environmental projects nationwide, preliminary remediation goals are established with the regulator prior to initiating a remediation. The SNL/NM ER Project extended this practice to the characterization step. For example, the ER Project has 84 drain and septic systems to address. Rather than approaching each system individually, sampling it, then checking with the regulator to determine whether more work is needed, a different strategy was employed. The SNL/NM staff responsible for these systems negotiated a strategy with the NMED that defined quantitative analytical results as "go-no-go" criteria for each step of the characterization process. In addition, each individual site was visited by a team of SNL/NM and NMED staff and evaluated to predetermine sampling locations. As a result of these cooperative negotiations, an agreement was reached on when characterization would be complete and fieldwork could stop. All sites now have undergone shallow soil sampling and/or passive soil-vapor sampling. The agreement stipulated that 150-foot-deep vapor wells would be installed for additional deeper characterization of the "worst" 10 percent of the systems based on the shallow soil and soil vapor sampling results. Analytical results for samples from these vapor wells were well below the levels that would require additional work; therefore, no additional characterization is planned for these sites. The up-front planning and negotiation enabled substantial efficiencies to be achieved in all aspects of work on these sites.

Risk assessments will be performed for each of these sites based primarily on the analytical results of environmental samples that have been collected at each location. It is assumed that the results of the risk assessments will conclusively demonstrate that the sites do not pose a threat to human health or the environment, and that the corresponding Assessment Reports that propose NFA will be approved by the NMED.

**Figure 1.3-3
Site Context - Future Land Use Designations**

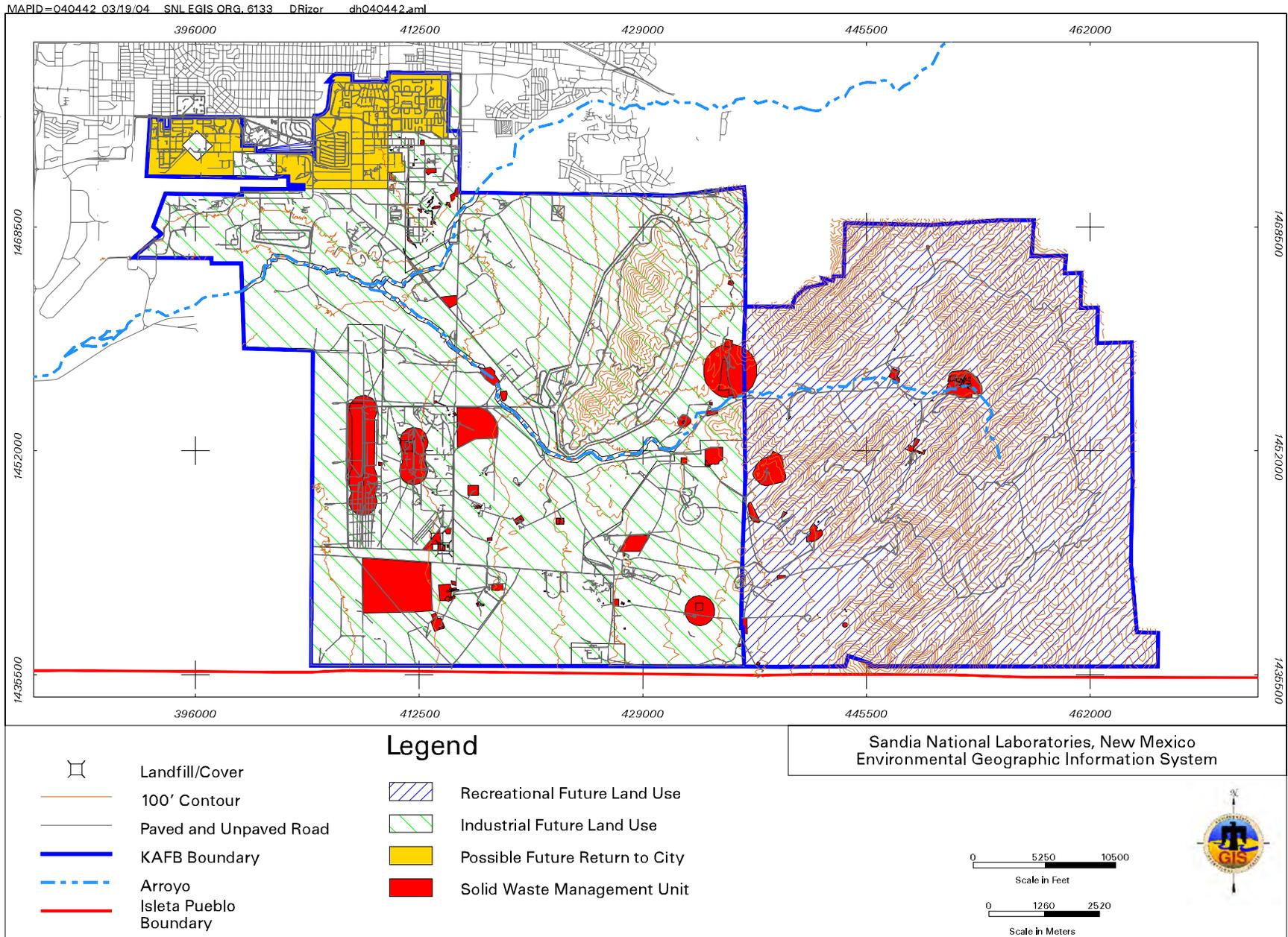


Figure 1.3-3 Site Context - Future Land Use Designations

Variable Approach to Characterization and Cleanup

A decision was made not to lock the ER Project into a single approach to characterization and cleanup. Early in the project, all ER sites were grouped into Operable Units, and the effort began to draft RCRA Facility Investigation (RFI) Workplans that described how to assess each of these groups as a whole. In some cases, this approach seemed workable. However, it became apparent that many sites would be better handled individually, or even jointly with single sites in other Operable Units for efficiency. From the time of this realization, Operable Units continued to exist only for the purposes of budgeting and tracking; the fieldwork was designed around any combination, however large or small, that made logistical sense.

The following are the highlights of the accomplishments of the ER Project to date:

- Future land-use designations established with regulator and stakeholder input (1995)
- Risk Assessments used in NFA proposals, in conjunction with future land use, since 1995
- Active stakeholder participation through CAB and CRIO, beginning in 1995
- 195 NFA proposals submitted for the SNL/NM facility
- LTES Plan submitted to the DOE in August 2001

2.0 SNL/NM REGIONAL CONTEXT

The SNL/NM facilities are surrounded by KAFB (KAFB refers to all the federal agencies located at KAFB) and includes some co-use agreements with the U.S. Air Force on the property. An area of the Manzano Mountains in the eastern portion of KAFB has been withdrawn from the U.S. Forest Service for the exclusive use of the U.S. Air Force and the DOE.

Located to the north and west of KAFB, Albuquerque is the largest population center in Bernalillo County. The 2000 census figure shows an Albuquerque population of 448,607. The greater Albuquerque area, including Rio Rancho and Corrales, has approximately 556,678 inhabitants. The 2000 Metropolitan Statistical Area (MSA) population, which includes Bernalillo County, Valencia County, and Sandoval County, is 712,738. The Isleta Indian Reservation borders KAFB on the south. The Pueblo of Isleta, located approximately 8 miles southwest of the base, had a population of 3,166 in 2000.

The Bureau of Business and Economic Research at the University of New Mexico creates population projections based on statistics it keeps for the state of New Mexico. They estimate that by the year 2025, Bernalillo county will have a population of 729,750. The MSA population, which includes Bernalillo, Valencia and Sandoval counties, is estimated to grow to 1,028,341 by 2025. It is assumed that this population growth may change the use of the lands bordering KAFB, which may put pressure on KAFB boundaries, and may begin to encroach or surround the complex. The current and end-state regional physical and surface interface maps are shown in Figures 2.1a and 2.1b.

KAFB is located on a high, arid mesa about 5 miles east of the Rio Grande in Bernalillo County, New Mexico. The mesa is cut by the east-west trending Tijeras Arroyo, which drains into the Rio Grande. The east side of KAFB north of Tijeras Arroyo is bounded by the southern end of the Sandia Mountains and south of Tijeras Arroyo by the Manzanita Mountains (foothills of the Manzano Mountains). Most of the area is relatively flat, sloping gently westward toward the Rio Grande. However, the eastern portion of the Complex extends into the canyons of the Manzanita Mountains. The western slope of the Manzanita Mountains facing KAFB is precipitous and rough with numerous arroyos. Elevations range from 4,920 feet at the Rio Grande to 7,988 feet at the Manzano Lookout Tower in the Manzano Mountains. The mean elevation of KAFB is 5,348 feet. The current and end-state regional human and ecological land-use interface maps are shown in Figures 2.2a and 2.2b. The only difference between the current and end state is the KAFB boundary on the northwest, which depicts several areas of base housing that may be returned to private ownership.

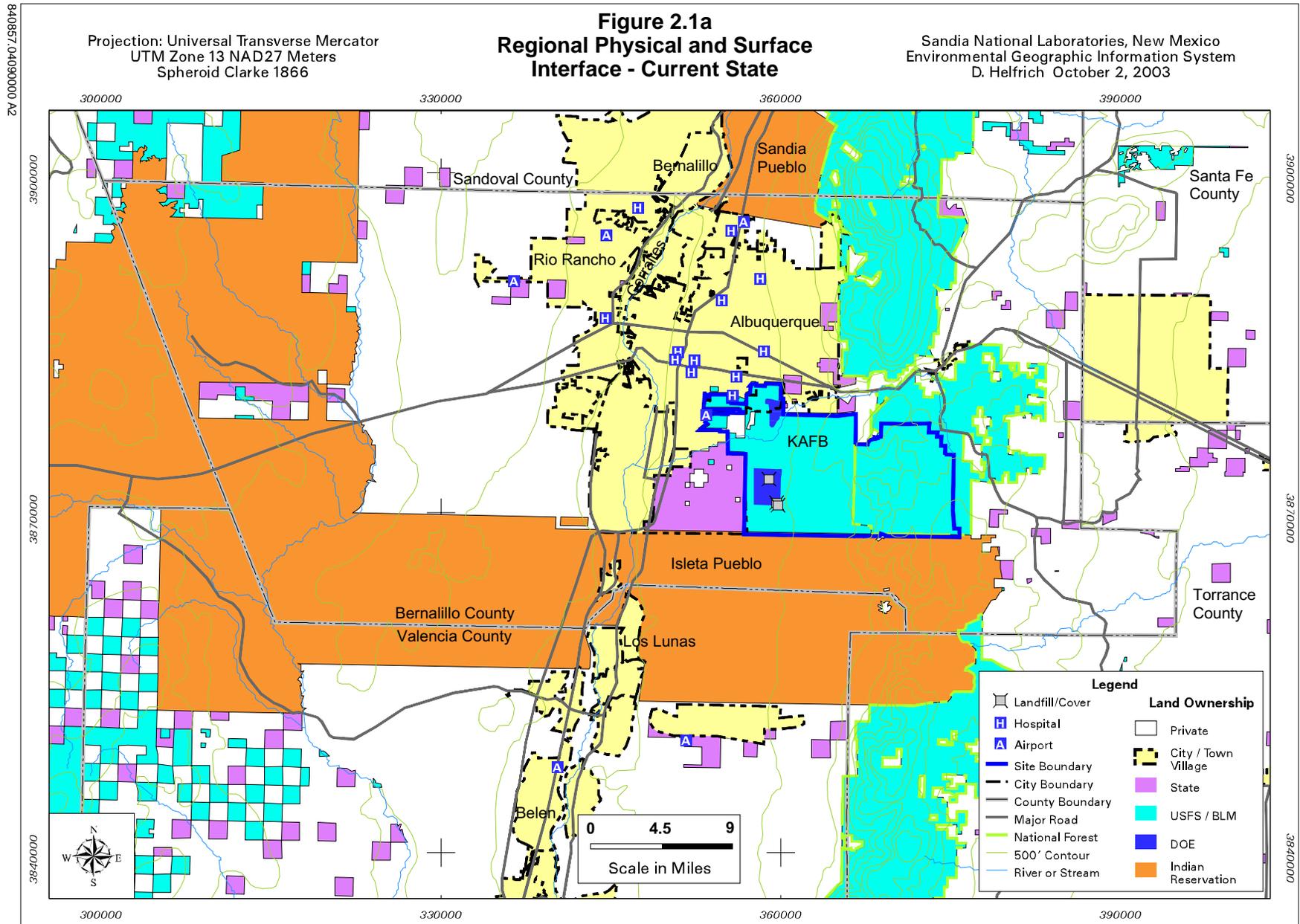


Figure 2.1a Regional physical and surface interface - current state

**Figure 2.1b
Regional Physical and Surface
Interface - End State**

Projection: Universal Transverse Mercator
UTM Zone 13 NAD27 Meters
Spheroid Clarke 1866

Sandia National Laboratories, New Mexico
Environmental Geographic Information System
D. Helfrich October 2, 2003

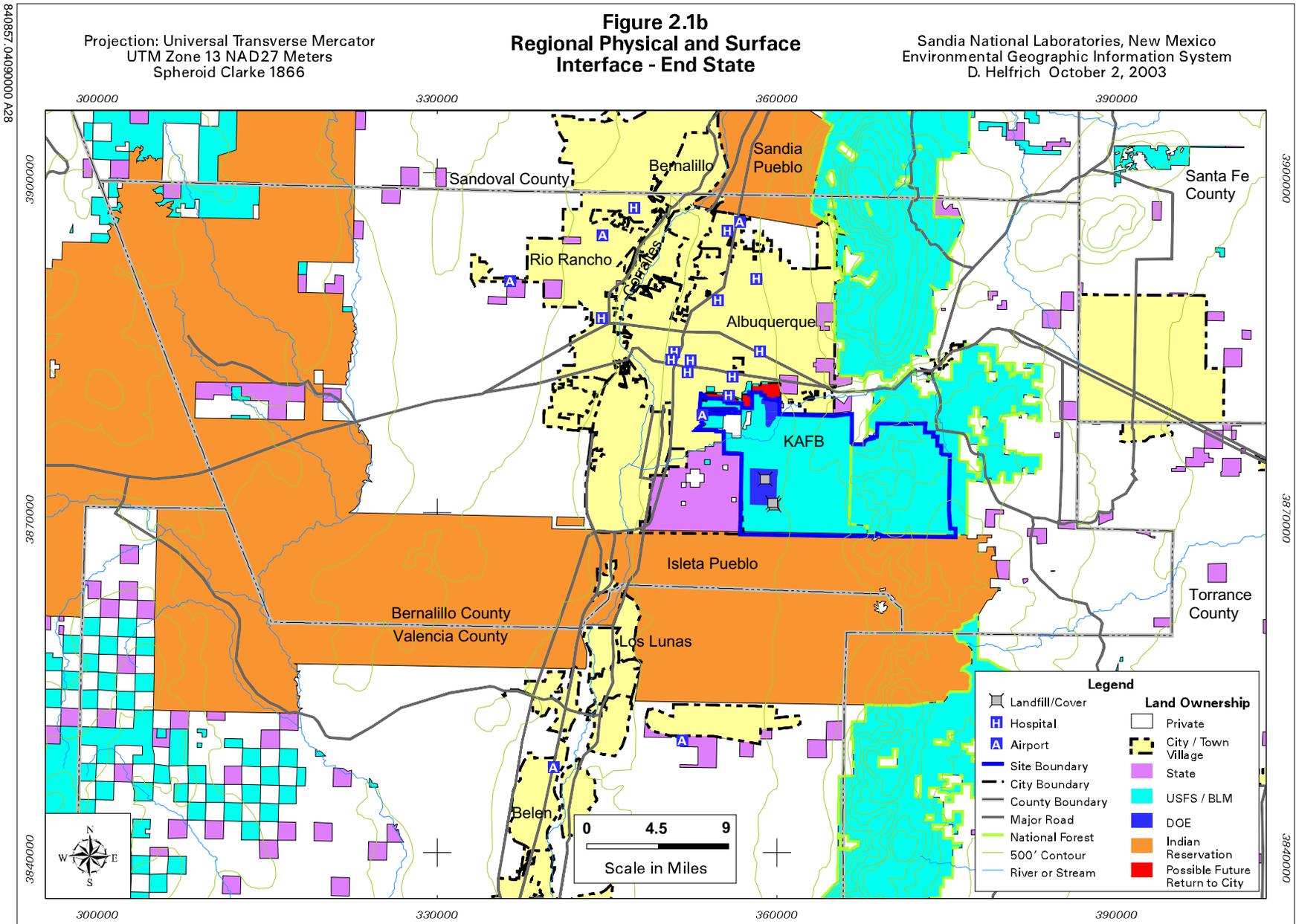


Figure 2.1b. Regional physical and surface interface - end state

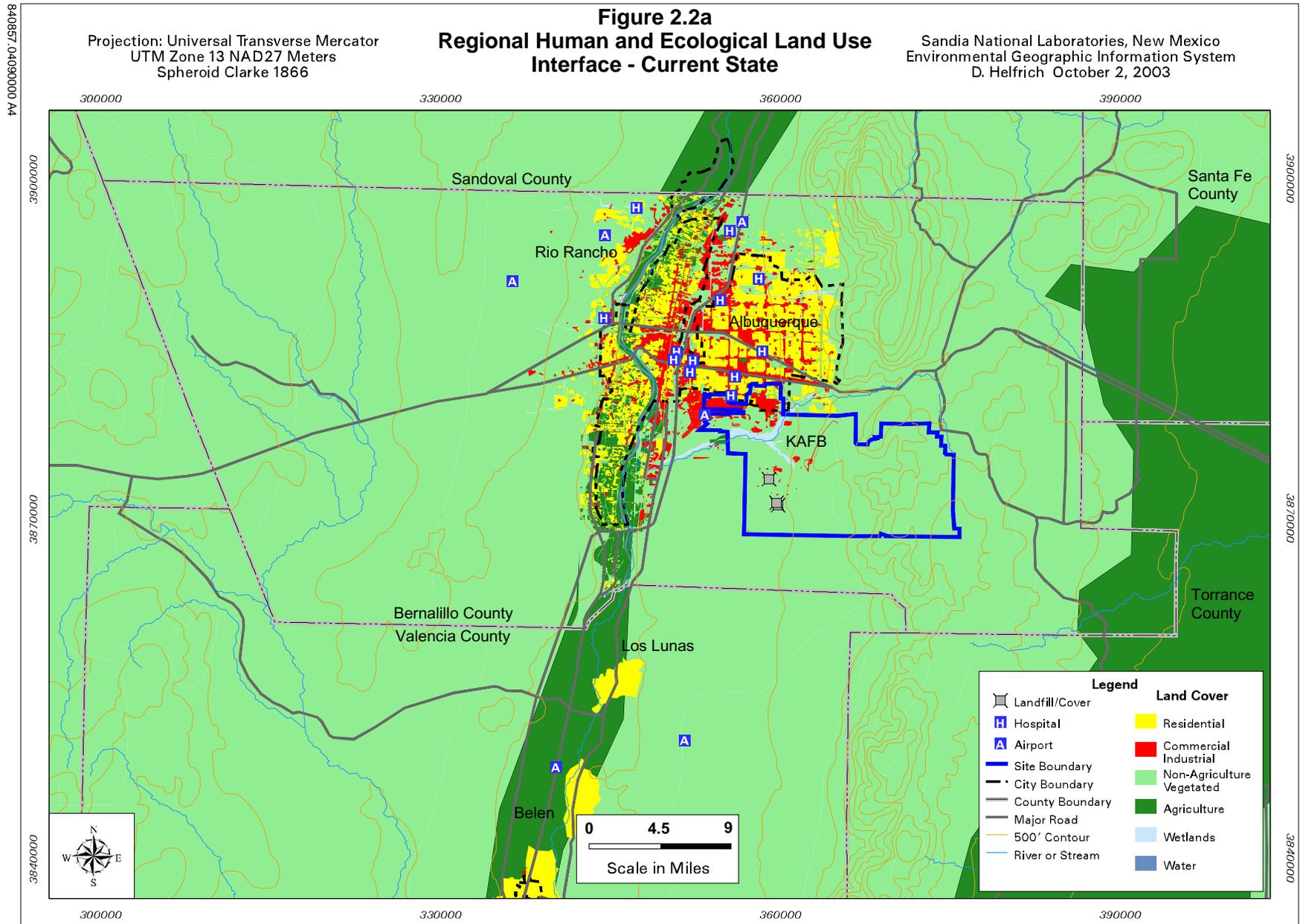


Figure 2.2a Regional human and ecological land use interface - current state

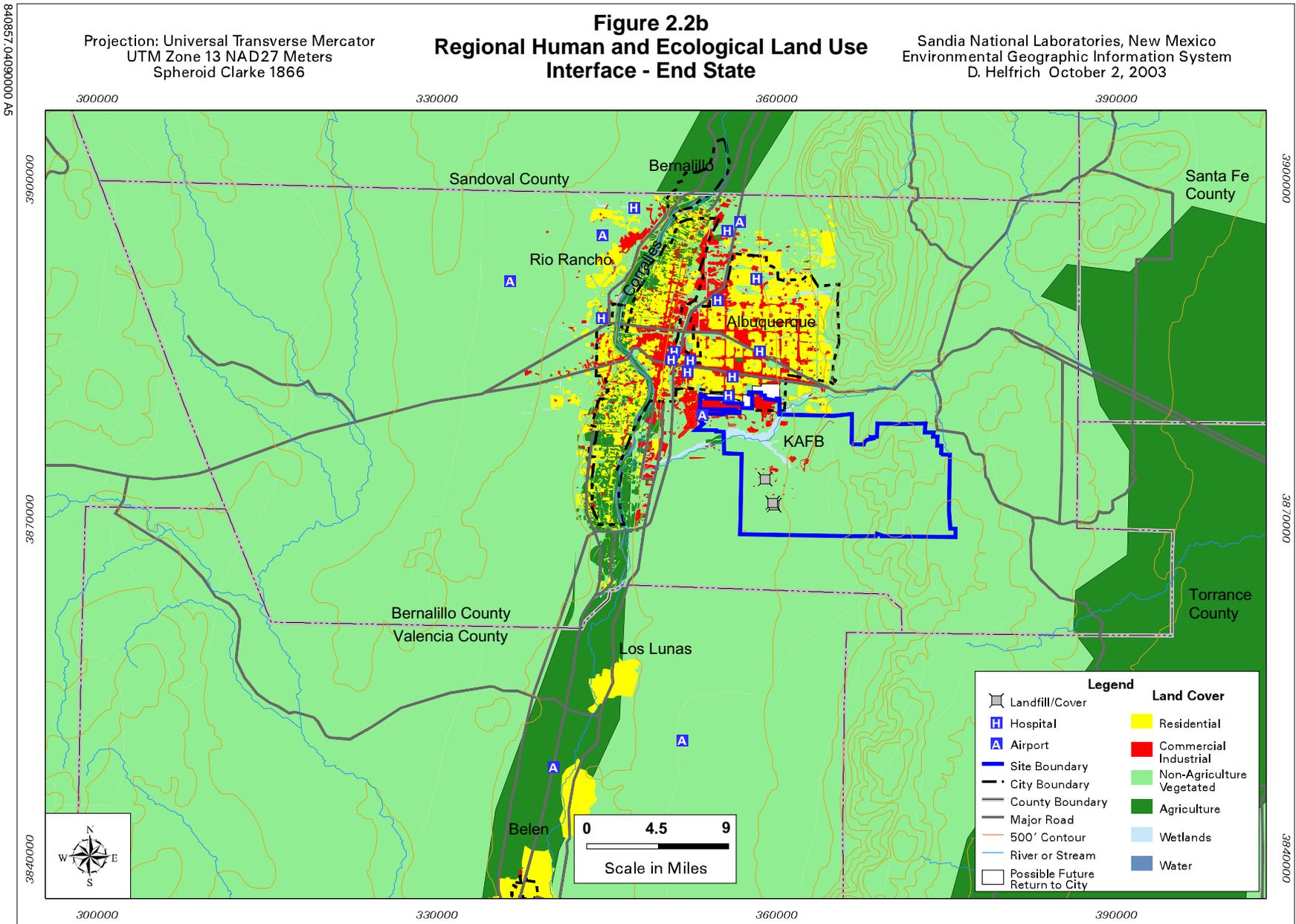


Figure 2.2b Regional human and ecological land use interface - end state - RBES

3.0 SNL/NM SITE CONTEXT

3.1 Physical and Surface Interface

SNL/NM facilities are located on KAFB. The ER Project is responsible for more than 200 ER sites located within the TAs and remote areas of KAFB. The TAs are found within the populated portion of KAFB and in the central area of the base. The physical and surface interface end state differs from the current state only in that the active ER sites are shown, and the boundary of KAFB may show change in property ownership. This is reflected in Figures 3.1a and 3.1b.

3.2 Human and Ecological Interface

KAFB is located on a high, arid mesa about 5 miles east of the Rio Grande in Bernalillo County, New Mexico. The mesa is cut by the east-west trending Tijeras Arroyo, which drains into the Rio Grande. The east side of KAFB north of Tijeras Arroyo is bounded by the southern end of the Sandia Mountains and south of Tijeras Arroyo by the Manzanita Mountains (foothills of the Manzano Mountains). Arroyo del Coyote runs through the central portion of KAFB with Tijeras Arroyo joining Arroyo del Coyote in the northwestern portion of the base.

Most of the area is relatively flat, sloping gently westward toward the Rio Grande. However, the eastern portion of the Complex extends into the canyons of the Manzanita Mountains. The western slope of the Manzanita Mountains facing the Base is precipitous and rough with numerous arroyos. Elevations range from 4,920 feet at the Rio Grande to 7,988 feet at the Manzano Lookout Tower in the Manzano Mountains. The mean elevation of KAFB is 5,348 feet. Figures 3.2a and 3.2b show the human and ecological interface, with the previously discussed potential boundary change.

3.3 Legal Ownership

The majority of the KAFB land is owned by the U.S. Air Force. The entire eastern half consists of land which has been withdrawn from the U.S. Forest Service. Varying internal use permits are in place across much of the complex. SNL/NM ER sites are located on land that has varying use permits, as shown in Figures 3.3a and 3.3b. The area designated as “DOE Fee” indicates lands owned by the U.S. Air Force and leased to the DOE.

The future land-use designations that cover the KAFB are shown in Figure 1.3-3. The future land-use designations were developed with input from all stakeholders, as described previously. There are no changes to communicate to these stakeholders because this RBES Vision document utilizes the same designations.

Three categories of environmental hazards remain from past operations at SNL/NM and include: 1) the materials or residuals left in the engineered units, 2) the low levels of contamination detected in four groundwater areas, and 3) the residual contaminants at the NFA sites that were cleaned up to industrial or recreational risk levels only and did not meet the residential risk criteria. Risks to human health or the environment from these hazards are minimal. These hazards are described in greater detail in Sections 4.1 through 4.3.

Figure 3.1a
Site Context Physical and Surface Interface - Current State

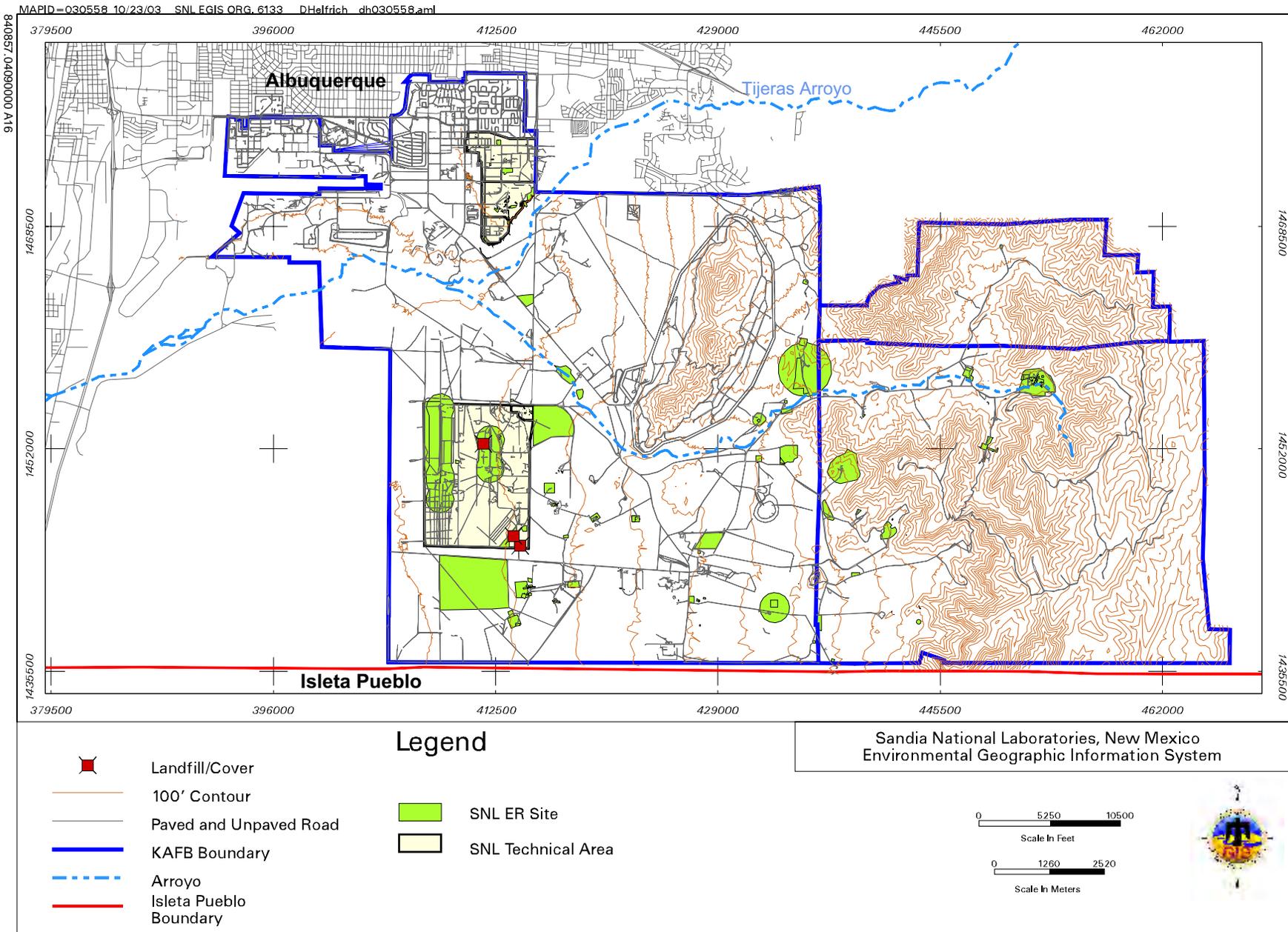
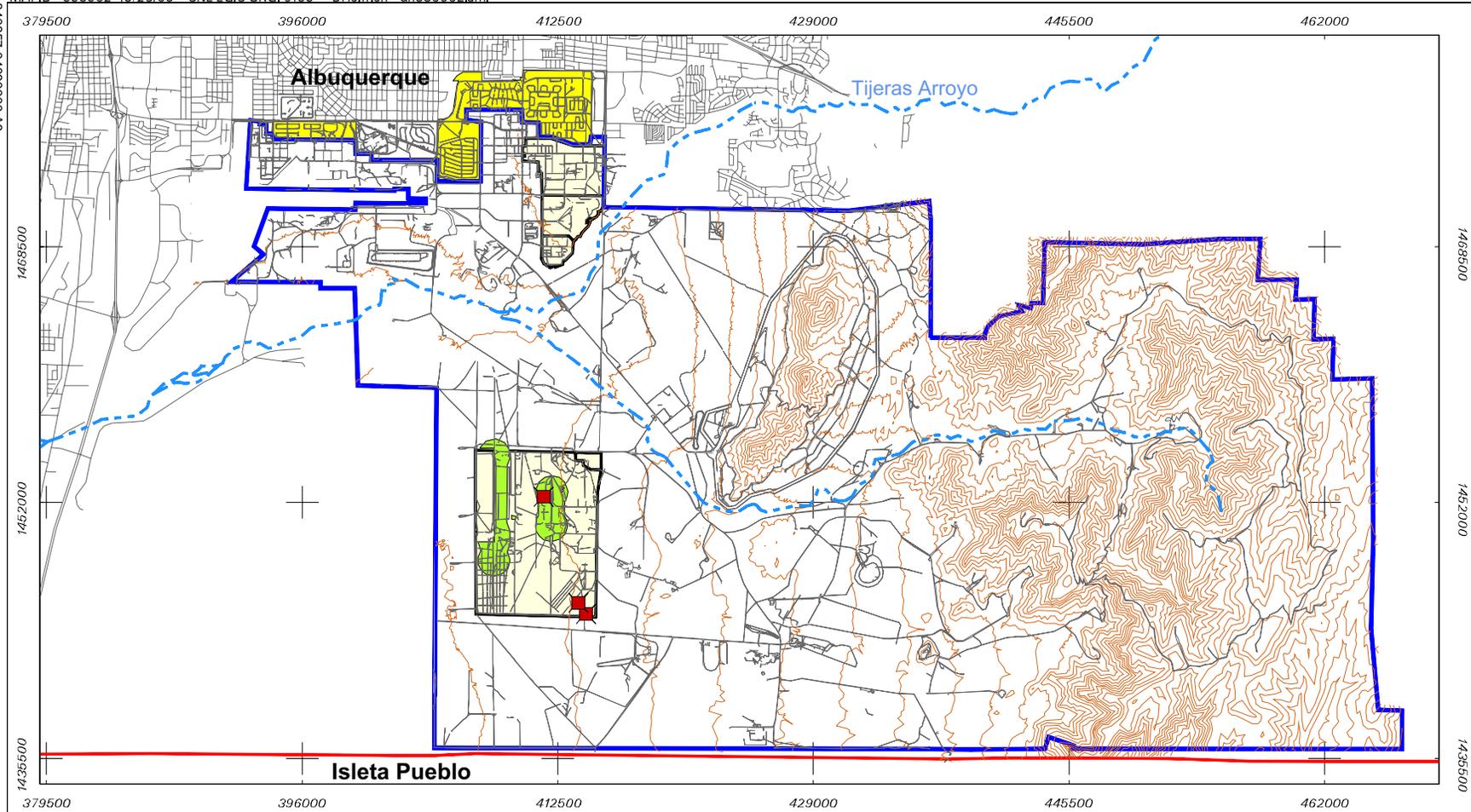


Figure 3.1a. Site physical and surface interface - current state

Figure 3.1b
Site Context Physical and Surface Interface - End State

MAPID=030562_10/28/03_SNL_EGIS.ORG_6133_DHelfrich_dh030562.aml



Legend

- Landfill/Cover
- 100' Contour
- Paved and Unpaved Road
- KAFB Boundary
- Arroyo
- Isleta Pueblo Boundary
- SNL ER Site
- SNL Technical Area
- Possible Future Return to City

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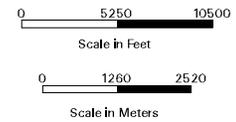


Figure 3.1b. Site physical and surface interface - rbes

Figure 3.2a
Site Context Human and Ecological Interface - Current State

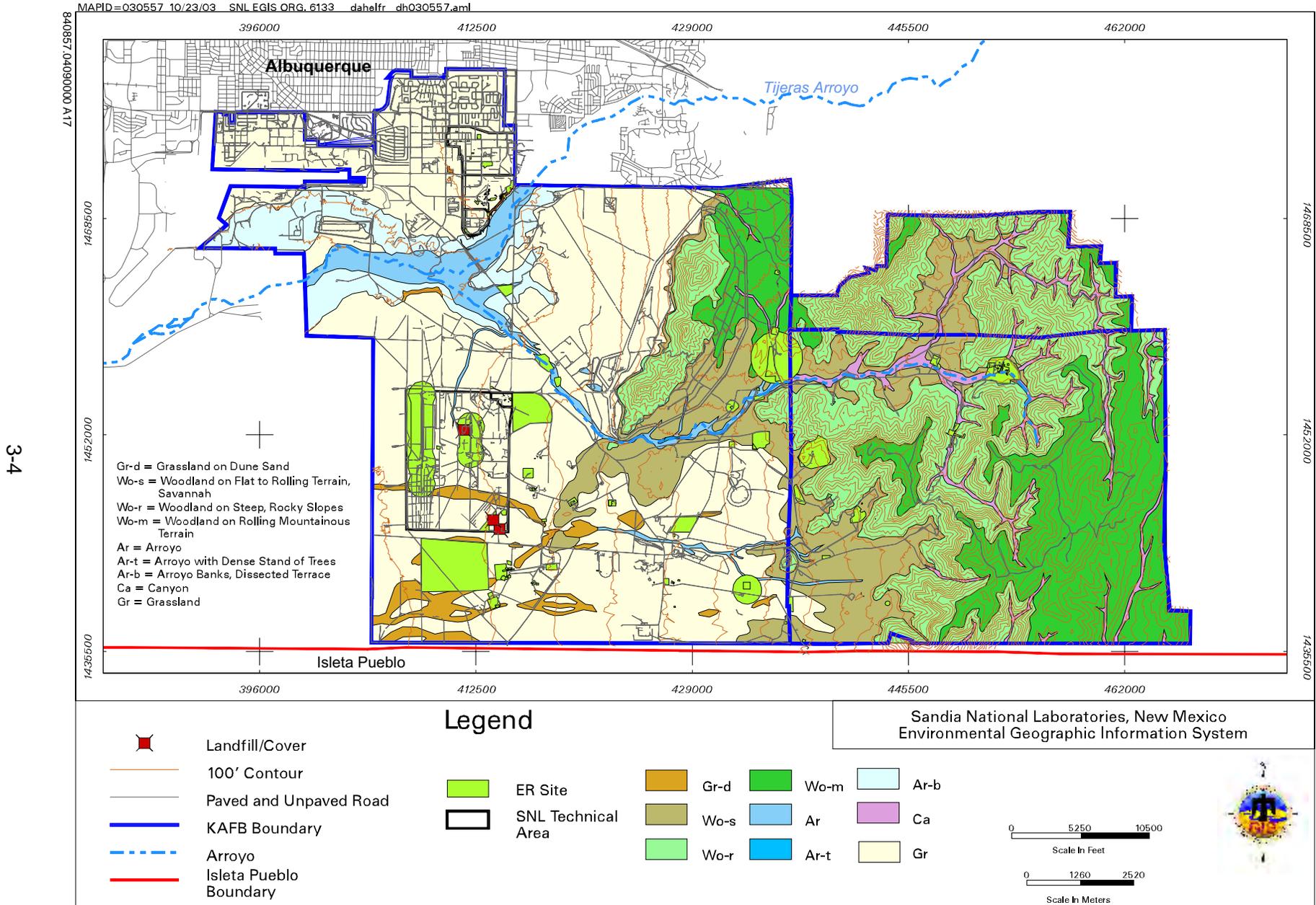


Figure 3.2a. Site human and ecological land use - current state

Figure 3.2b
Site Context Human and Ecological Interface - End State

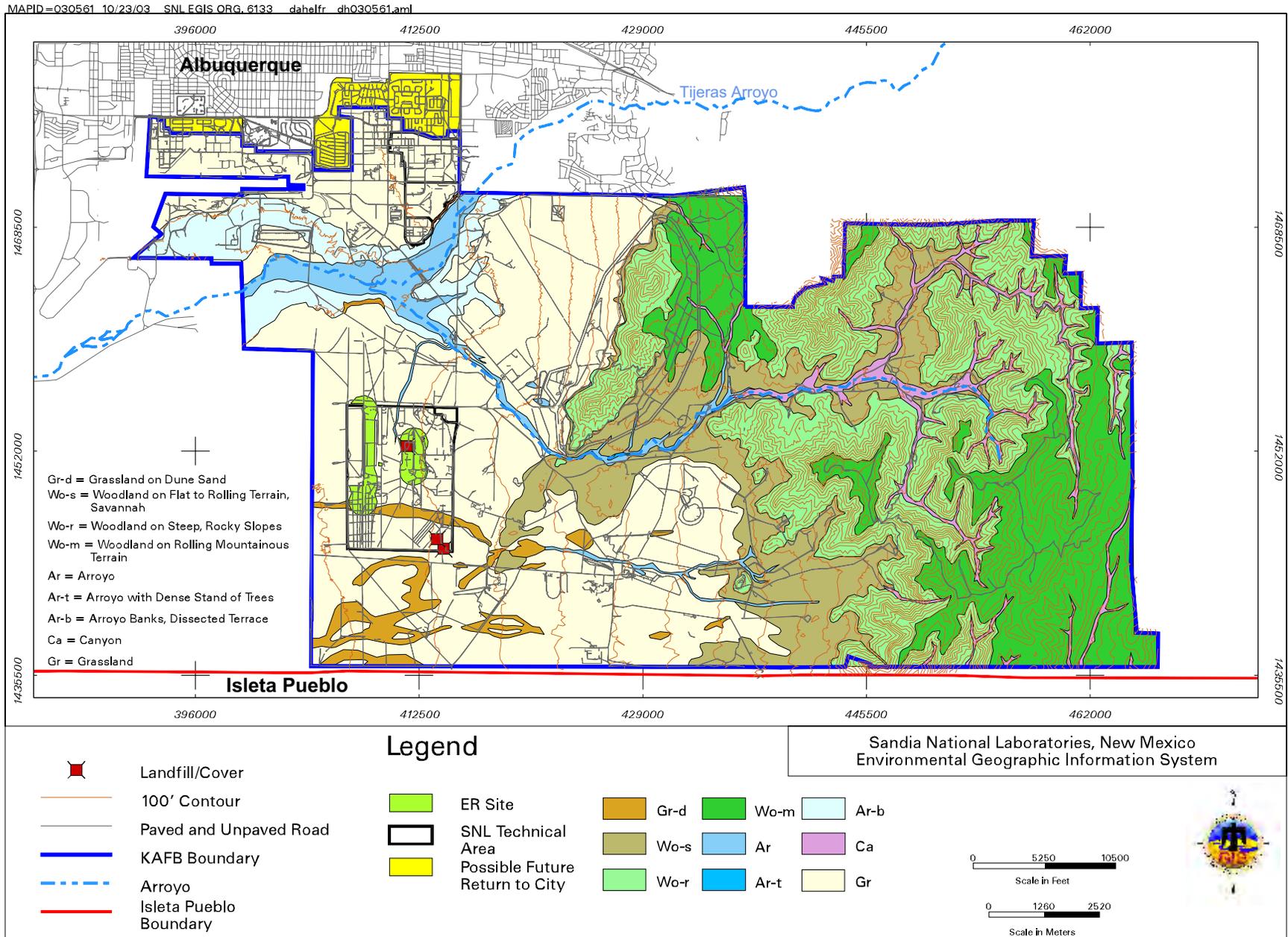
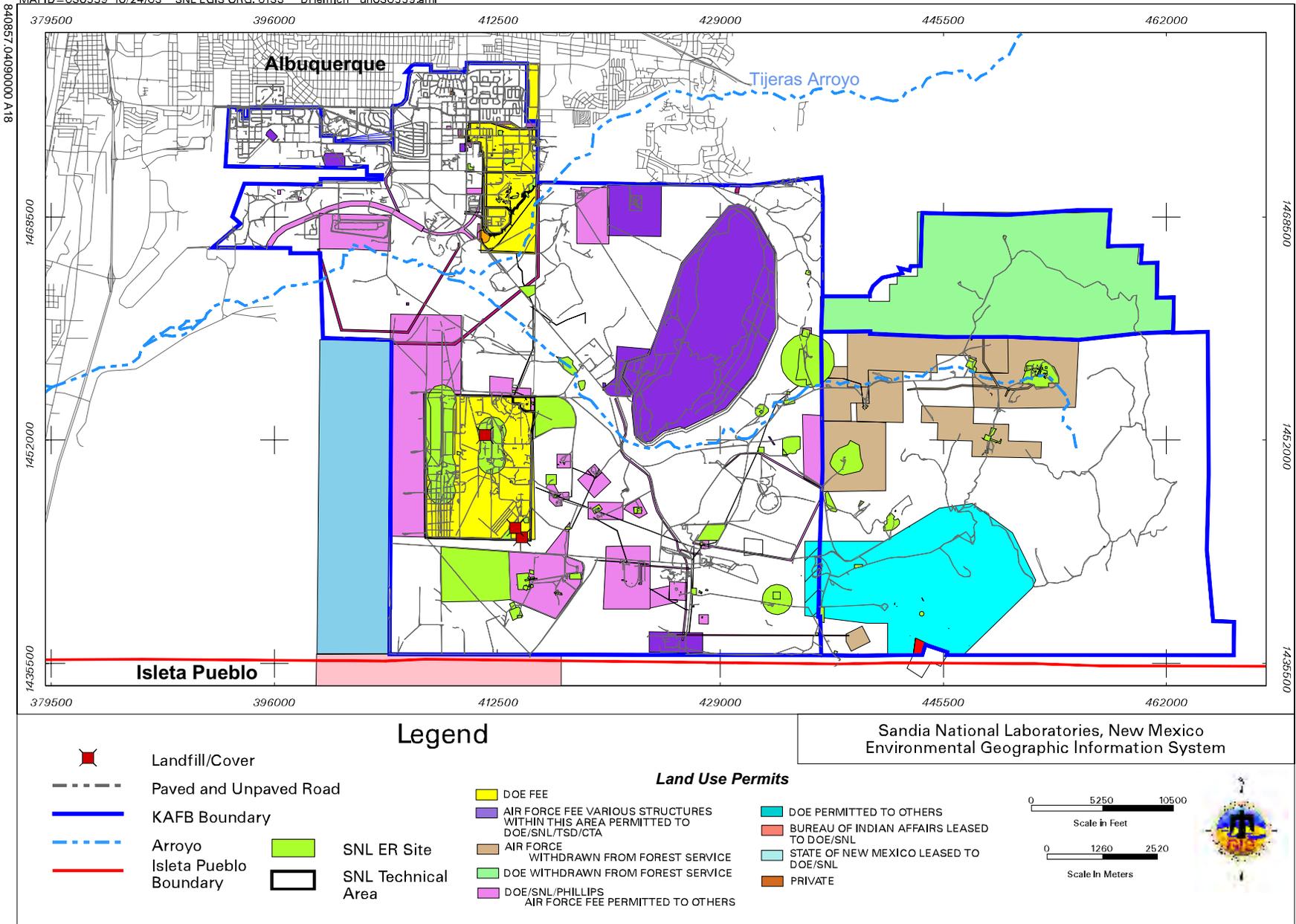


Figure 3.2b. Site human and ecological land use - rbes

Figure 3.3a
Site Context Legal Ownership - Current State

MAPID=030559_10/24/03_SNL EGIS.ORG.6133_DHelfrich_dh030559.aml



3-6

Figure 3.3a. Site legal ownership - current state

Figure 3.3b
Site Context Legal Ownership - End State

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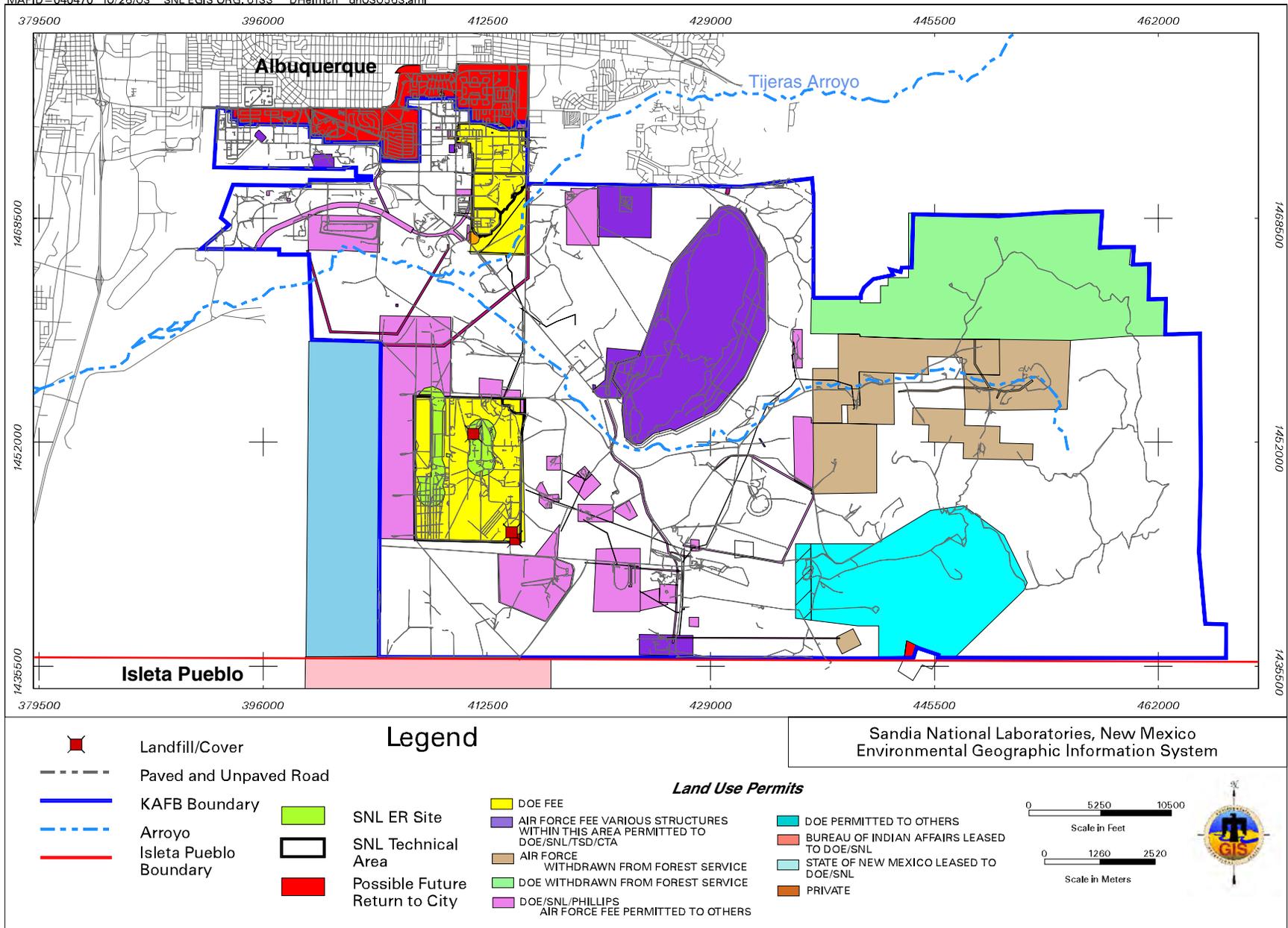


Figure 3.3b. Site legal ownership - rbes

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Because these hazards are located across the entire site, it is not practical to depict them on a single map in this section. Figures in Chapter 4.0 show the engineered units and the groundwater units; the status of the NFA sites is listed in a table.

4.0 HAZARD-SPECIFIC DISCUSSION

Three categories of environmental hazards remain from past operations at SNL/NM and include: 1) the materials or residuals left in the engineered units, 2) the low levels of contamination detected in four groundwater areas, and 3) the residual contaminants at the NFA sites that were cleaned up to industrial or recreational risk levels only and did not meet the residential risk criteria. Risks to human health or the environment from these hazards are minimal. These hazards are described in greater detail in Sections 4.1 through 4.3.

4.1 Engineered Units

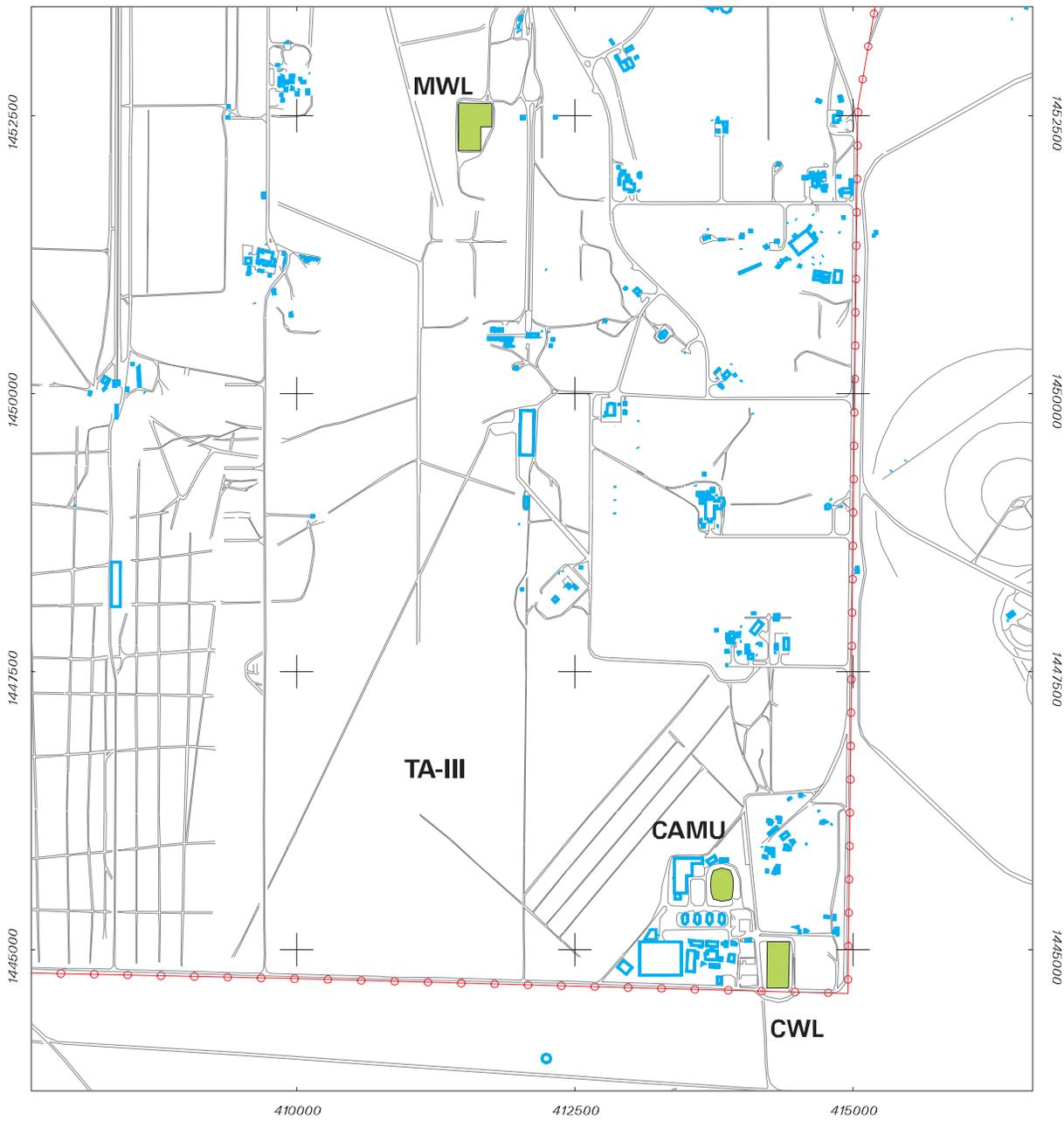
4.1.1 Introduction

The SNL/NM ER Project is responsible for three engineered units: the CWL, the MWL, and the CAMU. All three units are located in TA-3.

The CWL is a 1.9-acre interim status landfill being closed under 20.4.1.600 of the New Mexico Administrative Code (NMAC), incorporating 40 Code of Federal Regulations (CFR) 265 Subpart G and the Closure Plan (SNL/NM December 1992). The CWL is located in the southeastern corner of TA-3 (Figure 4.1.1-1). The CWL was used for the disposal of chemical, radioactive, and solid waste generated by SNL/NM research activities from 1962 until 1985 (liquid disposal ceased in 1981), and as a hazardous waste drum-storage facility from 1981 to 1989. After 1989, the CWL was no longer used as a hazardous waste drum-storage facility.

The MWL occupies 2.6 acres in the north-central portion of TA-3 (Figure 4.1.1-1). The MWL was identified as a SWMU in the August 1993 issuance of the HSWA Module for SNL/NM. Due to the lack of prescriptive HSWA guidance and the practical similarities of landfill corrective action under HSWA and landfill closure under RCRA, the DOE and SNL/NM elected to use the RCRA landfill closure requirements of 40 CFR Part 264 as guidance for remedy selection and closure of the MWL. The MWL accepted containerized and uncontainerized low-level radioactive waste and minor amounts of mixed waste from SNL/NM research facilities and off-site generators from March 1959 to December 1988. The site was used as an aboveground mixed waste drum storage facility in the 1990s. Approximately 100,000 cubic feet of low-level radioactive waste (excluding packaging, containers, demolition and construction debris, and contaminated soil) containing 6,300 curies (Ci) of activity (at the time of disposal) were disposed of at the MWL. The RCRA investigative process identified tritium as the primary contaminant of concern at the MWL. Tritium has been a consistent finding at the MWL since environmental studies were initiated in 1969. Tritium occurs in surface and near-surface soil in and around the classified area of the landfill.

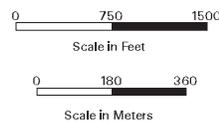
The CAMU is a 19-acre site currently undergoing closure as required by 20 NMAC 4.1.500, incorporating 40 CFR Section 264.552, and the Closure Plan (SNL/NM October 2002). The CAMU, located in the southeastern corner of TA-3 (Figure 4.1.1-1), was used for the staging, treatment, and containment of hazardous remediation waste generated during the excavation of the CWL.



Legend

-  Building / Structure
-  Paved and Unpaved Road
-  TA-III Boundary / Fence
-  Hazard: Landfill / Cover

Figure 4.1.1-1
Map of All Three Engineered Units,
Environmental Restoration Project,
Sandia National Laboratories



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

All three of these units have undergone extensive work and are very nearly at their final risk-based industrial end state. There is still some remaining work necessary to achieve the final RBES for each of the three units. The documents describing the RBES for these units have all been submitted to the regulatory agencies and are either approved as a regulatory permit or are currently being reviewed and commented on by regulatory personnel. Work remaining at the sites is limited to the implementation of the proposed or approved end states.

The CWL was remediated by the implementation of two voluntary corrective measures (VCMs), including vapor extraction (VE) and landfill excavation (LE). During the LE VCM a risk-based approach was developed and approved by the NMED and EPA that determined final cleanup standards for the CWL (SNL/NM August 2000). This approach integrated transport modeling to address the subsurface VOC vapor plume that was largely reduced and controlled through completion of the earlier VE VCM (SNL/NM May 2000). The process of selecting and installing the final remedy is in the last stages of the regulatory process. The final remedy proposed is installation of a simple vegetative cover to be completed at grade. Because this landfill is not a waste-in-place closure, the cover at grade satisfies the requirements for minimal long-term maintenance. This cover has been selected, designed, and proposed to the NMED in a Class 3 Closure Plan modification submittal. According to the CWL Closure Plan, the following three documents were submitted to the NMED in May 2003:

- Corrective Measures Study (CMS) Report (SNL/NM May 2003a):
Evaluates various cover designs and recommends the vegetative soil cover as the preferred final cover
- Remedial Action Proposal (RAP) (SNL/NM May 2003b):
Presents a detailed conceptual design and grading plan for the vegetative soil cover recommended in the CMS Report
- Post-Closure Care Plan and Permit Application (SNL/NM May 2003c):
Details long term monitoring of the groundwater and maintenance of the cover as required by 40 CFR 265 Subpart G

The NMED is currently reviewing this submittal package and issued comments in March 2004. Once comment resolution occurs on all three submittals and the public comment period is completed, the cover will be installed and the site will be graded and detour roads will be removed. In the meantime, the excavation backfilling is proceeding, after receiving regulatory input and verbal approval to proceed. Some waste still remains at the site and some demobilization of site equipment, supplies, and temporary structures are in progress. Although not anticipated based on discussions with NMED personnel, significant changes to the final remedy or post-closure care requirements may be deemed necessary by the NMED. This contingency has been identified as a risk to the expected end state.

The MWL poses acceptable risk without remedial action and is currently in the CMS process with a final waste-in-place remedy as the preferred alternative. This remedy was detailed in the CMS report, delivered to the NMED (SNL/NM May 2003d). This final remedy selection document proposes a vegetative cover with a monitoring network installed in the cover to detect the migration of any contaminants. The final selection, including extensive public comment and regulatory input, and construction of this cover is expected to occur during the next two years.

The CAMU has stored, treated and placed waste into the containment cell. The final cover has been installed and the unit is undergoing regulatory closure. The regulators have approved the end state documents for this site. The work remaining to achieve the RBES for this unit

includes the final site grading and removal of a few temporary structures and storage buildings, the removal of the remaining waste (predominantly leachate collected from the containment cell), records management, and the reporting and submission of final regulatory deliverables. Monitoring of this unit is required by the permit and is included in the costs of closure until 2006.

The conceptual site models for each of these engineered units are distinct and will be presented separately in the following sections.

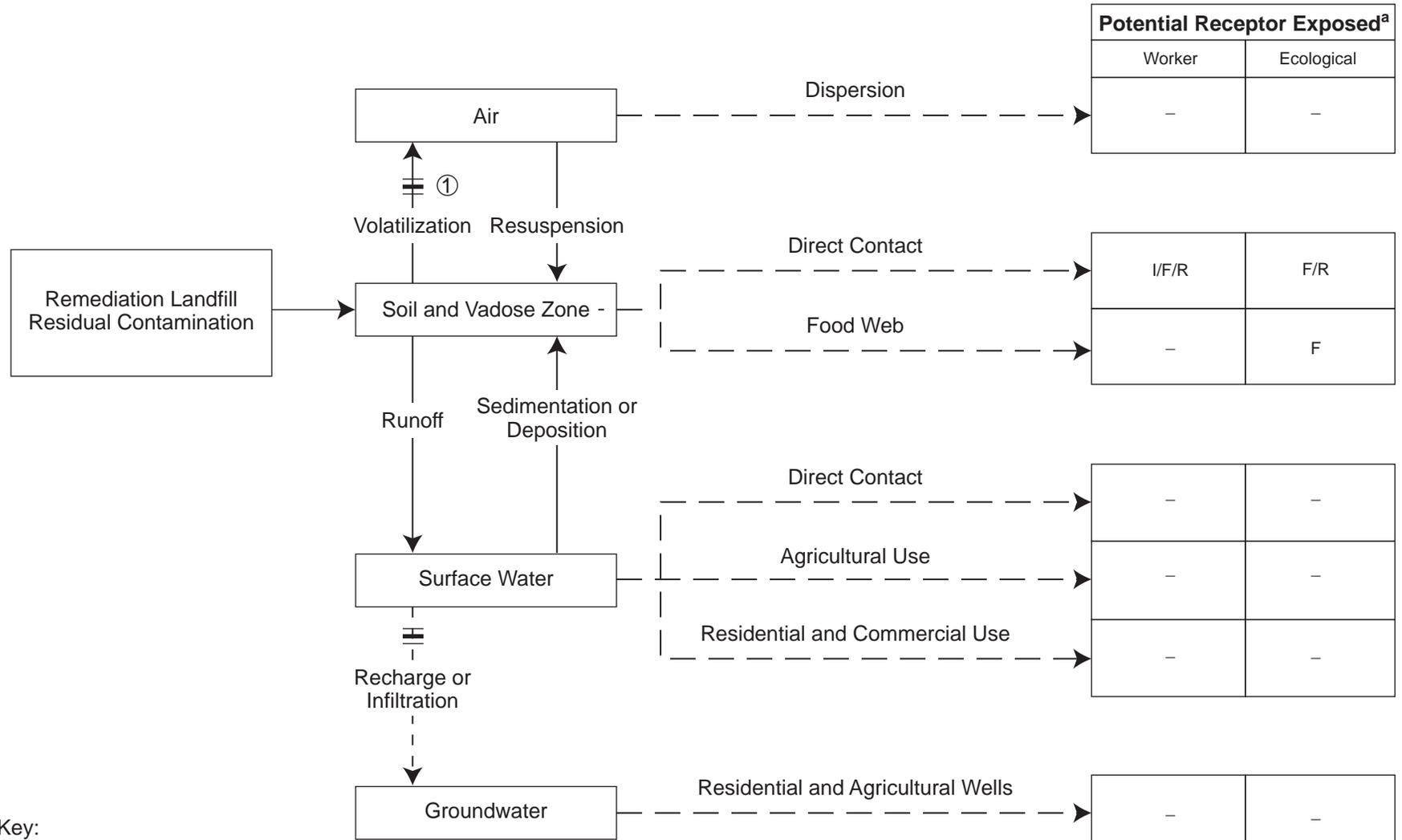
4.1.2 CWL Conceptual Site Model

Figure 4.1.2-1 presents the Conceptual Site Model (CSM) for the CWL in its current and end state. Table 4.1.2-1 provides a summary of the associated human health risk information for the CWL. The CSM is documented in detail in the risk assessment presented in the LE VCM final report (SNL/NM April 2003), which demonstrates that the CWL meets the NMED-approved risk-based cleanup standards designed to protect human health and the environment (SNL/NM August 2000). The current and future land-use designation for the CWL is industrial. This CSM provides a visual presentation of site exposure pathways at the CWL. When used in conjunction with the End-State Vision, this CSM shows how exposure conditions at the CWL have been eliminated, mitigated, or controlled.

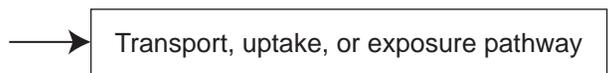
As shown in Figure 4.1.2-1, summarized in Table 4.1.2-1, and detailed in the risk assessment presented in the LE VCM final report (SNL/NM April 2003), the CWL has been remediated to risk-based cleanup standards negotiated and approved by the NMED and EPA (SNL/NM August 2000) based on industrial land use. This risk-based approach determined acceptable residual soil concentrations for the 0- to 5-foot and the greater-than-5-foot-bgs depth ranges, and integrated transport modeling for the remaining VOC vapor plume in the subsurface. Thus, the remaining sources of contamination at the CWL were included in this risk assessment and factored into the development of the CWL-specific cleanup standards for the LE VCM.

The current and end state conditions of the CWL are both represented in Figure 4.1.2-1. Although the CWL is only partially backfilled (as of December 2003), the only remaining actions to achieve the end state include monitoring, completion of backfilling, and installation of the final cover. Thus the barrier shown in Figure 4.1.2-1 represents both the backfill material (current state), and the backfill material plus the engineered vegetative soil cover (proposed end state). Installation of a final cover is required as part of the baseline assumptions included CWL risk-based approach (SNL/NM August 2000), and will not occur until NMED approves the CMS report and RAP. However, during this interim period (not expected to exceed two years) the backfill material will represent a partially completed barrier that is close to the end state condition.

No additional cleanup activities are required at the CWL because the risk-based cleanup standards have been achieved. If ongoing monitoring indicates a failure of the VCMs, a process is described in the Post-Closure Care Plan to evaluate the data, determine an appropriate course of action, and work with the NMED to implement the selected action(s) (SNL/NM May 2003c). The ultimate course of action will be determined based on the monitoring data and the determined cause of failure. Post-end state monitoring is required for the CWL in accordance with 40 CFR 265 Subpart G and is detailed in the CWL Post-Closure Care Plan that was submitted to the NMED in May 2003 (SNL/NM May 2003c).



Key:



- a The current and future land use is industrial
- I Inhalation
- D Dermal Contact
- F Ingestion
- R External Irradiation
- ① Barrier under current conditions/Engineered barrier under end state conditions

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Figure 4.1.2-1
CWL CSM - Current and End State

Table 4.1.2-1
Human Health Risk Summary for Identified Hazard Areas - CWL

Hazard Area	Land Use	Risk	Risk Scenario	Contaminant Description	Concentration (mg/kg)	Baseline Risk Level	Cleanup Goal	Basis for Cleanup Goal	Actual or Expected Post-cleanup Concentration Or Risk Level
CWL	Industrial	No	Industrial	No post cleanup chemicals of concern exceeded allowable risk levels	NA	NA	Industrial risk	Regulator approved risk based	Cleanup completed to allowable risk levels

CWL = Chemical Waste Landfill.

NA = Not Applicable.

mg/kg = Milligram(s) per kilogram.

4.1.2.1 *Description (Hazard Area Summary)*

The CWL hazard area is comprised of residual soil contamination and a subsurface VOC vapor that originated from the disposal of organic liquids during the operation phase of the CWL. Liquid organic waste was disposed of at the CWL from 1962 until 1981. As the result of two interrelated VCMs, the VOC vapor plume was significantly reduced, and the original buried waste and associated highly contaminated soil was excavated. More VCM information is provided in Section 4.1.2.2. Remaining hazards at the site include residual organic and inorganic soil contamination surrounding the former CWL disposal areas in the subsurface, low-level radiological soil contamination, and a greatly reduced VOC vapor plume in the vadose zone beneath the CWL. Figures 4.1.2-2 and 4.1.2-3 show the CWL current and end-state hazards.

4.1.2.2 *Primary and Secondary Sources*

Primary sources have been removed from the CWL, and only two secondary sources remain, including residual organic and inorganic soil contamination (Figure 4.1.2-2). In addition, a greatly reduced VOC vapor plume is present in the vadose zone beneath the CWL (Figure 4.1.2-2). Residual soil contamination and low-level radiological soil contamination are described in detail in the "Chemical Waste Landfill–Landfill Excavation Voluntary Corrective Measure–Final Report" (SNL/NM April 2003), which also includes a risk assessment. The VOC vapor plume is described in detail in the "Chemical Waste Landfill Vapor Extraction Voluntary Corrective Measures Final Report" (SNL/NM May 2000).

The depth of the subsurface VOC vapor plume is shown in Figure 4.1.2-3, which is a cross-section view across the main portion of the remaining plume. The lateral extent of the VOC vapor plume covers most of the CWL boundary and extends to the northwest and southeast beyond the CWL boundary. The VE VCM targeted VOC vapor concentrations identified in five specific depth ranges within the unsaturated zone and determined associated VOC vapor reduction goals that would be protective of groundwater based on transport modeling (SNL/NM May 2000). These goals were achieved based on monitoring results and soon after beginning the VE VCM, groundwater levels for trichloroethene (TCE) were reduced to levels below the EPA's maximum contaminant level (MCL) of 5 parts/billion. Transport modeling of the remaining VOC vapor plume after completion of the VE VCM was integrated into the development of risk-based cleanup standards (SNL/NM August 2000) and indicated the VOC vapor plume would not adversely impact groundwater such that the TCE MCL would be exceeded.

4.1.2.3 *Release Transport or Exposure Mechanisms*

Transport and exposure pathways are addressed in the risk assessment presented in the LE VCM (SNL/NM April 2003). Transport modeling for the VOC vapor plume was addressed as part of the development of NMED and EPA approved final cleanup standards for the CWL (SNL/NM August 2000). The following information is taken directly from the referenced report.

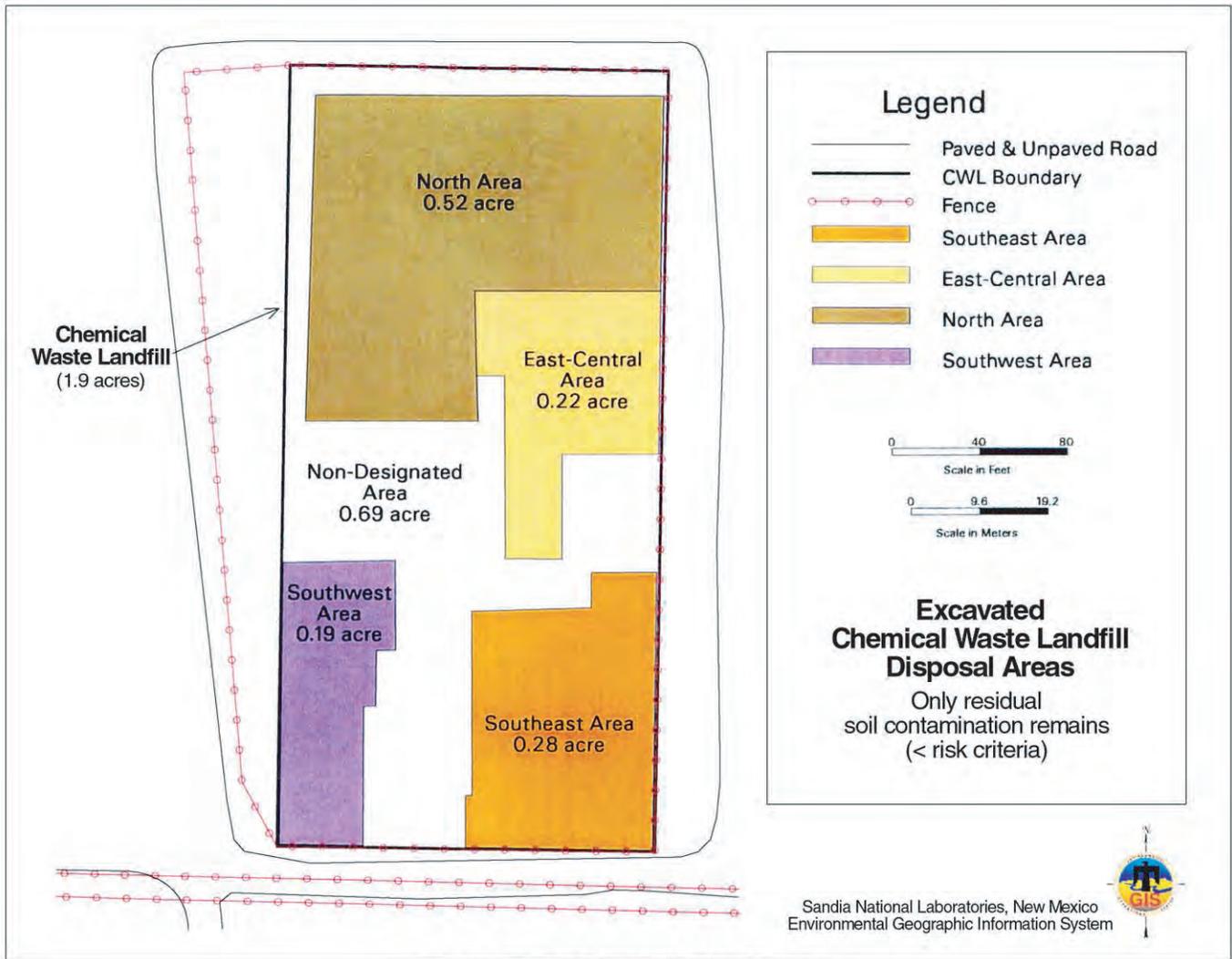


Figure 4.1.2-2 CWL Hazard Area - Current State

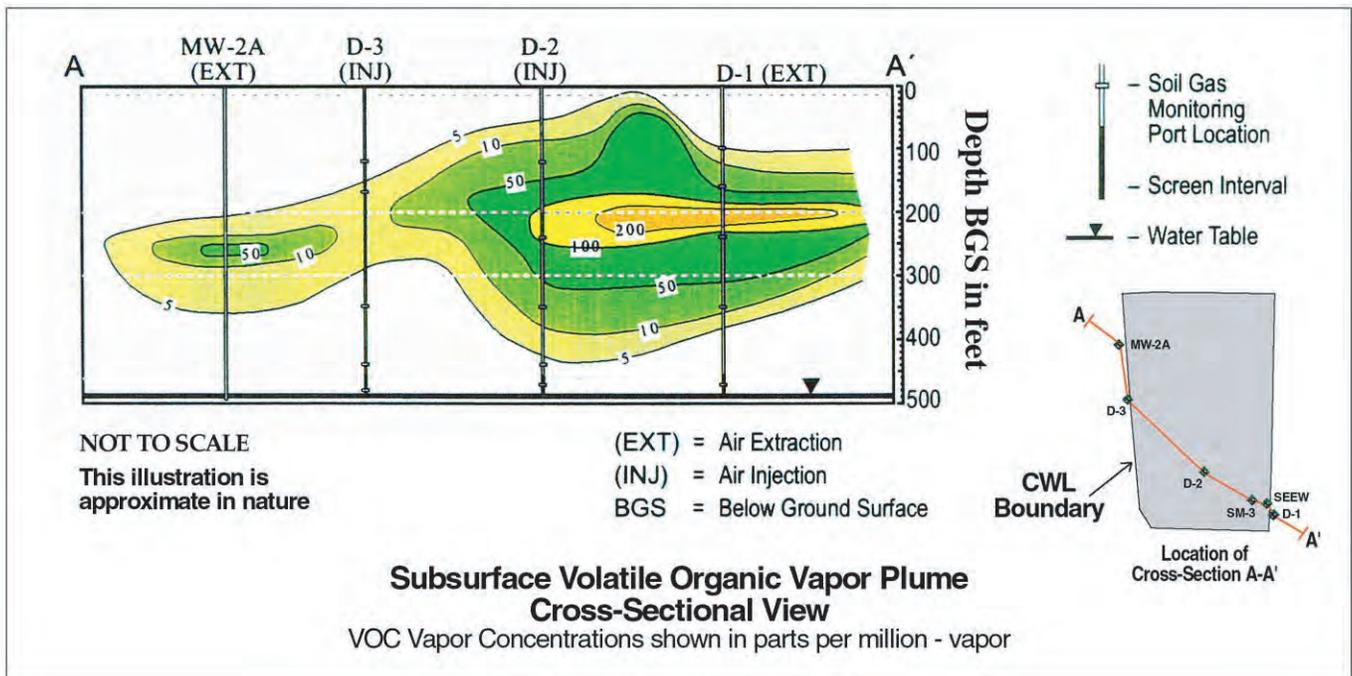


Figure 4.1.2-3 CWL Hazard Area - End State

The potential source of COCs at the CWL are backfilled and unexcavated soil with residual levels of contamination. Wind, water, and biota are natural mechanisms of transport for these COCs. The potential for wind and surface-water transport is temporally limited because the contaminated soil will be exposed only at the surface until backfilling is complete and the site is covered to grade with clean soil and revegetated. During this time, however, some transport of contaminated soil by wind is possible.

Water at the CWL is received as precipitation (rain or occasionally snow). The annual precipitation for the area, as measured at Albuquerque International Sunport, is 8.1 inches and will either evaporate at or near the point of contact, infiltrate into the soil, or form runoff.

Because both run-on and runoff at the CWL are controlled by a surrounding swale, surface water is not a potential transport mechanism for COCs at this site during the period of backfilling, and no residually contaminated soil will be exposed to surface-water transport following completion of the VCM.

Water that infiltrates into the soil will continue to percolate through the soil until field capacity is reached. COCs desorbed from the soil particles into the soil solution may be leached into the subsurface soil with this percolation. Because the estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall, virtually all of the moisture associated with infiltration is expected to evaporate. Groundwater at this site is approximately 485 feet bgs; therefore, the potential for COCs to reach groundwater through the unsaturated zone above the water table is very limited. This is not based on the presence of barriers, but on the limited annual precipitation, the very thick (485 feet) vadose zone at the CWL, and infiltration field studies conducted at the nearby MWL.

The site has been highly disturbed by the excavation and backfilling operations and is essentially devoid of vegetative cover. For this reason, biota uptake and food chain transfer are not potential transport mechanisms for COCs at this site. Food chain uptake is not expected to be a potential transport mechanism in the future because the site will ultimately be covered with clean soil and revegetated.

The COCs at the CWL include both inorganic and organic analytes. The inorganic COCs are elemental in form and therefore are generally not considered to be degradable. Radiological COCs, however, undergo decay to stable isotopes or radioactive daughter elements. Other transformations of inorganic constituents may include changes in valence (oxidation/reduction reactions) or incorporation into organic forms (e.g., the conversion of selenite or selenate from soil to seleno-amino acids in plants). The rate of such processes will be limited by the arid environment at this site. Degradation processes for organic COCs may include photolysis, hydrolysis, and biotransformation. Photolysis requires light, and therefore takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water and may occur in the soil solution. Biotransformation (i.e., transformation due to plants, animals, and microorganisms) may occur; however, biological activity may be limited by the arid environment at this site.

Table 4.1.2-2 summarizes the fate and transport processes that may occur at the CWL. COCs at this site occur as residual contaminants in unexcavated and backfill soil, and include both inorganic constituents (metals and radionuclides) and organic constituents. Wind is a potential mechanism for transport of these COCs until backfilling is complete and the site is covered with clean soil; however, transport by surface water is controlled by a swale surrounding the site. Leaching of COCs into the groundwater at this site is highly unlikely due to the low rainfall, high evaporation rate, and depth to groundwater. Essentially no uptake into the food chain is expected at this site because of the highly disturbed nature of the habitat, and the potential for future uptake of COCs by biota will be eliminated by the final covering of clean soil. For inorganic COCs, the potential for degradation is low. Decay of radiological COCs is insignificant due to their long half-lives (except for tritium). Degradation and/or biotransformation of some organic COCs may be a more significant mechanism of loss.

Table 4.1.2-2
Summary of Fate and Transport at the CWL

Transport and Fate Mechanism	Existence at the CWL	Significance
Wind	Yes	Low
Surface runoff	No	None
Migration to groundwater	No	None
Food chain uptake	No	None
Transformation/degradation	Yes	Moderate to low

CWL = Chemical Waste Landfill.

4.1.2.4 *Temporary Barriers and Controls*

In its present state, the CWL has several mechanisms in place that address the potential exposure pathways to current and future receptors. The primary barrier is the current layer of clean fill over the CWL excavation, which is approximately 75 percent backfilled. Backfilling will be completed in FY 2004 and after the final cover is approved and installed, there will be a minimum of 5 feet of clean fill covering residual contamination at depth in the CWL. The currently proposed final cover will minimize the infiltration of surface water and also minimize the potential for exposure of onsite workers and future industrial receptors to residual contamination at depth at the CWL.

Additional controls include existing access restrictions to the CWL, which will remain in place for the post-closure care period to limit human access and inadvertent human intrusion. These access controls include the CWL hazard area fence, as well as controls for access into TA-3 and KAFB. Access into TA-3, where the CWL is located, is strictly controlled. TA-3 is a locked, property control area that requires access through an electronically-controlled security gate for entry. Finally, TA-3 is located within the KAFB boundary, with its own strict access controls and closely-guarded perimeter. Post-closure monitoring (including groundwater), maintenance, and access restrictions; maintaining the land-use designation as industrial; and maintaining additional land-use restrictions are detailed in the CWL Post-Closure Care Plan (SNL/NM May 2003c). Institutional controls (ICs) will be implemented through the CWL Post-Closure Care Plan (SNL/NM May 2003c) after NMED approval and the LTES Plan.

4.1.2.5 *Remediation, Mitigation and Other Interventions*

Based on the site characterization work performed between 1992 and 1995, a VOC vapor plume was determined to be the source of the elevated levels of TCE in the groundwater (SNL/NM October 1995). In 1996, an expedited approach to the CWL Corrective Action program was proposed to accelerate risk reduction through source removal; mitigate groundwater impacts; and reduce the complexity, schedule, and cost of final closure. The expedited strategy included the VE and LE VCMs. The original waste in the landfill was the source for the VOC vapor plume. Therefore, the two VCMs were developed to address the two main sources of contamination, and to mitigate the impact to groundwater beneath the CWL.

The VE VCM was performed from May 1997 to July 1998 and was successful in significantly reducing the concentrations of subsurface VOC vapor contamination such that groundwater concentrations of TCE were reduced below the regulatory limit. The LE VCM was performed from September 1998 to February 2002. All former disposal areas and associated highly contaminated soil were completely excavated, involving the removal of more than 52,000 cubic yards of contaminated soil and debris. More detailed information is presented in the two following VCM final reports, which were submitted to the NMED:

- “Chemical Waste Landfill Vapor Extraction Voluntary Corrective Measures Final Report” (SNL/NM May 2000)
- “Chemical Waste Landfill–Landfill Excavation Voluntary Corrective Measure–Final Report” (SNL/NM April 2003)

4.1.2.6 *Receptors*

The potential current and future human health receptors for each site were established based on the “Baseline for Future Use Options” (DOE et al. September 1995). For SNL/NM, the categories for potential receptors included industrial and residential. The industrial land use is the current and future designation for the CWL. However, a residential receptor was evaluated in accordance with NMED guidance and cleanup levels were based on industrial land use. For a detailed description of the potential receptors at the CWL, refer to Annex A of the LE VCM final report that contains the risk assessment (SNL/NM April 2003).

As described in detail in “Predictive Ecological Risk Assessment Methodology, Environmental Restoration Program, Sandia National Laboratories, New Mexico” (IT July 1998), the ecological receptors include a nonspecific perennial plant that was selected as the receptor to represent plant species at the site. The deer mouse (*Peromyscus maniculatus*) and the burrowing owl (*Speotyto cunicularia*) are used to represent wildlife use. Because of its opportunistic food habits, the deer mouse is used to represent a mammalian herbivore, omnivore, and insectivore. The burrowing owl is used to represent a top predator at this site.

4.1.2.7 *Additional Information*

The risk assessment presented in the LE VCM final report (SNL/NM April 2003) evaluates the adequacy of the backfill materials and the adequacy of the extent of the excavation, using the criteria established in the previously approved risk-based approach (SNL/NM August 2000).

Previous investigations have addressed soil contamination and VOC vapor-phase contamination in the area beneath the current excavation and the surrounding subsurface, which are detailed in the following reports:

- “Chemical Waste Landfill—Unsaturated Zone Contaminant Characterization Report” (SNL/NM November 1993)
- “CWL Groundwater Assessment Report” (SNL/NM October 1995)
- “Chemical Waste Landfill—Vapor Extraction Voluntary Corrective Measures—Final Report (SNL/NM May 2000)
- CWL Quarterly Progress Reports (1991 to present)

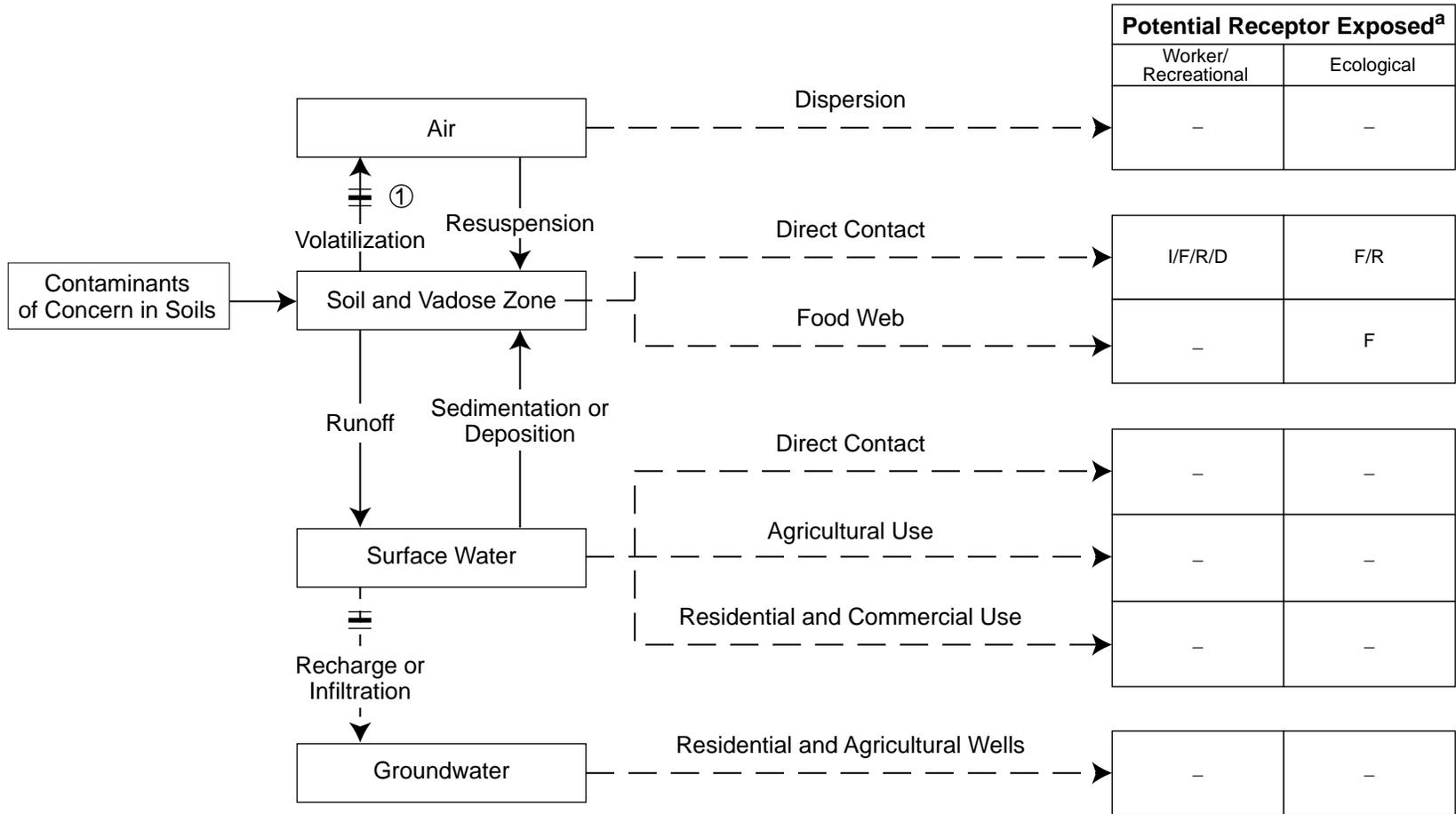
Installation of the final CWL cover will occur after the RAP (SNL/NM May 2003b) is approved by the NMED. Proposed post-closure care monitoring and surveillance and maintenance are detailed in the CWL Post-Closure Care Plan and Permit Application (SNL/NM May 2003c), and will be implemented after NMED approval. The Post-Closure Care Plan also addresses ICs, including land-use restrictions associated with the CWL.

4.1.3 MWL Conceptual Site Model

Figure 4.1.3-1 presents the CSM for the MWL in its current and end state. Table 4.1.3-1 provides a summary of the associated human health risk information. In the current state, the MWL is comprised of unlined disposal pits and trenches that contain the original buried waste covered with local soils compacted at grade. The assumed end state includes an engineered, centrally crowned vegetative soil cover installed above local grade. The current and future land-use designation for the MWL is industrial. Because the risk posed by the MWL does not change significantly relative to either the current or end state (in both cases the site poses acceptable risk), Figure 4.1.3-1 reflects both scenarios. The barrier shown in Figure 4.1.3-1 represents both the current-state operational cover and the proposed end-state engineered cover. The engineered vegetative soil cover is not driven by risk assessment results as shown in Figure 4.1.3-1.

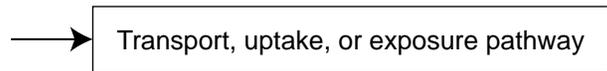
The CSM is documented in detail in the risk assessment for the MWL, Appendix I of the MWL CMS final report (SNL/NM May 2003d). This CSM provides a visual presentation of site exposure conditions at the MWL that currently connect a source of contamination to possible human and ecological receptors. When used in conjunction with the End-State Vision, this CSM shows how current exposure conditions at the MWL are eliminated, mitigated, or controlled.

If ongoing monitoring indicates a significant release from the MWL (i.e., exceedence of a regulatory level in groundwater), a process is in place to evaluate the data, determine an appropriate course of action, and work with NMED to implement the selected action(s). The ultimate course of action will be determined based on the monitoring data and the determined cause of failure. Post-end state monitoring is required for the MWL and will be documented in the MWL post-closure care plan that will be prepared and submitted to the NMED after the final corrective action determination is approved.



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Key:



- a The current and future land use is industrial
- I Inhalation
- D Dermal Contact
- F Ingestion
- R External Irradiation
- Minor or No Exposure
- ① Barrier under current conditions/Engineered barrier under end state conditions

Figure 4.1.3-1
MWL CSM - Current and End State

Table 4.1.3-1
Human Health Risk Summary for Identified Hazard Areas - MWL

Hazard Area	Land Use	Risk	Risk Scenario	Contaminant Description	Concentration (mg/kg)	Baseline Risk Level	Cleanup Goal	Basis for Cleanup Goal	Actual or Expected Post-cleanup Concentration Or Risk Level
MWL	Industrial	No	Industrial	No chemicals of concern exceeded allowable risk levels	NA	NA	Industrial risk	Regulatory	No cleanup required.

MWL = Mixed waste landfill.

NA = Not applicable.

mg/kg = Milligram(s) per kilogram.

4.1.3.1 *Description (Hazard Area Summary)*

The MWL accepted containerized and uncontainerized low-level radioactive waste and minor amounts of mixed waste from SNL/NM research facilities and off-site generators from March 1959 to December 1988 (Figure 4.1.3-2). Approximately 100,000 cubic feet of LLW (excluding packaging, containers, demolition and construction debris, and contaminated soil) containing 6,300 Ci of activity (at the time of disposal) were disposed of at the MWL. Disposal cells at the landfill are unlined and were backfilled and compacted to grade with stockpiled soil.

There are two distinct disposal areas at the MWL: the classified area (occupying 0.6 acres) and the unclassified area (occupying 2.0 acres) (Figure 4.1.3-3). Wastes in the classified area were disposed of in a series of vertical, cylindrical pits (Figure 4.1.3-4). Historical records indicate that early pits were 3 to 5 feet in diameter and 15 feet deep; later pits were 10 feet in diameter and 25 feet deep. Once pits were filled with waste, they were backfilled with soil and capped with concrete. Wastes in the unclassified area were disposed of in a series of parallel, north-south trenches (Figure 4.1.3-5). Records indicate that trenches were 15 to 25 feet wide, 150 to 180 feet long, and 15 to 20 feet deep. Trenches were backfilled with soil on a quarterly basis and, once filled with waste, were capped with the original soil that had been excavated and locally stockpiled.

The classified area contains wastes that present the greatest security, worker safety, and environmental concerns. Wastes in the classified area include military hardware, radioactive constituents (e.g., cobalt-60, cesium-137, tritium, radium-226), activation products (e.g., cobalt-60), multiple fission products (e.g., cesium-137, strontium-90), high specific-activity wastes (e.g., tritium, cobalt-60), plutonium, thorium, and depleted uranium.

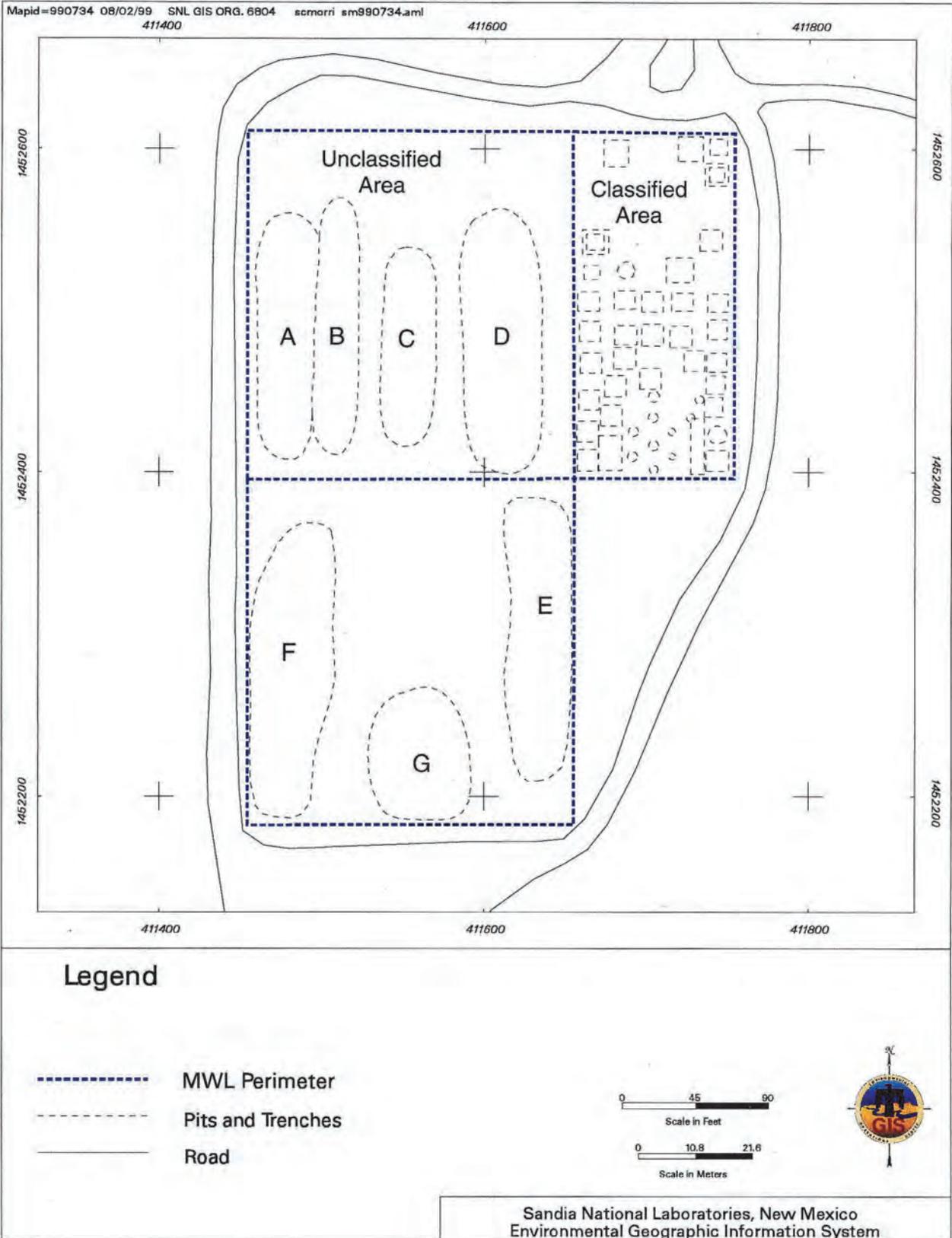
All pits and trenches contain routine operational and miscellaneous decontamination waste including gloves, paper, mop heads, brushes, rags, tape, wire, metal and polyvinyl chloride piping, cables, towels, quartz cloth, swipes, disposable lab coats, shoe covers, coveralls, high-efficiency particulate air filters, prefilters, tygon tubing, watch glasses, polyethylene bottles, beakers, balances, pH meters, screws, bolts, saw blades, Kleenex, petri dishes, scouring pads, metal scrap and shavings, foam, plastic, glass, rubber scrap, electrical connectors, ground cloth, wooden shipping crates and pallets, wooden and lucite dosimetry holders, and expended or obsolete experimental equipment.

Containment and disposal of routine waste commonly occurred using tied, double polyethylene bags, sealed A/N cans (military ordnance metal containers of various sizes), fiberboard drums, wooden crates, cardboard boxes, and 55-gallon steel and polyethylene drums. Larger items, such as glove boxes, spent fuel shipping casks, and contaminated soils, were disposed of in bulk without containment. Disposal of free liquids was not allowed at the MWL. Liquids such as acids, bases, and solvents were solidified with commercially available agents including Aquaset, Safe-T-Set, Petroset, vermiculite, or yellow powder before containerization and disposal. Historically, questions have been raised about disposal of liquids at the landfill. Drilling and sampling evidence from the MWL Phase 1 and Phase 2 RFIs demonstrate that uncontainerized liquids were not disposed of at the landfill.

A detailed MWL waste inventory, by pit and trench, is provided in the ER Project "Responses to NMED Technical Comments on the Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation, June 15, 1998" (SNL/NM June 1998).



Figure 4.1.3-2
Containerized Waste from Mixed Waste Landfill



**Figure 4.1.3-3
 Map of the Mixed Waste Landfill**



**Figure 4.1.3-4
Disposal of Waste in Vertical, Cylindrical Pits,
Mixed Waste Landfill
(Classified Area)**



**Figure 4.1.3-5
Disposal of Waste in Trenches,
Mixed Waste Landfill
(Unclassified Area)**

4.1.3.2 *MWL Primary and Secondary Sources*

The primary contaminant sources at the MWL are the buried low-level radioactive and mixed wastes within the pits and trenches of the landfill. A secondary contaminant source at the MWL is the tritium which has migrated from the pits and trenches, and which occurs in surface and near-surface soils in and around the classified area of the landfill. Figure 4.1.3-6 shows tritium flux from the MWL, based on 2003 data. Tritium levels range from 1100 picocuries/gram in surface soils to 206 picocuries/gram in subsurface soils. The highest tritium levels are found within 30 feet of the surface in soils adjacent to and directly below classified area disposal pits. Tritium also occurs as a diffuse air emission from the landfill, releasing 0.09 Ci/year to the atmosphere, based on 2003 tritium flux data. Tritium flux from the MWL in 2003 was significantly lower than in 1993.

Figure 4.1.3-7 presents the engineering design map of the MWL. Figures 4.1.3-8 and 4.1.3-9 present geophysical EM-61 ground conductivity survey results showing trench locations in the southern and northern parts of the unclassified area, respectively.

Additional information on the primary and secondary sources of contaminants at the MWL is presented in the "Report of the Phase 1 RCRA Facility Investigation of the Mixed Waste Landfill" (SNL/NM September 1990) and the "Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation" (Peace et al. September 2002).

4.1.3.3 *MWL Release Transport or Exposure Mechanisms*

The potential for release of COCs to the subsurface soil is directly associated with wastes buried in the MWL disposal cells. COCs may also be released through diffusion and vapor transport of tritium. Releases caused by erosion and degradation of the operational cover can also occur.

Wind, surface runoff, and biota are natural mechanisms of COC transport. Wind can transport soil particles with adsorbed COCs (or COCs in particulate form) as suspended dust, capable of dry or wet deposition away from the MWL. High winds may move larger (sand-sized) particles by saltation. The area around the MWL is moderately vegetated with ruderals and early successional grasses, and is susceptible to wind and water erosion.

Water percolating through the soil is the primary mechanism for the transport and migration of COCs in the subsurface. Water at the MWL is received as precipitation (rain or occasionally snow). The average annual precipitation in this area is approximately 8 inches (NOAA 1990). Water rarely infiltrates more than a few feet, and typically returns to the atmosphere via evapotranspiration. However, COCs desorbed from the soil particles into the soil solution may be leached into the subsurface soil with this percolation. Extensive field investigations and analytical studies undertaken in TA-3 and at the MWL provide data that address the potential extent of COC migration by this process. Data collected from boreholes, groundwater monitoring wells, and instantaneous profile tests measure saturated and unsaturated zone characteristics and include volumetric water content, saturated and unsaturated hydraulic conductivity, bulk density, and isotopic chloride content. These data are summarized in the MWL Phase 2 RFI report (Peace et al. September 2002). Based on these data, recharge is negligible and most of the water from precipitation returns to the atmosphere via evapotranspiration.

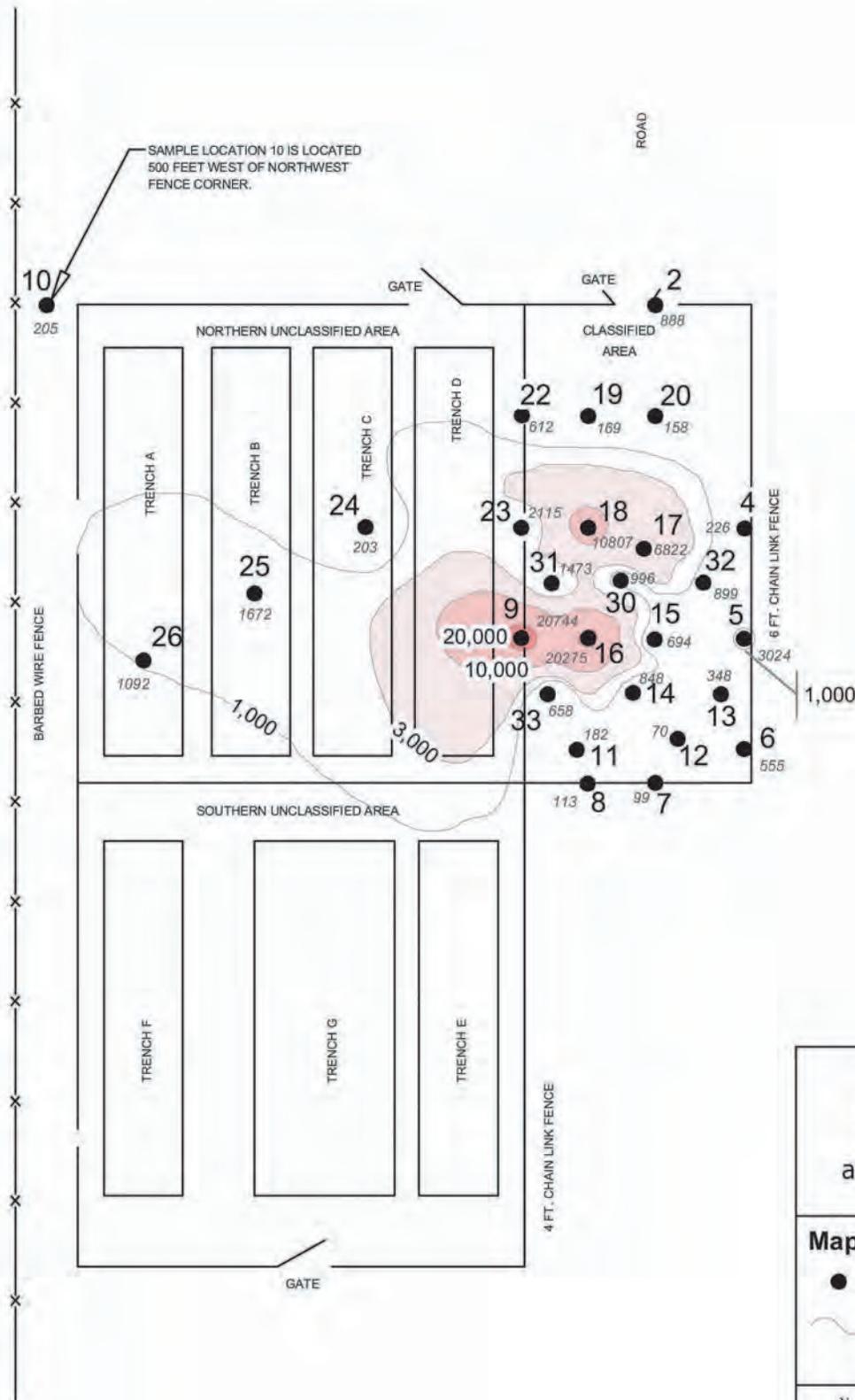


Figure 4.1.3-6
2003 Tritium Flux
at the Mixed Waste Landfill

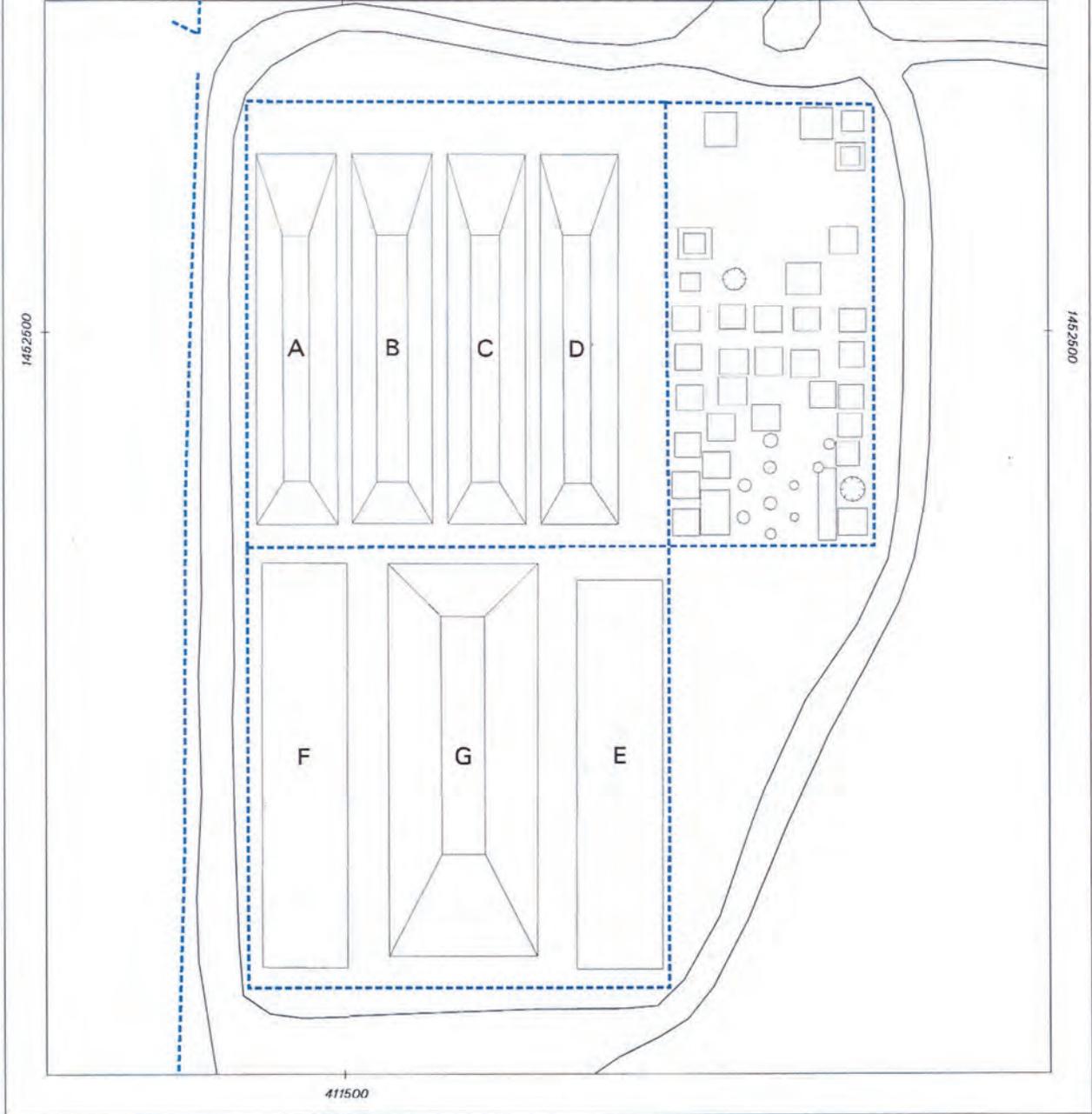
Map Legend

- Tritium Sampling Location
- ~ Tritium Flux Isoline (pCi/m²/hr)

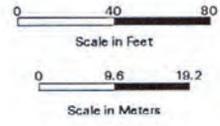
N

0 62.5 125 250

1 inch equals 250 feet



- Roads
- - - Fences
- Pits and Trenches



1 in = 80' 1:960



Sandia National Laboratories, New Mexico
Environmental Restoration Geographic Information System

Figure 4.1.3-7
MWL Engineering Design Map 91342

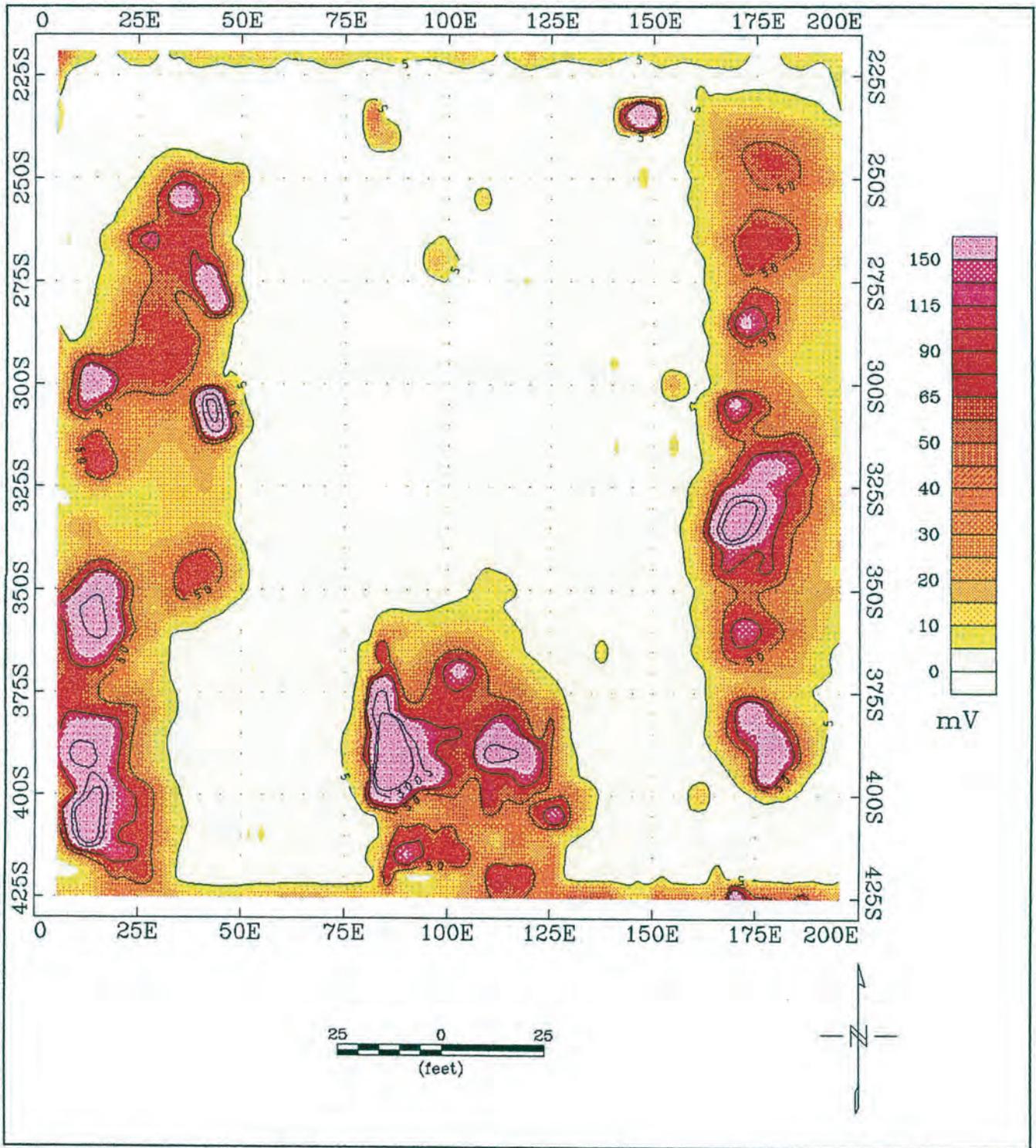


Figure 4.1.3-8
MWL Geophysics 1

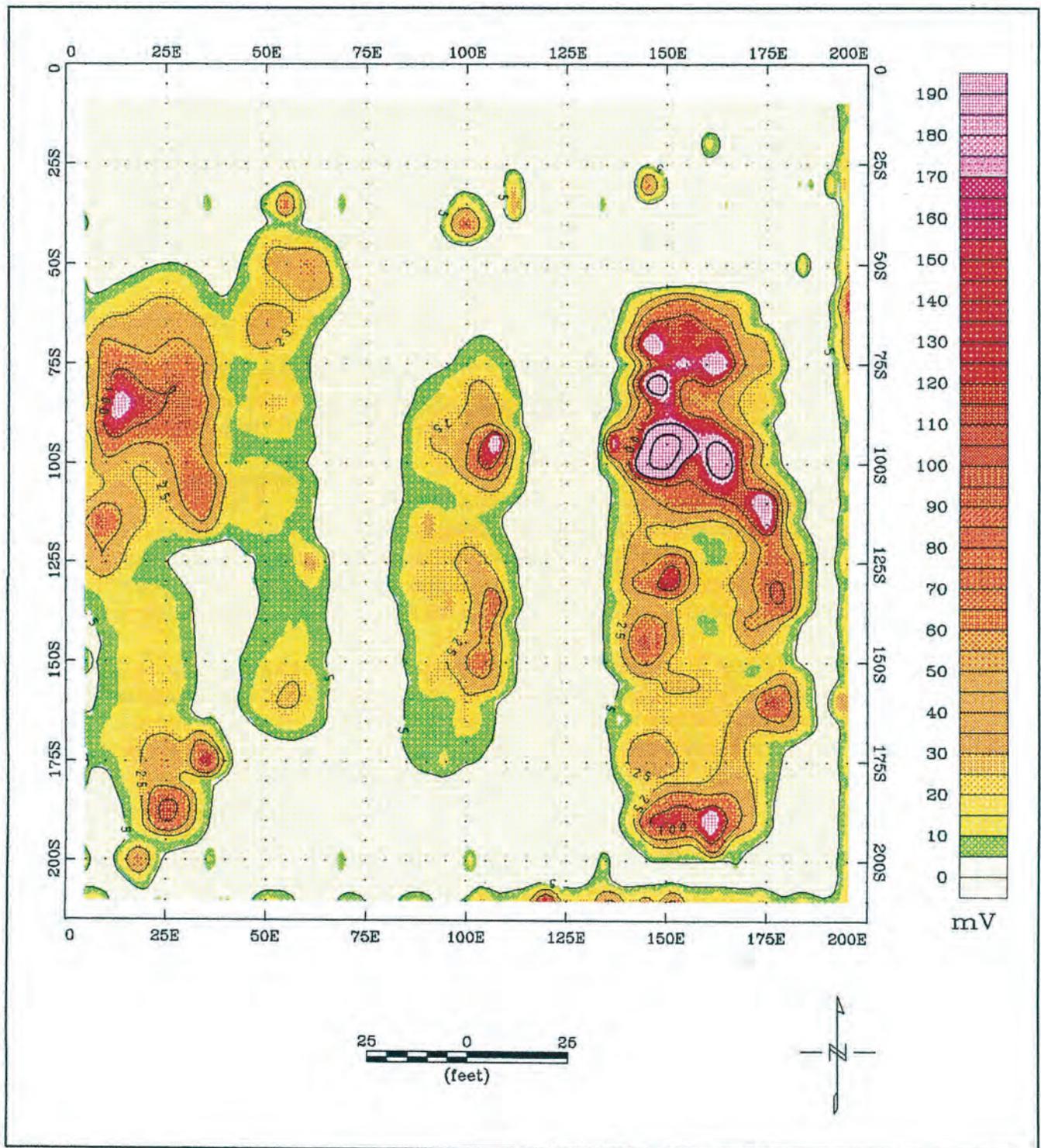


Figure 4.1.3-9
MWL Geophysics 2

It has further been estimated that 95 to 99 percent of the total rainfall received at SNL/NM is lost through evapotranspiration (Thompson and Smith 1985). This conclusion is supported by the MWL Phase 2 RFI characterization data, which show no evidence of significant water migration past the root zone of plants or the upper 2 feet of soil (Peace et al. September 2002). Vegetation, although sparse at the MWL, will increase the rate of water loss from the subsurface soil through transpiration. As water evaporates from the soil surface, it can be expected that the direction of COC movement near the surface may be reversed with capillary rise of the soil water.

Because of the arid nature of the environment at the MWL, characterized by low rainfall and high potential evapotranspiration estimates, recharge to the water table at the MWL is insignificant under current climatic and vegetative conditions (Peace et al. September 2002). Because groundwater beneath the MWL is approximately 500 feet bgs, the potential for COCs to reach groundwater through the unsaturated zone above the water table is very low.

COCs that are in the soil solution can enter the food chain via uptake by plant roots. This may be a passive process, but active uptake (i.e., requiring energy expenditure on the part of the plant) or exclusion of some constituents in the soil solution may also take place. COCs taken up by plant roots may be transported to the aboveground tissues which can take up adsorbed constituents directly from the air or by contact with dust particles. Organic constituents in plant tissues may be metabolized or released through volatilization. That which remains in the tissue may be consumed by herbivores or eventually returned to the soil as litter. Aboveground litter is capable of transport by wind until consumed by decomposer organisms in the soil. Constituents in plant tissues that are consumed by herbivores may be either absorbed into tissues or returned to the soil as litter (at the MWL or transported from the MWL in the herbivore). The herbivore may be eaten by a carnivore or scavenger and the constituents held in the consumed tissues will repeat the sequence of absorption, metabolism, excretion, and consumption by higher predators, scavengers, and decomposers. The potential for transport of the constituents within the food chain is dependent upon both the mobility of the species that comprise the food chain and the potential for the constituent to be transferred across the links in the food chain.

Degradation of COCs at the MWL may result from biotic or abiotic processes. Inorganic COCs at the MWL are elemental in form and are, therefore, not considered to be degradable. Radiological COCs, however, undergo decay to stable isotopes or radioactive daughter elements. Other transformations of inorganic constituents may include changes in valence (oxidation/reduction reactions) or incorporation into organic forms (e.g., the conversion of selenite or selenate from soil to seleno-amino acids in plants). Degradation processes for organic COCs may include photolysis, hydrolysis, and biotransformation. Photolysis requires light and, therefore, takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water and may occur in the soil solution. Biotransformation (i.e., transformation caused by plants, animals, and microorganisms) may occur; however, biological activity may be limited by the arid environment at the MWL.

Table 4.1.3-2 summarizes the fate and transport processes that may occur at the MWL. COCs include a variety of inorganic constituents (e.g., metals and radionuclides) and organic constituents (both volatile and semivolatile) in surface and subsurface soil. Because the topography of the site is relatively flat and the soil is fine-grained, the potential for surface-water transport is low. Because winds in the Albuquerque area can be fairly strong in late winter and early spring, the potential for transport by wind of COCs in surface soil is moderate. In both cases, however, the significance of these transport mechanisms is limited by the fact that the

principal releases of COCs (e.g., tritium) occurred to the subsurface soil. Because of the arid climate, significant movement of water through the subsurface soil is unlikely and migration to groundwater is not expected to occur. The potential for food chain uptake is low because of the relatively small size of the MWL (2.6 acres), the disturbed nature of the habitat, and the depth of the buried waste. In general, transformation of organic constituents will be slow because of the aridity of the environment, and degradation of the inorganic COCs will be insignificant. The decay of radiological COCs is also insignificant because of long half-lives.

Table 4.1.3-2
Summary of Fate and Transport at the MWL

Transport and Fate Mechanism	Existence at the MWL	Significance
Wind	Yes	Moderate
Surface runoff	Yes	Low
Migration to groundwater	No	None
Food chain uptake	Yes	Low
Transformation/degradation	Yes	Low

MWL = Mixed Waste Landfill.

4.1.3.4 *Temporary Barriers and Controls for the MWL*

In its present state, the MWL has several mechanisms in place which address the potential exposure pathways to current at-risk receptors. The primary barrier is the current operational cover of the MWL. This consists of up to several feet of soil overlying the wastes in the pits and trenches. Based on characterization data collected during the Phase 2 RFI, this operational cover minimizes infiltration through the wastes, and also minimizes the potential for exposure of onsite workers to buried waste at the MWL.

Additional controls include existing access restrictions to the MWL, which will remain in place for a minimum of 100 years to limit human access and inadvertent human intrusion. These access controls include the MWL hazard area and security fences, as well as controls for access into TA-3 and KAFB. Although they may be reconfigured (e.g., as a continuous perimeter fence) during implementation of corrective measures, the MWL fences currently include a standard 4-foot-high fence around the unclassified area, and an 8-foot-high security fence topped by barbed wire strands around the classified area. Access into TA-3, where the MWL is located, is strictly controlled. TA-3 is a locked, property control area that requires access through an electronically controlled security gate for entry. In addition, the MWL and TA-3 are located within the KAFB boundary, with its own strict access controls and closely-guarded perimeter.

Post-closure monitoring, maintenance, and access restrictions; maintaining the land-use designation as industrial; and maintaining additional land-use restrictions will be presented in the MWL post-closure care plan. The MWL post-closure care plan will be prepared and submitted to the NMED after approval of the MWL CMS report. ICs will be implemented through the MWL post-closure care plan and the SNL/NM LTES Plan.

4.1.3.5 *Remediation, Mitigation, and Other Interventions*

On October 11, 2001, the NMED directed the DOE and SNL/NM to conduct a CMS for the MWL. A CMS workplan (SNL/NM December 2001) was written in accordance with requirements set forth in SNL/NM RCRA Permit. The CMS workplan included a description of the general approach of the investigation and potential remedies, a definition of the overall objectives of the study, specific plans for evaluating remedies, schedules for conducting the study, and the proposed format for the presentation of information. The CMS workplan was approved with conditions by the NMED on October 10, 2002.

On May 21, 2003, SNL/NM completed the MWL CMS Final Report and submitted it to the NMED (SNL/NM May 2003d). The purpose of the CMS was to identify, develop, and evaluate corrective measures alternatives and recommend the corrective measure(s) to be taken at the MWL. The DOE and SNL/NM implemented a streamlined approach to remedy selection. The CMS establishes corrective action objectives for the MWL that are designed to protect human health and the environment and identifies corrective measures alternatives that will achieve the corrective action objectives.

In establishing corrective measures objectives and alternatives for the CMS, it was assumed that ICs would be maintained at the MWL for at least the next 100 years. ICs are implicit in all proposed alternatives and include site surveillance and maintenance, and access controls. It is also assumed that environmental monitoring (including groundwater) will be conducted following implementation of the corrective measure. Corrective action objectives are based on occupational (site worker), public health, and environmental exposure criteria; EPA guidance; and applicable state and federal regulations. Corrective action objectives developed for the MWL are designed to protect human health and the environment and take into consideration source areas, pathways, and receptors. The corrective action objectives developed for the MWL consist of the following: 1) minimize exposure to site workers, the public, and wildlife; 2) limit migration of contaminants to groundwater such that regulatory limits are not exceeded; 3) minimize biological intrusion into buried waste and any resulting release and redistribution of contaminants to potential receptors; and 4) prevent or limit human intrusion into buried waste over the long term.

Corrective measures alternatives are based on the results of the MWL Phase 1 RFI (SNL/NM September 1990), the Phase 2 RFI (Peace et al. September 2002), MWL groundwater monitoring (Goering et al. December 2002), environmental studies conducted at the MWL since 1969, and public input. Corrective measures alternatives rely upon preferred technologies identified by the EPA's scientific and engineering evaluations of performance data on technology implementation at similar sites. Preferred technologies are screened using three primary criteria: 1) responsiveness to corrective action objectives, 2) implementability, and 3) performance.

Corrective measures alternatives developed for the MWL make use of individual technologies or various combinations of technologies based on engineering practice to determine which of the candidate technologies are suitable for the site. Alternatives are developed to reduce the large number of candidate technologies to a manageable number of alternatives for detailed evaluation. EPA guidance recommends that three general criteria be used in the development of alternatives: 1) effectiveness, 2) implementability, and 3) cost.

Four corrective measures alternatives were found suitable for the MWL and evaluated in detail. These alternatives include three containment alternatives and one excavation alternative:

1. Alternative I.a—NFA with ICs;
2. Alternative III.b—Vegetative Soil Cover;
3. Alternative III.c—Vegetative Soil Cover with Bio-Intrusion Barrier; and
4. Alternative V.e—Future Excavation.

Each alternative is technically reliable and meets the corrective action objectives established in the CMS for the MWL.

Based on detailed evaluation and risk assessment using guidance provided by the EPA and the NMED, one candidate corrective measures alternative clearly presents the overall lowest risk to human health and the environment while minimizing costs and meeting MWL corrective action objectives. This alternative is Alternative I.a—NFA with ICs, which was originally proposed for the MWL in September 1996 after completion of the RCRA investigative process.

In September 1997, the NMED required that a cover be constructed over the MWL. Therefore, the DOE and SNL/NM recommend Alternative III.b—Vegetative Soil Cover—as the preferred corrective measure for the MWL. Relative to Alternative I.a, Alternative III.b offers additional protection against exposure to waste in landfill disposal cells, further minimizes infiltration of water, and mitigates bio- and human intrusion into buried waste without significant added cost in construction and long-term monitoring, surveillance and maintenance, and access controls.

Under Alternative III.b, a vegetative soil cover would be deployed on the existing landfill surface. The cover would be of sufficient thickness to store precipitation and support a healthy vegetative community and perform with minimal maintenance by emulating the natural analogue ecosystem. There would be no intrusive activities at the site and therefore no potential for exposure to waste. This alternative also poses minimal risk to site workers implementing ICs associated with environmental and groundwater monitoring as well as routine maintenance and surveillance of the site.

Alternative III.b is consistent with EPA directives regarding presumptive remedies for CERCLA municipal waste and military landfills. Presumptive remedies are preferred technologies for common categories of sites, and are expected to ensure consistent selection of remedial actions and to be used at all appropriate sites except under unusual site-specific circumstances. The EPA is committed to consistency of results between RCRA corrective action and Superfund remedial action programs, and any revisions to the CERCLA remedial expectations or the CERCLA remedy selection process will likely be incorporated into RCRA corrective action.

In recommending Alternative III.b as the preferred corrective measure for the MWL, the DOE and SNL/NM are demonstrating their commitment to protect the environment, preserve the health and safety of the public and their employees, and serve as responsible corporate citizens in meeting the community's environmental goals.

4.1.3.6 *Receptors*

The potential current and future human health receptors for each site were established based on the "Baseline for Future Use Options" (DOE et al. September 1995). For SNL/NM, the potential categories of receptors included industrial and residential. The industrial land use is

the current and future designation for the MWL. However, for all sites a residential receptor was evaluated as required by NMED guidance, and cleanup levels were based on industrial land use. For a detailed description of the potential receptors at the MWL, refer to the risk assessment presented in Appendix I of the MWL CMS final report (SNL/NM May 2003d).

As described in detail in "Predictive Ecological Risk Assessment Methodology, Environmental Restoration Program, Sandia National Laboratories, New Mexico" (IT July 1998), the ecological receptors include a nonspecific perennial plant that was selected as the receptor to represent plant species at the site. The deer mouse (*Peromyscus maniculatus*) and the burrowing owl (*Speotyto cunicularia*) are used to represent wildlife use. Because of its opportunistic food habits, the deer mouse is used to represent a mammalian herbivore, omnivore, and insectivore. The burrowing owl is used to represent a top predator at this site.

4.1.3.7 *MWL Variance Discussion*

The RBES for the MWL is NFA with ICs (and performance monitoring). This option is possible because there already is a soil cover at the landfill which is acceptable from a risk standpoint. Under this alternative, the existing operational cover would be maintained and current institutional controls would continue for the foreseeable future. Soil would be added to the existing landfill surface to bring the operational cover to a central crown and uniform grade to prevent ponding and promote surface runoff. Seeding, mulching, grading, erosion control, signage, and fencing are required. Performance monitoring for groundwater, soil, vegetation, and air for 30 years is included as part of this alternative.

This alternative was originally proposed for the MWL in September 1996 after completion of the RCRA investigative process, but in September 1997, NMED required that a cover be constructed over the MWL. Therefore, in the CMS described in Section 4.1.3.5, the DOE and SNL/NM recommend Alternative III.b—Vegetative Soil Cover—as the preferred corrective measure for the MWL.

Under this alternative, a vegetative soil cover would be deployed on the existing operational cover. The vegetative soil cover would be composed of multiple lifts of compacted soil to isolate buried waste from the surface environment and to minimize infiltration of water. A topsoil layer, admixed with gravel, would be vegetated with native plants to mitigate surface erosion and to promote evapotranspiration. Seeding, mulching, grading, erosion control, signage, and fencing are required. A cover constructed of natural soil will perform with minimal maintenance by emulating the natural analog ecosystem. Performance monitoring for groundwater, soil, vegetation, and air for 30 years is included as part of this alternative.

A vegetative cover with biointrusion barrier is also being considered by the regulators. Under this alternative, a biointrusion barrier composed of a layer of cobbles or boulders would be constructed on the existing operational cover before deployment of a vegetative soil cover. Seeding, mulching, grading, erosion control, signage, and fencing are required. Performance monitoring for groundwater, soil, vegetation, and air for 30 years is included as part of this alternative.

The last alternative discussed in the CMS, future excavation of the landfill contents, is considered very unlikely. The final variance for the MWL will depend on the NMED's decision on the MWL alternative. This decision is anticipated by mid-FY 2005.

4.1.3.8 *Additional Information*

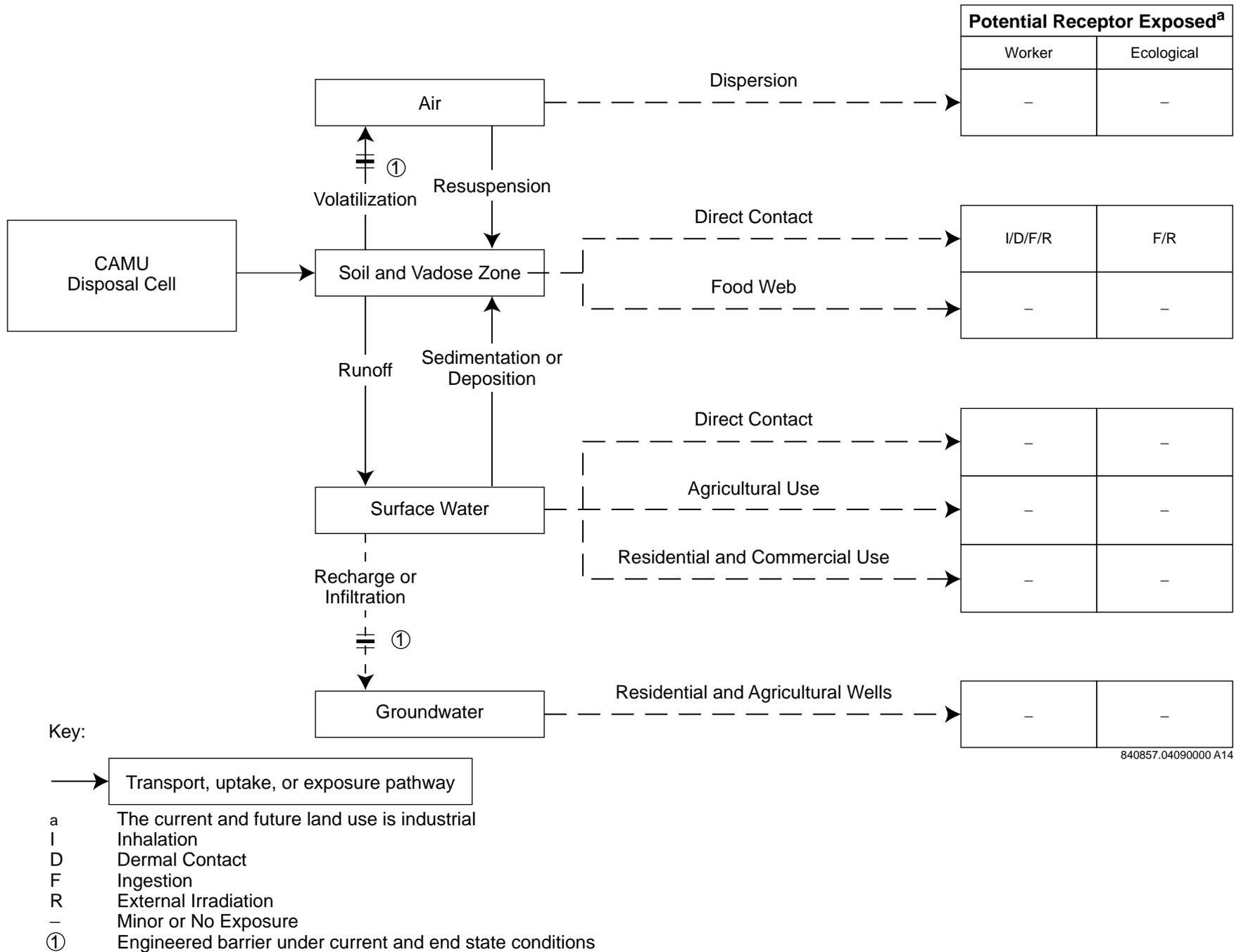
Groundwater at the MWL lies nearly 500 feet bgs. Groundwater monitoring at the MWL has been conducted since September 1990, with more than 35 combined quarterly, semi-annual, and annual sampling events conducted. Groundwater has been characterized for major ion chemistry and analyzed for numerous COCs that occur in the MWL disposal inventory. These COCs include VOCs, SVOCs, additional Appendix IX compounds, metals, nitrate, perchlorate, uranium, tritium, plutonium, strontium-90, cobalt-60, and cesium-137. Based on the plethora of analytical data collected to date, SNL/NM has determined that groundwater beneath MWL is free of contamination from the landfill. Additional information on groundwater quality at the MWL and on the regional aquifer is presented in the "Mixed Waste Landfill Groundwater Report, 1990 through 2001" (Goering et al. December 2002).

4.1.4 CAMU Conceptual Site Model

Figure 4.1.4-1 presents the CSM for the CAMU in its current state, which is also its end state as waste treatment, placement, and construction of the final engineered cover have been completed. The CSM is documented in detail in the "Risk Assessment for Corrective Action Management Unit" (SNL/NM July 2003), which demonstrates that the CAMU meets risk-based criteria. This CSM provides a visual presentation of site exposure pathways at the CAMU that currently connect a source of contamination to possible human and ecological receptors. When used in conjunction with the End-State Vision, this CSM shows how current exposure conditions at the CAMU were eliminated, mitigated, or controlled.

Figure 4.1.4-1 and Table 4.1.4-1 provide a summary of the human health risk information for the CAMU. In the current state, the CAMU is comprised of an engineered, lined disposal cell and final cover system designed to prevent the migration of hazardous constituents (barriers shown in Figure 4.1.4-1). In addition to the cell liner system and final cover, the CAMU containment cell includes a vadose zone monitoring system (VZMS) and a leachate collection and removal system. Because the CAMU operations have been completed, the current and end state are same. As summarized in Table 4.1.4-1 and detailed in the "Risk Assessment for Corrective Action Management Unit" (SNL/NM July 2003), the CAMU meets risk-based standards under the current and future industrial land-use designation. The risk assessment summarized in Table 4.1.4-1 addresses two scenarios: 1) where engineering controls are performing as intended; and 2) where engineering controls such as the liner and cover fail, and no risk benefit is claimed. Engineering controls are defined as the CAMU containment cell liner, cover, and support infrastructure, as well as the soil stabilization (ST) effort; which served to immobilize the inorganic contaminants.

If ongoing monitoring indicates a failure of the engineered barriers, a process is in place to evaluate the data, determine an appropriate course of action, and work with NMED to implement the selected action(s). The ultimate course of action will be determined based on the monitoring data and the determined cause of failure.



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**Figure 4.1.4-1
CAMU CSM - Current and End State**

Table 4.1.4-1
Human Health Risk Summary for Identified Hazard Areas - CAMU

Hazard Area	Land Use	Risk	Risk Scenario	Contaminant Description	Concentration (mg/kg)	Baseline Risk Level	Cleanup Goal	Basis for Cleanup Goal	Actual or Expected Post-cleanup Concentration Or Risk Level
CAMU (Case Scenario 1)	Industrial	No	Industrial	None	NA	NA	No cleanup necessary.	NA	NA
CAMU (Case Scenario 2)	Industrial	Yes	Industrial	Arsenic Benzo(a)pyrene PCBs	881 11 1538	6E-4 5E-5 HI=145 2E-3	To be determined upon release	Industrial	Risk level; HI = 1.0 Cancer risk = 1E-05

Case Scenario 1 - All the engineering controls that are present at the CAMU are maintained and all contaminant barriers are in place.

Case Scenario 2 - Ignores all engineering controls that are present or were applied to the contaminated soils placed within the CAMU with the exception of the physical destruction of organics by the LTTD unit (i.e., the engineered barriers are not functioning).

CAMU = Corrective Action Management Unit.

HI = Hazard index.

LTTD = Low-temperature thermal desorption.

NA = Not applicable.

PCB = Polychlorinated biphenyl.

4.1.4.1 *Description (Hazard Area Summary)*

The CAMU hazard area is comprised of the remediation waste that has been placed in the CAMU containment cell. The containment cell incorporates an engineered liner system and final cover system that are designed to prevent the migration of hazardous constituents from the encapsulated waste to the environment. Further information regarding the containment cell design is presented in the "Class III Permit Modification for the Management of Hazardous Remediation Wastes in the Corrective Action Management Unit, Technical Area III, Sandia National Laboratories/New Mexico Environmental Restoration Project," as modified (SNL/NM, September 1997), hereafter referred to as the CAMU Permit. Figure 4.1.4-2 shows the CAMU current-state hazards.

4.1.4.2 *Primary and Secondary Sources*

The primary source at the CAMU consists of the remediation waste encapsulated within the containment cell. Because the cell incorporates an engineered liner system and engineered cover comprised of clean materials, no secondary sources are present.

4.1.4.3 *Release Transport or Exposure*

The containment cell of the CAMU incorporates an engineered liner system and final cover system that was designed to prevent the migration of hazardous constituents to the environment from leachate, contaminated runoff, and hazardous waste decomposition products generated during CAMU waste placement operations and the post-closure care period. The liner system includes both bottom and sidewall liner components that will be chemically resistant to the waste and to potentially generated leachate. The final cover system effectively encapsulates the soil waste in the containment cell and is designed to minimize water infiltration.

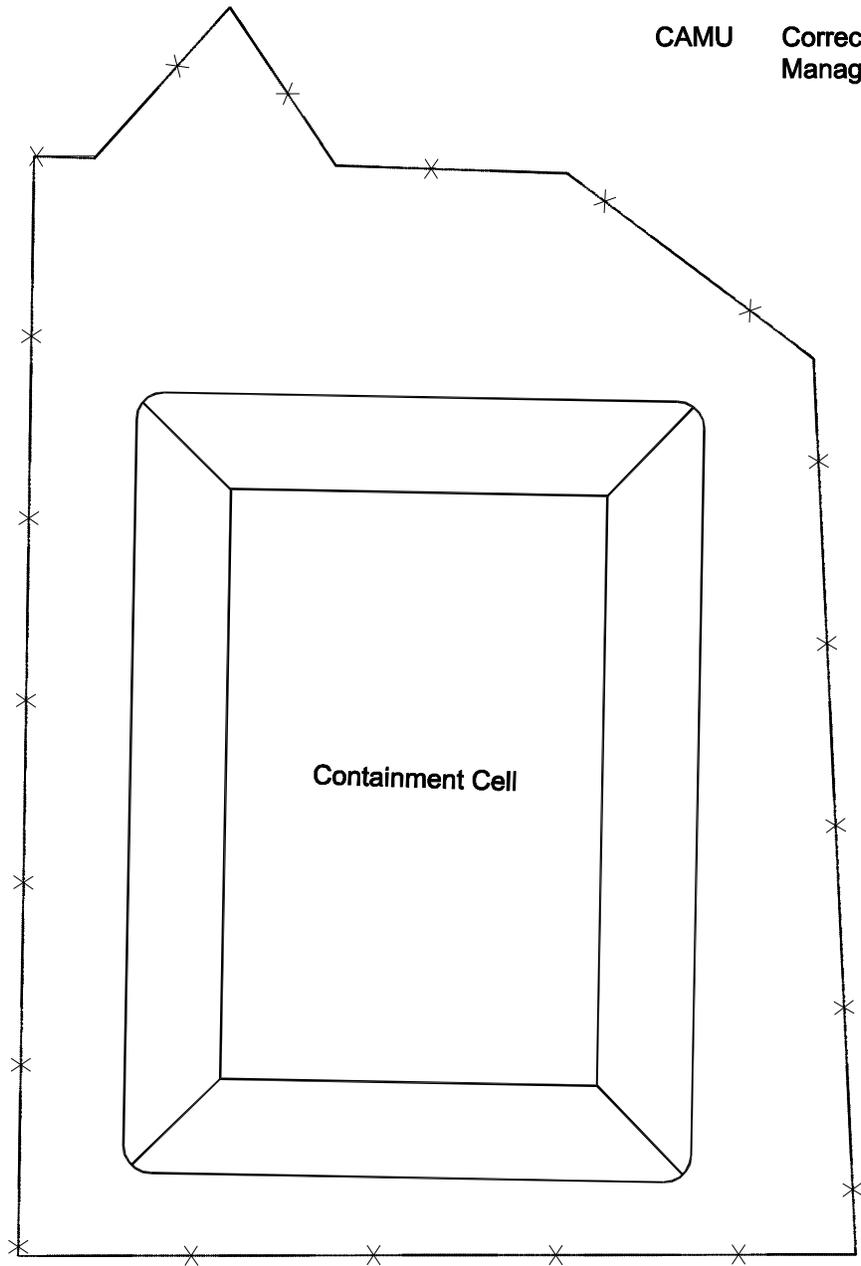
Construction of the final cover system was completed in June 2003. The cover system design incorporates a capillary barrier and vegetation cover for primary hydraulic control. A high-density polyethylene liner positioned at the base of the final cover system provides reinforced hydraulic control. Due to these engineered controls, no transport of COCs is expected to occur from the containment cell to the environment.

Water at the CAMU is currently received as precipitation (approximately 8 inches annually). Precipitation will either evaporate at or near the point of contact, infiltrate into the soil, or form runoff. Infiltration at the site is enhanced by the sandy texture of the soil. COCs in the soil can be leached deeper into the subsurface soil with the percolation of water through the soil; however, it is estimated that 95 to 99 percent of the annual precipitation in this area is lost through evapotranspiration. Therefore, the potential for significant downward movement of COCs through leaching is very limited. Because groundwater at this site is approximately 485 feet bgs, and because a liner system is in place, the potential for COCs to reach groundwater through the unsaturated zone above the water table is extremely small. Surface runoff from the site has the potential to carry soil particles, but the upper liner prevents this transport, therefore, would be of minimal significance as a potential mechanism for COCs to be transported from the site.

Legend

—X— Perimeter Boundary

CAMU Corrective Action Management Unit



SCALE 1" = 80'

**Figure 4.1.4-2
Current-state Hazards at the Corrective Action Management Unit**

COCs can enter the food chain through uptake by plant roots. COCs taken up by plant roots can be transported to aboveground tissues where they can be consumed by herbivores, which can in turn be eaten by predators. Once in the food web, COCs can be transported from the site by the movements of the organisms that contain them or other surficial transport mechanisms. However, because the CAMU occupies only a small area (1.4 acre), food chain transport is expected to be of low potential significance at this site.

The COCs at the CAMU include both inorganic and organic analytes. The nonradiological inorganic COCs are elemental in form, and are not considered to be degradable. Transformations of these inorganics could include changes in valence (oxidation/reduction reactions) or incorporation into organic forms (e.g., the conversion of selenite or selenate from soil to seleno-amino acids in plants). However, because of the aridity of the environment at this site, and the lack of potential contact with biota, none of these mechanisms is expected to result in significant losses or transformations of the inorganic COCs.

The organic COCs at the CAMU may be degraded through photolysis, hydrolysis, and biotransformation. Photolysis requires light, and therefore takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water, and may occur in the soil solution. Biotransformation (i.e., transformation due to plants, animals, and microorganisms) may occur; however, biological activity may be limited by the aridity of the environment at this site.

Tritium is the only radiological COC present at the CAMU and it is only present in concentrations that are acceptable in drinking water (20,000 picocurie/liter in soil moisture). This radiological COC will undergo decay to stable isotopes or radioactive daughter elements and has a half-life of 12.3 years. Therefore radiological COCs are expected to be of low significance at the CAMU.

Table 4.1.4-2 summarizes the fate and transport processes that can occur at the CAMU. No significant transport to the environment outside of the containment cell is expected to occur due to the protectiveness of the cover and liner installed at the site. The potential for transformation of inorganic constituents is low. For some organic compounds, loss through volatilization and eventual degradation could be of moderate significance.

Table 4.1.4-2
Summary of Fate and Transport at the CAMU

Transport and Fate Mechanism	Existence at the CAMU	Significance
Wind	Yes	None
Surface runoff	Yes	None
Migration to groundwater	No	None
Food chain uptake	Yes	None
Transformation/degradation	Yes	Moderate to low

CAMU = Corrective Action Management Unit.

4.1.4.4 *Temporary Barriers and Controls*

The CAMU containment cell final cover system was completed in July 2003, effectively encapsulating all remediation waste that had been placed. The engineered liner system and final cover system are considered a permanent controls.

Presently, a four-strand, barbed-wire fence with one main gate surrounds the CAMU containment cell. The gate is locked and only authorized SNL/NM personnel control the keys to the lock.

Additional controls include existing access restrictions to the CAMU, which will remain in place for the post-closure care period to limit human access and inadvertent human intrusion. These access controls include access into TA-3 and KAFB. Access into TA-3, where the CAMU is located, is strictly controlled. TA-3 is a locked, property control area that requires access through an electronically-controlled security gate for entry. Finally, TA-3 is located within the KAFB boundary, with its own strict access controls and closely-guarded perimeter.

Post-closure monitoring, maintenance, and access restrictions; maintaining the land-use designation as industrial; and maintaining additional land-use restrictions are detailed in the CAMU Post-Closure Care Plan (SNL/NM June 2003a). ICs will be implemented through the CAMU Post-Closure Care Plan (SNL/NM June 2003a) after NMED approval and the SNL/NM LTES Plan.

4.1.4.5 Remediation, Mitigation and Other Interventions

A total of approximately 32,000 cubic yards of remediation waste were placed into the CAMU containment cell. Waste material that met CAMU containment standards, as defined in the CAMU Permit, were placed directly into the containment cell. If necessary, waste material was treated prior to placement using low temperature thermal desorption (LTTD) and/or ST treatment technologies. Further information regarding LTTD treatment operations is presented in the "Class 2 Permit Modification Request for Low Temperature Thermal Desorption Treatment Operations at the Corrective Action Management Unit, Technical Area III" (SNL/NM June 2002). Further information regarding ST treatment operations is presented in the "Class II Permit Modification Request for Temporary Unit Treatment Operations at the Corrective Action Management Unit, Technical Area III" (SNL/NM, May 2002). Waste material that did not meet the containment standards was shipped to an off-site disposal facility.

The containment cell includes an engineered liner system and final cover system that is designed to prevent the migration of hazardous constituents to the environment from leachate, contaminated runoff, and hazardous waste decomposition products generated during CAMU operations and the postclosure care period.

In accordance with 40 CFR Section 264.310(a)(1-5), the final cover of the containment cell was constructed to:

- Provide long-term minimization of migration of liquids through the closed containment cell
- Function with minimum maintenance
- Promote drainage and minimize erosion or abrasion of the containment cell cover

- Accommodate for settling and subsidence so that the integrity of the containment cell cover is maintained
- Have an unsaturated hydraulic conductivity that is less than or equal to that of the bottom liner system and/or natural subsoil

In addition to the containment cell liner system and final cover, a VZMS is in place under the containment cell. Additional information regarding the VZMS is provided in Appendix E of the CAMU Permit.

4.1.4.6 *Receptors*

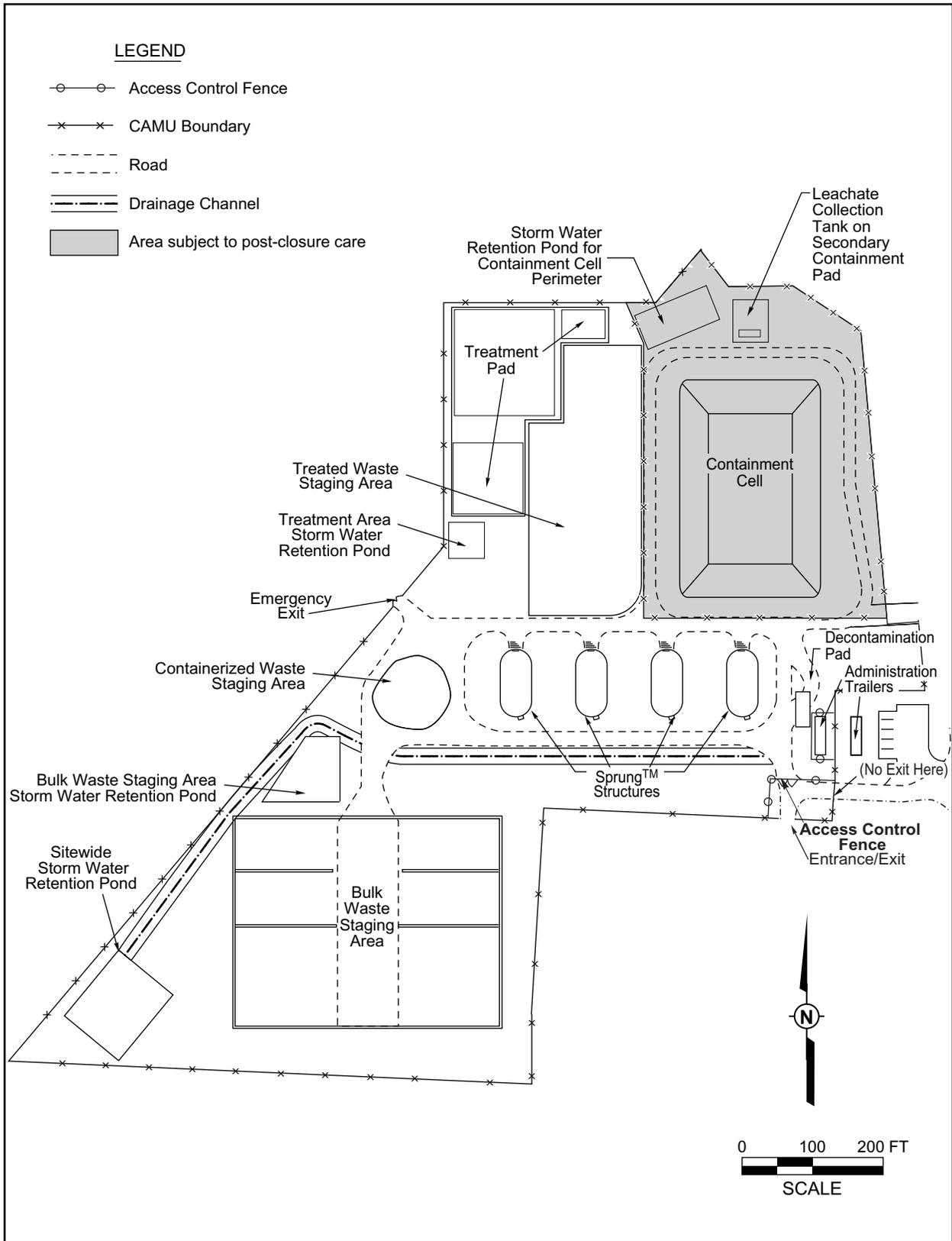
The potential current and future human health receptors for each site were established based on the “Baseline for Future Use Options” (DOE et al. September 1995). For the CAMU, the potential receptors included industrial and residential. The industrial land use is the current and future designation for the CAMU. However, a residential receptor was evaluated. For a detailed description of the potential receptors at the CAMU, refer to the “Risk Assessment for Corrective Action Management Unit” (SNL/NM July 2003).

As described in detail in “Predictive Ecological Risk Assessment Methodology, Environmental Restoration Program, Sandia National Laboratories, New Mexico” (IT July 1998), the ecological receptors include a nonspecific perennial plant that was selected as the receptor to represent plant species at the site. The deer mouse (*Peromyscus maniculatus*) and the burrowing owl (*Speotyto cunicularia*) are used to represent wildlife use. Because of its opportunistic food habits, the deer mouse is used to represent a mammalian herbivore, omnivore, and insectivore. The burrowing owl is used to represent a top predator at this site.

4.1.4.7 *Additional Information*

Closure activities at the CAMU, which were initiated on January 27, 2003, included identification and removal of stained areas, decontamination, and sampling. These activities were conducted using a phased approach, as operational conditions permitted sequential closure of individual areas within the CAMU. The staging, treatment, and support areas at the CAMU were clean-closed under the RCRA provisions as outlined in the “Closure Plan for the Corrective Action Management Unit, Technical Area III, Sandia National Laboratories/New Mexico Environmental Restoration Project” (SNL/NM October 2002), and all hazardous waste and hazardous waste residues were removed. The CAMU containment cell was closed. The containment cell and supporting infrastructure are subject to the post-closure requirements established in the “Post-Closure Care Plan for the Corrective Action Management Unit, Technical Area III, Sandia National Laboratories/New Mexico Environmental Restoration Project” (SNL/NM, June 2003a), when approved by the NMED. Figure 4.1.4-3 delineates the area subject to post-closure care.

A closure certification for the CAMU was submitted to the NMED on October 2, 2003, and the acknowledgement of the receipt of that certification occurred the week of October 20, 2003. All closure activities, including decontamination, sample collection, and data validation, are documented in the “Resource Conservation and Recovery Act Closure Report for the Corrective Action Management Unit Technical Area III” (SNL/NM December 2003).



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Figure 4.1.4-3
Pre-Closure Areal Configuration of the Corrective Action Management Unit (CAMU)
Showing Area Subject to Post-Closure Care

4.2 Groundwater

4.2.1 Groundwater Introduction

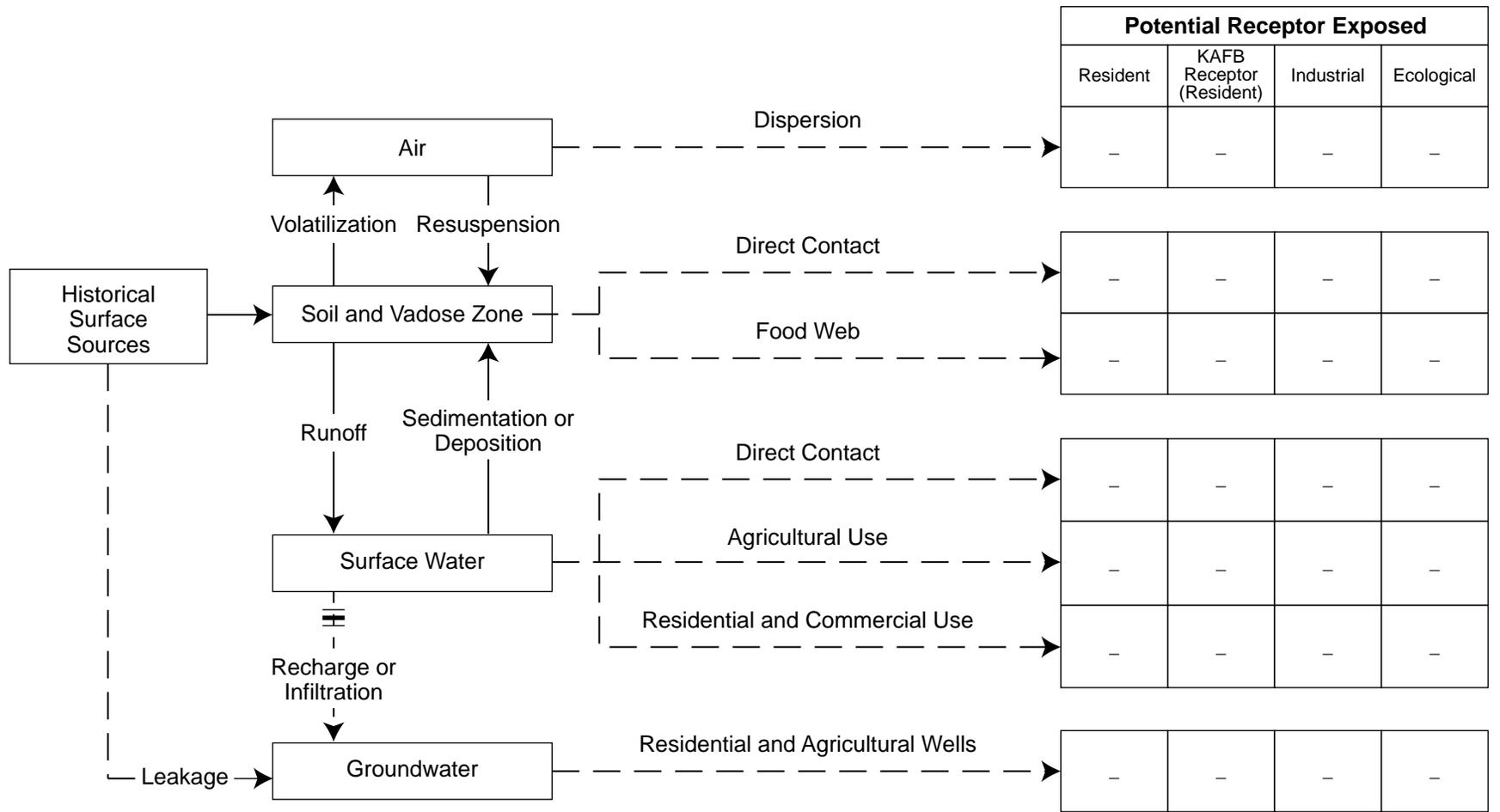
The hydrogeology at SNL/NM is well characterized, especially where the Middle Rio Grande basin underlies the property (SNL/NM March 1994, SNL/NM March 1995, SNL/NM March 1996, SNL/NM February 1998b). SNL/NM has an arid, high-elevation desert climate and receives approximately 8 inches of rain per year. SNL/NM is on the eastern margin of the Middle Rio Grande Basin (Bartolino and Cole 2002). The margin is identified by a complex of faults that form a distinct hydrogeologic boundary between the aquifer within the basin (approximately 500 feet bgs) and the aquifer systems within the uplifted areas (generally between 50 to 250 feet). East of the fault complex, a thin layer of alluvium covers bedrock. Most of the wells east of the faults are completed in fractured bedrock. Most monitoring wells on the basin side of the faults are completed at approximately 500 feet bgs. The rest are completed in a localized perched groundwater system in the northern area of SNL/NM. This localized perched system is approximately 200 feet above the basin aquifer, is not presently used for drinking water supply, and is not well-connected to the aquifer below.

The hydrogeology of the Middle Rio Grande basin at SNL/NM is dominated by two distinct depositional environments: the ancestral Rio Grande deposits and, from the mountains, alluvial fan deposits. The north-south-oriented ancestral Rio Grande deposits are typically coarse-grained and well sorted. The bedding is relatively continuous and thicker than 5 feet. As such, these fluvial deposits present moderate to high hydraulic conductivities and make excellent municipal water supply well locations. In contrast, the east-west-oriented alluvial fan deposits have lower hydraulic conductivities given that they are finer grained, poorly sorted, less continuous, and thinner. The perched system is found in the alluvial fan deposits. The City of Albuquerque altered the natural westerly groundwater flow direction under SNL/NM when it completed groundwater supply wells in the 1960s in the ancestral Rio Grande deposits north of SNL/NM. Today groundwater flows from the east and turns to the north toward those City wells. The only sources of recharge to basin at SNL/NM are mountain-front and arroyo recharge. Water levels in, or adjacent to, the ancestral Rio Grande deposits at SNL/NM have been falling 1 to 3 feet per year.

Understanding impacts to the Middle Rio Grande Basin is important because the City of Albuquerque and KAFB rely exclusively on this basin for drinking water. SNL/NM's activities have not impacted drinking water wells. However, there are some isolated areas with groundwater contamination from TCE, tetrachloroethene (PCE), and nitrate that do not pose substantive risk to the Middle Rio Grande basin and its users (SNL/NM February 2001).

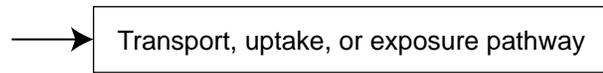
4.2.2 Groundwater Conceptual Site Model

The CSM flow diagram for Groundwater is illustrated in Figure 4.2.2-1. As described previously, past activities at SNL/NM resulted in some isolated areas with groundwater contamination from TCE, PCE, and nitrate; these areas do not pose substantive risk to the Middle Rio Grande basin and its users. There is no receptor well within the vicinity of these minor releases; and, therefore, there are no complete groundwater pathways. The desert climate and thick vadose zone at SNL/NM provide a natural barrier that keeps surface contamination from reaching groundwater. However some source removals were required and are already complete.



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Key:



- Minor or No Exposure

Figure 4.2.2-1
Groundwater CSM - Current and End State

The CSM is the same for current state, current baseline end state and risk-based end state. The current baseline end state vision CSM for groundwater at SNL/NM will be nearly the same as the current except that the groundwater contamination concentrations are expected to decrease with time. Concentration reductions are expected due to either monitored natural attenuation (MNA) or a combination of bioremediation and MNA. MNA and bioremediation evaluations will be prepared and presented to the NMED and public as part of a Corrective Measures Evaluation (CME) that is due in September 2005. Currently, a preliminary technology survey is available (Ho August 2003) that reviews the applicability of treatment technologies to groundwater projects at SNL/NM.

In summary, there are no complete current or future exposure pathways for the limited contamination found in groundwater at SNL/NM.

4.2.2.1 *Groundwater Description (Hazard Area Summary)*

As the ER Project progressed in its investigations of SWMUs and site-wide hydrogeology, six areas of concern within SNL/NM were identified for groundwater investigations. They are

- The CWL
- The MWL
- Tijeras Arroyo
- TA-5
- Canyons
- Drain and Septic Systems

Four of these six areas were found to have groundwater contamination above the MCL due to past activities by SNL/NM. These areas are shown on Figure 4.2.2-2 and include:

- The CWL
- Tijeras Arroyo
- TA-5
- Canyons

Investigations at the CWL, including groundwater, are conducted according to RCRA closure agreements. All other groundwater investigations have been voluntary in anticipation of a Compliance Order on Consent that was issued as a final draft for public comment on January 21, 2004. The final Compliance Order on Consent requires that CMEs for groundwater be performed at Tijeras Arroyo, TA-5, and the Canyons Area. A CME as described in the Compliance Order on Consent is similar to a RCRA CMS. Regulations require that all groundwater at SNL/NM be evaluated against MCLs as a potential drinking water resource.

Under a RBES vision, the land use would be considered at each of the areas. The land use is industrial in the areas of groundwater contamination at the CWL, the Tijeras Arroyo Area, and TA-5. The Canyons Area risk would be based on recreational land use.

The current municipal and U.S. Air Force drinking water supply is safe from any groundwater contamination due to past SNL/NM activities at these areas. All groundwater areas affected by SNL/NM activities are monitored and surrounded by sentry wells.

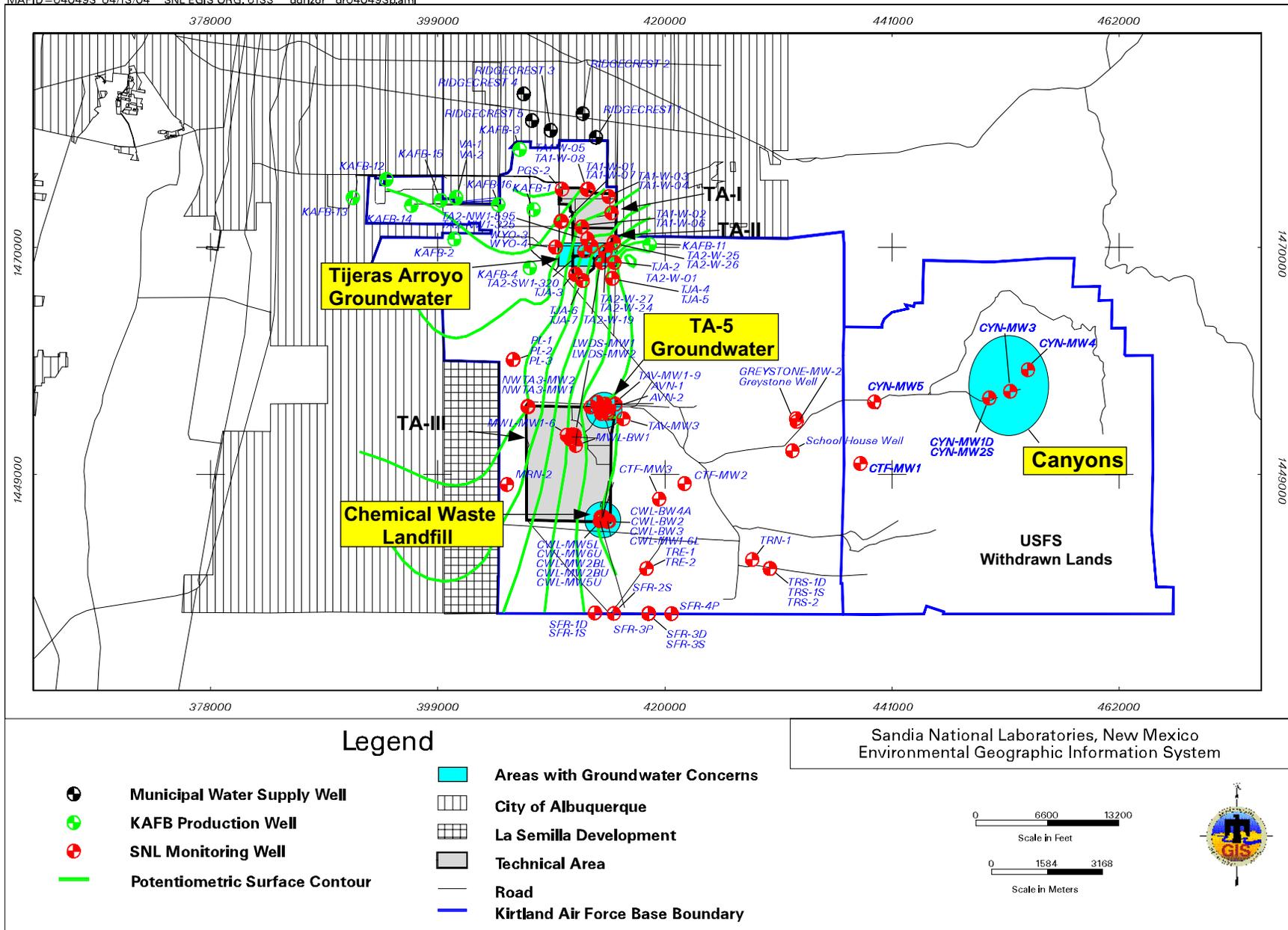


Figure 4.2.2-2 Long-Term Stewardship at Sandia National Laboratories
Location of Areas with Groundwater Concerns

The SNL/NM ER Project has conducted groundwater monitoring since 1986 and owns and routinely samples 65 wells (mostly single-completion monitoring wells with 20-foot screens). Forty-three are monitoring wells in the Santa Fe group aquifer of the Middle Rio Grande Basin between 450 to 620 feet bgs. Fifteen are in the perched groundwater system approximately 200 feet above the Santa Fe group aquifer. This perched groundwater system is not well-connected to the Santa Fe group aquifer. The remaining seven monitoring wells are east of the Santa Fe Group aquifer in either a complex fault or bedrock system, neither of which is well-connected to the Santa Fe group aquifer (2002, SNL/NM 2001 ASER).

Past SNL/NM activities have resulted in TCE, PCE and/or nitrate (as nitrogen) concentrations at or slightly higher than the drinking water standard in isolated locations. The drinking water standard for TCE and PCE is 5 micrograms/liter and for nitrate (as nitrogen) is 10 milligrams/liter. The maximum concentrations measured in FY 2002 were 8.1 micrograms/liter for PCE, 18.1 micrograms/liter for TCE, and 49 milligrams/liter for nitrate (as nitrogen).

4.2.2.2 *Groundwater Primary and Secondary Sources*

Sources are shown with a dashed line on the CSM because investigations show that past sources no longer contaminate the groundwater. The following is a summary of the primary sources and COCs that exceeded MCLs for the each area summarized above:

- The CWL: The TCE source was sufficiently removed (by vapor extraction and landfill excavation). CWL groundwater saw a reduction in TCE concentrations. A CMS and Post Closure Care Plan were submitted to the NMED for approval in May 2003 (SNL/NM May 2003a). The groundwater contamination remained adjacent to the landfill. The maximum TCE concentration following source removal was 12.5 micrograms/liter in a well on the landfill boundaries. TCE contamination did not reach a sentry well 150 feet directly downgradient of this location. The nearest receptor well is approximately four miles from the sentry well.
- Tijeras Arroyo area: PCE and TCE contamination is in a perched groundwater system that is 200 feet above the portion of the Middle Rio Grande basin aquifer used for water supply. Investigations show that former sources such as the KAFB Sewage Lagoons and the SNL/NM Acid Waste Line Outfall did not leave residual sources that could continue to contaminate the groundwater. PCE is found in one well above the MCL of 5 ppb. TCE is found in 2 wells above the MCL of 5 ppb; one of these wells is the one with PCE. This solvent contamination above the MCL is found only in the groundwater perched 200 feet above the basin aquifer. This perched groundwater is not well-connected to the supply water and is moving in a direction away from water-supply wells. The maximum concentrations of PCE and TCE found in this perched system in FY 2002 were 8.1 and 7.5 micrograms/liter, respectively. Nitrate contamination has been found in a few locations adjacent to the Tijeras Arroyo in both deep and shallow groundwater. The maximum concentration in FY 2002 was 49 milligrams/liter. NMED approved a groundwater investigation workplan (SNL/NM June 2003b) for this project in September 2003. A CME is scheduled for completion in September 2005.

- TA-5: Groundwater contamination has remained adjacent to the TA-5 and is surrounded by sentry wells. Investigations show that there is no source remaining in the 500-foot thick vadose zone. The maximum TCE concentration in FY 2002 was 18.1 micrograms/liter. The maximum PCE concentration measured in FY 2002 was 7.5 micrograms/liter. Nitrate (as nitrogen) groundwater concentration was measured in one well above the MCL at 12.7 milligrams/liter maximum in FY 2002. No chlorinated solvent or nitrate contamination is found in sentry wells. It is approximately a mile from these sentry wells to the nearest receptor well. NMED verbally approved a sampling and analysis plan for MNA parameters in October 2003 (Dettmers and Wymore October 2003). A CME is scheduled for completion in September 2005.
- Canyons Area: The Canyons Area is in a complex bedrock system a mile or more east of, but not well-connected to, the Middle Rio Grande Basin aquifer system. A source excavation of petroleum product was completed in the Canyons Area. There is no organic contamination above the MCL in the Canyons Area. The maximum concentration of nitrate (as nitrogen) measured in FY 2002 at the Burn Site was 22.5 milligrams/liter. A CME is scheduled for completion in September 2005.

4.2.2.3 *Groundwater Release Transport or Exposure Mechanisms*

The only release from these areas of groundwater contamination to the receptors would be the result of groundwater flow to a receptor/production well. Groundwater contamination at the CWL, Tijeras Arroyo Area, and TA-5 is in the less conductive alluvial fan deposits. Given the slow groundwater travel times at SNL/NM, none of the areas of groundwater contamination is near enough to receptor wells to impact drinking water.

4.2.2.4 *Groundwater Temporary Barriers and Controls*

Given the low concentrations of groundwater contamination, slow groundwater travel times and depth to groundwater at the site, the SNL/NM assumes temporary barriers and controls are not applicable to groundwater there.

4.2.2.5 *Groundwater Remediation, Mitigation and Other Interventions*

The current baseline end state for groundwater at SNL/NM will be selected via a CME. Early indications are that the alternatives considered in the three remaining corrective measures evaluations (Tijeras Arroyo, TA-5, and Canyons Area) may include 1) MNA, 2) bioremediation with MNA, and 3) NFA with long-term monitoring.

MNA typically operates on the principle of indigenous microorganisms using a supply of nutrients and electron acceptors (or donors) already present in the environment to completely metabolize or cometabolize pollutants (EPA September 1998, Wiedemeier et al. 1999). In certain applications, non-destructive attenuation mechanisms (i.e., dispersion or dilution) may be sufficient to meet site-specific cleanup goals. Careful characterization and thorough monitoring are essential to ensure that sufficient attenuation will take place to comply with all

regulatory requirements. This characterization is the difference between MNA and groundwater monitoring because groundwater monitoring makes no attempt to verify pathways of natural attenuation or to predict contaminant transport and degradation. MNA has wide applicability, relative low cost, and requires minimal infrastructure. The primary costs associated with this remedy are monitoring costs. It can be used for remediation of common groundwater contaminants. Biodegradation or cometabolism can result in reduction of VOC concentrations, and nitrate can be transformed through redox processes (e.g., denitrification) that are operative in the subsurface.

The Office of Solid Waste and Emergency Response (OSWER) Directive, "Use of MNA at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites" (EPA April 1999) states four key principles that should generally be considered during selection of remedial measures:

- Source control measures should use treatment to address "principal threat" wastes (or products) wherever practical, and engineering controls (i.e., containment for waste or products) that pose a relatively low long-term threat, or where treatment is impracticable.
- Contaminated groundwater should be returned to "their beneficial uses wherever practical, within a timeframe that is reasonable given the particular circumstances of the site." When restoration of groundwater is not practical, EPA "expects to prevent further migration of the plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction."
- Contaminated soil should be remediated to achieve an acceptable level of risk to human and environmental receptors, and to prevent any transfer of contaminants to other media (e.g., surface or groundwater, air, sediments) that would result in an unacceptable risk or exceed required cleanup levels.
- Remedial actions in general should include opportunities for public involvement that serve to both educate interested parties and to solicit feedback concerning the decision making process.

The principal threat wastes mentioned in the first principle are defined in the OSWER Directive as "source materials that are highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur." The directive further states that contaminated groundwater is not a source material; therefore, it is not a principal threat waste.

Guidance for determining favorable conditions for evaluating MNA as a remedial alternative is listed in "Decision-Making Framework Guide for Evaluation and Selection of Monitored Natural Attenuation Remedies at Department of Energy Sites" (DOE May 1999). Two options for the first stage of decision-making include: 1) the contamination currently is not posing an unacceptable risk, there is no active source term, and plume contours are static or retreating or 2) data suggest attenuation mechanisms are operable or exist. No active source term is defined as "any inventory of contaminant in the environment that is being released to the plume at a rate greater than that at which it can be attenuated" (DOE May 1999).

Bioremediation is the application of biological treatment for remediation of contaminants. In situ bioremediation (ISB) is the application of bioremediation in the subsurface and can be used for remediation of a wide variety of contaminants, both organic and inorganic, under both aerobic and anaerobic conditions. It combines an understanding of biology, geochemistry,

hydrogeology, and engineering into a cohesive strategy for the destruction of groundwater contaminants using microbes. Thorough data evaluation is necessary to evaluate ISB effectiveness. Data evaluation includes knowledge of the type of microorganisms, the type of contaminant, and the geological conditions at the site.

Bioremediation can involve aerobic or anaerobic processes (Wiedemeier et al. 1999, ITRC 2002). Aerobic bioremediation techniques can include implementation of biosparging (EPA March 2003). Biosparging is similar to air sparging except that the injected air (or oxygen) can be amended with nutrients, increasing activity of indigenous microorganisms to stimulate aerobic degradation. Contaminants are removed through microbial degradation and volatilization, whereas air sparging removes contaminants through volatilization only. The operating principles are the same as air sparging and this technology is often used with other technologies (e.g., soil vapor extraction).

Anaerobic bioremediation techniques can include injection of an electron donor to increase activity of indigenous microorganisms to stimulate anaerobic degradation to remove contaminants through microbial degradation. VOC and nitrate reduction can occur in the absence of oxygen and the presence of an electron donor where VOCs and nitrate can act as electron acceptors in the microbial respiration process. This results in anaerobic reductive dechlorination of VOCs to ethene and conversion of nitrate to nitrite and ultimately to nitrogen (N₂).

No further action with long-term monitoring is groundwater monitoring. Groundwater monitoring consists of collecting samples from a network of monitoring wells with the objective of monitoring contaminant concentrations and transport in groundwater over time. Groundwater monitoring is applicable for relatively low concentration groundwater plumes with long remedial timeframes and minimal risk of harm to human health and the environment. A monitoring plan will be established to identify monitoring locations, frequency and duration of sample collection, and analysis parameters. Extensive knowledge of site-specific geohydrologic conditions and contaminant distribution and transport is required to establish an appropriate monitoring plan.

Groundwater monitoring is not considered to be a no action approach because active monitoring will take place and a contingency plan will be established. If a no action approach was selected, then monitoring would not take place and a contingency plan would not be established. A contingency plan will include reevaluation criteria in the event that groundwater monitoring is no longer effectively protecting human health and the environment (e.g., dramatic increases in contaminant concentrations and contaminant distribution and transport beyond control location). Unlike MNA, the groundwater monitoring approach makes no attempt to verify pathways of natural attenuation or to predict contaminant transport and degradation. No further action with long-term monitoring was verbally rejected by the NMED in May 2003.

A CMS for the MWL was delivered to the NMED in May 2003 (Sandia National Laboratories May 2003d). The MWL is currently in an annual groundwater sampling cycle.

Preliminary data show that the drains and septic systems did not impact groundwater. Groundwater sampling is expected to be completed in FY 2004. Reports for the Drains and septic systems will follow but ultimately must be delivered by the end of FY 2006.

4.2.2.6 *Groundwater Receptors*

The potential current and future human health receptors were established based on the "Baseline for Future Use Options" (DOE et al. September 1995). For SNL/NM, the potential receptors included industrial, recreational, and residential. The industrial and recreational land uses were the most predominant. However, the groundwater in the vicinity of SNL/NM will not be used by these potential receptors (there are no complete exposure pathways). Nonetheless the CMEs will need to consider the untapped groundwater as a potential resource.

As described in detail in "Predictive Ecological Risk Assessment Methodology, Environmental Restoration Program, Sandia National Laboratories, New Mexico" (IT July 1998) the ecological receptors include, a nonspecific perennial plant was selected as the receptor to represent plant species at the site. The deer mouse (*Peromyscus maniculatus*) and the burrowing owl (*Speotyto cunicularia*) were used to represent wildlife use. Because of its opportunistic food habits, the deer mouse was used to represent a mammalian herbivore, omnivore, and insectivore. The burrowing owl was used to represent a top predator at this site. There is no current or future surface release of the groundwater found in the vicinity of SNL/NM and therefore, there are no complete ecological exposure pathways for contact with groundwater.

4.2.2.7 *Groundwater Variance Discussion*

The Current Cleanup Baseline End State assumes that all groundwater contaminated by SNL/NM activities must ultimately be remediated in a manner consistent with current environmental regulations and existing permit agreements. The impacted groundwater body is assumed the point of compliance. The Risk-Based End State Vision assumes that the KAFB site boundary would be the point of compliance for contaminants in groundwater. The clean up goals within the site boundary would be based on land-use expectations of industrial or recreational. The Risk-Based End State Vision, therefore, is not consistent with Federal and State environmental regulations and existing agreements in terms of onsite cleanup of groundwater. The Risk-Based End State is contrary to enforcement documents signed by the DOE, SNL/NM, the EPA, and the NMED.

The current baseline end state vision for groundwater is based on a preliminary technology survey and verbal discussions with the regulator. A CME will be delivered in September 2005. If MNA is chosen as the corrective measure, and no additional remediation is required, then the current state will differ little from the end state vision. The differences seen would likely be contaminant concentration reductions.

The evaluation for MNA will include following the EPA protocol for MNA. This protocol lends itself best to anaerobic groundwater systems. The groundwater at SNL/NM is aerobic. To mitigate the difficulty of applying an aerobic system to the EPA protocol, SNL/NM is using some expertise used at Idaho National Laboratories for deep aerobic groundwater with TCE contamination.

The NMED has not reviewed many MNA evaluations. SNL/NM is working with the NMED in teamwork fashion early in the process to smooth the progress of their decision making. Also SNL/NM is seeking ways to accelerate delivery of the CME again to give the NMED sufficient information as early as possible for decision making.

All groundwater decisions for SNL/NM will be based on assumptions regarding the current groundwater supply network. As long as there are no substantive changes to groundwater supply in the area of SNL/NM these assumptions and decisions hold. However, a significant change in groundwater flow conditions can occur if, for example, the City of Albuquerque stops using the well field north of SNL/NM, the Ridgecrest wells. Future groundwater supply changes will be an important long-term stewardship issue. The future groundwater supply will continue to be monitored as a part of the LTES effort at SNL/NM, in conjunction with the City of Albuquerque and Bernalillo County.

4.3 NFA Sites Passing Industrial or Recreational Risk

4.3.1 Introduction

The DOE and SNL/NM have submitted a total of 229 NFA documents to the EPA and/or the NMED for approval. The NMED has developed NFA criteria that are used during the investigation and remediation (if necessary) of SWMUs and that are used to determine the appropriateness of proposing NFA for any particular SWMU. During investigation of the SWMUs at SNL/NM, it was determined that RCRA solid or hazardous wastes and/or constituents or other CERCLA hazardous substances were never managed (generated, treated, stored, or disposed of) at some sites identified as SWMUs. Other SWMUs could not be located, did not exist, were duplicates of other SWMUs, or were included in investigations of other SWMUs. In addition, some SWMUs never had a release to the environment and future releases were also determined to be unlikely. These SWMUs are not considered to contain hazards, and are not included in the discussion in this section. All NFA sites (SWMUs and AOCs) are listed in Table 4.3.1-1, which gives the status and risk level attained. Detailed risk information is contained in the NFA proposals for each site, which are currently available to the public at the library of the University of New Mexico, and which will be available shortly on the SNL/NM external web.

Finally, some SWMUs were characterized and remediated in accordance with current applicable state and/or federal regulations, and confirmatory data indicate that remaining contaminant concentrations pose acceptable levels of risk to human health and the environment under current and projected future land uses. All sites that underwent remediation were cleaned up either to the industrial or recreational risk level, which is consistent with the future land-use designations. Most of the cleanups were excavations/soil removals, and were conducted with heavy equipment. In some cases this lack of fine control resulted in inadvertent attainment of the residential risk levels. Sites which passed the residential risk criteria are not considered to contain hazards, and so are also excluded from this section.

The SNL/NM ER Project has 22 NFA sites which are known to not pass the residential risk, and therefore have been closed under industrial or recreational land use. Another 24 NFA sites will have risk assessments re-run under the new guidance from NMED, and may not pass at the residential level. For the purpose of this section, the term "NFA Sites" refers to these industrial or recreational risk sites.

The hazard discussed in this section is the residual contamination remaining at the NFA sites which were cleaned up to industrial or recreational risk levels only, and which did not meet the residential risk criteria. Risks to human health or the environment from these residuals are minimal.

Table 4.3.1-1
Status of NFA Sites

Site #	Sub-site	Site Name	Operable Unit	Type of Site	Approval Date ^a	Pass Residential Risk?	Pass Industrial Risk?
1		Radioactive Waste Landfill	1303	SWMU		NO	YES
2		Classified Waste Landfill	1303	SWMU		NO	YES
3		Chemical Disposal Pits	1303	SWMU		NO	YES
4		LWDS Surface Impoundments	1307	SWMU		NO	YES
5		LWDS Drainfield	1307	SWMU		NO	YES
6		Gas Cylinder Disposal Pit	1335	SWMU	11/19/01	YES	NA
6		Gas Cylinder Disposal Pit (Bldg. 9966)	1335	SWMU	11/19/01	YES	NA
7		Gas Cylinder Disposal Pit	1309	SWMU	9/15/00	YES	NA
9		Burial Site/Open Dump	1334	SWMU		YES	NA
10		Burial Mounds (N of Pendulum Site)	1333	SWMU	7/21/00	NO	YES
11		Explosive Burial Mounds	1334	SWMU	10/15/00	NO	YES
12	A	Open Arroyo (Lurance Canyon)	1333	SWMU	10/15/00	YES	NA
12	B	Buried Debris in Graded Area	1333	SWMU	7/14/00	NO	YES
13		Oil Surface Impoundment	1333	SWMU	7/14/00	NO	YES
14		Burial Site (Bldg. 9920)	1335	SWMU	7/14/00	NO	YES
15		Trash Pits (Frustration Site) ^b	1332	SWMU	12/1/97	NO	YES
16		Open Dumps	1309	SWMU	10/15/00	NO	YES
17	A-H	Scrap Yards/Open Dump	1335	SWMU	7/14/00	NO	YES
18		Concrete Pad	1306	SWMU		YES	NA
19		TRUPAK Boneyard Storage Area	1332	SWMU	7/14/00	NO	YES
20		Schoolhouse Mesa Burn Site	1334	SWMU	12/31/95	YES	NA
21		Metal Scrap (Coyote Springs)	1334	SWMU	10/15/00	NO	YES
22		Storage Burn (West of DEER)	1334	SWMU	7/14/00	NO	YES
23		Disposal Trenches	1309	SWMU	7/21/00	YES	NA
25		Burial Site (South of TA-1)	1302	SWMU	12/31/95	YES	NA
26		Burial Site (West of Tech Area 3)	1306	SWMU		YES	NA
27		Bldg. 9820 Animal Disposal Pit	1332	SWMU	7/21/00	YES	NA
28	1	Mine Shafts - 28A (IPABS)	1332	SWMU	12/1/97	NO	YES

Refer to footnotes at end of table.

Table 4.3.1-1 (Continued)
Status of NFA Sites

Site #	Sub-site	Site Name	Operable Unit	Type of Site	Approval Date ^a	Pass Residential Risk?	Pass Industrial Risk?
28	2	Mine Shaft	1332	SWMU		NO	YES
28	3	Mine 28C (IPABS)	1332	SWMU	12/1/97	NO	YES
28	4	Mine 28D (IPABS)	1332	SWMU	12/1/97	NO	YES
28	5	Mine 28E (IPABS)	1332	SWMU	12/1/97	NO	YES
28	6	Mine 28F (IPABS)	1332	SWMU	12/1/97	NO	YES
28	7	Mine 28G (IPABS)	1332	SWMU	12/1/97	NO	YES
28	8	Mine 28H (IPABS)	1332	SWMU	12/1/97	NO	YES
28	9	Mine 28I (IPABS)	1332	SWMU	12/1/97	NO	YES
28	10	Mine 28J (IPABS)	1332	SWMU	11/19/01	YES	NA
30		Reclamation Yard	1302	SWMU		YES	NA
31		Transformer Oil Spill	1306	SWMU	11/19/01	YES	NA
32		Steam Plant Oil Spill (TA-I)	1302	SWMU	12/31/95	YES	NA
34		Centrifuge Oil Spill	1306	SWMU	11/19/01	YES	NA
35		Vibration Facility Oil Spill (TA-3)	1306	SWMU		YES	NA
36		HERMES Oil Spill	1306	SWMU	11/19/01	YES	NA
37		PROTO Oil Spill	1306	SWMU	11/19/01	YES	NA
38		Oil Spills (BLDG 9920)	1335	SWMU	7/14/00	NO	YES
39		Oil Spill - Solar Facility	1335	SWMU	9/29/97	YES	NA
40		Oil Spill	1309	SWMU	11/1/97	NO	YES
41		Building 838 Mercury Release (TA-I)	1302	SWMU	12/31/95	YES	NA
42		Building 870 Water Treatment Facility (TA-I)	1302	SWMU	10/15/00	NO	YES
43		Radioactive Materials Storage Yard	1303	SWMU	9/15/00	YES	NA
44		Decontamination Site and	1303	SWMU	7/14/00	NO	YES
45		Liquid Discharge	1309	SWMU		NO	YES
46		Old Acid Waste Line Outfall	1309	SWMU		NO	YES
47		Unmanned Seismic Observatory	1334	SWMU	12/31/95	YES	NA
48		Bldg. 904 Septic System	1303	SWMU		NO	YES
49		Bldg. 9820 Drains	1295	SWMU		NO	YES

Refer to footnotes at end of table.

Table 4.3.1-1 (Continued)
Status of NFA Sites

Site #	Sub-site	Site Name	Operable Unit	Type of Site	Approval Date ^a	Pass Residential Risk?	Pass Industrial Risk?
50		Old Centrifuge Site	1309	SWMU	10/15/00	NO	YES
51		Bldg. 6924 Pad, Tank, and Pit	1306	SWMU	11/19/01	YES	NA
52		LWDS Holding Tanks	1307	SWMU		NO	YES
53		Bldg. 9923 Storage Igloo	1335	SWMU	9/29/97	YES	NA
54		Pickax Site (Thunder Range)	1335	SWMU	7/14/00	NO	YES
55		Red Towers Site (Thunder Range)	1335	SWMU	10/15/00	NO	YES
56		Old Thunderwells (Thunder Range)	1335	SWMU	7/14/00	NO	YES
57	A	Workman Site: Firing Site	1334	SWMU	10/15/00	NO	YES
57	B	Workman Site: Target Area	1334	SWMU	10/15/00	NO	YES
59		Pendulum Site	1333	SWMU	7/21/00	YES	NA
60		Bunker Area	1333	SWMU	11/19/01	YES	NA
61	A	Schoolhouse Mesa Test Site: Blast Area	1334	SWMU	7/14/00	NO	YES
61	B	Schoolhouse Mesa Test Site: Cratering Area ^c	1334	SWMU	12/5/96	NO	YES
61	C	Schoolhouse Mesa: Schoolhouse Building	1334	SWMU	10/15/00	NO	YES
62		Greystone Manor Site	1334	SWMU	12/31/95	YES	NA
63	A	Balloon Test Area: PDSP Site	1333	SWMU	10/15/00	NO	YES
63	B	Balloon Test Area: Balloon/Helicopter Site	1333	SWMU	7/14/00	NO	YES
64		Gun Site (Madera Canyon)	1333	SWMU	10/15/00	NO	YES
65	A	Small Debris Mound	1333	SWMU	10/15/00	NO	YES
65	B	Primary Detonation Area	1333	SWMU	10/15/00	NO	YES
65	C	Secondary Detonation Area	1333	SWMU	10/15/00	NO	YES
65	D	Near Field Dispersion Area	1333	SWMU	10/15/00	NO	YES
65	E	Far Field Dispersion Area	1333	SWMU	7/14/00	NO	YES
66		Boxcar Site	1332	SWMU		YES	NA
67		Frustration Site	1332	SWMU	11/19/01	YES	NA
69		Old Borrow Pit	1334	SWMU	12/31/95	YES	NA
70		Explosives Test Pit (Water Towers)	1334	SWMU	10/15/00	NO	YES
71		Moonlight Shot Area	1334	SWMU	7/14/00	NO	YES

Refer to footnotes at end of table.

Table 4.3.1-1 (Continued)
Status of NFA Sites

Site #	Sub-site	Site Name	Operable Unit	Type of Site	Approval Date ^a	Pass Residential Risk?	Pass Industrial Risk?
72		Operation Beaver Site	1333	SWMU	7/14/00	NO	YES
73		Hazardous Waste Repackaging/Storage (Building 895)	1302	SWMU	12/31/95	YES	NA
76		Mixed Waste Landfill	1289	SWMU		NO	YES
77		Oil Surface Impoundment	1309	SWMU	7/14/00	NO	YES
78		Gas Cylinder Disposal Pit	1306	SWMU		NO	YES
81	A	Catcher Box/Sled Track	1333	SWMU	11/19/01	YES	NA
81	B	Impact Pad	1333	SWMU	11/19/01	YES	NA
81	C	Former Burial Location	1333	SWMU	10/15/00	NO	YES
81	D	Northern Cable Area	1333	SWMU	11/19/01	YES	NA
81	E	Gun Impact Area	1333	SWMU	11/19/01	YES	NA
81	F	Scrap Yard	1333	SWMU	11/19/01	YES	NA
82		Old Aerial Cable Site Scrap	1332	SWMU	11/19/01	YES	NA
85		Firing Site (Bldg. 9920)	1335	SWMU	7/14/00	NO	YES
86		Firing Site (Bldg. 9927)	1335	SWMU	11/19/01	YES	NA
87		Building 9990 Firing Site	1332	SWMU		NO	YES
88	A	Firing Site: Ranch House	1334	SWMU	12/31/95	YES	NA
88	B	Firing Site: Instrumentation Pole	1334	SWMU	10/15/00	NO	YES
89	A-C	Shock Tube Site (Thunder Range)	1335	SWMU	7/14/00	NO	YES
90		Beryllium Firing Site (Thunder Range)	1335	SWMU	10/15/00	NO	YES
92		Pressure Vessel Test Site	1333	SWMU	9/29/97	YES	NA
93	A-C	Madera Canyon Rocket Launcher	1333	SWMU	7/14/00	NO	YES
94	A	Above Ground Tanks	1333	SWMU	7/14/00	NO	YES
94	B	Debris/Soil Mound Area	1333	SWMU		YES	NA
94	C	Bomb Burner Discharge Line	1333	SWMU	11/19/01	YES	NA
94	D	Bomb Burner Discharge Pit	1333	SWMU	10/15/00	NO	YES
94	E	Small Surface Impoundment	1333	SWMU	10/15/00	NO	YES
94	F	LAARC Discharge Pit	1333	SWMU		YES	NA
94	G	Scrap Yard	1333	SWMU	11/19/01	YES	NA

Refer to footnotes at end of table.

Table 4.3.1-1 (Continued)
Status of NFA Sites

Site #	Sub-site	Site Name	Operable Unit	Type of Site	Approval Date ^a	Pass Residential Risk?	Pass Industrial Risk?
94	H	LCBS Fuel Spill	1335	SWMU		YES	NA
96		TA-I Storm Drain System	1302	SWMU		YES	NA
98		Building 863, TCA and Photochemical Releases (also was 185 until 11/93)	1302	SWMU		NO	YES
100		Bldg. 6620 Drain/Sump	1306	SWMU	11/19/01	YES	NA
101		Explosive Contaminated Sumps, Drains (Bldg. 9926)	1295	SWMU		NO	YES
102		Radioactive Disposal Area	1306	SWMU	11/19/01	YES	NA
103		Scrap Yard	1335	SWMU	7/14/00	NO	YES
104		PCB Spill, Computer Facility	1302	SWMU	12/31/95	YES	NA
105		Mercury Spill @ Bldg. 6536	1306	SWMU	12/31/95	YES	NA
107		Explosives Test Area (Southeast TA-3)	1306	SWMU		YES	NA
108		Firing Site (BLDG 9940)	1335	SWMU	7/14/00	NO	YES
109		Firing Site (BLDG 9956)	1335	SWMU	7/14/00	NO	YES
111		Bldg. 6715 Sump/Drain	1306	SWMU	11/19/01	YES	NA
112		Explosive Contaminated Sump	1335	SWMU	10/15/00	NO	YES
113		Area II Firing Sites	1303	SWMU	11/19/01	YES	NA
114		Explosives Burn Pit	1303	SWMU		YES	NA
115		Firing Site (BLDG 9030)	1335	SWMU	10/15/00	NO	YES
116		Building 9990 Septic System	1295	SWMU		NO	YES
117		Trenches (BLDG 9939)	1335	SWMU	11/19/01	YES	NA
135		Bldg. 906 Septic System	1303	SWMU		NO	YES
136		Bldg. 907 Septic System	1303	SWMU		NO	YES
137		Bldg. 6540/6542 Septic System	1295	SWMU		NO	YES
138		Bldg. 6630 Septic System	1295	SWMU		NO	YES
139		Bldg. 9964 Septic System	1295	SWMU	12/31/95	YES	NA
140		Bldg. 9965 Septic System (Thunder Range)	1295	SWMU		NO	YES
141		Bldg. 9967 Septic System (Thunder Range)	1295	SWMU	11/19/01	YES	NA
142		Bldg. 9970 Septic System	1295	SWMU	10/15/00	NO	YES
143		Bldg. 9972 Septic System	1295	SWMU	10/15/00	NO	YES

Refer to footnotes at end of table.

Table 4.3.1-1 (Continued)
Status of NFA Sites

Site #	Sub-site	Site Name	Operable Unit	Type of Site	Approval Date ^a	Pass Residential Risk?	Pass Industrial Risk?
144		Bldg. 9980 Septic System	1295	SWMU	10/15/00	NO	YES
145		Bldgs. 9981/9982 Septic System	1295	SWMU	10/15/00	NO	YES
146		Bldg. 9920 Drain System	1295	SWMU		NO	YES
147		Bldg. 9925 Septic System	1295	SWMU		NO	YES
148		Bldg. 9927 Septic System	1295	SWMU		NO	YES
149		Bldg. 9930 Septic System	1295	SWMU		NO	YES
150		Bldg. 9939/9939A Septic Systems	1295	SWMU		NO	YES
151		Bldg. 9940 Septic Systems	1295	SWMU	11/19/01	YES	NA
152		Bldg. 9950 Septic Systems	1295	SWMU		NO	YES
153		Bldg. 9956 Septic Systems	1295	SWMU		NO	YES
154		Bldg. 9960 Septic Systems	1295	SWMU		NO	YES
155		Bldg. 6597 25,000 Gallon Tank (TA-V)	Archival/1300	UST	5/1/1994	YES	NA
159		Bldg. 935 Septic System	1303	SWMU		NO	YES
160		Bldg. 9832 Septic Systems	1295	SWMU	11/19/01	YES	NA
161		Bldg. 6636 Septic Systems	1295	SWMU		NO	YES
165		Bldg. 901 Septic System	1303	SWMU		NO	YES
166		Bldg. 919 Septic System	1303	SWMU		NO	YES
167		Bldg. 940 Septic System	1303	SWMU		NO	YES
168		Bldg. 901 UST (TA-II)	Archival/1300	UST	5/1/1994	YES	NA
169		Bldg. 910 UST (TA-II)	Archival/1300	UST	5/1/1994	YES	NA
170		Bldg. 911 UST (TA-II)	Archival/1300	UST	5/1/1994	YES	NA
171		Bldg. 912 UST (TA-II)	Archival/1300	UST	5/1/1994	YES	NA
172		Bldg. 888 UST (TA-I)	Archival/1300	UST	5/1/1994	YES	NA
173		Bldg. 6525 UST (TA-III)	Archival/1300	UST	5/1/1994	YES	NA
174		Bldg. 6581 UST (TA-IV)	Archival/1300	UST	5/1/1994	YES	NA
175		Bldg. 6588 UST (TA-IV)	Archival/1300	UST	5/1/1994	YES	NA
176		Bldg. 605 UST (TA-I)	Archival/1300	UST	5/1/1994	YES	NA
178		Bldg. 6587 UST (TA-III)	Archival/1300	UST	5/1/1994	YES	NA

Refer to footnotes at end of table.

Table 4.3.1-1 (Continued)
Status of NFA Sites

Site #	Sub-site	Site Name	Operable Unit	Type of Site	Approval Date ^a	Pass Residential Risk?	Pass Industrial Risk?
179		Bldg. 7570 UST	Archival/1300	UST	5/1/1994	YES	NA
180		Bldg. 6503 UST (TA-III)	Archival/1300	UST	5/1/1994	YES	NA
181		Bldg. 6500 UST (TA-V)	Archival/1300	UST	5/1/1994	YES	NA
186		Building 859 TCE Disposal	1302	SWMU	10/1/00	NO	YES
187		TA-I Sanitary Sewer Lines	1302	SWMU		YES	NA
188		Bldg. 6597 Aboveground Spill Containment	1306	SWMU	12/31/95	YES	NA
190		Steam Plant Tank Farm	1302	SWMU		NO	YES
191		Equus Red	1335	SWMU	11/19/01	YES	NA
192		TA-I Waste Oil Tank	1302	SWMU	7/14/00	NO	YES
193		Sabotage Test Area	1335	SWMU	7/14/00	NO	YES
194		Gen. Purpose Heat Source Test Area	1335	SWMU	9/29/97	YES	NA
195		Experimental Test Pit	1306	SWMU		YES	NA
196		TA-V Cistern Bldg. 6597	1306	SWMU		NO	YES
211		Building 840 Former UST	1302	SWMU	10/15/00	NO	YES
226		TA-I Former Acid Waste Line	1302	SWMU		YES	NA
227		Bunker 904 Outfall	1309	SWMU		NO	YES
228	A	Centrifuge Dump Site	1309	SWMU	10/15/00	NO	YES
228	B	Centrifuge Dump Site	1309	SWMU	11/15/01	NO	YES
229		Storm Drain System Outfall	1309	SWMU		NO	YES
230		Storm Drain System Outfall (East Side of TA-4)	1309	SWMU		YES	NA
232		Storm Drain System Outfall (Southeast of TA-4)	1309	SWMU		YES	NA
233		Storm Drain System Outfall	1309	SWMU		NO	YES
234		Storm Drain System Outfall	1309	SWMU		NO	YES
235		Storm Drain System Outfall	1309	SWMU	10/15/00	NO	YES
241		Storage Yard	1306	SWMU		YES	NA
275		TA-V Seepage Pits	1306	SWMU	7/14/00	NO	YES
277		New Firing Site East of Optical Range	1332	AOC	11/19/01	YES	NA
828		Building 828	1302	SWMU		YES	NA

Refer to footnotes at end of table.

Table 4.3.1-1 (Concluded)
Status of NFA Sites

Site #	Sub-site	Site Name	Operable Unit	Type of Site	Approval Date ^a	Pass Residential Risk?	Pass Industrial Risk?
1001		Bldg. 898 Septic System (TA-I)	1295	AOC		YES	NA
1003		Former Bldg. 915/922 Septic System (TA-II)	1295	AOC		YES	NA
1008		Bldg. 6750 Septic System (TA-III)	1295	AOC		YES	NA
1009		Bldg. 6620 Internal Sump (TA-III)	1295	AOC		YES	NA
1014		Former T-12, T-42, and T-43 Septic System (TA-V)	1295	AOC		YES	NA
1026		Bldg. 6501 West Septic System	1295	AOC		YES	NA
1030		Bldg. 6587 Septic System (TA-III)	1295	AOC		YES	NA
1032		Bldg. 6610 Septic System (TA-III)	1295	AOC		YES	NA
1033		Bldg. 6631 Septic System (TA-III)	1295	AOC		YES	NA
1072		T-52 and Former Bldg. 6500 Septic System (TA-V)	1295	AOC		NO	NA
1073		Bldg. 6580 seepage pit (TA-V)	1295	AOC		YES	NA
1077		Bldg. 6920 Septic System (TA-III)	1295	AOC		YES	NA
1082		Bldg. 6620 Septic System (TA-III)	1295	AOC		YES	NA
1086		Bldg. 6523 Septic System (TA-III)	1295	AOC		YES	NA
1089		Bldg. 6734 seepage pit (TA-III)	1295	AOC		YES	NA
1091		Bldg. 6720 Septic System (TA-III) ^d	1295	AOC		NA	NA
1093		Bldg. 6584 West Septic System (TA-III)	1295	AOC		YES	NA
1096		Bldg. 6583 Septic System (TA-V)	1295	AOC		YES	NA
1101		Bldg. 885 Septic System (TA-I)	1295	AOC		YES	NA
1105		Bldg. 6596 Drywell (TA-V)	1295	AOC		YES	NA
1111		Bldg. 6720 Drywell (TA-III)	1295	AOC		YES	NA
1112		Bldg. 6590 Reactor Sump Drywell, TA-V	1295	AOC		YES	NA
TNT		TNT Site	1335	AOC		YES	NA

^aInformation for shaded areas to be provided.

^bAs detection limit high.

^cTransferred to Kirtland Air Force Base.

^dSite does not exist.

4.3.2 NFA Conceptual Site Model

Figure 4.3.2-1 presents the generic CSM for the NFA Sites that have been cleaned up to only industrial or recreational risk levels. This generic CSM provides a visual presentation of site exposure pathways at the sites that currently connect a source of contamination to possible human and ecological receptors. A site-specific CSM is documented in greater detail for each of the NFA Sites in the risk assessments presented in the NFA for each site. These risk assessments demonstrate that the sites meet the current and projected future land uses which were determined as discussed in the previous sections.

Description (Hazard Area Summary)

The NFA sites hazard areas are comprised of residual soil contamination that originated from the SNL/NM operations. In some cases, characterization showed that the soils contained residuals which were sufficient to pass a risk assessment assuming an industrial or recreational land-use scenario. Other sites were remediated only to the industrial or recreational level. The NFA sites are located in Technical Areas as well as in the more remote firing sites and large explosive test areas. Risks to human health or the environment from these residuals are minimal.

4.3.2.1 *Primary and Secondary Sources*

COCs at these sites are due to SNL/NM operations and occur as residual contaminants in surface and subsurface soils, and include both inorganic constituents (metals and radionuclides) and organic constituents.

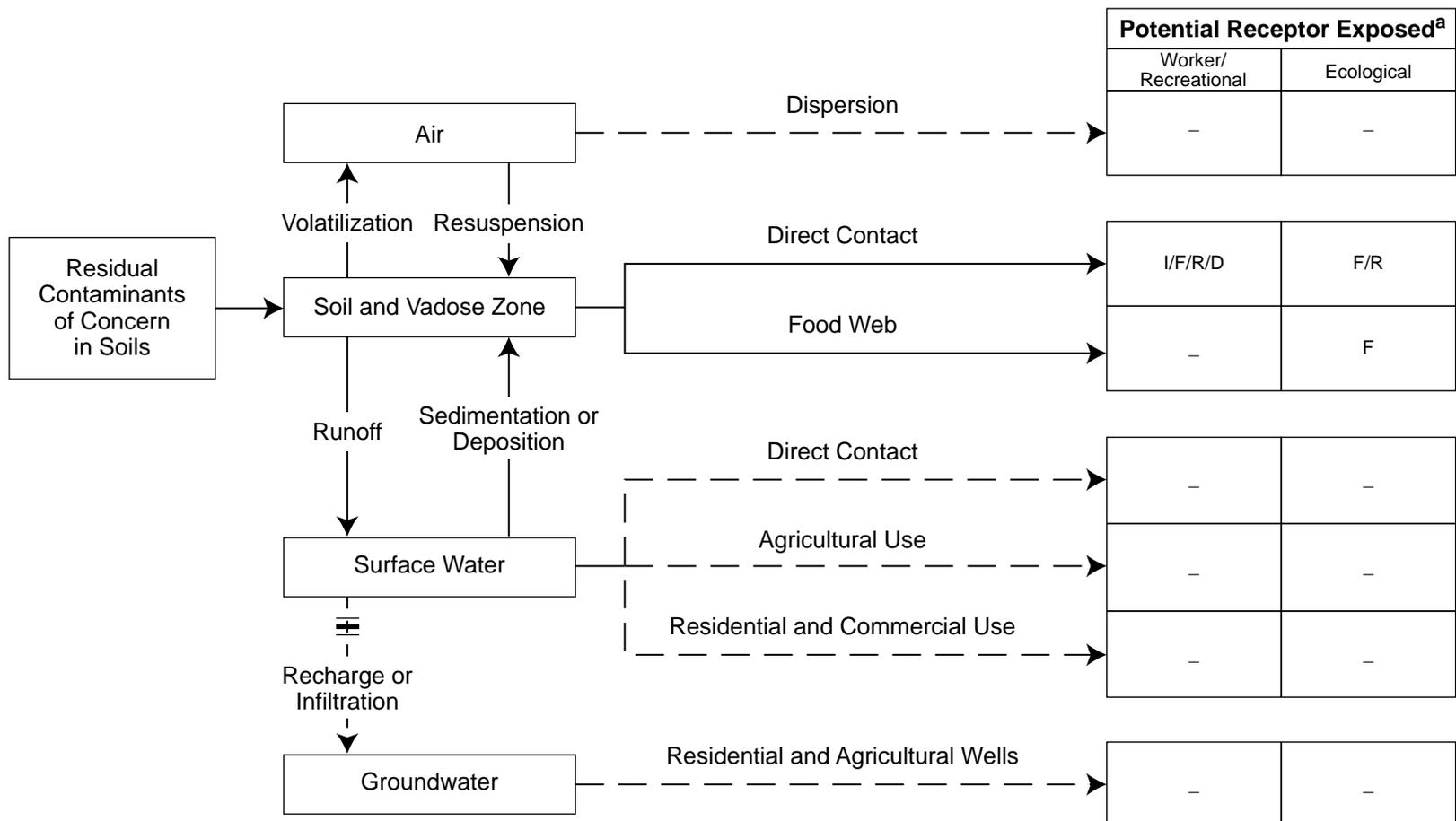
4.3.2.2 *Release Transport or Exposure Mechanisms*

Transport and exposure pathways are addressed in the risk assessment presented for each of the NFA Sites. The following information is generic in nature and can, for the most part, be attributed in general to the NFA Sites.

The potential source of COCs at the sites is soil with residual levels of contamination. Wind, water, and biota are natural mechanisms of transport for these COCs. For sites with surface soil sources, some transport of contaminated soil by wind is possible. This is a minor transport mechanism for subsurface sources.

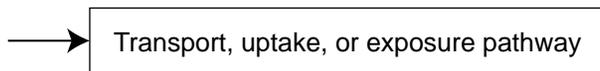
Water at the sites is received as precipitation (rain or occasionally snow). The annual precipitation for the area, as measured at Albuquerque International Sunport, is 8.1 inches and will either evaporate at or near the point of contact, infiltrate into the soil, or form runoff. Both run-on and runoff at most of the NFA Sites is not a potential transport mechanism for COCs due to the limited rainfall within the area.

Water that infiltrates into the soil will continue to percolate through the soil until field capacity is reached. COCs desorbed from the soil particles into the soil solution may be leached into the subsurface soil with this percolation. Because the estimates of evapotranspiration for the KAFB



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Key:



- a The current and future land use is industrial
- I Inhalation
- D Dermal Contact
- F Ingestion
- R External Irradiation
- Minor or No Exposure

Figure 4.3.2-1
Industrial/Recreational NFA Sites CSM - Current and End State

area range from 95 to 99 percent of the annual rainfall, virtually all of the moisture associated with infiltration is expected to evaporate. Groundwater at SNL/NM is deep, therefore, the potential for COCs to reach groundwater through the unsaturated zone above the water table is very limited.

Biota uptake and food chain transfer for COCs vary at the NFA Sites depending on vegetation, and size of the site.

The COCs include both inorganic and organic analytes. The inorganic COCs are elemental in form and therefore are generally not considered to be degradable. Radiological COCs, however, undergo decay to stable isotopes or radioactive daughter elements. Other transformations of inorganic constituents may include changes in valence (oxidation/reduction reactions) or incorporation into organic forms (e.g., the conversion of selenite or selenate from soil to seleno-amino acids in plants). The rate of such processes will be limited by the arid environment at this site. Degradation processes for organic COCs may include photolysis, hydrolysis, and biotransformation. Photolysis requires light, and therefore takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water and may occur in the soil solution. Biotransformation (i.e., transformation due to plants, animals, and microorganisms) may occur; however, biological activity may be limited by the arid environment at this site.

Table 4.3.2-1 summarizes the fate and transport processes that may occur. COCs at these sites occur as residual contaminants in surface and subsurface soils, and include both inorganic constituents (metals and radionuclides) and organic constituents.

Table 4.3.2-1
Summary of Fate and Transport at the NFA Sites

Transport and Fate Mechanism	Existence at the NFA Site	Significance
Wind	Yes (for surface soils)	Low to moderate
Surface runoff	No	None
Migration to groundwater	No	None
Food chain uptake	Varies	Low to high
Transformation/degradation	Yes	Low to moderate

4.3.2.3 *Temporary Barriers and Controls*

Sites cleaned up to industrial or recreational risk levels do not contain any temporary barriers or controls.

4.3.2.4 *Remediation, Mitigation and Other Interventions*

A variety of cleanup activities have already been completed at the sites which meet industrial or recreational risk levels. The details of these activities are included in the NFA document for the individual site.

4.3.2.5 *Receptors*

The potential current and future human health receptors for each site were established based on the "Baseline for Future Use Options" (DOE et al. September 1995). For SNL, the potential receptors included industrial, recreational, and residential land users. The industrial and recreational land uses were the most predominant. However, for all sites a residential receptor was evaluated for comparison purposes. For a detailed description of the potential receptors at the sites refer to the individual NFA documents.

As described in detail in "Predictive Ecological Risk Assessment Methodology, Environmental Restoration Program, Sandia National Laboratories, New Mexico" (IT July 1998) the ecological receptors include, a nonspecific perennial plant was selected as the receptor to represent plant species at the site. The deer mouse (*Peromyscus maniculatus*) and the burrowing owl (*Speotyto cunicularia*) were used to represent wildlife use. Because of its opportunistic food habits, the deer mouse was used to represent a mammalian herbivore, omnivore, and insectivore. The burrowing owl was used to represent a top predator at this site.

5.0 VARIANCE DISCUSSION

There are two variances between the end state that is expected to result from the presently scheduled ER work and the appropriate risk-based end state. These variances concern the MWL and groundwater, are shown in Table 5-1, and are discussed below. Potential future variances may occur at individual sites that have not yet been approved by the NMED. Since risk-based end states have driven cleanup levels for nearly ten years at SNL/NM, and have been applied to all major cleanups, any variance is expected to be minimal.

SNL/NM has worked closely with the NMED to develop the risk-based "one-pass" process described in Section 1.3. This process is tied directly to the risk-based future land uses that were determined with stakeholder input. The "one-pass" process has been successfully implemented, thus avoiding any major variances between the planned end state and the risk-based end state.

For sites that have been removed from SNL/NM's RCRA permit, the current state is exactly the risk-based end state. The four sites that have a small amount of fieldwork remaining (Sites 8, 58, 68, and 91) but have regulatory concurrence with the cleanup approach, are in essentially the same situation. Although there is always the possibility of surprises in the field, these cleanups have been planned on the basis of preliminary site characterization data, and thus are fairly well defined.

Instances where the actual cleanup level attained at a site exceeded the target industrial or recreational level may have occurred because of the use of heavy equipment for soil removal, or the recalculation of residential risk, per new NMED guidance. This unintended result is beneficial since it reduces the amount of stewardship required in the future.

The CWL remediation is complete except for handling the waste and installing a soil cover, which is scheduled to be completed in 2004 and 2005, respectively. The current state is, therefore, very nearly the end state. The post-closure requirements for the CAMU are being finalized with the regulators, and the responsibility for compliance is being transitioned to a permanently funded department of SNL.

Mixed Waste Landfill

This site is currently in the CMS stage and may be required to do more fieldwork than is consistent with the RBES. The RBES for the MWL is to do NFA with ICs (and performance monitoring). Since this alternative was proposed to the regulators in 1998 and rejected, the preferred alternative selected by DOE/SNL from the CMS is a vegetative cover. This cover will consist of a minimum of three feet of soil with native vegetation. A vegetative cover with a bio-intrusion barrier is also being considered. The scope, cost estimates, and schedule for these alternatives are discussed in detail in the CMS (SNL/NM May 2003d). The scope, cost, and schedule for these alternatives for the MWL are shown in Table 5-1.

Table 5-1
Variance Table for the Risk-Based End State at SNL/NM

Alternative	Description of Variances	Impacts (in terms of Scope, Cost, Schedule and Risk)	Barriers in Achieving RBES	Recommendations
The MWL Risk-Based End State (RBES) is No Further Action (NFA) with Institutional Controls (ICs). This alternative would require performance monitoring.	Although the regulators have not yet selected the alternative for the MWL, NFA (the RBES) is unlikely to be selected. Based on the recently completed Corrective Measures Study for the MWL, the DOE/SNL have proposed a vegetative cover as the preferred alternative for the MWL. The vegetative cover with bio-intrusion barrier alternative is also being considered by the regulators.	<p>Estimated total costs of these alternatives are:</p> <ul style="list-style-type: none"> • NFA with ICs alternative :\$1,772,882 <p>Vegetative cover: \$4,335,274.</p> <ul style="list-style-type: none"> • Vegetative cover with bio-intrusion barrier :\$7,096,859. <p>Any of these three alternatives could be implemented in FY05 once a regulatory decision has been made. Monitoring for all alternatives will continue indefinitely.</p> <p>Risk for the NFA with IC's alternative is Transportation: Injuries: 1.8E-2; Fatalities: 4.9E-4 Implementation: Injuries: 9.5E-2; Fatalities: 2.4E-3 Risk for the vegetative cover alternative is Transportation: Injuries: 4.9E-2; Fatalities: 1.3E-3 Implementation: Injuries: 2.6E-1; Fatalities: 3.2E-3 Risk for the vegetative cover with bio-intrusion barrier alternative is: Transportation: Injuries: 2.5E-1; Fatalities: 6.6E-3 Implementation: Injuries: 3.2E-1; Fatalities: 3.5E-3</p>	The regulators have verbally informed DOE/SNL that the RBES (NFA with ICs) is unacceptable. Community activism and political pressure are unlikely to allow the RBES to be selected.	Allow the NMED to make their own decision on the MWL alternative, and accept their decision.

Refer to footnotes at end of table.

Table 5-1 (Concluded)
Variance Table for the Risk-Based End State at SNL/NM

Alternative	Description of Variances	Impacts (in terms of Scope, Cost, Schedule and Risk)	Barriers in Achieving RBES	Recommendations
The Risk-Based End State Vision assumes that only long-term monitoring would be performed, and that the site boundary would be the point of compliance for contaminants in groundwater. The RBES clean up goals within the KAFB site boundary would be based on land-use expectations of industrial or recreational.	The Current Cleanup Baseline End State assumes that all groundwater contaminated by Sandia National Laboratories activities must ultimately be remediated in a manner consistent with current environmental regulations and existing permit agreements. The impacted groundwater body is assumed the point of compliance and MCLs must be met. Monitoring wells are already in place at these locations.	<p>New well installations would be required to implement this RBES solution.</p> <p>To install 20 wells at the KAFB site boundary: \$2.4M To monitor the site boundary wells, performance wells and background wells: \$450K/year including period well replacements due to declining water levels.</p> <p>The installation of these wells would take several years, before compliance monitoring could begin.</p>	The Risk-Based End State Vision is not consistent with Federal and State environmental regulations and existing agreements in terms of onsite cleanup of groundwater. The Risk-Based End State is contrary to enforcement documents signed by the DOE, Sandia National Laboratories, the U.S. Environmental Protection Agency, and the New Mexico Environment Department.	Long-term monitoring will be considered as part of the Corrective Measures Evaluation. However, the regulator has already expressed an objection to that alternative. If EM-1 requires this remedy, consultation with the state regulators, the EPA Region 6, and the New Mexico public should be pursued before the Corrective Measures Evaluation is complete.

DOE = U.S. Department of Energy.
 EPA = U.S. Environmental Protection Agency.
 IC = Institutional Control.
 KAFB = Kirtland Air Force Base
 MWL = Mixed waste landfill.
 NFA = No further action.
 RBES = Risk-Based End State.
 SNL/NM = Sandia National Laboratories/New Mexico.

Groundwater

A variance will probably occur for groundwater, where the cleanup must meet MCLs and not risk-based levels. The RBES point of compliance is assumed to be at the KAFB site boundary, and not the point of impact, where monitoring wells are currently in place. The RBES cleanup goals within the site boundary would be based on expectations of industrial or recreational land use. Compliance at the site boundary would require nearly 20 new wells. Permission to place new wells on KAFB property would need to be obtained before fieldwork could begin. The estimated scope, schedule, and cost of this variance is summarized in Table 5-1.

The currently planned end state vision for groundwater is based on a preliminary technology survey and verbal discussions with the regulator. A Corrective Measures Evaluation will be delivered to the regulator and public in September 2005. If MNA is chosen as the corrective measure, and no additional remediation is required, then the current state will differ little from the end state vision.

The Current Cleanup Baseline End State assumes that all groundwater contaminated by SNL/NM activities must ultimately be remediated in a manner consistent with current environmental regulations and existing permit agreements. The impacted groundwater body is assumed the point of compliance. The RBES Vision, therefore, is not consistent with federal and state environmental regulations and existing agreements in terms of on-site cleanup of groundwater. The RBES is contrary to enforcement documents signed by the DOE, SNL/NM, the EPA, and the NMED.

Other Issues

Sites and AOCs under active use that have not yet been cleaned up will remain a liability for SNL/NM and the DOE. The main sites under active use are the Long Sled Track (Site 83), Short Sled Track (Site 84), and the Gun Facility (Site 240). While these sites remain environmental liabilities, they are also considerable DOE assets because of their test capabilities. The AOCs under active use are all septic systems that will ultimately be decommissioned along with the facilities they support.

A final issue is the use of preliminary transition guidance or process between EM and NNSA as ER fieldwork is completed and the ER Project attempts to define and transfer stewardship responsibilities to NNSA. SNL/ER has attempted to bridge this gap by beginning to transition responsibilities internally to a permanently funded SNL/NM department. The majority of the long term environmental stewardship function will be performed by SNL/NM's Environmental Management department.

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APPENDIX A
Compliance Order on Consent

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LIST OF ACRONYMS

AOC	Area of Concern
C.F.R.	Code of Federal Regulations
CME	Corrective Measures Evaluation
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study (synonymous with CME)
DOE	United States Department of Energy
EPA	United States Environmental Protection Agency
HE	High Explosive
HI	Hazard Index
HQ	Hazard Quotient
HSWA	Hazardous and Solid Waste Amendments
HWA	New Mexico Hazardous Waste Act, NMSA 1978, §§ 74-4-1 to 74-4-14
IM	Interim Measures
KAFB	Kirtland Air Force Base
LANL	Los Alamos National Laboratory
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mi	mile or miles
mi ²	square miles
NFA	No Further Action
NMAC	New Mexico Administrative Code
NMSA	New Mexico Statutes Annotated
OU	Operable Unit
PCB	polychlorinated biphenyls
RCRA	Resource Conservation Recovery Act
RFI	RCRA Facility Investigation
RSI	Request for Supplemental Information
SAR	SWMU Assessment Report
SNL	Sandia National Laboratories
SSL	Soil Screening Level
SWMU	Solid Waste Management Unit
TA	Technical Area
TAG	Tijeras Arroyo Groundwater
TCE	trichloroethylene
TNT	trinitrotoluene
TSCA	Toxic Substances Control Act
UCL	upper confidence level
µg/L	micrograms per liter
VCA	Voluntary Corrective Action
VCM	Voluntary Corrective Measure
VOC	volatile organic compound
WQCC	Water Quality Control Commission

I. INTRODUCTION

This Compliance Order on Consent (Consent Order) is issued pursuant to the New Mexico Hazardous Waste Act (HWA), NMSA 1978, § 74-4-10, and entered into by the Secretary of the New Mexico Environment Department (the Department), Respondent the United States Department of Energy (DOE), and Respondent Sandia Corporation (Sandia). This Consent Order is also issued pursuant to the New Mexico Solid Waste Act (SWA), NMSA 1978, § 74-9-36(D), for the purpose of addressing the requirements concerning nitrate and perchlorate set forth in this Consent Order.

This Consent Order contains investigation and corrective action requirements for the Sandia National Laboratories/New Mexico (the Facility or SNL/NM), which is owned and operated by DOE and co-operated by Sandia. The Consent Order provides for the corrective action requirements primarily by establishing schedules and deliverables. Details regarding the technical strategy and scope of the environmental investigations are found in various work plans, sampling and analysis plans, or other plans previously approved by or scheduled to be delivered to and approved by the Department.

This Consent Order is divided into 11 Sections. Section I provides this introduction. Section II sets forth the Department's findings of fact and conclusions of law in support of this Consent Order. Section III contains general provisions, such as purposes, definitions, jurisdiction, stipulated penalties, force majeure, dispute resolution, covenants not to sue, reservation of rights and defenses, enforcement, integration with permit, and land transfer. Section IV sets forth the requirements for investigation of environmental contamination at the Facility. It addresses general requirements, areas with groundwater contamination, the Mixed Waste Landfill (MWL), septic systems, and other Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs). Section V provides for the investigation of newly identified SWMUs, AOCs and releases. Section VI sets forth the corrective action process to be employed at the Facility. Section VII provides for the identification of cleanup alternatives and the implementation of corrective measures. Section VIII establishes requirements for groundwater monitoring wells. Section IX sets requirements for groundwater sampling, including the purging of monitoring wells. Section X sets forth the requirements for various reports to be submitted to the Department. Section XI establishes the schedules for implementation of the Consent Order.

The requirements of this Order do not apply to radionuclides, including, but not limited to, source, special nuclear, or byproduct material as defined in the Atomic Energy Act of 1954, as amended, or the radioactive portion of mixed waste. The requirements of this Order do apply, however, to the hazardous waste component of mixed waste.

This Consent Order has been negotiated in good faith and is entered into by the signatories hereto without the admission or adjudication of any issue of fact or law, and with the intent that the parties will act in good faith to implement the terms and requirements of the Consent Order. The actions undertaken by Respondents in accordance with this Consent Order do not constitute an admission of any liability, or any agreement with any Findings of Fact or Conclusions of Law

contained in this Consent Order. Respondents do not admit, and retain the right to controvert in any subsequent proceedings, other than proceedings to implement or enforce this Consent Order, the validity of the Findings of Facts and Conclusions of Law in this Consent Order. Respondents agree to comply with and be bound by the terms of this Consent Order and agree that they will not contest the basis or validity of this Consent Order.

II. FINDINGS OF FACT AND CONCLUSIONS OF LAW

II.A. FINDINGS OF FACT

The Department makes the following findings of fact:

II.A.1. The Parties

1. The New Mexico Environment Department is the department within the executive branch of the New Mexico state government charged with administration and enforcement of the HWA, NMSA 1978, § 74-4-10; the Hazardous Waste Regulations, 20.4.1 NMAC; and the SWA, NMSA 1978, § 74-9-36(D).
2. Respondent DOE is a department of the United States, and is the owner and a co-operator of the Facility. Respondent Sandia is the management and operating contractor for the Facility pursuant to a contract with DOE, and is a co-operator of the Facility.

II.A.2. Facility

3. The Facility, as defined in Section III.B of this Consent Order, is the Sandia National Laboratories/New Mexico (SNL/NM) site. That site comprises five Technical Areas (TAs) located within Kirtland Air Force Base (KAFB) and several large remote test areas located on KAFB and adjacent U.S. Forest Service lands: Foothills Test Area, Central Coyote Test Area, Southwest Test Area, and Canyons Test Area. Within KAFB, the Facility comprises 2,820 acres (4.4 square miles). The SNL/NM/KAFB area encompasses 52,223 acres (81.6 square miles) bounded on the north and northwest by Albuquerque, on the east by the Cibola National Forest, on the south by the Pueblo of Isleta, and on the west by land owned by the State of New Mexico and the Albuquerque International Sunport.
4. Within the boundaries of the Facility, two major surface drainages, or canyons, drain the Manzanita and Sandia Mountains to the east and northeast of the Facility. The canyons run roughly east to west. From north to south, these drainages are Tijeras Canyon and Arroyo del Coyote and their tributaries.
5. Hydrogeologic investigations have identified four discrete hydrogeologic zones beneath the lands on which Facility operations are located: (1) canyon alluvial systems; (2) fractured bedrock under canyon alluvial systems; (3) shallow perched water in alluvial sediments in the northern part of KAFB; and (4) the regional aquifer located in the main part of the Albuquerque Basin.
6. The City of Albuquerque operates approximately 16 public water supply wells within about 1.5 miles to the north and west of the Facility. The wells draw water from the regional aquifer. KAFB periodically operates approximately eight public water supply wells within the boundaries of the base; these wells are also screened in the regional aquifer. Within two miles of the Tijeras Arroyo Groundwater (TAG) area are eight KAFB supply wells, seven are

inside of the TAG area and one is outside. Additionally, outside of the TAG area and within two miles are four City of Albuquerque municipal supply wells and one hospital supply well.

II.A.3. Facility Operations

10. SNL/NM began operations in 1945 on Sandia Base in Albuquerque, New Mexico, as Z Division, originally part of what is now Los Alamos National Laboratory (LANL). Both SNL/NM and LANL were born out of America's World War II atomic bomb development effort, the Manhattan Project. SNL/NM came into being as an ordnance design, testing, and assembly facility located on Sandia Base (the Army base that preceded KAFB). Today, SNL/NM is a multidisciplinary laboratory engaged in research and development of non-nuclear components of nuclear weapons, alternative energy sources, and a wide variety of other national security related research and development.
11. From 1949 until 1993, American Telephone and Telegraph managed SNL. In 1993, Martin Marietta Corporation, now Lockheed Martin Corporation, was awarded the management contract by DOE. Sandia, which is a wholly owned subsidiary of Lockheed Martin Corporation, is presently under contract to operate SNL. Today, SNL/NM, a part of SNL, comprises a large laboratory and headquarters in Albuquerque.
9. Most SWMUs at the Facility have been assigned to 11 Operable Units (OUs). These are: Septic Tanks and Drainfields (OU 1295), TA-I (OU 1302), TA-II (OU 1303), TA-III and TA-V (OU 1306), Tijeras Arroyo (OU 1309), Foothills Test Area (OU 1332), Canyons Test Area (OU 1333), Central Coyote Test Area (OU 1334), Southwest Test Area (OU 1335), the Liquid Waste Disposal System (OU 1307), and the MWL (OU 1289). This Consent Order requires investigation and, as necessary, corrective measures of all SWMUs and AOCs, regardless of whether or not assigned to a particular OU.

II.A.4. Waste Management

10. As a result of the Facility's operations from approximately 1945 to the present, Respondents have generated, treated, stored, disposed of, and otherwise handled solid wastes, hazardous wastes, hazardous constituents, and mixed wastes.
11. Respondents have disposed of hazardous wastes and hazardous constituents at the Facility. In addition, nitrates are present in the environment at the Facility. Respondents have disposed of materials, including hazardous waste and hazardous constituents, in pits, trenches, landfills, and waste piles throughout the Facility. Respondents have also discharged industrial wastewater from outfalls into the Tijeras Arroyo watercourse and through numerous septic systems located across the Facility. The various waste disposal units at the Facility consist of SWMUs and AOCs. SWMUs and AOCs comprise unpermitted landfills, septic system leachfields and seepage pits, outfalls, waste piles, and test areas. Unpermitted landfills include, but are not limited to, those at TA-II (Classified Waste and Radioactive Waste Landfills) and TA-III (MWL).

II.A.5. Polychlorinated Biphenyls

Discussed below are three areas at the Facility where polychlorinated biphenyl (PCB) contamination has been identified. These areas include SWMU 2 (also known as the Classified Waste Landfill), SWMU 18, and SWMU 30.

12. SWMU 2 (Classified Waste Landfill) was excavated as a voluntary corrective measure pursuant to the provisions of the Hazardous and Solid Waste Amendments (HSWA) module of Respondents' Resource Conservation and Recovery Act (RCRA) Part B Permit. Following the excavation, the Department requested additional characterization of the excavated soils; this characterization identified low PCB concentrations in the soil. DOE and Sandia then conducted further characterization sampling to determine the extent and maximum PCB concentration at the site. Such sampling was performed pursuant to Toxic Substances Control Act (TSCA) under the express direction of the United States Environmental Protection Agency (EPA) Region 6 personnel.
13. On September 26, 2002, DOE and Sandia submitted a risk-based disposal request to EPA under TSCA regulation, 40 C.F.R. § 761.61(c) for SWMU 2. (EPA received the request on October 2, 2002 and therefore refers to it as the October 2, 2002 request.) That request documents the sampling activities and results obtained by DOE and Sandia at SWMU 2. The request also provides an assessment of the risk associated with the use of PCB soils to backfill the SWMU 2 excavation. The request further identifies a number of management activities for which DOE and Sandia sought approval, including excavation backfilling, verification sampling for soil pile staging areas, and management of cleanup wastes (e.g., booties, protective clothing).
14. On March 27, 2003, EPA proposed approving DOE's and Sandia's October 2, 2002 request. The public comment period on EPA's proposed approval closed on May 11, 2003. EPA approved the request on June 12, 2003. The Department has reviewed DOE's and Sandia's October 2, 2002 request to EPA, and has concurred with the cleanup protocol and other specifications for SWMU 2. The Department has concluded that SWMU 2 may be appropriate for a determination of No Further Action (NFA)¹ under an industrial land-use scenario.
15. SWMU 18 (the Concrete Pad) was investigated in April 1994, and the sampling results indicated small, localized areas of PCBs in shallow soils around the northwest corner of the pad. In January 1995, additional samples were collected to determine the extent of the PCB

¹ The Department now uses the term "Corrective Action Complete" instead of the term "No Further Action." More specifically, the Department now uses the terms "Corrective Action Complete Without Controls" and "Corrective Action Complete With Controls" to indicate whether or not structural or institutional controls are required after corrective action has been completed. The Department's new terminology is consistent with EPA guidance. Throughout this Consent Order, the Parties refer to "No Further Action" or "NFA" when referring to Department actions that have already occurred and to "Corrective Action Complete" when referring to Department actions that will occur in the future.

contamination. Sample results from these investigations were documented in the Technical Area III/V RCRA Facilities Investigation (RFI) report submitted to the Department in June 1996.

16. In October 1996, DOE and Sandia conducted a Voluntary Corrective Measure (VCM) to remove PCB-contaminated soils at SWMU 18. Cleanup levels for PCBs were determined in conjunction with EPA and the Department and were based on EPA guidance provided to SNL/NM environmental restoration personnel in a memorandum from EPA Region 6 dated March 26, 1996. After the VCM was completed, DOE and Sandia submitted to the Department a NFA proposal under RCRA for SWMU 18.
17. Between July 31, 1997 and April 1998, the Department issued two Notices of Deficiency (NOD) for the Technical Area III/V RCRA Facilities Investigation report. Sandia and DOE responded and, from July 1998 through March 2001, conducted additional sampling for PCBs, consistent with the Department's request.
18. In October 2001, DOE and Sandia submitted the sample results and sample location maps from its 1997 and 1998 sampling to EPA Region 6. Shortly thereafter, in December 2001, EPA confirmed in writing to DOE and Sandia that its concerns regarding SWMU 18 had been adequately addressed for purposes of TSCA and that no further action needed to be taken. After receiving EPA's approval of the site cleanup under TSCA, DOE and Sandia submitted the sample results and a revised risk assessment for SWMU 18 to the Department, along with a request for a NFA determination for the site under RCRA. In a letter dated March 18, 2003, the Department concluded that SWMU 18 appears to be suitable for NFA status under an industrial land-use scenario.
19. SWMU 30 (the Reclamation Yard) was investigated under the Technical Area I RCRA Facilities Investigation; sampling results indicated the presence of PCBs in shallow soils. On April 22, 1999, DOE and Sandia submitted to EPA Region 6 a notification of self-implementing cleanup under TSCA regulation, 40 C.F.R. § 761.61(a). On May 18, 1999, EPA Region 6 responded to the notification, seeking additional information from DOE and Sandia.

In December 1999, DOE and Sandia provided EPA with additional information to demonstrate that the characterization requirements of TSCA, 40 § CFR 761.61(a), had been met with respect to SWMU 30. On March 1, 2002, DOE and Sandia also transmitted to EPA Region 6 a letter, which responded to the other deficiencies noted by EPA in May 1999. Shortly thereafter, EPA approved DOE's and Sandia's responses. Although not required, or even contemplated under TSCA's self-implementing regulations, EPA also approved the cleanup conducted by DOE and Sandia under 40 § C.F.R. § 761.61(a). The Department has concluded that SWMU 30 is suitable for a determination of Corrective Action Complete With Controls, under an industrial land-use scenario, because of the presence of other hazardous constituents.

II.A.6. Releases of Contaminants

20. Waste management activities at the Facility have caused the release of solid and hazardous wastes, hazardous constituents, and mixed wastes into the environment. Hazardous waste or hazardous constituents that have been released into, and detected in, soils and sediments at the Facility include high explosive (HE) compounds; organic solvents; semi-volatile organic compounds; metals such as barium, beryllium, cadmium, chromium, copper, lead, mercury, silver, and zinc; and PCBs.
21. Contaminants that have been released into, and detected in, groundwater beneath the Facility include, for example, trichloroethylene (TCE) and other volatile organic compounds, chromium, and nitrate. Contaminants have been detected in the environment beneath the Facility in both perched and regional groundwater, and in canyon alluvial and bedrock systems.

II.A.7. Regulatory History of the Facility

22. Since November 19, 1980, Respondents have managed RCRA-regulated wastes under the applicable requirements of 40 C.F.R., Parts 260-270, and within the requirements of 20 NMAC Title 4, as they became effective.
23. On January 25, 1985, the State of New Mexico received authorization from EPA to implement its hazardous waste program under the HWA. 50 Fed. Reg. 1515 (Jan. 11, 1985).
24. In August 1990, Respondents submitted a RCRA Part A and Part B Permit Application for hazardous waste management units that covered the storage and/or treatment of hazardous wastes at the Radioactive and Mixed Waste Management Facility, the High Bay Waste Storage Facility, the Manzano Storage Bunkers, and the Interim Storage Site. This application was revised and re-submitted in November 1996. The Department did not take action on the application and some units continued to operate under interim status.
25. On April 17, 1991, Respondents submitted a RCRA Part B Permit Application for the operation of hazardous waste storage facilities at SNL/NM.
26. On August 6, 1992, the Department issued the Hazardous Waste Facility Permit to Respondents for the operation of hazardous waste storage units (Permit NM589011518-1). This Permit covered storage of hazardous wastes at the Hazardous Waste Management Facility and expired August 6, 2002. Respondents submitted a Part A and Part B Permit Request on February 6, 2002. Respondents' Permit remains in effect.
27. On July 27, 1993, EPA issued a Settlement Agreement and HSWA Module to the Permit, effective on August 26, 1993. The HSWA Module of the Permit expired on September 20, 2002, but that Permit is still in effect, as noted in the preceding Paragraph.
28. On October 1, 1994, Respondents submitted petitions for NFA for 22 sites (Round 1). The

EPA issued a Notice of Deficiency on April 7, 1995, that disapproved nine of the 22 petitions. Currently, two of the 22 sites (SWMUs 135 and 165) are not approved for Corrective Action Complete status.

29. On November 4, 1994, the Department issued the Hazardous Waste Treatment Facility Permit to Respondents for the operation of a hazardous waste treatment unit (Permit NM589011518-2). This Permit covered treatment of hazardous wastes at the Thermal Treatment Facility and expires December 4, 2004.
30. In June 1995, Respondents submitted an assessment report on the Building 829X silver recovery sump (now tracked as SWMU 276). The Department issued a Notice of Deficiency on August 8, 1996, and another on December 21, 2000. This site remains unapproved for Corrective Action Complete status.
31. On June 5, 1995, Respondents submitted petitions for NFA for 23 sites (Round 2). The Department issued a Notice of Deficiency on July 29, 1996 that disapproved 22 of the 23 petitions. Another Notice of Deficiency was issued on October 13, 1999. Currently, 12 of the 23 sites (SWMUs 48, 136, 159, 166, 167, 46, 227, 229, 230, 231, 233, and 234) are not approved for Corrective Action Complete status.
32. In August 1995, Respondents submitted petitions for NFA for 14 sites (Round 3). The Department issued a Notice of Deficiency on April 28, 1997 that disapproved 11 of the 14 petitions. Currently, three of the 14 sites (SWMUs 146, 148, and 28-2) are not approved for Corrective Action Complete status.
33. In September 1995, Respondents submitted a RCRA Facility Investigation (RFI) Report for the Liquid Waste Disposal System, petitioning for NFA status for three SWMUs (4, 5, and 52). The Department issued a Request for Supplemental Information (RSI) in September 1997; another RSI was issued for SWMU 52 in March 2001. All three SWMUs remain unapproved for Corrective Action Complete status.
34. On October 4, 1995, the Department issued a Federal Facilities Compliance Order under the Federal Facilities Compliance Act Amendments of 1992 to Respondents to resolve alleged violations of hazardous waste storage prohibitions. Exhibit A to the order consists of the Site Treatment Plan that provides the schedules and milestones for the treatment and/or shipment of covered mixed wastes at the Facility.
35. In March 1996, Respondents submitted a work plan for investigation of volatile organic compound (VOC)-contaminated groundwater in the Sandia North study area (now known as the Tijeras Arroyo Groundwater Investigation). The Department approved the plan in February 1997.
36. In June 1996, Respondents submitted a RFI Report for Technical Areas III and V. Within this report are NFA petitions for 14 of the SWMUs addressed. The Department issued a

Notice of Deficiency on the report on July 31, 1997, and another Notice of Deficiency on March 27, 1998. Currently, seven of the 18 SWMUs (18, 78, 83, 84, 196, 240 and 241) are not approved for Corrective Action Complete status.

37. In June 1996, Respondents submitted petitions for NFA for 12 sites (Round 4). On June 9, 1998, the Department issued a Notice of Deficiency that disapproved ten of the 12 petitions. A RSI was issued on June 9, 2000. Currently, seven of the 12 sites (SWMUs 49, 101, 116, 138, 149, 161, and 114) are not approved for Corrective Action Complete status.
38. In October 1996, the Respondents submitted a NFA petition for Building 828. The Department issued a RSI on December 12, 2000, and a 90-day time extension was granted on February 16, 2001. A response to the RSI was submitted to the Department in July 2001. Although the Department believes Building 828 to be suitable for a Corrective Action Complete determination based on an industrial risk scenario, public input is still pending. To date, Building 828 remains unapproved for Corrective Action Complete determination status.
39. In October 1996, Respondents submitted petitions for NFA for 11 sites (Round 5). The Department issued a Notice of Deficiency on February 4, 1998 that disapproved nine of the 11 petitions. A RSI was issued on June 5, 2000. Currently, two of the 11 sites (SWMUs 33 and 66) are not approved for Corrective Action Complete status.
40. In January 1997, Respondents submitted petitions for NFA for nine sites (Round 6). The Department issued a Notice of Deficiency on February 4, 1998 that disapproved seven of the nine petitions. Subsequently, the Department issued a Request for Supplemental Information on June 9, 1999, and December 14, 1999. Currently, five of the nine sites (SWMUs 137, 140, 150, 152, and 153) are not approved for Corrective Action Complete status.
41. In May 1997, Respondents submitted petitions for NFA for nine sites (Round 7). The Department issued a Notice of Deficiency on June 9, 1999 that disapproved four of the nine petitions. A RSI was issued on March 17, 1998. Currently, four of the nine sites (SWMUs 147, 96, 187, and 226) are not approved for Corrective Action Complete status.
42. In August 1997, Respondents submitted petitions for NFA for seven sites (Round 8). The Department issued a RSI on June 9, 1999 that disapproved three of the seven petitions. A RSI was also issued on December 13, 1999. Currently, three of the seven sites (SWMUs 154, 18, and 232) are not approved for Corrective Action Complete status.
43. In September 1997, Respondents submitted petitions for NFA for 14 sites (Round 9). The Department issued a RSI on June 9, 1999 that disapproved six of the 14 petitions. Currently, three of the 14 sites (SWMUs 1, 3, and 45) are not approved for Corrective Action Complete determination status.
44. In July 1998, Respondents submitted petitions for NFA for five sites (Round 10). The Department issued a RSI on June 9, 1999 for two of the five sites; in the same document, the

other three sites were deemed appropriate for NFA petition. The two remaining sites were deemed appropriate for NFA petition on December 6, 1999.

45. In September 1998, Respondents submitted petitions for NFA for nine sites (Round 11). The Department issued a RSI on June 9, 1999. All nine sites were deemed appropriate for NFA petition on December 13, 1999.
46. In May 1999, Respondents submitted petitions for NFA for five sites (Round 12). All five sites were deemed appropriate for NFA petition on September 30, 1999.
47. In August 1999, Respondents submitted petitions for NFA for six sites (Round 13). All six sites were deemed appropriate for NFA petition on March 23, 2000.
48. In August 1999, the Department approved a work plan for the investigation of VOC-contaminated groundwater in the TA-V groundwater investigation study area.
49. On October 19, 1999, Respondents submitted a Sampling and Analysis Plan for characterizing and assessing potential releases from septic and drain systems. On January 28, 2000, the Department approved this Plan. Currently, 83 septic and drain systems remain unapproved for Corrective Action Complete status at the Facility, including 61 systems not previously petitioned for NFA and SWMUs submitted in NFA Rounds 1-4 and 6-8.
50. In September 2000, Respondents submitted petitions for NFA for ten sites (Round 14). The Department issued a RSI on December 5, 2000 that disapproved four of the ten petitions. Currently, two of the ten sites (SWMUs 9 and 98) are not approved for Corrective Action Complete status.
51. In March 2001, Respondents submitted petitions for NFA for three sites: 94C, 94G, and 228B (Round 15). Two of the sites were deemed appropriate for NFA petition on March 30, 2001. The third site was deemed appropriate for NFA petition on April 26, 2001.
52. In September 2001, Respondents submitted petitions for NFA for four sites (Round 16). The Department is in the process of reviewing the investigation reports for these four sites.
53. On February 6, 2002, Respondents submitted a Part A and Part B Permit Request (10-year reapplication) to the Department that includes the Hazardous Waste Management Facility, the Thermal Treatment Facility, the Radioactive and Mixed Waste Management Facility, the High Bay Storage Facility, the Auxiliary Hot Cell, and the Manzano Storage Bunkers.
54. In September 2002, Respondents submitted petitions for NFA for three sites: 94H, 190, and the TNT Site (Round 17). The Department is in the process of reviewing the investigation reports for these three SWMUs.
55. As of the effective date of this Consent Order, the Department has approved the corrective

actions taken at 136 SWMUs and one AOC pursuant to the terms of its Facility RCRA Part B Permit. Those SWMUs and AOC have been granted No Further Action status pursuant to the Class 3 Permit Modification request process set forth in the Permit. This Consent Order requires corrective action to be completed at the remaining 64 SWMUs and 62 AOCs at the Facility. Corrective action either is in the process of being undertaken or has yet to be undertaken at these remaining SWMUs and AOCs.

II.A.8. Procedural History of Consent Order

56. On September 3, 2002, pursuant to Sections 74-4-10.1 and 74-4-13 of the HWA, the Department issued the "Determination of an Imminent and Substantial Endangerment to Health and the Environment" concerning Sandia National Laboratories (the Determination) to DOE and Sandia.
57. On September 3, 2002, the Department also issued a draft order pursuant to Sections 74-4-10.1 and 74-4-13 of the HWA (Draft Order). The Draft Order proposed a series of investigation and corrective action tasks for DOE and Sandia to complete at the Facility.
58. The Department provided notice to the public and an opportunity to comment on the Draft Order. The comment period opened on September 3, 2002 and closed on November 4, 2002. The Department received written comments from 11 citizens and organizations, including Respondents.
59. On October 3, 2002, the United States of America (United States), on behalf of DOE, filed a complaint with the United States District Court for the District of New Mexico, Civil No. 02-1245 MCA/ACT, challenging the Determination. The United States also filed a notice of appeal in the New Mexico Court of Appeals, No. 23,492, challenging the Determination.
60. On October 3, 2003, Sandia filed a complaint in the United States District Court for the District of New Mexico, Civil No. 02-1246 LFG/RHS, and a notice of appeal in the New Mexico Court of Appeals, No. 23,480, challenging the Determination.
61. From November 2002 through September 2003, the Parties engaged in settlement negotiations to resolve the issues raised by the United States' and Sandia's lawsuits. To facilitate the settlement discussions, the Parties agreed to stay the pending litigation during the settlement process.
62. This Consent Order is the result of the Parties' settlement negotiations. In addition, as a result of the settlement negotiations, the Department has agreed to withdraw the Determination and not to issue a final order pursuant to Sections 74-4.10.1 and 74-4-13, and the United States and Sandia have agreed to dismiss their lawsuits. See Section III.R.
63. On January 21, 2004, the Department made a draft of this Consent Order available to the public for review and comment. The Department placed a public notice of the availability of

the draft Consent Order in the local news outlets, and mailed copies of the notice to all interested parties included on the Department's Hazardous Waste Bureau's mailing list.

64. The Department invited the public to submit written comments on the draft Consent Order during a 30-day public comment period that began January 21, 2004, and ended on February 20, 2004. The public was notified by newspaper advertisements (English and Spanish), by mail (English), and by radio announcements (English). The draft Consent Order was available for review at the Department Hazardous Waste Bureau, located at 2905 Rodeo Park Drive East, Building 1, Santa Fe, New Mexico 87505-6303; and the Department District 1 Office located at 4131 Montgomery NE, Albuquerque, New Mexico 87109 from 8:00 a.m. to 5:00 p.m. A copy of the draft Order was also made available for the public at the Department website: <http://www.nmenv.state.nm.us/HWB/snlperm.html>. The website also contained English and Spanish versions of the public notice, the Fact Sheet, and a Frequently Asked Questions and Answer page.

Comments were accepted in the form of electronic mail (e-mail) at the address:

hazardous_waste_comment@nmenv.state.nm.us

All significant written and electronic mail (e-mail) comments received prior to 5:00 p.m., February 20, 2004, were considered in the preparation of the final Consent Order. Written comments were received from one citizen advocacy group.

II.B. CONCLUSIONS OF LAW

The Department makes the following conclusions of law:

1. Each of the Respondents, DOE and Sandia, is a "person" within the meaning of Section 74-4-3(K) of the HWA and the Hazardous Waste Regulations at 20.4.1.100 NMAC (incorporating 40 C.F.R. § 260.10).
2. Sandia National Laboratories/New Mexico is a "facility" within the meaning of the Hazardous Waste Regulations at 20.4.1.100 NMAC (incorporating 40 C.F.R. § 260.10).
3. Respondent DOE is an "owner" and an "operator" of the Facility within the meaning of the Hazardous Waste Regulations at 20.4.1.100 NMAC (incorporating 40 C.F.R. § 260.10).
4. Respondent Sandia is an "operator" of the Facility within the meaning of the Hazardous Waste Regulations at 20.4.1.100 NMAC (incorporating 40 C.F.R. § 260.10).
5. Respondents have engaged in the "storage," "treatment," and "disposal" of "solid waste" and "hazardous waste" at the Facility within the meaning of Section 74-4-3(P), (T), (E), (O), and (K) of the HWA, and the Hazardous Waste Regulations at 20.4.1.100 NMAC (incorporating 40 C.F.R. § 260.10).

6. The Department has determined that Respondents may have violated 20.4.1.900 NMAC, incorporating by reference 40 C.F.R. § 270.33, Schedule of Compliance. See NMSA 1978, § 74-4-10:
7. The Respondents have addressed or are in the process of addressing PCB contamination at SWMU 2, SWMU 18, and SWMU 30 pursuant to TSCA regulations, including 40 C.F.R. § 761.61(c). The Department has had a reasonable opportunity to review and comment upon the cleanup protocols for SWMU 2, SWMU 18, and SWMU 30, and this Consent Order imposes no new or additional requirements concerning PCBs at these three sites.
8. Each of the Respondents is a "person" under Section 74-9-3(I) of the SWA.
9. Perchlorate and nitrates are solid wastes under Section 74-9-3(N) of the SWA.
10. The Department has determined that there is or has been a release of nitrate and perchlorate into the environment requiring corrective action pursuant to Section 74-9-36(D) of the SWA.

III. GENERAL PROVISIONS

III.A. PURPOSES AND SCOPE OF CONSENT ORDER

The purposes of this Consent Order are: 1) to fully determine the nature and extent of releases of Contaminants at or from the Facility; 2) to identify and evaluate, where needed, alternatives for corrective measures, including interim measures, to clean up Contaminants in the environment, and to prevent or mitigate the migration of Contaminants at or from the Facility; and 3) to implement such corrective measures.

Except as provided in Section III.W.1, this Consent Order fulfills the requirements for corrective action for releases of hazardous waste or hazardous constituents under sections 3004(u) and (v) and 3008(h) of RCRA, 42 U.S.C. §§ 6924(u) and (v) and 6928(h), sections 74-4-4(A)(5)(h) and (i), 74-4-4.2(B), and 74-4-10(E) of the HWA, and their implementing regulations at 40 C.F.R. Part 264, Subpart F (incorporated by 20.4.1.500 NMAC). This Consent Order also addresses corrective action for releases of nitrate and perchlorate pursuant to section 74-9-36(D) of the SWA.

This Consent Order contains no requirements for radionuclides or the radioactive portion of mixed waste. Therefore, any radionuclides found in any media at the Facility shall not be subject to this Consent Order or any enforcement action relating to this Consent Order. Notwithstanding the foregoing, Respondents may voluntarily include in any plan, report or other document submitted pursuant to this Consent Order, including work plans, references to, or information concerning, radionuclides or the radioactive portion of mixed waste. The voluntary inclusion of such radionuclide information by the Respondents in any plan, report or other document shall not be enforceable by any entity, including the State, under this Consent Order, because such information falls wholly outside the requirements of this Consent Order.

III.B. DEFINITIONS

Unless otherwise expressly provided herein, the terms used in this Consent Order shall have the meanings set forth in the HWA, RCRA, and their implementing regulations.

“Administrative Record” means the administrative record supporting and otherwise relating to the requirements of this Consent Order, compiled as of the effective date of this Consent Order, which forms the basis for the terms of this Consent Order. The Administrative Record includes the full record relating to the Respondents’ current Hazardous Waste Facility Permit (permit No. NM5890110518), and those documents submitted in writing by the Department, Respondents, or the public, as of the effective date of the Consent Order for inclusion in the Administrative Record. The Administrative Record is available for review at the Department’s Hazardous Waste Bureau.

“Area of Concern” or “AOC” means any area that may have had a release of a hazardous waste or hazardous constituent, which is not a Solid Waste Management Unit.

“Consent Order” or “Order” means this Compliance Order on Consent.

“Contaminant” means any hazardous waste listed or identified as characteristic in 40 C.F.R. Part 261 (incorporated by 20.4.1.200 NMAC); any hazardous constituent listed in 40 C.F.R. Part 261, Appendix VIII (incorporated by 20.4.1.200 NMAC) and 40 C.F.R. Part 264, Appendix IX (incorporated by 20.4.1.500 NMAC); nitrate; and perchlorate. Contaminant does not include radionuclides or the radioactive portion of mixed waste.

“Day” means a calendar day, unless specified as a business day. “Business day” means Monday through Friday, excluding all federal and New Mexico State holidays.

“Department” means the New Mexico Environment Department, and any successor departments or agencies.

“DOE” means the United States Department of Energy, and any successor departments or agencies.

“EIB” means the New Mexico Environmental Improvement Board, and any successor departments or agencies.

“EPA” means the United States Environmental Protection Agency, and any successor departments or agencies.

“Facility” means the Sandia National Laboratories/New Mexico site owned by the United States Department of Energy, comprised of approximately 4.4 square miles and located on Kirtland Air Force Base, south of Albuquerque in Bernalillo County in central New Mexico. The Facility includes various test sites operated by the Respondents on KAFB land withdrawn from the public domain by the United States Department of the Air Force and the United States Department of Energy for military and research and development purposes, respectively.

“HWA” means the New Mexico Hazardous Waste Act, NMSA 1978, §§ 74-4-1 to 74-4-14.

“Groundwater” means interstitial water which occurs in saturated earth material and which is capable of entering a well in sufficient amounts to be utilized as a water supply.

“Hazard Index” or “HI” means the sum of more than one hazard quotient for multiple substances and/or multiple exposure pathways. The HI is calculated separately for chronic, subchronic, and shorter-duration exposures.

“Hazard Quotient” or “HQ” means the ratio of a single substance exposure level over a specified time period (e.g., subchronic) to a reference dose for that substance derived from a similar exposure period.

"Hazardous constituent" or "hazardous waste constituent" means any constituent identified in 40 C.F.R. Part 261, Appendix VIII (incorporated by 20.4.1.200 NMAC), and any constituent identified in 40 C.F.R. Part 264, Appendix IX (incorporated by 20.4.1.500 NMAC).

"Hazardous Waste" means any solid waste or combination of solid wastes which because of its quantity, concentration, or physical, chemical, or infectious characteristics meets the description set forth in NMSA 1978, § 74-4-3(K), and is listed as a hazardous waste or exhibits a hazardous waste characteristic under 40 C.F.R. Part 261 (incorporated by 20.4.1.200 NMAC).

"Hazardous Waste Regulations" means the New Mexico Hazardous Waste Management Regulations, 20.4.1 NMAC.

"Interim Measures" or "IM" means actions that can be implemented to minimize or prevent migration of Contaminants and to minimize or prevent actual or potential human or ecological exposure to Contaminants while long-term, final corrective action remedies are evaluated and, if necessary, implemented.

"Landfill" means a disposal facility or part of a facility where hazardous waste is placed in or on the land and which is not a pile, a land treatment facility, a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground mine, a cave, or a corrective action management unit.

"Maximum Contaminant Level" or "MCL" means a maximum contaminant level adopted by EPA under the federal Safe Drinking Water Act, 42 U.S.C. §§ 300f to 300j-26, or by the Environmental Improvement Board under the Environmental Improvement Act, NMSA 1978, § 74-1-8(A)(2) (2000).

"Mixed Waste" means waste that contains both hazardous waste subject to the HWA and RCRA and source, special nuclear or byproduct material subject to the Atomic Energy Act of 1954, as amended.

"Operable Unit" or "OU" means any individual SWMU or AOC or a group of SWMUs or AOCs based on geographic location (i.e., technical area or test area) or, in the case of OU 1295, SWMUs or AOCs grouped by similar construction, transport pathways, exposure routes, receptors, potential risk, and potential locations for Contaminants to accumulate.

"Parties" means collectively the New Mexico Environment Department, the United States Department of Energy, and Sandia Corporation, and the term "Party" shall refer to one of these three entities.

"Permit" means the RCRA Permit issued to the Respondents for the Facility to operate a hazardous waste treatment and storage facility, EPA ID No. NM5890110518, as it may be modified or amended.

"Pit" means an earthen surface impoundment or excavation constructed to retain waste.

"RCRA" means the Federal Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901 to 6992k, also known as the Solid Waste Disposal Act.

"Respondents" means the United States Department of Energy and Sandia Corporation.

"SWA" means the New Mexico Solid Waste Act, NMSA 1978, §§ 74-9-1 to 74-9-42.

"Sandia" means Sandia Corporation, a corporation organized under the laws of the State of Delaware, doing business in the State of New Mexico.

"Secretary" means the Secretary of the New Mexico Environment Department or designated representative.

"Solid Waste" means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Federal Water Pollution Control Act, as amended (86 Stat. 880), or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923).

"Solid Waste Management Unit" or "SWMU" means any discernible unit at which solid waste has been placed at any time; and from which the Department determines there may be a risk of a release of hazardous waste or hazardous constituents, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at the Facility at which solid wastes have been routinely and systematically released; they do not include one-time spills. *See* 61 Fed. Reg. 19431, 19442-43 (May 1, 1996).

"State of New Mexico" or "State" means the State of New Mexico, including all of its departments, agencies, and instrumentalities.

"Surface Impoundment" means a facility or part of a facility which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen material (although it may be lined with man-made materials), which is designed to hold an accumulation of liquid wastes or wastes containing free liquids, and which is not an injection well. Examples of surface impoundments are holding, storage, settling, and aeration pits, ponds, and lagoons.

"Technical Area" or "TA" means an administrative unit of area established to encompass operations at the Facility.

"Trench" means a long, narrow depression or excavation, natural or artificial, in the earth's surface.

"United States" means the United States of America, including all of its departments, agencies, and instrumentalities.

"WQCC" means the New Mexico Water Quality Control Commission, and any successor agencies, boards, or commissions.

"Water Quality Control Commission (WQCC) Regulations" means the regulations at 20.6.2 NMAC promulgated by the New Mexico Water Quality Control Commission governing the quality of groundwater and surface water in New Mexico.

"Watershed" means a region or basin drained by, or contributing waters to, a river, stream, lake, or other body of water and separated from adjacent drainage areas by a divide such as a mesa, ridge or other geologic feature.

III.C. HEADINGS

Any section or paragraph headings in this Consent Order are provided solely as a matter of convenience to the reader and shall not be construed to alter the meaning of any provision of this Consent Order.

III.D. JURISDICTION

This Consent Order is issued to DOE and Sandia pursuant to section 74-4-10 of the HWA. It is also issued under section 74-9-36(D) of the SWA, for the limited purpose of addressing the corrective action requirements concerning nitrate and perchlorate set forth in this Order. Although Respondents consent to SWA jurisdiction for enforcement of the corrective action requirements of this Consent Order relating to nitrate and perchlorate, they otherwise reserve any and all rights, claims, and defenses with respect to the applicability of the requirements of the SWA.

Section 6001 of RCRA provides, in part, that "[e]ach department, agency, and instrumentality of the executive ...branch[] of the Federal Government (1) having jurisdiction over any solid waste management facility or disposal site, or (2) engaged in any activity resulting, or which may result, in the disposal or management of solid waste or hazardous waste shall be subject to, and comply with, all Federal, State, interstate, and local requirements, both substantive and procedural . . ., respecting control and abatement of solid waste or hazardous waste disposal and management in the same manner, and to the same extent, as any person is subject to such requirements." 42 U.S.C. § 6961.

III.E. TERM OF CONSENT ORDER

III.E.1. Effective Date

The effective date of this Consent Order is the date on which all of the Parties have signed the Consent Order.

III.E.2. Termination Date

Respondents shall notify the Department, in writing, when all of the requirements of this Consent Order, except those requirements concerning record preservation in Section III.Q, have been completed. Respondents' notice to the Department shall include a copy of all of the certificates of completion, as described in Section VII.D.6, obtained by Respondents pursuant to this Consent Order.

If the Department identifies any requirements of this Consent Order that have not been satisfactorily completed and for which a certificate of completion has not been obtained, it will notify the Respondents in writing. The Department's notice shall identify which requirements of the Consent Order the Department believes have not been met and which activities must be undertaken by Respondents to satisfy those requirements.

This Consent Order shall terminate on the date that the Respondents receive written notice from the Department that the Respondents have demonstrated that the terms of this Consent Order, with the exception of record preservation, have been satisfactorily completed. The Department shall provide such written notice within 60 days of receipt of the Respondents' notice pursuant to this Section (III.E.2). If, however, a Class 3 Permit Modification request pursuant to Section III.W.3.b is pending at the close of the 60-day period, the Department shall provide the written notice pursuant to this Paragraph within 15 days of the date on which the Department takes final agency action on the Class 3 Permit Modification request. Sections III.Q (Record Preservation), III.S (State's Covenant Not to Sue), and III.T (State's Reservation of Rights) shall survive the termination of this Consent Order as an agreement among the Parties.

III.F. BINDING EFFECT

This Consent Order shall apply to and bind the State, its officers when acting in their official capacity but not in their individual capacity, its agents, successors and assigns, and the Respondents, their officers when acting in their official capacity but not in their individual capacity, their agents, successors, and assigns.

The Respondents' obligations under this Consent Order may be satisfied by the actions of either DOE or Sandia Corporation, or by both of them. However, the Respondents shall be jointly and severally responsible for, and liable for any failure to carry out, all their obligations under this Consent Order.

The obligations of Sandia Corporation under this Consent Order shall terminate upon the effective date of the termination or expiration of its prime contract with DOE. If the contract between DOE and Sandia Corporation is terminated prior to such time as the obligations of this Consent Order are fully completed, DOE agrees to give the Department at least 30 days notice prior to a change in operating contractor and to impose the same obligations as are now imposed upon Sandia Corporation under this Consent Order upon any successor contractor or other applicable entity.

The Respondents shall require all contractors, subcontractors, laboratories, and consultants retained to conduct or monitor any portion of the work performed pursuant to this Consent Order to comply with and abide by the terms of this Consent Order.

III.G. STIPULATED PENALTIES

III.G.1. General Process and Notice

For each failure of the Respondents to submit the items listed in Table XI-2 of this Consent Order by the deadlines specified in that Table, the Department may assess a stipulated penalty in the amounts and pursuant to the procedures set forth in this Section (III.G). The Department may also assess a stipulated penalty in the amounts and pursuant to the procedures set forth in this Section if a submittal listed in Table XI-2 does not substantially comply with the specifications set forth in this Consent Order; provided, however, that the Department shall bear the burden of proof of demonstrating that the submittal does not substantially comply with the specifications of this Consent Order. Stipulated penalties may not be assessed for any reason other than the two set forth in this Paragraph.

If the Department seeks to assess stipulated penalties pursuant to this Section, it shall provide written notice of that fact to the Respondents. Such written notice shall state the violation for which penalties are being assessed. If the Department issues such written notice within 15 days of the submittal deadline identified in Table XI-2, stipulated penalties may be assessed beginning with the day after the submittal deadline date. If the Department provides written notice 16 days or more after the submittal deadline, the Department may only assess stipulated penalties beginning on the date that written notice was given to the Respondents pursuant to this Section.

III.G.2. Stipulated Penalty Amounts

Consistent with the beginning dates for assessment of stipulated penalties set forth in Section III.G.1, the Respondents shall pay to the State the following stipulated penalties for each day of noncompliance:

Days 1 through 30:	\$1,000.00 per day
Days 31 and beyond	\$3,000.00 per day

The Department may, in its discretion, agree to reduce or waive the stipulated penalties that would otherwise be due under this Section (III.G.). Such decision shall not be subject to judicial review.

III.G.3. Revisions to Specifications or Schedules

The Respondents shall not be liable for stipulated penalties for failure to take any action by a deadline specified in Table XI-2 of this Consent Order if (1) the Department has approved an alternate schedule in writing, through either an approved work plan or other document, or (2) a schedule has been modified pursuant to the provisions for modification in Section III.J. If any deadline for a submittal is modified, the Parties shall modify Tables XI-2 and XI-3 to reflect the revised deadline. The Respondents must comply with the revised deadline approved by the Department and that deadline, if not met, shall be the basis for stipulated penalties pursuant to Section III.G.1. The Respondents shall not be liable for stipulated penalties based on the Department's belief that a submission does not substantially comply with the requirements of this Consent Order if the submittal substantially complies with alternative requirements approved by the Department, in writing, through a work plan or other document under this Consent Order.

III.G.4. Procedure for Payment

Stipulated penalties under this Section shall be due within 45 days from the date that the Department makes a written demand for payment of stipulated penalties in accordance with Section III.G.1 (General Process and Notice) and III.L (Notice to Parties). Payment shall be by check, made payable to the State of New Mexico, and shall be delivered to:

Chief, Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-2567

The check shall be accompanied by a transmittal letter referencing this Consent Order. A copy of the transmittal letter shall be delivered to the attorney for the Department at the following address:

First Class mail address:

Office of General Counsel
New Mexico Environment Department
Post Office Box 26110
Santa Fe, New Mexico 87502

Overnight delivery address:

Office of General Counsel
New Mexico Environment Department
1190 St., Francis Drive
Santa Fe, New Mexico 87501

III.G.5. Interest

Interest shall accrue on all stipulated penalties not paid when due at the rate specified in 28 U.S.C. § 1961. Interest shall accrue from the date the penalty is due until the date it is actually paid.

III.G.6. Reservation

The Department reserves the right to seek other appropriate relief, in lieu of stipulated penalties under this Section (III.G), for any failure of the Respondents to comply with any requirement, including schedules, of this Consent Order. If, however, the Department elects to assess stipulated penalties pursuant to the provisions of this Section (III.G), the State will not seek a separate civil penalty or other monetary relief for the alleged deficiency identified in the Department's notice under Section III.G.1.

III.H. FORCE MAJEURE

III.H.1. General

For the purposes of this Consent Order, "force majeure" shall mean any event arising from causes beyond the reasonable control of the Respondents or their respective agents, contractors, or employees that delays or prevents the performance of any of the obligations of the Respondents under this Consent Order and that could not be overcome by due diligence. A force majeure shall not include unanticipated or increased costs or expenses associated with the implementation of this Consent Order.

III.H.2. Examples of Force Majeure

A force majeure could include, but is not limited to:

1. Acts of God, natural disasters such as fire or flood, war, terrorism, insurrection, civil disturbance, or explosion;
2. A federal government shut down, such as the one that occurred in 1995 and 1996;
3. Unanticipated breakage or accident to machinery, equipment or lines of pipe;
4. Restraint by court order;
5. Inability to obtain, at reasonable cost, any necessary authorizations, approvals, permits or licenses due to action or inaction of any governmental agency or authority other than DOE; and
6. Delays caused by compliance with applicable statutes or regulations governing contracting, procurement or acquisition procedures.

The Parties recognize that the events set forth above are merely examples of potential force majeure. Any force majeure claimed by the Respondents, whether identified in the above list or not, must meet the definition of force majeure in Section III.H.1. The Department reserves its right to evaluate each force majeure claimed by Respondents and determine whether the facts associated with such claimed force majeure meet the definition of force majeure in Section

III.H.1. The Parties further agree that the absence of a type of force majeure from the list of examples set forth herein does not create any presumption or evidence that such event does not constitute a force majeure.

III.H.3. Procedure for Claiming Force Majeure

If any event occurs which causes or may cause a delay in, or which prevents or may prevent, the performance of any obligations of the Respondents under this Consent Order, the Respondents shall notify the Department orally, or in writing in accordance with Section III.L (Notice to Parties), within 72 hours of when the Respondents first knew that the event might cause a delay. Within seven business days of the Respondents' verbal notification to the Department, the Respondents shall provide a written notice to the Department in accordance with Section III.L (Notice to Parties). The notice shall describe in detail: a) the cause or causes of the delay; b) the expected duration of the delay, including any obligations that would be affected; c) the actions taken or to be taken by the Respondents to prevent or minimize the delay; and d) the timetable by which those actions will be implemented. The Respondents shall take all reasonable actions to prevent or minimize any such delay. The Respondents' failure to provide notice pursuant to the terms of this Paragraph shall constitute a waiver of any claim of force majeure as to the event in question.

The Department will notify the Respondents, in writing in accordance with Section III.L (Notice to Parties) whether it agrees or disagrees that a force majeure has occurred, and will provide such notice within seven business days after receipt of the Respondents' notice of the event. If the Department agrees in writing that a delay or anticipated delay is attributable to a force majeure event, as defined in Section III.H.1, the time for performance of the affected obligation or obligations will be extended for a period not to exceed the actual delay resulting from the force majeure event, and stipulated penalties shall not be due for such delay. If the Department does not agree that a delay or anticipated delay is attributable to a force majeure event, it will notify the Respondents in writing and provide the basis for its conclusion.

III.I. DISPUTE RESOLUTION

Any dispute that arises under this Consent Order shall be subject to the procedures of this Section (III.I), unless the Consent Order expressly excludes such dispute from dispute resolution.

III.I.1. Informal Negotiations

Any dispute that arises under this Consent Order shall in the first instance be the subject of informal negotiations among or between the Parties to the dispute. The period for informal negotiations shall not exceed ten business days from the date the dispute arises, unless the period is extended by written agreement of the Parties to the dispute. The complaining Party (or Parties) shall send the other Party (or Parties) a written notice of dispute by overnight mail, facsimile, or hand delivery in accordance with Section III.L (Notice to Parties). Such notice shall describe in detail the disputed issue and propose a resolution. The dispute shall be considered to have arisen when the receiving Party(ies) receives the written notice of dispute from the complaining Party(ies).

III.I.2. Tier 1 Negotiations

If the Parties are unable to resolve a dispute by informal negotiation under Section III.I.1, the dispute shall be elevated to the Department Director of the Water and Waste Management Division, the Assistant Manager for Facilities and Project Management for the DOE Sandia Site Office, and the Director of the Sandia GeoScience and Environment Center for Sandia Corporation (the "Tier 1 Officials"). Within seven business days after the expiration of the informal dispute resolution period, each of the Parties to the dispute shall submit a written statement of position to the Tier 1 Officials. The Tier 1 Officials shall review the written statements of position and shall meet and confer in an attempt to resolve the dispute. The period for Tier 1 negotiations shall not exceed five business days from the date the Tier 1 Officials receive the Parties' statements of position, unless the period is extended by written agreement of the Parties to the dispute.

III.I.3. Tier 2 Negotiations

If the Parties are unable to resolve a dispute by Tier 1 negotiations under the preceding Paragraph, the matter shall be immediately elevated to the Department Deputy Secretary, the Manager of the DOE Sandia Site Office, and the Vice President of the Sandia Energy, Information and Infrastructure Surety Division (the "Tier 2 Officials"). The Tier 2 Officials shall review the Parties' written statements of position and shall meet and confer in an attempt to resolve the dispute. The period for Tier 2 negotiations shall not exceed five business days from the date the Tier 2 Officials receive the statements, unless the period is extended by written agreement of the Parties to the dispute.

III.I.4. Tier 3 Negotiations

If the Parties are unable to resolve a dispute by Tier 2 negotiations under the preceding Paragraph, the matter shall be immediately elevated to the Department Secretary and the Principal Deputy Administrator or Chief Operating Officer of the National Nuclear Security Administration within DOE (the "Tier 3 Officials"). The Tier 3 Officials shall review the Parties' written statements of position and shall meet and confer in an attempt to resolve the dispute. The period for Tier 3 negotiations shall not exceed three business days from the date the Tier 3 Officials receive the statements, unless the period is extended by written agreement of the Parties to the dispute.

III.I.5. Other Remedies

If the Parties are unable to resolve a dispute by Tier 3 negotiations under the preceding Paragraph, the Parties may agree to seek to resolve the dispute through non-binding mediation or another non-binding dispute resolution method, or the Parties may pursue any available legal remedy to resolve the dispute, which may include, for the Department, bringing an enforcement action or, for the Respondents, petitioning a court to resolve the matter. The decision or other action forming the basis of the dispute shall be deemed final for purposes of judicial review once the Tier 3 negotiations are complete.

III.I.6. Extension of Deadlines

The deadline for any obligation of the Respondents under this Consent Order that is directly affected by a dispute raised pursuant to this Section (III.I) shall be extended by a period of time not to exceed the actual time taken to resolve the dispute in accordance with the procedures of this Section (III.I). The invocation of the dispute resolution process under this Section (III.I) shall not, however, extend, postpone, or affect in any way any obligations of the Respondents under this Consent Order not directly in dispute, unless otherwise agreed by the Department in writing. Stipulated penalties attributable to the disputed matter shall continue to accrue, but payment shall be stayed pending resolution of the dispute. If the Department prevails in the dispute, the Respondents shall pay all accrued stipulated penalties, plus accrued interest, in accordance with Section III.G.

III.J. MODIFICATION

III.J.1. Procedures for Modifying any Provision of the Consent Order

The Parties may modify any of the provisions of this Consent Order. Except as provided in Sections III.L (Notice to Parties) and III.M (Work Plans and Schedules), any such modifications must be in writing and signed by all Parties. Any modification shall be subject to the preservation of procedural rights in Section III.W.5.

III.J.2. Provisions Governing Extensions of Time

The Respondents may seek an extension of time in which to perform a requirement of this Consent Order, for good cause, by sending a written request for extension of time and proposed revised schedule to the Department. The request shall state the length of the requested extension and describe the bases for the request. The Department will respond in writing to any request for extension within ten business days following receipt of the request. If the Department denies the request for extension, it will state the reasons for the denial. If the Department does not respond in writing within ten business days, the requested extension shall automatically be granted.

As set forth in Section III.M.2 (Time for Department Review), a failure by the Department to meet the expected review times identified in Table XI-2, shall result in an automatic extension of time for Respondents.

III.K. COMPLIANCE WITH APPLICABLE LAWS

III.K.1. Generally

The Respondents shall undertake all actions required by this Consent Order in accordance with the requirements of all applicable federal, state, and local laws and regulations. Nothing in this Consent Order shall be construed as relieving the Respondents of their obligation to comply with applicable law.

III.K.2. Atomic Energy Act, as amended

The Atomic Energy Act (AEA), as amended, 42 U.S.C. §§ 2011 *et seq.*, and the Department of Energy Organization Act, 42 U.S.C. §§ 7101 *et seq.*, and their implementing regulations, orders and directives, require DOE to protect the public health and safety, and, to this end, exclusively authorize DOE to regulate nuclear safety at its facilities. DOE's authority to regulate nuclear safety is governed by the provisions of 10 C.F.R. Parts 830 through 835. Pursuant to those regulations, DOE is required to review and approve all activities and work, including activities and work under this Consent Order, to ensure that its statutory and regulatory responsibilities for nuclear safety are met. In making determinations concerning nuclear safety, DOE follows the requirements of 10 C.F.R. Parts 830 through 835. Nothing in this Consent Order shall require the performance of any work or activity that is inconsistent with any nuclear safety requirement implemented pursuant to 10 C.F.R. Parts 830 through 835. If such an inconsistency arises, the Respondents shall provide appropriate documentation demonstrating the inconsistency to the Department.

III.K.3. Anti-Deficiency Act

No provision of this Consent Order shall be interpreted as, or constitute, a commitment or requirement that the United States shall obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. § 1341. Payment or obligation of funds by the United States is subject to the availability of appropriated funds.

III.L. NOTICE TO PARTIES

Whenever under the terms of this Consent Order, any Party is required to provide notice to any other Party, or to submit any plan, report, or other document called for under this Consent Order, such notice, plan, report or other document shall be sent or directed to the following persons.

As to the Department, either of the following:

Chief, Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone: (505) 428-2512
Telefax: (505) 428-2567

Albuquerque Group Manager
Hazardous Waste Bureau
New Mexico Environment Department
c/o Sandia National Laboratories
P.O. Box 5800 / MS1089
Albuquerque, New Mexico 87185
Telephone: (505) 284-5086

Telefax: (505) 284-2617

As to DOE:

First Class mail address:

Environmental Restoration Project Manager
U.S. Department of Energy / National Nuclear Security Administration
Sandia Site Office
Post Office Box 5400
Albuquerque, New Mexico 87185-5400
Telephone: (505) 845-5326
Telefax: (505) 845-4671

Overnight delivery address:

Environmental Restoration Project Manager
U.S. Department of Energy / National Nuclear Security Administration
Sandia Site Office
Pennsylvania & H Streets
Albuquerque, New Mexico 87116

As to Sandia:

First Class mail address:

Environmental Restoration Project Manager
Sandia National Laboratories
P.O. Box 5800, Mailstop 1089
Albuquerque, New Mexico 87185
Telephone: (505) 284-2577
Telefax: 505-284-2616

Overnight delivery address:

Environmental Restoration Project Manager
Sandia National Laboratories
1515 Eubank Boulevard SE
Albuquerque, New Mexico 87123

Any Party may change the name, title, address, telephone number or fax number of the contact person noted above by providing written notice to the other Parties. The provisions of Section III.J.1 (Modification) shall not apply to such changes.

III.M. WORK PLANS AND SCHEDULES

III.M.1. General

All work plans and schedules approved pursuant to this Consent Order are incorporated into this Consent Order and become enforceable requirements of this Consent Order, as of the date of receipt by Respondents of the Department's written approval. Notwithstanding the preceding sentence, any reference to, or information concerning, radionuclides or the radioactive portion of mixed waste contained in any work plan or schedule or other document submitted under this Consent Order shall not be enforceable under this Consent Order and shall not constitute the basis for any enforcement action under this Consent Order.

All work plans and schedules that the Respondents are required to prepare under this Consent Order shall be submitted to the Department for review and approval. Upon review of each work plan or schedule, the Department will send Respondents a written notice of approval or disapproval, and will state in writing the deficiencies and other reasons for any disapproval. A notice of disapproval may include modifications to the work plan schedule necessary for the Department's approval, or other written comments. Upon receipt of a written notice of disapproval, the Respondents shall revise the work plan or schedule to incorporate all modifications and comments, and otherwise correct all deficiencies that gave rise to the disapproval. Within 30 days after Respondents receipt of a written disapproval, Respondents shall resubmit the revised work plan or schedule to the Department for approval.

The Department may require work in addition to that specified in an approved work plan, if the Department demonstrates and documents, with appropriate technical and other documentation, that the approved work plan is insufficient to achieve the objectives stated in the work plan and that the additional work is necessary.

In submitting a work plan or schedule to the Department for review and approval, the Respondents may propose alternate requirements that differ from those in this Consent Order. Any such proposal shall be in writing, shall specifically identify each proposed alternate requirement and how it differs from the requirement in the Consent Order, and shall be accompanied by a detailed written justification. If the Department approves in writing a work plan with alternate requirements, the alternate requirements of the work plan, rather than the requirements of the Consent Order, shall be applicable and enforceable.

Respondents shall comply with all applicable federal, state, and local laws or regulations, and shall obtain all necessary approvals or permits prior to conducting the activities required by this Consent Order and performing the obligations required hereunder. The Department makes no representation with respect to approvals and permits required by federal, state and local laws or regulations other than those required under the HWA and SWA and their implementing regulations.

III.M.2. Time for Department Review

The Department anticipates that it will review all deliverables that the Respondents are required to prepare pursuant to this Consent Order within the Department expected review times set forth in Table XI-2. Timely review constitutes sending the Respondents a written notice of approval or disapproval within the review time specified in Table XI-2. If the Department takes additional time to send the Respondents a written notice of approval or disapproval beyond the review time specified in Table XI-2, the schedule for any subsequent work or deliverable that is dependent upon such review shall be automatically extended by a period equal to such additional time. No stipulated penalties or any other liability for noncompliance with the Consent Order attributable to the Department's failure to respond within the review times specified in Table XI-2 shall accrue to the Respondents.

III.N. OFFSITE ACCESS

To the extent any requirement of this Consent Order, including any work plan approved under this Consent Order, requires access to property not owned or controlled by DOE, Respondents shall use their best efforts to obtain access from the present owners of such property to conduct required activities, and to allow the Department access to such property to oversee such activities. In the event that access is not obtained when necessary, the Respondents shall notify the Department in writing regarding their best efforts and their failure to obtain such access.

III.O. ENTRY AND INSPECTION

In accordance with section 74-4-4.3 of the HWA, for purposes of enforcing the requirements of this Consent Order, the Respondents shall allow any authorized representative of the Department to enter the Facility at reasonable times and in accordance with applicable security requirements: (1) to inspect the Facility; (2) to obtain samples of any hazardous waste, soil, surface water, or ground water; and (3) to inspect and copy documents relating to this Consent Order, subject to normal security restrictions related to classified information.

The Respondents shall notify the Department in writing or by e-mail or fax of any field sampling activities undertaken pursuant to any plan or requirement of this Consent Order a minimum of 15 days prior to the sampling being conducted as required to meet the terms of this Consent Order, and shall provide the Department the opportunity to collect split samples upon request of the Department. The 15-day notice requirement of this Paragraph shall not apply to sampling of surface water runoff during storm events. For such events, Respondents shall provide the Department as much advance notice as is practicable.

The Respondents shall notify the Department in writing or by e-mail or fax a minimum of 15 days prior to the implementation of any plan required under this Consent Order.

Nothing in this Section (III.O) shall be construed to limit or impair in any way the inspection and entry authority of the Department under the HWA, the Hazardous Waste Regulations, RCRA, or any other applicable law or regulations.

III.P. AVAILABILITY OF INFORMATION

In accordance with section 74-4-4.3 of the HWA, the Respondents shall, within a reasonable time after receipt of a request from any authorized representative of the Department, furnish information to the Department relating to hazardous wastes that are or have been managed at the Facility.

Nothing in this Section (III.P) shall be construed to limit or impair in any way the information gathering authority of the Department under the HWA, the Hazardous Waste Regulations, RCRA, or any other applicable law or regulation.

III.Q. RECORD PRESERVATION

Until ten years after the Respondents' receipt of the Department's written notice of termination of the Consent Order pursuant to Section III.E, the Respondents shall maintain all records, documents, data, and other information required to be prepared under this Consent Order. The only exception to this requirement relates to those SWMUs for which a Class 3 Permit Modification request for corrective action complete with or without controls has been granted by the Department pursuant to the Permit (*see* Section III.W Integration with Permit). The record preservation requirements for such SWMUs shall be set forth in the Permit and those permit requirements shall control and supersede the requirements of this Section. Nothing herein shall be construed as a waiver of any attorney client, work product or other privilege that the Respondents might otherwise possess.

III.R. PENDING ACTIONS

In consideration of the Respondents' agreement to perform the work under this Consent Order, the Department hereby withdraws and vacates the "Secretary's Determination of an Imminent and Substantial Endangerment to Health and the Environment" issued by the Department on September 3, 2002 under the HWA, NMSA 1978, §§ 74-4-10.1 and 74-4-13 (the Determination).

The United States and Sandia have filed lawsuits challenging the Endangerment Determination. Given that this Consent Order vacates the Endangerment Determination, and thereby renders the lawsuits moot, the United States and Sandia will dismiss their respective federal and state court lawsuits, which are captioned as follows: 1) *United States v. Ron Curry* (Civil No. 02-1245 MCA/ACT) (D.N.M.); 2) *United States v. Ron Curry* (Ct. App. No. 23,492) (N.M. Ct. App.); 3) *Sandia Corporation v. Ron Curry* (Civil No. 02-1246 LFG/RHS) (D.N.M.); and 4) *Sandia Corporation v. Ron Curry* (Ct. App. No. 23,480) (N.M. Ct. App.).

III.S. STATE'S COVENANT NOT TO SUE

In consideration of the actions that will be performed by the Respondents under the terms of this Consent Order, and except as specifically provided in Section III.T (State's Reservation of Rights), the State covenants not to sue or take administrative action against the Respondents, their respective officers, agents, successors, or assigns, under the HWA, the SWA, or RCRA, for matters addressed in this Consent Order. This covenant not to sue shall take effect upon the

Effective Date of this Consent Order. This covenant not to sue extends only to the Respondents and their respective officers, agents, successors, and assigns and does not extend to any other person. This covenant not to sue shall survive the termination of this Consent Order.

III.T. STATE'S RESERVATION OF RIGHTS

As provided in Section III.U, nothing herein shall prevent the State from seeking legal or equitable relief, either administratively or judicially, to enforce the requirements of this Consent Order. Moreover, nothing herein shall prevent the State from taking administrative action to implement the requirements of this Consent Order (e.g., approving or disapproving work plans, issuing certificates of completion). Finally, nothing herein shall prevent the State from taking appropriate action to address conditions at the Facility that constitute an emergency situation or that present an immediate threat to public health or the environment.

The covenant not to sue set forth in Section III.S does not pertain to any matters not addressed in this Consent Order. The State reserves, and this Consent Order is without prejudice to, all rights against the Respondents with respect to all such other matters, including, but not limited to, the following:

1. Conditions unknown to the Department at the time of issuance of a completion certificate pursuant to Section VII.D.6 of this Consent Order, which are discovered following issuance of the completion certificate, where the previously unknown conditions together with other relevant information indicate that a particular completion certificate is not protective of human health or the environment;
2. Information unknown to the Department at the time of issuance of a completion certificate pursuant to Section VII.D.6 of this Consent Order, which is discovered following issuance of the completion certificate, where the new information together with other relevant information indicate that a particular completion certificate is not protective of human health or the environment;
3. Liability arising from the past, present, or future disposal or release of Contaminants outside the Facility to the extent the State obtains information concerning such disposal or release following termination of this Consent Order and such information was not available to the Department at the time of termination;
4. Liability arising from the future disposal or release of Contaminants at the Facility to the extent the State obtains information concerning such disposal or release following termination of this Consent Order and such information was not available to the Department at the time of termination;
5. Liability for damages for injury to, destruction of, or loss of natural resources and the costs of any natural resource damage assessment;

6. Criminal liability; and
7. Liability for violation of federal or state law, which occurs during or after implementation of the corrective action.

Although this Consent Order does not address radionuclides or radionuclide contamination at the Facility, the State reserves the right to bring any action, including judicial or administrative action, under any appropriate authority, to compel the Respondents to monitor and report radionuclide contamination at or from the Facility, to consider such radionuclide contamination in conducting risk assessment, and to clean up such radionuclide contamination. Respondents reserve all available defenses to any such action.

III.U. ENFORCEMENT

This Consent Order is an enforceable document. If the Respondents violate any requirements of this Consent Order, the State's sole remedy for such noncompliance shall be to enforce those requirements pursuant to applicable law, subject, however, to the provisions of Section III.G.6, which apply where the State has sought stipulated penalties pursuant to this Consent Order.

The State maintains that it may take the following actions, or some combination of the following actions, to enforce the requirements of this Consent Order: issue a compliance order under section 74-4-10 of the HWA seeking injunctive relief or civil penalties for Respondents' noncompliance with the requirements of the Consent Order; file a civil action under sections 74-4-10 and 74-4-10.1(E) of the HWA or section 7002(a) of RCRA, 42 U.S.C. § 6972(a), seeking injunctive relief or civil penalties for alleged violations of the Consent Order; and file an action seeking criminal penalties under section 74-4-11 of the HWA. The State also maintains that each requirement of this Consent Order is an enforceable "requirement" of the HWA within the meaning of section 74-4-10 and an enforceable "requirement" of RCRA within the meaning of section 7002(a)(1)(A), 42 U.S.C. § 6972(a)(1)(A). The State further maintains that the list of authorities identified in this Paragraph is not exhaustive and reserves all rights to take any action authorized by law to enforce the requirements of this Consent Order. Finally, the State maintains that citizens may sue to enforce the requirements of this Consent Order pursuant to section 7002(a) of RCRA, 42 U.S.C. § 6972(a), if Respondents violate those requirements.

The Respondents reserve any and all rights and defenses to any enforcement action taken by the State or any citizen, and nothing in this Consent Order will constitute a waiver of such rights or defenses.

III.V. RELATIONSHIP TO WORK COMPLETED

This Consent Order shall be construed to avoid duplication of work already satisfactorily completed as determined by the Department pursuant to its current HSWA authority or by EPA pursuant to its HSWA authority prior to delegation of the RCRA program to the State. Investigations and other work that have been satisfactorily completed prior to the effective date of this Consent Order, that fulfill the substantive requirements of this Consent Order, and that

have been approved by the Department or EPA, in writing, shall be deemed to comply with this Consent Order.

III.W. INTEGRATION WITH PERMIT

III.W.1. General

The Department has determined that all corrective action for releases of hazardous waste or hazardous constituents at the Facility, required by sections 3004(u) and (v) of RCRA, 42 U.S.C. §§ 6924(u) and (v), and sections 74-4-4(A)(5)(h) and (i) and 74-4-4.2(B) of the HWA, shall be conducted solely under this Consent Order and not under the current or any future Hazardous Waste Facility Permit ("Permit"), with the exception of the following four items which will be addressed in the Permit and not in this Consent Order: (1) new releases of hazardous waste or hazardous constituents from operating units at the Facility; (2) the closure and post-closure requirements of 20.4.1.500 NMAC (incorporating 40 C.F.R. Part 264, Subpart G), as they apply to operating units at the Facility; (3) implementation of the controls, including long-term monitoring, for any SWMU on the Permit's Corrective Action Complete With Controls list, which is described in Section III.W.3.b; and (4) any releases of hazardous waste or hazardous constituents that occur after the date on which this Consent Order terminates pursuant to Section III.E.2. The Department has determined that setting forth corrective action requirements in this Consent Order in lieu of the Permit fully complies with the requirements of section 3004 of RCRA, 42 U.S.C. § 6924, and section 74-4-4.2(B) of the HWA.

III.W.2. Effect of Consent Order on Permit

In addition to the four items listed in Section III.W.1 above, the Permit will include a list of SWMUs requiring corrective action under this Consent Order. That list is for tracking purposes only.

The Parties enter into this Consent Order based on their understanding that there shall be only one enforceable instrument for corrective action relating to the Facility, except as provided in Section III.W.1, and that such instrument is this Consent Order. For the purposes of any enforcement action taken by the State or any third party, other than the items listed in Section III.W.1, compliance with the terms of this Consent Order constitutes compliance with the requirements for corrective action under RCRA and the HWA and their implementing regulations, including section 3004(u) and (v) of RCRA, 42 U.S.C. § 6924(u) and (v), 40 C.F.R. Part 264, Subpart F, sections 74-4-4.2(B) and 74-4-4(A)(5)(h) and (i) of the HWA and section 20.4.1.500 NMAC (incorporating 40 C.F.R. Part 264, Subpart F). Upon the effective date of this Consent Order, the sole mechanism for enforcing corrective action requirements, except as provided in Section III.W.1, shall be this Consent Order. The State will not take any action to enforce the corrective action requirements of the existing Permit, except as to those items listed in Section III.W.1.

Finally, this Consent Order sets forth corrective action requirements for nitrate and perchlorate, which are not hazardous wastes or hazardous constituents. The Department reserves any right it

may have to impose long-term monitoring or other activities relating to nitrate and perchlorate following issuance of a certificate of completion under this Consent Order. Such requirements shall not be imposed through this Consent Order, however.

III.W.3. Modification of Permit

III.W.3.a. Class 3 Permit Modification to Remove Corrective Action Requirements

The Facility Permit currently contains corrective action requirements. Given the Department's position that corrective action shall be conducted under this Consent Order and not under the Permit as provided in Section III.W.1, and the Parties' understanding that the sole enforceable mechanism for corrective action will be this Consent Order, except as provided in Section III.W.1, the Respondents intend to seek a Class 3 Permit Modification for the Permit pursuant to 20.4.1.900 NMAC (incorporating 40 C.F.R. § 270.42(c)) ("Permit Modification"). That Permit Modification request, consistent with Section III.W.1, will seek to remove all corrective action requirements of the Permit for releases of hazardous waste or hazardous constituents at the Facility, with the exception of the four items specifically identified in III.W.1. The Permit Modification request will also provide that the terms of this Consent Order are not enforceable as terms of the Permit, except as provided in Section III.W.1. Finally, as set forth in Section III.W.3.b, the Permit Modification request will authorize the Respondents to seek additional permit modifications to remove a SWMU from the list of SWMUs requiring corrective action to one of two lists identified in Section III.W.3.b concerning SWMUs for which corrective action is complete. The Department supports the Permit Modification.

III.W.3.b. Class 3 Permit Modification For Corrective Action Complete

Whenever the Respondents obtain a certificate of completion pursuant to the terms of this Consent Order for a SWMU or group of SWMUs, the Respondents can initiate a "Class 3 Permit Modification for Corrective Action Complete" pursuant to the terms of the Permit. The Permit Modification described in Section III.W.3.a will provide that once a Class 3 Permit Modification for Corrective Action Complete is granted, the SWMU or SWMUs that are the subject of that modification shall be removed from the list of SWMUs requiring corrective action and placed onto one of the following two lists: "Corrective Action Complete With Controls;" or "Corrective Action Complete Without Controls." These two lists are for informational purposes only and are not enforceable; provided, however, that where controls are identified for a SWMU, only those controls (e.g., institutional controls, engineered barriers, long-term monitoring and operation and maintenance) are enforceable under the Permit. The Department's determination that corrective action is complete for a SWMU placed on either the Corrective Action Complete With Controls list or the Corrective Action Complete Without Controls list will be subject to the State's reservation of rights for new information or unknown conditions. The Department must initiate a Permit modification if it seeks to require additional work at any SWMU contained on either of the two lists for Corrective Action Complete.

III.W.4. Renewal of Permit

The requirements of this Consent Order shall not terminate upon renewal of the Permit issued to the Respondents. The renewed Permit, and any future modifications, renewals, or reissuance of the Permit, will not include any corrective action requirements, nor any other requirement that is duplicative of this Consent Order. The Permit or any renewed Permit can include the four excepted items and the list of SWMUs requiring corrective action described in Section III.W.1.

III.W.5. Preservation of Procedural Rights

This Consent Order hereby incorporates all rights, procedures and other protections afforded the Respondents and the public pursuant to the regulations at 20.4.1.900 NMAC (incorporating 40 C.F.R. § 270.42) and 20.4.1.901 NMAC, including, but not limited to, opportunities for public participation, including public notice and comment, administrative hearings, and judicial appeals concerning, for example, remedy selection decisions of the Department.

III.W.6. Contingencies

The Department hereby commits to process the Permit Modification described in Section III.W.3.a (Class 3 Permit Modification to Remove Corrective Action Requirements) expeditiously. In making this commitment, the State recognizes that the Respondents have entered into this Consent Order based on their understanding that there shall be only one enforceable instrument for corrective action and that such instrument is this Consent Order. See Section III.W.2 (Effect of Consent Order on Permit). If the Department fails to process the Permit Modification expeditiously, this Consent Order shall automatically be vacated after the Parties have exhausted dispute resolution, as provided for under this Consent Order, and a court of competent jurisdiction has determined that the Department has failed to act expeditiously in processing the Permit Modification. The Parties and the State agree that if the Department fails to act on the Permit Modification, the sole issue for dispute resolution and for the court of competent jurisdiction is whether the Department has acted expeditiously in processing the Permit Modification, as initiated by the Respondents.

If the Department denies the Permit Modification request and the basis for the denial can be cured, the Parties will promptly take all appropriate actions to cure the identified deficiency. If the Department denies the Permit Modification request and the basis for the denial cannot be cured, this Consent Order shall automatically be vacated 30 days after the Department's denial.

Finally, if the Department grants the Permit Modification, and a court of competent jurisdiction determines that corrective action requirements for releases of hazardous waste or hazardous constituents in this Consent Order must be included in the Permit, the Respondents shall submit a Class 3 Permit Modification request that incorporates those terms of the Consent Order which, as of the date of the modification, have not been met. Once that Permit Modification becomes effective, this Consent Order shall automatically be vacated.

III.X. SEVERABILITY

If any provision or authority of this Consent Order is held by a court of competent jurisdiction to be invalid, if that provision or authority is severable from the remainder of the Consent Order, the remainder of the Consent Order shall remain in force and shall not be affected by the court's order and ruling. Additionally, if the application of this Consent Order to any party or circumstance is held by a court of competent jurisdiction to be invalid, the application of this Consent Order to other parties or circumstances shall remain in force and shall not be affected thereby.

III.Y. LAND TRANSFER

III.Y.1. Transfer of Facility Proper in Fee

The provisions of this Section (III.Y.1) shall apply for the duration of the Consent Order to any transfer in fee of Facility property from the United States to another entity during DOE's operational control of the property, to the extent that such property is subject to any requirement under the Consent Order.

III.Y.1.a. Notice and Meeting

Prior to the United States transferring in fee any portion of the Facility to another entity, DOE will provide written notice of such transfer to the Department at least 120 days prior to the date of transfer. Appropriate representatives of DOE, the Department, and the entity to which the United States intends to transfer title to the property ("the transferee") will meet within 30 days after issuance of DOE's written notice of transfer. At the meeting, the Parties will discuss the transferee's intended use of the property that is the subject of the transfer ("the property"). The Department and DOE will review the corrective measures, including remedy, taken with regard to the property, in light of the transferee's intended use of the property.

III.Y.1.b. Department's Determination

Within 60 days after the meeting described in Section III.Y.1.a, the Department will determine if the corrective measures implemented by the Respondents with regard to the property are protective of human health and the environment in light of the transferee's intended use of the property.

- (i) If the Department determines that the corrective measures implemented by the Respondents with regard to the property are not protective of human health and the environment in light of the transferee's intended use of the property, the Department must explain, in writing, why such measures are not protective, and must identify the specific additional corrective action requirements that Respondents must complete with regard to the property. If DOE thereafter still intends to go through with the transfer, Respondents will endeavor to conduct any additional corrective action requirements identified by the Department prior to transfer. With the Department's prior approval, DOE may conduct such additional corrective action requirements following transfer, pursuant to a schedule

approved by the Department. Such schedule shall be enforceable pursuant to the terms of this Consent Order.

- (ii) If the Department determines that the corrective measures implemented by Respondents with regard to the property are protective of human health and the environment in light of the transferee's intended use of the property, no additional corrective action requirements will be imposed with regard to the property prior to transfer. If the Department determines, pursuant to this Paragraph (Section III.Y.1.b.ii), that no additional corrective measures will be imposed, DOE shall not be precluded from transferring the property immediately following receipt of the Department's determination, even if that determination is received prior to the expiration of the review period.

The Department must notify Respondents no later than 60 days following the meeting required by Section III.Y.1.a as to whether additional corrective action measures are necessary with regard to the property given the transferee's intended use of the property. If the Department does not notify Respondents within this time frame, the Department will be deemed to have concluded that no additional corrective measures are necessary given the transferee's intended use of the property.

III.Y.1.c. Terms of Transfer

In transferring land to another entity, the United States shall comply with the terms of section 120(h) of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), 42 U.S.C. § 9620(h). That section applies to any property owned by the United States on which any hazardous substance was stored for one year or more, known to have been released, or disposed of. Consistent with CERCLA section 120(h)(3)(A), the United States will include in the deed transferring the property the information required by CERCLA section 120(h)(3)(A)(i), the covenant required by CERCLA section 120(h)(3)(A)(ii), and the access clause required by CERCLA section 120(h)(3)(A)(iii). The United States may defer the requirement of section 120(h)(3)(A)(ii)(I), consistent with the terms of CERCLA section 120(h)(3)(C).

III.Y.1.d. Restricted Use

When the United States transfers property that has been cleaned to a level less protective than a residential use scenario, the United States will include in the deed a restriction that limits future use of the property to the particular use scenario on which DOE has based its cleanup of the property (e.g., if the property was cleaned based on an industrial use scenario, future use of the property would be limited to industrial use). The language of the deed restriction governing future land use necessarily will differ for each deed, depending upon the facts and circumstances of the property being transferred. Such restriction shall, at a minimum, be consistent with the following language:

The property shall not be used for any purpose other than [define the use scenario on which DOE has based its cleanup of the property]. That means that the property shall not be used for [define less restrictive uses].

At least 30 days prior to transfer, DOE shall provide the Department the opportunity to review and comment upon the language of the proposed deed restriction limiting future land use, as described generally in the preceding Paragraph. The Department shall provide comments on such proposed language no later than 15 days after receipt of DOE's proposed language.

III.Y.1.e. Enforceability Against Transferee

The Parties agree that the covenant required by CERCLA section 120(h)(3)(A)(ii), and the deed restriction described in Section III.Y.1.d (to the extent the property is not remediated for unrestricted use), are requirements within the meaning of CERCLA section 310(a)(1), 42 U.S.C. § 9659(a)(1).

The Parties agree that the contract of sale between the United States and the transferee will state that the Parties to the contract agree that the deed restriction to be set forth in the deed is a requirement within the meaning of CERCLA section 310(a)(1), 42 U.S.C. § 9659(a)(1). Further, the Parties agree that such statement within the Contract of Sale will survive the transfer of the deed.

The Parties also agree that the deed transferring title from the United States to the transferee will state that the restriction on land use set forth in the deed is intended to be an equitable servitude, that both the Department and the transferor are beneficiaries of the equitable servitude, that the Parties intend for the restriction on land use to run with the land and to bind subsequent transferees, that such restriction is enforceable by the Department and the transferor against any subsequent transferee that fails to comply with its terms. The deed shall be recorded in the appropriate recording office in the chain of title of the property to give notice of the use restriction to subsequent transferees of the property.

III.Y.1.f. EPA Institutional Controls Tracking System

For any deed transferring title from the United States to the transferee that contains a restriction on future land use, DOE will, within 90 days of transfer of the property, notify EPA, Region VI, of the transfer and identify for EPA the location of the property that is the subject of the transfer so that EPA can, as appropriate, include such property in its pilot institutional controls data base and tracking system. This database and tracking system, among other things, identifies former United States' property on which deed restrictions have been placed.

III.Y.2. Transfer of Control of Facility Property to Another Federal Entity

The provisions of this Section shall apply for the duration of the Consent Order to any transfer of operational control of Facility property from DOE to another agency, department, or instrumentality of the United States, to the extent that such property is subject to any requirement under the Consent Order.

III.Y.2.a. Notice and Meeting

If DOE decides or learns of a decision that operational control of any portion of the Facility will be transferred from DOE to another agency, department or instrumentality of the United States (the "transferee agency"), DOE will provide written notice of such operational transfer to the Department at least 120 days prior to the transfer, if practicable. If, however, DOE decides or learns of such decision fewer than 120 days prior to the transfer, DOE will provide written notice to the Department as soon thereafter as is reasonably practicable. Appropriate representatives of DOE will meet with representatives of the Department and the transferee agency. Such meeting shall take place within 30 days after DOE's written notice under this Paragraph. The meeting may occur following the change in operational control, if the United States determines that the change in operational control cannot be delayed. At the meeting, the Parties will discuss the transferee agency's intended use of the property. The Department and DOE will review the corrective measures, including remedy, taken with regard to the property, in light of the transferee agency's intended use of the property.

III.Y.2.b. Department's Determination

Within 60 days after the meeting, the Department will determine if the corrective measures implemented by Respondents with regard to the property are protective of human health and the environment in light of the transferee agency's intended use of the property.

- (i) If the Department determines that the corrective measures implemented by Respondents with regard to the property are not protective of human health and the environment in light of the transferee agency's intended use of the property, the Department must explain, in writing, why such measures are not protective, and must identify the specific additional corrective action requirements that Respondents must complete with regard to the property. To the extent practicable, Respondents will endeavor to conduct any additional corrective action requirements identified by the Department prior to the transfer of operational control. DOE may, however, conduct such additional corrective action requirements following transfer of operational control, pursuant to a schedule approved by the Department. Such schedule shall be enforceable pursuant to the terms of this Consent Order.
- (ii) If the Department determines that the corrective measures implemented with regard to the property are protective of human health and the environment in light of the transferee agency's intended use of the property, no additional corrective action work will be taken with regard to the property.

The Department must notify Respondents no later than 60 days following the meeting required by the preceding Section (III.Y.2.a) as to whether additional corrective action measures are necessary with regard to the property. If the Department does not notify Respondents within this time frame, the Department will be assumed to have concluded that no additional corrective measures are necessary given the transferee agency's intended use of the property.

III.Y.2.c. Contrary Land Use

If the Department determines that the transferee agency plans to use, or is using, the subject property in a manner contrary to the use(s) discussed at the meeting described in Section III.Y.2.b, the Department shall notify DOE and the transferee agency in writing. In such writing, the Department shall explain its concerns with regard to the proposed or current use of the property. Within 30 days thereafter DOE, the Department, and the transferee agency shall meet to discuss the Department's stated concerns. The State reserves its right to take any action, including administrative or judicial action, to address the contrary land use.

IV. FACILITY INVESTIGATION

IV.A. BACKGROUND

Prior to the issuance of this Consent Order, the Respondents had begun investigations of contamination at the Facility. The results of previous investigation work are to be incorporated into the investigations conducted under this Consent Order. However, additional investigation is necessary to fully characterize the nature, extent, fate and transport of Contaminants that have been released to the environment as a result of Facility operations.

The Respondents have established a groundwater-monitoring network for the purpose of hydrogeologic characterization and groundwater quality sampling. The current Facility monitoring network includes test wells, monitoring wells, and springs. This monitoring network has been determined by the Department to be adequate for the purpose of establishing background groundwater quality and understanding the general hydrogeologic system beneath the Facility. However, additional site-specific groundwater monitoring wells may be needed to investigate the TAG area and other SWMUs/AOCs.

IV.B. PERCHLORATE SCREENING IN GROUNDWATER

The Respondents shall evaluate the nature and extent of perchlorate contamination based on a screening level of 4 micrograms per liter ($\mu\text{g/L}$). The detection limit shall not exceed 0.004 milligrams per liter (mg/L). In a given monitoring well, four consecutive non-detects at this screening level will be considered evidence of the absence of perchlorate, such that additional monitoring for perchlorate in that well is not required. In a given monitoring well, detection of perchlorate at this screening level will initiate the requirement of subsequent perchlorate monitoring, following the relevant schedule in Table XI.1 of this Consent Order, until four consecutive non-detect results are obtained for that well. The Respondents shall report all monitoring results on a quarterly basis to the Department, unless the Department agrees in writing to a longer reporting period.

Monitoring for perchlorate as described above is required only in groundwater monitoring wells installed at the Facility after implementation of this Consent Order and in the existing wells: NWT3-MW2, MRN-3D, MRN-2, MWL-BW1, MWL-MW1, CYN-MW1D, and CYN-MW5.

IV.C. AREAS WITH GROUNDWATER CONTAMINATION

Groundwater is or has been contaminated above WQCC or EPA standards at the Burn Site, TA-V, and Tijeras Arroyo Groundwater area (formerly Sandia North). These areas are briefly discussed below:

1. Burn Site. In 1996, sampling results from the Burn Site Well, a non-potable water supply well, showed elevated nitrate levels at 26 mg/L (maximum contaminant level (MCL) is 10 mg/L). The Department required monitoring wells at the Burn Site; these wells have yielded groundwater samples with levels of nitrate greater than 10 mg/L . Fuel constituents below

state and EPA standards have also been detected in some wells. The contamination is found in canyon alluvium and fractured bedrock aquifers that may connect to the regional aquifer in the Albuquerque Basin to the west.

2. TA-V. TA-V is located in the northeastern corner of TA-III, in the southwestern part of KAFB. TCE has been detected in water samples from some monitoring wells screened in the regional aquifer in and around TA-V since 1993. Also, nitrate, a Contaminant from septic system effluent, has been detected above state drinking water and groundwater standards. TCE levels have ranged as high as 23 $\mu\text{g/L}$, and nitrate has ranged as high as 16.3 mg/L.
3. Tijeras Arroyo Groundwater area (formerly Sandia North). TAG is an approximately 8.0 square miles rectangular (3.25 miles x 2.5 miles) area located in the north central part of KAFB. Groundwater occurs in a perched system in addition to the regional system. The perched groundwater system is contaminated with TCE and nitrate at levels reaching 7.5 $\mu\text{g/L}$ (MCL = 5.0 $\mu\text{g/L}$) and 30 mg/L (MCL = 10 mg/L), respectively. Nitrate has been detected in the regional aquifer at concentrations ranging as high as 18 mg/L.

The Respondents must complete a Corrective Measures Evaluation (CME) for the Burn Site, TA-V, and Tijeras Arroyo Groundwater area in accordance with the schedules in Section XI.

Prior to conducting a CME, site characterization efforts must be completed to the satisfaction of the Department. Respondents shall determine for each area of groundwater contamination and as required by the Department:

1. Nature, rate of transport, and extent of contamination;
2. Regional and perched aquifer boundaries;
3. Depth to water, water levels, water table, potentiometric surface, and any seasonal variations;
4. Flow directions and velocities;
5. Geologic, hydrostratigraphic, and structural relationships;
6. Water supply well pumping influences, seasonal pumping rates, and annual amounts of water withdrawn;
7. Saturated hydraulic conductivity, porosity, effective porosity, permeability, transmissivity, particle size, storage coefficients, and estimated fracture/secondary porosity;
8. Contaminant concentrations in soil, rock, sediment, vapor, and water (as appropriate); and
9. General water chemistry.

In selecting sites for new wells, the Respondents shall consider lithology, paleotopography, fracture density and orientation, source areas, Contaminant characteristics, geologic structures,

groundwater flow direction, and any known and potential occurrences of groundwater.

IV.D. MIXED WASTE LANDFILL

The MWL was operated from 1959 to 1988 as a land disposal unit for various wastes, including mixed waste and hazardous waste. The landfill occupies about 2.6 acres and is located in the north-central portion of TA-III. Wastes disposed of in the MWL include acids, metals, organic solvents and other organic compounds. A RFI has shown that cadmium and tritium, a radioactive material that is not covered by this Consent Order, have migrated from the landfill.

On October 11, 2001, the Department directed the Respondents to conduct a Corrective Measures Study (CMS) (equivalent to a CME) meeting the requirements set forth in Sections N, O, P, Q, and S of Module IV (HSWA requirements) of the Respondents' RCRA Permit. Since then, the Respondents have submitted a CMS Plan to the Department, fulfilling the first phase of this directive, and a CMS Report. The Respondents must complete the CMS and implement and complete the approved corrective measures in accordance with the schedules in Section XI.

IV.E. SEPTIC SYSTEMS

Small septic systems make up the bulk of sites still requiring investigation at the Facility. The Respondents shall investigate these sites in accordance with the Sampling and Analysis Plan submitted October 19, 1999, and approved by the Department on January 28, 2000. Investigation reports for each site are due in accordance with the schedules in Section XI, Tables XI-2 and XI-3. The Respondents may substitute a completed septic system investigation report for any other report for a septic system that is due, but is incomplete, by notifying the Department in writing, provided that the substitute report is for a site not yet granted Corrective Action Complete status by the Department. Any report replaced by a substitute report shall assume the original due date of the substitute.

IV.F. OTHER SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

The Respondents must complete and submit an investigation report for each SWMU and AOC listed in, and in accordance with, the schedules in Section XI, Tables XI-2 and XI-3. The Respondents may substitute a completed investigation report for any other report that is due, but is incomplete, if given prior written approval by the Department, and provided the substitute report is for a site that has not yet been granted Corrective Action Complete status by the Department. Any report replaced by a substitute report shall assume the original due date of the substitute.

V. NEWLY IDENTIFIED SWMUS, AOCs AND RELEASES

Within 15 days after the discovery of any newly identified or suspected SWMUs or AOCs, the Respondents shall notify the Department in writing of such discovery. The notification shall include, at a minimum, the location of the SWMU or AOC and all available information pertaining to the nature of any release of Contaminants from the SWMU or AOC, including the Contaminants released, the magnitude of the release, and the media affected by the release.

Within 60 days after submitting such notification, the Respondents shall submit to the Department for approval a SWMU Assessment Report (SAR) for each newly identified or suspected SWMU or AOC unit. At a minimum, the SAR shall provide the following information, to the extent available:

1. Location of each unit on a topographic map of appropriate scale;
2. Designation of type and function of each unit;
3. General dimensions, capacities and structural description of each unit (including any available plans and drawings);
4. Dates of operation for each unit;
5. Identification of all wastes that have been managed at or in each unit, to the extent available, including any available data on hazardous constituents in the waste; and
6. All available information pertaining to any release of Contaminants from each unit, including groundwater data, soil analyses, air sampling or monitoring data, and surface water data.

Based on the results of the SAR, the Department will determine the need for further investigations at the SWMUs or AOCs covered in the SAR, including the need for an investigation report under Section VI.C. If warranted, the Department may also require corrective measures of the SWMU or AOC, based on a finding that releases of Contaminants have occurred, are occurring, or are likely to occur from the unit.

Within 15 days after the discovery of any previously unknown release of a Contaminant from a SWMU or AOC, the Respondents shall notify the Department in writing of such discovery. The Department may determine that further investigation of the release of Contaminants is needed, including the need for an investigation report under Section VI.C. If warranted, the Department may also require corrective measures of the SWMU or AOC, based on a finding that releases of Contaminants have occurred, are occurring, or are likely to occur from the unit.

VI. CORRECTIVE ACTION PROCESS

VI.A. INVESTIGATION WORK PLAN

The Department may determine that further investigation is needed at any of the SWMUs or AOCs listed in the Facility Operating Permit or identified under Sections IV, V or XI. If the Department determines that further investigation is needed, it will notify the Respondents in writing. The Respondents shall submit to the Department for approval an investigation work plan or plans for those SWMUs and AOCs that need further investigation. An individual work plan may cover several SWMUs or AOCs. The work plans shall be prepared in accordance with Section X.B of this Consent Order and shall be submitted by the date specified by the Department.

VI.B. SITE INVESTIGATION

The Respondents shall perform the site investigations in accordance with the approved investigation work plan. The Respondents shall notify the Department in writing or by email or fax of any field sampling activities undertaken pursuant to any plan or requirement of this Consent Order a minimum of 15 days prior to the commencement of any field activity under the approved investigation work plan.

VI.C. INVESTIGATION REPORT

The Respondents shall submit to the Department for approval an investigation report that presents the results of field activities, summarizes the data collected, and presents the recommendations and conclusions of the investigation. An individual report may cover several SWMUs or AOCs. The reports shall be prepared in accordance with Section X.C of this Consent Order and shall be submitted by the date specified by the Department or as listed in Section XI, Tables XI-2 and XI-3.

VI.D. CORRECTIVE MEASURES EVALUATION

If the Department requires corrective measures at a SWMU or AOC listed in the Facility's Operating Permit or identified in Sections IV, V or XI of this Consent Order, the Respondents shall submit to the Department a CME Work Plan within 90 days of notification by the Department that a CME is required. The CME Work Plan shall contain a schedule to conduct the CME. The Department will review the CME Work Plan, and will provide the Respondents written notice of any deficiencies in the CME Work Plan. The Respondents will correct any deficiencies in the CME Work Plan by the submittal date specified by the Department. Upon approval of the CME Work Plan by the Department, the work plan shall be implemented. A CME Report, in compliance with the requirements of Section X.F of this Consent Order, shall be submitted to the Department on the date specified in Section XI of this Consent Order or, if there is no date specified in Section XI, within 90 days of completion of the CME. The Department will review the CME Report, and will provide the Respondents written notice of any deficiencies in the Report. The Respondents will correct any deficiencies in the CME Report by the submittal date specified by the Department. When the Department determines that there are no deficiencies in the CME Report, the Department

will seek and consider public comment prior to approving, approving with modifications, or rejecting a remedy.²

VI.E. CORRECTIVE MEASURES IMPLEMENTATION

Respondents shall prepare a Corrective Measures Implementation Plan for the remedy approved by the Department, then shall implement the remedy upon approval of the Plan by the Department in accordance with a schedule for completion. Upon completion of the remedy, the Respondents shall submit a Corrective Measures Implementation Report to the Department for approval in accordance with a schedule approved by the Department or as required in Section XI, Tables XI-2 and XI-3.

VI.F. INTERIM MEASURES WORK PLAN

If required by the Department, the Respondents shall prepare and submit to the Department for approval an Interim Measures Work Plan within 90 days after receiving notification from the Department that a plan is required. Interim measures will be required, if necessary, to reduce or prevent migration of Contaminants, or to reduce or prevent human or environmental exposure to Contaminants while long-term corrective action remedies are evaluated and implemented. The Respondents shall include an implementation schedule in the Interim Measures Work Plan.

The Interim Measures Work Plan required by the Department must be approved prior to implementation. If the Department disapproves the Interim Measures Work Plan, the Department will notify the Respondents in writing of the plan's deficiencies and specify a due date for submission of a revised Interim Measures Work Plan.

The Respondents may determine, during implementation of site investigation activities, that emergency interim measures are necessary to address an immediate threat of harm to human health or the environment. The Respondents shall notify the Department within three business days of discovery of the facts giving rise to the threat, and shall propose emergency interim measures to address the threat. If the Department approves the emergency interim measures in writing, the Respondents may implement the emergency interim measures without submitting an interim measures work plan. In some circumstances, initiation of emergency interim measures might be warranted prior to obtaining written approval from the Department. Respondents shall notify the Department within one business day of taking the emergency interim measure. The notification will contain a description of the emergency situation, what types and quantities of Contaminants are involved, the emergency interim measures taken, and contact information for the emergency coordinator that handled the problem. The notification will also include a written statement justifying the need to take the emergency action without prior written approval from the Department.

VI.G. INTERIM MEASURES IMPLEMENTATION

The Respondents shall implement the interim measures in accordance with the approved Interim

² In selecting a remedy, the Department may select more than one remedy for a particular SWMU or AOC. The use of the term "remedy", when referring to the selection of a remedy, refers also to multiple remedies.

Measures Work Plan.

Within 90 days of completion of interim measures, the Respondents shall prepare and submit to the Department, an Interim Measures Report summarizing the results of the interim measures, and including copies of all relevant laboratory, monitoring, and other data. The Interim Measures Report shall follow the same requirements as for a Corrective Measures Implementation Report.

VI.H. ACCELERATED CLEANUP PROCESS

At any time, if the Respondents identify a corrective action or measure that, if implemented voluntarily, would reduce impacts to human health and the environment, reduce cost or reduce overall schedule, the Respondents may implement the corrective action or measure as provided in this Section (VI.H) in lieu of the process established in Sections VI.A through VI.E. The proposed corrective action or measure will be documented in a Voluntary Corrective Action Plan or Voluntary Corrective Measure Plan, which shall include: (1) a description of the remediation initiative, including details of the unit or activity that is subject to the requirements of this Consent Order; and (2) an explanation of how the proposed action is consistent with the overall corrective action objectives and requirements. The Respondents shall notify the Department of the planned action or measure a minimum of 15 days prior to the commencement of any voluntary field activity; the notification shall include the submittal of the plan. The Department may review the plan to ensure that the proposed action would not pose unacceptable risks to human health and/or the environment. Within 90 days after completion of the voluntary corrective action or measure, the Respondents shall submit to the Department an Investigation Report that includes the contents satisfying the requirements of a Corrective Measures Implementation Report, as specified in Section VII.D.5.a.

VI.H.1. Voluntary Corrective Measures Work Plan

A VCM Work Plan must be approved prior to implementation. If the Department disapproves the VCM Work Plan, the Department will notify the Respondents in writing of the plan's deficiencies and specify a due date for submission of a revised VCM Work Plan, or explain why the proposed VCM will not be approved. The Respondents shall include an implementation schedule in the VCM Work Plan.

VI.H.2. Voluntary Corrective Measures Implementation

The Respondents shall implement the VCM in accordance with the approved VCM Work Plan. Within 90 days of completion of the VCM, the Respondents shall prepare and submit to the Department, an Investigation Report that includes the contents satisfying the requirements of a Corrective Measures Implementation (CMI) Report.

The VCM may not be the final remedy. The Department will evaluate the adequacy of cleanup as it does for a CMI, and the Department may require a CME.

VI.H.3. Voluntary Corrective Action Work Plan

The Department may review the Voluntary Corrective Action (VCA) Work Plan to ensure that the proposed VCA does not pose unacceptable risk to human health or the environment or interfere with the attainment of a final remedy.

The VCA Work Plan need not be approved prior to implementation. However, if the Department disapproves the VCA Work Plan, the Department will notify the Respondents in writing of the Plan's deficiencies.

VI.H.4. Voluntary Corrective Action Implementation

The Respondents shall implement the VCA in accordance with the VCA Work Plan. Within 90 days of completion of the VCA, the Respondents shall prepare and submit to the Department an Investigation Report that includes the contents satisfying the requirements of a CMI Report.

The VCA may not be the final remedy. The Department will evaluate the adequacy of cleanup as it does for a CMI, and the Department may require a CME.

VI.I. RISK ANALYSIS

The Respondents shall evaluate potential human and ecological risk for all SWMUs and AOCs at which there is contamination or residual contamination that will not be removed by corrective action. Additionally, the Department may require human health and ecological risk analyses for any SWMU or AOC to determine if there are current risks to human health or the environment from the existing level of contamination at the SWMU or AOC. The risk evaluation shall be in the form of a risk screening (Sections VI.I.1.b and VI.J) or a baseline risk assessment.

The risk evaluation results shall be reported in a Risk Assessment Report in compliance with Section X.E of this Consent Order. Alternatively, text equivalent to a Risk Assessment Report may be appended to an Investigation Report (Section X.C) or a Corrective Measures Evaluation Report (Section X.F). Contamination at SWMUs and AOCs not meeting the Department's human health target excess cancer risk goal of 10^{-5} for the sum of all carcinogenic Contaminants or the Department's goal of a hazard index (HI) of one (1.0) for the sum of all noncarcinogenic Contaminants is subject to cleanup, as determined by the Department. Contaminants at SWMUs and AOCs not meeting the requirements for ecological risk in Section VI.J are also subject to cleanup, as determined by the Department.

The Respondents shall attain the cleanup goals specified in the above paragraph and the cleanup levels specified in Section VI.K of this Consent Order to protect human health and the environment. Respondents may request alternative cleanup goals or levels at a particular site pursuant to the terms of Section VI.L.

VI.I.1. Risk Assessment Report

Risk Assessment reports (or equivalent text appended to other reports) shall conform to the

requirements in Section X.E of this Consent Order. In any case in which the Department has approved a demonstration of impracticability for a SWMU or AOC pursuant to Section VI.L, the Respondents shall submit to the Department for approval, within 90 days following completion of cleanup activities, a Risk Assessment Report for that SWMU or AOC.

VI.I.1.a. Conceptual Site and Risk Exposure Models

The risk assessment shall include information on the expected fate and transport of Contaminants detected at the site, including a list of all known sources of contamination at the site. The conceptual site model shall be discussed in all risk assessments. Sources that are no longer considered to be releasing Contaminants, but represent the point of origination for Contaminants transported to other locations, shall be included. The discussion of fate and transport shall address potential migration of each Contaminant in each medium, potential breakdown products and their migration, and anticipated pathways of exposure for human and ecological receptors.

For human health risk assessments for soils, the conceptual site and risk exposure models shall include the current and reasonably foreseeable future land use (such as industrial or recreational) for each SWMU or AOC. For any SWMU or AOC where the current and reasonably foreseeable future land use is not residential, a risk assessment based on a residential land-use scenario shall also be performed and reported. The residential land use risk assessment shall be used for comparison purposes only, unless the land use changes to residential.

A SWMU-specific risk scenario may be used for the human health risk assessment based on the current and reasonably foreseeable future land use. If such a scenario is used, the Respondents shall include all toxicity information and exposure assessment equations used for the SWMU-specific scenario as well as the sources for that information. If MCLs and WQCC standards, as described below, are pertinent to a SWMU or AOC, these levels shall also be used in the screening assessment.

Conceptual site and risk exposure models presented for ecological risk assessments shall identify assessment endpoints and measurement receptors for the site. The discussion of the models shall explain how the measurement receptors for the site are protective of the ecological receptors.

VI.I.1.b. Human Health Risk Screening Levels

The risk analysis shall include a screening assessment that compares appropriate soil screening levels, or WQCC standards or EPA MCLs as described below, to Contaminants at a site. The Department's soil screening levels (SSLs) for residential land use shall be used to screen soil contamination for risk to human health, or a baseline risk assessment shall be conducted. In either case, SSLs for Contaminants detected at a SWMU or AOC shall be included in the Risk Assessment Report for comparative purposes. For any given Contaminant that occurs naturally, the approved background concentration shall also be reported for comparative purposes, and the total risk of that Contaminant must include the risk from background levels. For those Contaminants not appearing on the Department's SSL table, EPA Region 6 soil screening values adjusted to a 10^{-5} target excess cancer risk goal shall be used in place of SSLs. If no

scientifically valid toxicological studies exist for a particular receptor or Contaminant, the Contaminant and receptor combination shall be addressed using qualitative methods.

VI.J. ECOLOGICAL RISK EVALUATION

Ecological risk at each site shall be evaluated by a baseline risk assessment or by using the Department's *Guidance for Assessing Ecological Risks Posed by Chemicals: Screening-Level Ecological Risk Assessment* (March 2000). *The Predictive Ecological Risk Assessment Methodology, Environmental Restoration Project, Sandia National Laboratories, NM*, developed by Sandia National Laboratories/New Mexico, may be used instead of the ecological screening levels cited in the guidance above if written approval of the Department for these values is obtained prior to use. If no scientifically valid toxicological studies exist for a particular receptor or Contaminant, the Contaminant and receptor combination shall be addressed using qualitative methods.

VI.K. CLEANUP GOALS AND CLEANUP LEVELS

As noted below, the WQCC and the Department have separately specified certain cleanup goals and methods of calculating cleanup levels, and reporting requirements for sites where corrective action is required. The Department's cleanup goals for protection of human health are based on excess lifetime cancer risk levels that are consistent with the EPA's National Oil and Hazardous Substance Pollution Contingency Plan, 40 C.F.R. § 300.430(e)(2)(i)(A)(2). The EPA recommends a range of 10^{-4} to 10^{-6} lifetime excess cancer risk as acceptable. In general, the Department has selected a human health target excess cancer risk goal of 10^{-5} for the sum of all carcinogenic Contaminants and the goal of a hazard index (HI) of one (1.0) for the sum of all noncarcinogenic Contaminants.

In addition to the above-noted cleanup goals, the Department and the EPA have established certain soil screening levels and MCLs, and the WQCC has adopted groundwater and surface water standards that are described below. Respondents shall use the cleanup levels described below in a manner consistent with the EPA RCRA corrective action process in implementing the corrective action requirements of this Consent Order. Finally, the Department has neither established, nor adopted pursuant to applicable law, a specific cleanup level for perchlorate in soil, groundwater, or surface water. To the extent any future regulatory requirements (i.e., WQCC standards, MCLs or other standards that are applicable) are adopted by the Environmental Improvement Board (EIB), WQCC, or EPA for perchlorate, Respondents shall comply with those requirements, whichever are the most stringent. As noted below and in Section IV.B of this Consent Order, the Parties have agreed to a screening level for monitoring perchlorate in groundwater. Section VI.K.1.b also describes that screening level for groundwater and the procedures Respondents shall follow if Respondents obtain detections above this screening level.

VI.K.1. Groundwater

Groundwater cleanup levels for human health should typically be developed using existing cleanup standards (e.g., drinking water standards) when they are available and when using them

is protective of current and reasonably expected exposures. The parties shall refer to EPA guidance, *Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action* (Sept. 2002), in developing groundwater cleanup levels.

VI.K.1.a. Groundwater Cleanup Levels

The WQCC has adopted groundwater cleanup standards for selected Contaminants (20.6.2.7.SS, 20.6.2.3103 and 20.6.2.4103 NMAC). Groundwater cleanup levels are based on the WQCC standards and the EPA MCLs for drinking water Contaminants. If both a WQCC standard and a MCL have been established for an individual substance, then the most stringent of the two levels shall be considered the cleanup level for that substance.

If, at the time of a CME, a WQCC standard or MCL has not been established for a Contaminant, the Respondents shall use the cleanup goals of a target excess cancer risk level of 10^{-5} and for noncarcinogenic Contaminants an HI of one (1.0) and using a residential scenario as the basis for proposing a cleanup level for the Contaminant. Prior to a CME, the WQCC standards and the drinking water MCLs shall be used as screening levels. If a WQCC standard or MCL has not been established for a specific substance, the EPA Region VI Human Health Medium Specific Screening Level for tap water shall be used as the screening level. Monitoring results in excess of those levels may indicate the need for changes to the relevant monitoring plan, further characterization of releases, evaluation of potential Interim Measures, as specified in Section VII.B of this Consent Order, or other appropriate actions as required by the Department.

VI.K.1.b. Groundwater Perchlorate Screening Level

The Parties agree that, prior to the promulgation of any applicable regulatory standards for perchlorate, the Respondents shall screen for perchlorate in all new groundwater monitoring wells installed at the Facility after the effective date of this Consent Order and at the following existing groundwater monitoring wells: NWT A3-MW2, MRN-3D, MRN-2, MWL-BW1, MWL-MW1, CYN-MW1D, and CYN-MW5. Groundwater monitoring for perchlorate shall be conducted for a minimum of four quarters and utilize a detection limit not to exceed 0.004 mg/L. Should perchlorate be detected in groundwater at any level in any monitoring wells, the Respondents shall continue monitoring perchlorate at such wells at a frequency to be negotiated with the Department. The frequency of monitoring shall not exceed one year. The Respondents shall report all monitoring results on a quarterly basis to the Department, unless the Department agrees in writing to a longer reporting period.

If perchlorate is detected at 0.004 mg/L or greater, Respondents shall evaluate the nature and extent of the perchlorate contamination. The results of the evaluation of the nature and extent of contamination shall be incorporated into a CME. If, at the time of the CME, no groundwater standard or MCL has been adopted by the EIB, WQCC or EPA for perchlorate, the Respondents shall use the cleanup goal of a HI of one (1.0) and a residential scenario in the CME evaluation to develop the proposed cleanup level.

VI.K.2. Soil Screening Levels and Cleanup Goal

The Department has specified soil-screening levels that are based on a target total excess cancer risk of 10^{-5} and for noncarcinogenic Contaminants a target HI of one (1.0) for residential land use. The target residential soil screening levels for selected substances are listed in the Department's Technical Background Document for Development of Soil Screening Levels. The Department uses the most recent version of the EPA Region VI Human Health Medium Specific Screening Level (HHMSSL) for residential soil as the target screening level for compounds designated as "n" (noncarcinogen effects), "max" (maximum concentration), and "sat" (soil saturation concentration), or ten times the EPA Region VI HHMSSL for compounds designated "c" (carcinogen effects), if a Department residential soil screening level has not been established for a Contaminant.

The Respondents shall either utilize the Department's soil screening levels as cleanup levels for purposes of this Consent Order, or shall propose cleanup levels to the Department based on a risk assessment and a target excess cancer risk level of 10^{-5} or, for noncarcinogenic Contaminants, a HI of one (1.0) for current and reasonably foreseeable future land use. The proposed cleanup level will be subject to the Department's review and approval.

VI.K.2.a. Soil Polychlorinated Biphenyls Cleanup Levels

PCBs are hazardous constituents (20.4.1.200 NMAC incorporating 40 C.F.R. § 261, Appendix VIII). Soil cleanup levels for PCBs are discussed in the Department's Position Paper *Risk-based Remediation of Polychlorinated Biphenyls at RCRA Corrective Action Sites* (Mar. 2000). Except as noted in this Section and in Section VII.L below, the default soil cleanup level for PCBs is 1 milligram per kilogram (mg/kg).

The Department has reached agreement with both the EPA and the Respondents regarding the cleanup levels of PCBs at SWMU 2: total PCB concentrations shall be less than 10 mg/kg at a depth of greater than five feet. The upper five feet of the now-excavated landfill shall be backfilled with clean soil.

VI.K.3. Surface Water Cleanup Levels

The surface water quality standards set forth in the Clean Water Act, 33 U.S.C. §§ 1251 *et seq.*; Ground and Surface Water Protection Regulations, 20.6.2 NMAC; and the Standards for Interstate and Intrastate Surface Waters, 20.6.4 NMAC, shall constitute the cleanup levels for surface water for purposes of this Consent Order.

VII. REQUESTS FOR VARIANCE FROM CLEANUP GOAL OR LEVEL

As noted in Section VI.I, Respondents may seek to vary from a particular cleanup goal or cleanup level. The nature of the request will differ depending on whether a WQCC standard is involved. If a WQCC standard is involved, Respondents may seek an alternative abatement standard in accordance with the process specified in the WQCC Regulations, Section 20.6.2.4103.E and F NMAC. Those regulations require Respondents to make a request to the

WQCC. The WQCC will then determine whether an alternative abatement standard is appropriate and, if it is, will approve such standard consistent with the WQCC Regulations.

For all other instances in which Respondents seek to vary from a cleanup goal or level identified above, Respondents shall submit a demonstration to the Department that achievement of the cleanup goal or level is impracticable. The Department will review the Respondents' written submission concerning impracticability and determine whether the demonstration is approvable. Respondents shall have the burden of making the impracticability demonstration and, in making such demonstration, Respondents may consider such things as technical or physical impracticability of the project, the effectiveness of proposed solutions, the cost of the project, hazards to workers or to the public, and any other basis that may support a finding of impracticability at a particular SWMU or AOC. The Department may consider such things as technical or physical feasibility of the project, the effectiveness of proposed solutions, the cost of the project, hazards to workers or to the public, and any other basis that may support or refute a finding of impracticability at a particular SWMU or AOC. Respondents may also refer to all applicable guidance concerning impracticability, including, for example, the criteria set forth in EPA's Interim Final Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration (Sept. 1993) and EPA's Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action (Sept. 2002). In addition to demonstrating the basis for their impracticability request, Respondents' written submission shall propose the action(s) to be taken by Respondents if the Department approves the impracticability demonstration. Such action(s) shall include, but is (are) not limited to, completion of a site-specific risk assessment and identification of alternate cleanup goals or levels.

If the Department approves Respondents' impracticability demonstration, it shall indicate so in writing, and such writing shall identify the specific action(s) to be taken by Respondents.

VII. CORRECTIVE MEASURES

The Respondents shall implement corrective measures at the Facility, as necessary, in accordance with the requirements of this Section (VII).

The results of the investigations required in this Consent Order, and other information available to the Department, will be used as the basis for determining whether further investigation or corrective measures are necessary at each SWMU or AOC. The general procedures for implementing corrective measures are described below.

VII.A. EROSION CONTROL

The Respondents are responsible for controlling erosion at each SWMU or AOC and from roads constructed by the Facility solely for the purpose of accessing, investigating, or remediating a SWMU or AOC. The Respondents shall control and limit significant siltation, sediment transport, Contaminant transport and surface erosion within individual SWMU/AOC boundaries. Erosion controls shall include slope stabilization, surface-water run-on and run-off control, and sediment transport controls, as needed. The Respondents shall implement engineering controls and best management practices to control surface water and sediment transport within individual SWMU or AOC boundaries. Erosion control and surface water monitoring shall be performed in accordance with the Clean Water Act, U.S. Code Title 33, Chapter 26; the State of New Mexico Standards for Interstate and Intrastate Surface Waters, 20.6.4 NMAC; Ground and Surface Water Protection Regulations, 20.6.2 NMAC; and in accordance with the Department's Surface Water Quality Bureau and EPA guidance. Erosion control shall be implemented, as necessary, before, during, and after implementation of corrective measures.

VII.B. INTERIM MEASURES

VII.B.1. General

The Department will require interim measures, if the Department determines that such measures are necessary, to reduce or prevent migration of Contaminants, or to reduce or prevent human or environmental exposure to Contaminants while long-term corrective action remedies are evaluated and implemented. Upon making such a determination, the Department will notify the Respondents in writing.

VII.B.2. Interim Measures Work Plan

Within 90 days after receiving notification from the Department that interim measures are required, the Respondents shall submit to the Department for approval an Interim Measures Work Plan that shall include an implementation schedule.

VII.B.2.a. Approval of Interim Measures Work Plan

If the Department disapproves the Interim Measures Work Plan, the Department will notify the Respondents in writing of the Interim Measures Work Plan's deficiencies and specify a due date for submission of a revised Interim Measures Work Plan. Upon receipt of such notification of

disapproval, the Respondents shall submit to the Department, within the specified timeframe, a revised Interim Measures Work Plan that corrects the deficiencies.

VII.B.3. Interim Measures Implementation

The Respondents shall implement the interim measures in accordance with the approved Interim Measures Work Plan and implementation schedule.

VII.B.4. Emergency Interim Measures

The Respondents may determine, during implementation of site investigation activities, that emergency interim measures are necessary to address an immediate threat of harm to human health or the environment. The Respondents shall notify the Department within three business days of discovery of the facts giving rise to the threat, and shall propose emergency interim measures to address the threat. If the Department approves the emergency interim measures in writing, the Respondents may implement the emergency interim measures without submitting an interim measures work plan. In some circumstances, initiation of emergency interim measures might be warranted prior to obtaining written approval from the Department. Respondents shall notify the Department within one business day of taking the emergency interim measure. The notification will contain a description of the emergency situation, what types and quantities of Contaminants are involved, the emergency interim measures taken, and contact information for the emergency coordinator that handled the problem. The notification will also include a written statement justifying the need to take the emergency action without prior written approval from the Department.

VII.B.5. Interim Measures Report

Within 90 days after completion of interim measures, the Respondents shall submit to the Department an Interim Measures Report summarizing the results of the interim measures, that shall include copies of the results of all field screening, monitoring, sampling, analysis and other data generated as part of the interim measures implementation. The Interim Measures Report shall follow the requirements for a Corrective Measures Implementation Report.

VII.C. CORRECTIVE MEASURES EVALUATION

The Department will require corrective measures at a SWMU or AOC if the Department determines, based on an Investigation Report and other information available to the Department, that there has been a release of Contaminants into the environment at the SWMU or AOC and that corrective measures are necessary to protect human health or the environment. Upon making such a determination, the Department will notify the Respondents in writing.

Within 90 days of receiving notification from the Department that a corrective measures evaluation is required, the Respondents shall submit to the Department for approval a CME Work Plan. The Department will review the CME Work Plan and will provide the Respondents written notice of any deficiencies in the work plan. The Respondents shall correct any deficiencies in the CME Work Plan by the submittal date specified by the Department. When

the Department determines that there are no deficiencies in the CME Work Plan, the Respondents shall implement the CME Work Plan.

For simple sites with obvious remedies, the Respondents may choose to remediate a SWMU or AOC using the accelerated cleanup process pursuant to Section VI.H of this Consent Order. The completion of an accelerated cleanup at a SWMU or AOC does not obligate the Department to make a Corrective Action Complete determination for such SWMU or AOC. The Department may require a CME to be conducted for a SWMU or AOC that has been previously remediated by the accelerated cleanup process, if the latter is determined to be inadequate by the Department.

VII.C.1. Corrective Measures Evaluation Report

Within 90 days of completion of the CME, the Respondents shall submit a CME Report to the Department for approval of a remedy. The Respondents shall follow the CME Report requirements in Section X.F of this Consent Order.

The corrective measures evaluation shall evaluate potential remedial alternatives and shall recommend a preferred remedy that will be protective of human health and the environment and attain the appropriate cleanup goals for Contaminants that are present. The CME Report shall, at a minimum, comply with Section X.F of this Consent Order and include particular to the SWMU or AOC being evaluated:

1. A description of the location, status, and current use of the SWMU or AOC;
2. A description of the history of SWMU or AOC operations and the history of releases of Contaminants;
3. A description of SWMU or AOC surface conditions;
4. A description of SWMU or AOC subsurface conditions;
5. A description of on- and off-site contamination in all affected media;
6. An identification and description of all sources of Contaminants;
7. An identification and description of Contaminant migration pathways;
8. An identification and description of potential receptors;
9. A description of cleanup standards or other regulatory criteria;
10. An identification and description of a range of remedy alternatives;

11. Remedial alternative pilot or bench scale testing results;
12. A detailed evaluation and rating of each of the remedy alternatives, applying the criteria set forth in Section VII.C.3.a-b ;
13. An identification of a proposed preferred remedy;
14. Design criteria of the selected remedy;
15. A proposed schedule for implementation of the preferred remedy.

VII.C.2. Cleanup Standards

The Respondents shall select corrective measures that are capable of achieving the cleanup standards and goals outlined in Section VI.J and VI.K of this Consent Order or, approved risk-based cleanup goals established by a risk assessment, as described in Section VI.I.

VII.C.3. Corrective Measures Evaluation Criteria

VII.C.3.a. Threshold Criteria

The Respondents shall evaluate each of the remedy alternatives for the following threshold criteria. To be selected, the remedy alternative must:

1. Be protective of human health and the environment;
2. Attain media cleanup standard or alternative, approved risk-based cleanup goals;
3. Control the source or sources of releases so as to reduce or eliminate, to the extent practicable, further releases of Contaminants that may pose a threat to human health and the environment; and
4. Comply with standards for management of wastes.

VII.C.3.b. Remedial Alternative Evaluation Criteria

The Respondents shall evaluate each of the remedy alternatives for the factors described in Section VII.C.3.b.i-v. These factors shall be balanced in proposing a preferred alternative.

VII.C.3.b.i. Long-Term Reliability and Effectiveness

Each remedy shall be evaluated for long-term reliability and effectiveness. This factor includes consideration of the magnitude of risks that will remain after implementation of the remedy; the extent of long-term monitoring or other management that will be required after implementation of the remedy; the uncertainties associated with leaving Contaminants in place; and the potential for failure of the remedy. A remedy that reduces risks with little long-term management, and

that has proven effective under similar conditions, shall be preferred.

VII.C.3.b.ii. Reduction of Toxicity, Mobility, or Volume

Each remedy shall be evaluated for its reduction in the toxicity, mobility, and volume of Contaminants. A remedy that more completely and permanently reduces the toxicity, mobility, and volume of Contaminants shall be preferred.

VII.C.3.b.iii. Short-Term Effectiveness

Each remedy shall be evaluated for its short-term effectiveness. This factor includes consideration of the short-term reduction in existing risks that the remedy would achieve; the time needed to achieve that reduction; and the short-term risks that might be posed to the community, workers, and the environment during implementation of the remedy. A remedy that quickly reduces short-term risks, without creating significant additional risks, shall be preferred.

VII.C.3.b.iv. Feasibility

Each remedy shall be evaluated for its feasibility, or the difficulty of implementing the remedy. This factor includes consideration of installation and construction difficulties; operation and maintenance difficulties; difficulties with cleanup technology; permitting and approvals; and the availability of necessary equipment, services, expertise, and storage and disposal capacity. A remedy that can be implemented quickly and easily, and poses fewer and lesser difficulties, shall be preferred.

VII.C.3.b.v. Cost

Each remedy shall be evaluated for its cost. This factor includes a consideration of both capital costs, and operation and maintenance costs. Capital costs shall include, without limitation, construction and installation costs; equipment costs; land development costs; and indirect costs including engineering costs, legal fees, permitting fees, startup and shakedown costs, and contingency allowances. Operation and maintenance costs shall include, without limitation, operating labor and materials costs; maintenance labor and materials costs; replacement costs; utilities; monitoring and reporting costs; administrative costs; indirect costs; and contingency allowances. All costs shall be calculated based on their net present value. A remedy that is less costly, but does not sacrifice protection of health and the environment, shall be preferred.

VII.C.4. Approval of Corrective Measures Evaluation Report

If the Department disapproves the CME Report, the Department will notify the Respondents in writing of the CME Report's deficiencies and specify a due date for submission of a revised CME Report. Upon receipt of such notification of disapproval, the Respondents shall submit to the Department, within the specified time, a revised CME Report that corrects the deficiencies. If the Department determines that there are no deficiencies in the CME Report, the Department will notify the Respondents in writing.

VII.C.5. Statement of Basis

When the Department determines that there are no deficiencies in the CME Report, the Department will select a final remedy for the SWMU or AOC. The Department may select a different remedy from that preferred by the Respondents in accordance with law. The Department will issue a Statement of Basis for selection of the final remedy, and will receive public comment on the remedy. The public comment period will extend for 45 days from the date of the public notice of the Statement of Basis. The Department will select a final remedy and issue a response to public comments within 90 days, or other appropriate time period based on good cause, after the end of the public comment period. In selecting a final remedy the Department shall follow the public participation requirements applicable to remedy selection under Sections 20.4.1.900 (incorporating 40 C.F.R. § 270.41) and 20.4.1.901 NMAC.

The Administrative Record for the Facility will be made available to the public at the Department's offices in Santa Fe, New Mexico. All significant written and signed comments (including e-mailed comments) will be considered by the Department prior to approving a final remedy.

A public hearing may be held by the Department if the Secretary of the Department determines there is significant public interest in the selection of a final remedy. The comment period shall automatically be extended to the close of the public hearing. The public hearing shall follow the hearing requirements under 20.4.1.901.F and 20.4.1 NMAC.

The Department's decision on the final remedy shall follow the requirements of Section 20.4.1.901.G NMAC. The Department will issue a response to public comments at the time the Department's decision is issued.

VII.D. CORRECTIVE MEASURES IMPLEMENTATION

VII.D.1. General

The Respondents shall implement the final remedy selected by the Department.

VII.D.2. Corrective Measures Implementation Plan

Within 90 days after the Department's selection of a final remedy, or such other time as the Department determines, the Respondents shall submit to the Department for approval a CMI Plan outlining the design, construction, operation, maintenance, and performance monitoring for the selected remedy, and a schedule for implementation. The CMI Plan shall, at a minimum, include the following elements.

1. A description of the selected final remedy;
2. A description of the cleanup goals and remediation system objectives;

3. An identification and description of the qualifications of all persons, consultants, and contractors that will be implementing the remedy;
4. Detailed engineering design drawings and systems specifications for all elements of the remedy;
5. A construction work plan;
6. An operation and maintenance plan;
7. The results of any remedy pilot tests;
8. A plan for monitoring the performance of the remedy, including sampling and laboratory analysis of all affected media;
9. A waste management plan;
10. A proposed schedule for submission to the Department of periodic progress reports;
11. A proposed schedule for implementation of the remedy.

VII.D.3. Health and Safety Plan

The Respondents shall conduct all activities in accordance with a Health and Safety Plan.

VII.D.4. Community Relations

The Respondents shall involve the public in all corrective measures selections and implementations by giving presentations of such at quarterly public meetings and at other meetings such as meetings held for providing information on CME Reports. The Department encourages the Respondents to conduct additional activities to inform the public about the SWMU or AOC that is the subject of the CME or CMI process. Additional activities may include informal meetings or direct contact with the public, site tours, or workshops.

VII.D.5. Progress Reports

The Respondents shall submit to the Department progress reports in accordance with the schedule approved in the CMI Plan. The progress reports shall, at a minimum, include the following information.

1. A description of the work completed during the reporting period;
2. A summary of all problems, potential problems, or delays encountered during the reporting period;
3. A description of all actions taken to eliminate or mitigate problems, potential problems, or delays;

4. A discussion of the work projected for the next reporting period, including all sampling events;
5. Copies of the results of all monitoring, including sampling and analysis, and other data generated during the reporting period; and
6. Copies of all waste disposal records generated during the reporting period.

VII.D.5.a. Corrective Measures Implementation Report

Within 90 days after completion of a remedy, the Respondents shall submit to the Department a CMI Report. The report shall, at a minimum, include the following items.

1. A summary of the work completed;
2. A statement signed, if appropriate, by a registered professional engineer, that the remedy has been completed in full satisfaction of the specifications in the CMI Plan.
3. As-built drawings and specifications signed and stamped, if appropriate, by a registered professional engineer;
4. Copies of the results of all monitoring, including sampling and analysis, and other data generated during the remedy implementation, if not already submitted in a progress report;
5. Copies of all waste disposal records, if not already submitted in a progress report;
6. A certification, signed by a responsible official of both Respondents, stating: "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

VII.D.6. Certificate of Completion for SWMUs and AOCs.

Respondents may request a Certificate of Completion for any SWMU or AOC. With such request, Respondents shall submit an appropriate report documenting completion of all work required at the SWMU or AOC. Upon receipt of this information, the Department will determine whether the requirements of this Consent Order for corrective action for a SWMU or AOC have been satisfied. The Department may conduct an inspection of the SWMU or AOC, or request additional information from the Respondents to make this determination. If the Department determines that the requirements have not been satisfied, it will notify the

Respondents in writing of the actions that are necessary to correct the deficiencies. The Respondents shall implement such actions in accordance with the notification. If the Department determines that the requirements of this Consent Order have been satisfied for the SWMU or AOC, it will issue to the Respondents a written Certificate of Completion, which shall state that Corrective Action is Complete With Controls or Corrective Action is Complete Without Controls. If an AOC is designated as Corrective Action Complete With Controls, it shall be considered a SWMU and added to the Permit. See Section III.W.

VIII. GROUNDWATER MONITORING WELLS

VIII.A. DRILLING, DESIGN, AND CONSTRUCTION

A variety of methods are available for drilling monitoring wells and piezometers. While the selection of the drilling procedure is usually based on the site-specific geologic conditions, the following issues shall also be considered.

1. Drilling shall be performed in a manner that minimizes impacts to the natural properties of the subsurface materials;
2. Contamination and cross-contamination of groundwater and aquifer materials during drilling shall be prevented;
3. The drilling method shall allow for the collection of representative samples of rock and unconsolidated sediments and soil, as applicable;
4. The drilling method shall allow the Respondents to determine when the appropriate location for the screened interval has been encountered;
5. The drilling method shall allow for the proper placement of the filter pack and annular sealants;
6. The drilling method shall allow for the collection of representative groundwater samples and water level data. Drilling fluids (including air) shall be used only when minimal impact to the surrounding formation and groundwater can be ensured.

The selection of the specific drilling procedure will usually depend on site-specific geologic conditions. Justification for the method selected must be provided to the Department in writing (normally in a work plan or sampling and analysis plan) that will be subject to approval by the Department.

Groundwater monitoring wells and piezometers must be designed and constructed in a manner that will yield high quality, representative samples. Each well or piezometer must be constructed such that it will last the duration of the planned monitoring need (i.e., last long enough to gather enough samples for purposes of establishing concentration trends for Contaminants or potential Contaminants; determining if releases from SWMUs or AOCs will impact groundwater; monitoring post VCA, VCM, or corrective measure activities to ensure efficacy; and monitoring for post-closure care). In the event of a well or piezometer failure, or if a well or piezometer is any way no longer usable for its intended purpose, it must be replaced with an equivalent well or piezometer. In constructing a well or piezometer, Respondents shall ensure that the well or piezometer will not serve as a conduit for Contaminants to migrate between different zones of saturation. The design and construction of groundwater monitoring wells and piezometers shall comply with the guidelines established in EPA guidance, including, but not limited to:

- U.S. EPA, *RCRA Groundwater Monitoring: Draft Technical Guidance*, EPA/530-R-93-001, Nov. 1992;
- U.S. EPA, *RCRA Groundwater Monitoring Technical Enforcement Guidance Document*, OSWER-9950.1, Sept. 1986; and
- Aller, L., Bennett, T.W., Hackett, G., Petty, R.J., Lehr, J.H., Sedoris, H., Nielsen, D.M., and Denne, J.E., *Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells*, EPA 600/4-89/034, 1991.

VIII.B. WELL DEVELOPMENT

Each monitoring well shall be developed to create an effective filter pack around the well screen, correct damage to the formation caused by drilling, remove fine particles from the formation near the borehole, and assist in restoring the water quality of the saturated zone in the vicinity of the well to that prior to well installation. Development of wells is important to ensure the collection of representative groundwater samples.

Common methods used for developing wells include: pumping and over pumping, backwashing, surging (with a surge block), bailing, jetting, and airlift pumping.

VIII.C. WELL ABANDONMENT

Wells shall be abandoned when they are no longer required in the monitoring network, no longer provide representative groundwater samples because of falling water levels or insufficient productivity, or become damaged beyond repair. The goal of well abandonment is to seal the well in such a manner that it cannot act as a conduit for the migration of Contaminants from either the ground surface to the saturated zone or between saturated zones. Respondents shall prepare an abandonment plan for any and all wells that are to be plugged and abandoned, and shall submit the plan to the Department for approval. Respondents shall not abandon any groundwater monitoring well without prior written approval of the Department.

VIII.D. DOCUMENTATION

All information on the design, construction, and development of each monitoring well shall be recorded and presented on a boring log, a well construction log, and a well construction diagram. The well construction log and diagram shall include the following information.

1. Well name/number;
2. Date of well construction;
3. Drilling method;
4. Drilling contractor and name of driller;
5. Borehole diameter and well casing diameter;
6. Well depth;

7. Casing length;
8. Casing materials;
9. Casing and screen joint type;
10. Screened interval(s);
11. Screen materials;
12. Screen slot size and design;
13. Filter pack material and gradation;
14. Filter pack volume (calculated and actual);
15. Filter pack placement method;
16. Filter pack interval(s);
17. Annular sealant composition;
18. Annular sealant placement method;
19. Annular sealant volume (calculated and actual);
20. Annular sealant interval(s);
21. Surface sealant composition;
22. Surface seal placement method;
23. Surface sealant volume (calculated and actual);
24. Surface sealant interval;
25. Surface seal and well apron design and construction;
26. Well development procedure and turbidity measurements;
27. Well development purge volume(s) and stabilization parameter measurements;
28. Type and design and construction of protective casing;
29. Well cap and lock;
30. Ground surface elevation;
31. Survey reference point elevation on well casing;
32. Top of monitoring well casing elevation;
33. Top of protective steel casing elevation;
34. Name of geologist;
35. Initial water level;
36. Final water level;
37. Date of well development.

IX. GROUNDWATER

IX.A. SAMPLING

Groundwater samples shall initially be obtained from monitoring wells between 10 to 30 days after completion of well development. Groundwater monitoring and sampling shall be conducted at an interval approved in writing by the Department after the initial sampling event or in accordance with the frequency specified in Section XI, Table XI-1, or in accordance with work plans or sampling and analysis plans approved in writing by the Department. The Respondents shall sample all saturated zones screened to allow entry of groundwater into a monitoring well during each sampling event unless otherwise approved in writing by the Department. All requests for variances from the groundwater sampling schedule shall be submitted to the Department, in writing, 30 days prior to the start of scheduled monitoring and sampling events. If a variance is approved, the Department will state so in writing. When a saturated zone is encountered in an exploratory boring that was not intended to be completed as a monitoring well, Respondents shall install a properly constructed groundwater monitoring well in the boring or next to the boring that encountered groundwater. In such cases, samples shall be collected and analyzed for the constituents of concern appropriate to the purpose of the borehole.

Water samples shall be analyzed for physical and chemical parameters as determined in work plans or sampling and analysis plans or other plans and shall be completed by schedules approved by the Department. Sampling shall be conducted in accordance with a written and approved plan or in accordance with the EPA Technical Enforcement Guidance Document (U.S. EPA, *RCRA Groundwater Monitoring Technical Enforcement Guidance Document*, OSWER-9950.1, Sept. 1986).

Sampling and Analysis Plans shall, at a minimum, include the following elements of discussion.

1. Water level measurements;
2. Sampling equipment / pump type;
3. Purge requirements;
4. Filtration;
5. Preservation and holding times;
6. Containers;
7. Sequence of sample fractions;
8. Field quality control (QC) samples;
9. Laboratory QC samples;
10. Labeling containers;
11. Analytical requests;
12. Chain of custody;
13. Handling/shipping;
14. Field parameters:
 - pH, temp, specific conductance;
 - turbidity, dissolved oxygen;

15. Decontamination procedures;
16. Report format;
17. Schedules and frequency of sampling;
18. Report due date;
19. Instrument calibration methods;
20. Health and safety.

IX.B. WELL PURGING

Stagnant well water in each monitoring well shall be purged by removing groundwater prior to sampling to ensure that fresh formation water is being sampled. Micro-purging (or no-purge) methods shall not be employed. Well purging shall be conducted in accordance with the Department's position paper "*Use of Low-Flow and other Non-Traditional Sampling Techniques for RCRA Compliant Groundwater Monitoring*" (Oct. 30, 2001), or in accordance with the EPA technical enforcement guidance document (EPA, *RCRA Groundwater Monitoring Technical Enforcement Guidance Document*, OSWER-9950.1 (Sept. 1986)).

X. REPORTING REQUIREMENTS

X.A. GENERAL

The purpose of this section is to describe general minimum reporting requirements and provide report-format guidance for corrective action activities conducted at all SWMUs and AOCs required under this Consent Order. Included are the general reporting requirements and report-format guidance for site-specific investigation work plans, investigation reports, periodic monitoring reports, Risk Assessment reports, and CME Reports. The Respondents shall consider the reports required pursuant to this Consent Order to be the equivalents of RFI Work Plans, RFI Reports, Periodic Monitoring Reports, Risk Assessment Reports, CMS Plans, CMS Reports, CMI Plans, and CMI Reports for the purposes of RCRA compliance and the Department's fee assessments pursuant to 20.4.2 NMAC. See Fed. Reg. 30875-77 (July 27, 1990), proposed 40 C.F.R. §§ 264.520 to 264.524. The Respondents shall include detailed, site-specific requirements in all SWMU and AOC investigation work plans, investigation reports, monitoring reports, and corrective measures evaluation plans and reports. All plans and reports shall be prepared with technical and regulatory input from the Department except for VCA Plans and certain emergency VCM Plans as provided in Sections VI.F and VI.H. All work plans and reports shall be submitted to the Department in the form of one electronic copy and two paper copies. Where information cannot reasonably be converted to an electronic format, the Respondents shall notify the Department prior to the submittal date for the information and shall seek approval for submission of the information in an alternative format. Text documents submitted as an electronic file shall be compatible with Microsoft Word™ and Excel™, and shall be submitted on a compact disk, or in other file formats and devices approved by the Department.

The guidance below does not necessarily include all sections that may be necessary to complete each type of report listed. The Respondents or the Department may determine that additional sections are needed to address site-specific issues or information. Additionally, the sequence in which Sections are presented and specific wording are not compulsory. However, all reports submitted by the Respondents shall follow the general approach and limitations for data presentation described in this section.

X.B. INVESTIGATION WORK PLAN

The Respondents shall prepare an Investigation Work Plan using the format set forth below as guidance. Work plans should be based on the data quality objective process, including discussion on, but not limited to, problem definition, development of a conceptual site model, data need assessment, and decision criteria. All research, locations, depths and methods of exploration, field procedures, analytical analyses, data collection methods, and schedules shall be included in each work plan. In general, interpretation of data acquired during previous investigations should be presented only in the background sections of the work plans. The other text sections of the work plans should be reserved for presentation of anticipated site-specific activities and procedures relevant to the project. Major requirements for the general work plan

are:

1. Title Page and Signature Block (for the name, title, and organization of the preparer and the responsible DOE or Sandia representative);
2. Executive Summary;
3. Table of Contents;
4. Introduction;
5. Background Information;
6. Site Conditions;
7. Scope of Activities;
8. Investigation Methods;
9. Monitoring and Sampling Program;
10. Schedule;
11. Tables;
12. Figures;
13. Appendices (e.g., Investigation-Derived Waste Management Plan).

X.C. INVESTIGATION REPORT

The Respondents shall prepare an Investigation Report using the format set forth below as guidance. This section describes the minimum requirements for reporting. All data collected during investigation of a SWMU or AOC shall be included in the investigation report. In general, interpretation of data should be presented only in the background, conclusions and recommendations sections of the reports. The other text sections of the reports should be reserved for presentation of facts and data without interpretation or qualifications. Major requirements for the general report are:

1. Title Page and Signature Block (for the name, title and organization of the preparer and the responsible DOE and/or Sandia representative);
2. Executive Summary (Abstract);

3. Table of Contents;
4. Introduction;
5. Background Information;
6. Scope of Activities;
7. Field Investigation Result – Including, as applicable, but not limited to: surface conditions; subsurface conditions; monitoring well construction, boring or excavation abandonment; groundwater conditions; materials testing results; and pilot testing results;
8. Regulatory Criteria;
9. Site Contamination – Including, as applicable, but not limited to: soil, rock and sediment sampling analytical results; soil, rock and sediment sample field screening results; groundwater sampling results; surface water sampling results; and subsurface vapor sampling results; and conclusions;
10. Recommendations;
11. Tables;
12. Figures - All figures showing maps shall include an accurate bar scale and a north arrow; other types of figures shall include a bar scale, if appropriate. An explanation shall be provided on each figure for all abbreviations, symbols, acronyms, and qualifiers;
13. Appendices - Including, as appropriate, field methods, boring/test pit logs and well construction diagrams, chemical analytical reports, and other appendices as required by the Department.

X.D. PERIODIC MONITORING REPORT

The Respondents shall prepare a Period Monitoring Report using the format set forth below as guidance. The reports shall present the results of periodic or routine groundwater and remediation system monitoring at the Facility. The following sections provide a general outline as guidance for monitoring reports. All data collected during each monitoring and sampling event in the reporting period shall be included in the reports. In general, interpretation of data should be presented only in the background, conclusions and recommendations sections of the reports. The other text sections of the reports should be reserved for presentation of facts and data without interpretation or qualifications.

1. Title Page and Signature Block (for the name, title and organization of the preparer and the responsible DOE and Sandia representative);

2. Executive Summary (Abstract);
3. Table of Contents;
4. Introduction;
5. Scope of Activities;
6. Regulatory Criteria;
7. Monitoring Results;
8. Conclusions;
9. Tables;
10. Figures;
11. Appendices.

X.E. RISK ASSESSMENT REPORT

The Respondents shall prepare a Risk Assessment Report using the format set forth below as guidance. Risk Assessment Reports may be appended to or combined with CME or Investigation Reports to create a single document for a given SWMU or AOC. This section provides a general outline for risk assessments and also lists the minimum requirements for describing risk assessment elements. In general, interpretation of data should be presented only in the background, conceptual site and risk exposure models, conclusions, and recommendations sections of the reports. The other text sections of the Risk Assessment Report should be reserved for presentation of sampling results from all investigations; the conceptual and mathematical elements of the risk assessment, and presentations of toxicity information and screening values used in the risk assessment. Human health and ecological risk assessments should be presented in separate sections, but the general risk assessment outline applicable to both sections is provided below as guidance. The conceptual site model shall be discussed in all risk assessments.

1. Title Page and Signature Block (for the name, title and organization of the preparer and the responsible DOE and Sandia representative);
2. Executive Summary (Abstract);
3. Table of Contents;

4. Introduction;
5. Background Information -- Including site description and sampling results;
6. Conceptual Site and Risk Exposure Models;
7. Risk Screening Levels -- A section shall present the screening values used for each Contaminant for comparison to all human health and ecological risk screening levels. The requirements of Section VI.I.1.b of this Consent Order shall also be met

and/or

Risk Assessment Results -- including uncertainty analysis;
8. Conclusions and Recommendations;
9. Tables;
10. Figures;
11. Appendices.

A section in the report shall summarize the analytical results of sampling at the SWMU or AOC. It shall include a description of the history of releases of Contaminants, the known and possible sources of contamination, and the vertical and lateral extent of contamination present in each medium. Sources that are no longer considered to be ongoing but represent the point of origination for Contaminants transported to other locations shall be included. This section shall reference any pertinent figures, data summary tables, and references in other reports. References to other reports shall include page, table numbers, and figure numbers for referenced information. Summaries of data shall include for each Contaminant: the maximum value detected, the detection limit, the 95th percent upper confidence level (UCL) of the mean (if applicable to the data set), and indicate the statistical method used to calculate the 95th percent UCL of the mean. Background values used for comparison to inorganic constituents and discussion of how "non-detect" analytical results were handled in the averaging of data shall also be included.

Another section in the report shall present the conceptual site and risk exposure models. It shall include information on the expected fate and transport of Contaminants detected at the SWMU or AOC. The discussion of fate and transport shall address potential migration of each Contaminant in each medium, potential breakdown products and their migration, and anticipated pathways of exposure for human or ecological receptors. Diagrammatic representations of the conceptual site and risk exposure models shall appear in the figures section of the document. For human health risk assessments, the conceptual site and risk exposure models shall include the current and foreseeable future land use (such as industrial or recreational) for all risk

assessments.

All values for exposure parameters and the source of those values shall be included in table format and presented in the Tables section of the document. Conceptual site and risk exposure models presented for ecological risk assessments shall identify assessment endpoints and measurement receptors for the SWMU or AOC. The discussion of the models shall explain how the measurement receptors are protective of the ecological receptors.

If risk screening is utilized, a section in the report shall present the actual screening values used for each Contaminant for comparison to all human health and ecological risk screening levels. Other regulatory levels applicable to screening the site, such as drinking water MCLs or WQCC standards, shall also be included in this section.

For risk assessments a section of the report shall present risk values, hazard quotients (HQ), and HIs for human health under projected future land use and residential scenarios and any site-specific scenarios. A similar section shall also present for each Contaminant the HQ for each ecological receptor.

Finally, a section shall also be included in the report that contains a discussion of qualitative, semi-quantitative, and quantitative uncertainty in the risk assessment and provides estimates of the potential impact of the various uncertainties. Appendices may include the results of statistical analyses of data sets and comparisons of data, full sets of results of all sampling investigations at the site, or other data as appropriate.

X.F. CORRECTIVE MEASURES EVALUATION REPORT

The Respondents shall prepare a CME Report using the format set forth below as guidance. Investigation summaries, site condition descriptions, corrective action goals, corrective action options, selection criteria, and schedules shall be included in the CME Report. In general, interpretation of historical investigation data should be presented only in the background sections. At a minimum, detections of Contaminants encountered during previous site investigations shall be presented in table format with an accompanying site plan showing sample locations. The other text sections of the CME Report should be reserved for presentation of corrective action-related information regarding anticipated or potential site-specific corrective action options and methods relevant to the project. Elements and suggested format for CME reports are as follows.

1. Title Page and Signature Block (for the name, title and organization of the preparer and the responsible DOE and Sandia representative);
2. Executive Summary (Abstract);
3. Table of Contents;

4. Introduction;
5. Background Information;
6. Site Conditions -- Including, as appropriate, surface, subsurface, and groundwater conditions;
7. Potential Receptors -- Including sources, pathways, and receptors;
8. Regulatory Criteria;
9. Identification of Corrective Measures Options;
10. Evaluation of Corrective Measures Options -- Including the required information in Section VII.C.3.a-b(i-v) ;
11. Selection of Preferred Corrective Measure;
12. Design Criteria to Meet Cleanup Objectives;
13. Schedule;
14. Tables;
15. Figures;
16. Appendices.

XI. COMPLIANCE SCHEDULE TABLES

The Respondents shall meet the specified compliance schedules for all SWMUs and AOCs included in this Consent Order. Table XI-1 presents the schedules for groundwater monitoring. Table XI-2, which is the schedule subject to stipulated penalties pursuant to Section III.G.1, summarizes in chronological order by due date the reports that shall be submitted. Table XI-3 is a cross-reference to Table XI-2 and identifies in detail the appropriate reports that are required by this Consent Order for each SWMU or AOC and their due dates.

Any report required by this Consent Order may contain an associated Risk Assessment Report and a request for a Certificate of Completion. The Department expects to determine within 60 days of receipt of an appropriate report whether to grant a Certificate of Completion for the subject SWMU or AOC.

Reports submitted to the Department by the Respondents on or before September 30, 2003 are listed in Table XI-4. The Department expects to determine whether to issue a Certificate of Completion for each SWMU or AOC listed in Table XI-4 by September 30, 2004. If the Department decides not to issue a Certificate of Completion and makes a decision to require Respondents to perform additional work, any such additional work shall be performed in accordance with the terms of this Consent Order.

Site	*Minimum Sampling Frequency
Mixed Waste Landfill	New wells: MW5 and MW6 – Quarterly for eight quarters, then annually. Other wells: Annually
Facility-Wide (Perchlorate Screening)	New Wells and Existing Wells (NwTA3-MW2, MRN-3D, MRN-2, MWL-BW1, MWL-MW1, CYN-MW1D, and CYN-MW5); Quarterly for four quarters, unless perchlorate is detected. If perchlorate is detected, the Respondents will continue monitoring at a frequency negotiated with the Department.
Technical Area V Groundwater	Quarterly
Tijeras Arroyo Groundwater area	Six events – after TAG HPT Characterization Plans approved by the Department and starting no later than the first quarter of Calendar Year 2004 (followed by CME)
Burn Site Groundwater	New Wells: Quarterly for eight quarters, then semi-annually.

*The Department may increase the sampling frequency and require additional analytical parameters if necessary to protect human health and the environment. Respondents may request a change in monitoring or termination of monitoring on a case-by-case basis. Such request may be approved by the Department in writing without formal modification of the Consent Order.

Table XI-2. Summary Schedule of Deliverables (sum Chronological Order (Calendar Year))

(Substitutions between Drains & Septic Systems sites -- those marked with an asterisk (*) -- may be made with written notification only; see Section IV.E)

Deliverable/ Report Number (Crosswalk to Table XI-3)	SWMU/AOC Description	Deliverable	Due Date	Expected Review Time
			<i>Fourth Quarter 2003</i>	
1	Drains & Septic Systems	Appropriate Report ² (8 sites*)	12/31/2003	See Footnote #1
2	Misc. Sites	Appropriate Report ² (3 sites)	12/31/2003	See Footnote #1
			<i>First Quarter 2004</i>	
3	Drains & Septic Systems	Appropriate Report ² (6 sites*)	3/31/2004	See Footnote #1
4	Misc. Sites	Appropriate Report ²	3/31/2004	Deliverable already Submitted
			<i>Second Quarter 2004</i>	
5	Drains & Septic Systems	Appropriate Report ² (9 sites*)	6/30/2004	See Footnote #1
			<i>Third Quarter 2004</i>	
6	Drains & Septic Systems	Appropriate Report ² (6 sites*)	9/30/2004	See Footnote #1
7	Misc. Sites	Appropriate Report ²	9/30/2004	Deliverable already Submitted
8	Landfills	Mixed Waste Landfill CMI Plan	9/30/2004	See Footnote #1
			<i>Fourth Quarter 2004</i>	
9	Drains & Septic Systems	Appropriate Report ² (13 sites*)	12/31/2004	See Footnote #1
10	Misc. Sites	Appropriate Report ² (2 sites)	12/31/2004	See Footnote #1

		Calendar Year 2005	
		First Quarter 2005	
11	Drains & Septic Systems	Appropriate Report ² (5 sites*)	3/31/2005 See Footnote #1
12	Misc. Sites	Appropriate Report ² (1 site)	3/31/2005 See Footnote #1
		Second Quarter 2005	
13	Misc. Sites	Appropriate Report ² (2 sites)	4/26/2005 See Footnote #1
14	Drains & Septic Systems	Appropriate Report ² (5 sites*)	6/30/2005 See Footnote #1
15	Misc. Sites	Appropriate Report ² (1 site)	6/30/2005 See Footnote #1
		Third Quarter 2005	
16	Drains & Septic Systems	Appropriate Report ² (4 sites*)	9/30/2005 See Footnote #1
17	Misc. Sites	Appropriate Report ² (3 sites)	9/30/2005 See Footnote #1
18	Groundwater	CME Reports (3 locations)	9/30/2005 See Footnote #1
		Fourth Quarter 2005	
19	Drains & Septic Systems	Appropriate Report ² (5 sites*)	12/31/2005 See Footnote #1
		Calendar Year 2006	
		First Quarter 2006	
20	Landfills	Mixed Waste Landfill CMI Report	1/20/2006 See Footnote #1
21	Misc. Sites	Appropriate Report ²	3/31/2006 Deliverable already Submitted

¹ Expected Department review times -- 60 days or less upon receipt. See Section III.M.2.

² Appropriate Report includes Investigation Reports, CME, or CMI Reports as provided in Table XI-3 and may include a Request for Certificate of Completion pursuant to Section VII.D.6. Certificate of Completion.

Table XI-3 - Detailed Description of Appropriate Report by Deliverable/Report Number

Deliverable/ Report #	Grouping of SWMU/AOC	Site #	SWMU or AOC Description	Report	Due Date
1	Drains & Septic Systems ^{1,2}	1	Bldg. 6620 Internal Sump (TA-III)	Investigation Report	12/31/2003
		2	Bldg. 6501 East Septic System (TA-III) [Active Site ³]	Investigation Report	12/31/2003
		3	Bldg. 6501 West Septic System (TA-III)	Investigation Report	12/31/2003
		4	Bldg. 6631 Septic System (TA-III)	Investigation Report	12/31/2003
		5	Bldg. 6530 Septic System (TA-III)	Investigation Report	12/31/2003
		6	Bldg. 6584 West Septic System (TA-III)	Investigation Report	12/31/2003
		7	Bldg. 885 Septic System (TA-I)	Investigation Report	12/31/2003
		8	Bldg. 6596 Drywell (TA-V)	Investigation Report	12/31/2003
		9	Bldg. 6590 Reactor Sump Drywell (TA-V)	Investigation Report	12/31/2003
2	Misc. Sites	1	Storm Drain System	Investigation Report	12/31/2003
		2	Septic Tank Piping for POTW	Investigation Report	12/31/2003
		3	Old Acid Waste Line	Investigation Report	3/31/2004
3	Drains & Septic Systems ²	1	Bldg. 6741 Septic System (TA-III)	Investigation Report	3/31/2004
		2	Bldg. 6730 Septic System (TA-III)	Investigation Report	3/31/2004
		3	Former MO 231-234 Septic System (TA-V)	Investigation Report	3/31/2004
		4	MO-146, MO-235, and T-40 Septic System (TA-III)	Investigation Report	3/31/2004
		5	Bldg. 6584 North Septic System (TA-III)	Investigation Report	3/31/2004
		6	Bldg. 6536 Drain System (TA-III)	Investigation Report	3/31/2004
4	Misc. Sites	1	Bunker 904 Outfall	Investigation Report ¹	3/31/2004
		2	Storm Drain System Outfall (for TA-II)	Investigation Report ¹	3/31/2004
		3	Experimental Test Pit	Investigation Report ¹	3/31/2004

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5	Drains & Septic Systems ²	1	48	Bldg. 904 Septic System and HE Drain System (TA-II)	Investigation Report	6/30/2004				
		2	135	Bldg. 906 Drain System (TA-II)	Investigation Report	6/30/2004				
		3	136	Bldg. 907 Septic System and HE Drain System (TA-II)	Investigation Report	6/30/2004				
		4	159	Bldg. 935 Septic System and Drywell (TA-II)	Investigation Report	6/30/2004				
		5	165	Bldg. 901 Septic System (TA-II)	Investigation Report	6/30/2004				
		6	166	Bldg. 919 Septic System and Seepage Pit (TA-II)	Investigation Report	6/30/2004				
		7	167	Bldg. 940 Septic System and Seepage Pits (TA-II)	Investigation Report	6/30/2004				
		8	1086	Bldg. 6523 Septic System (TA-III)	Investigation Report	6/30/2004				
		9	1024	MO 242-245 Septic System (TA-III)	Investigation Report	6/30/2004				
6	Drains & Septic Systems ²	1	1010	Bldg. 6536 Septic System and Seepage Pit (TA-III)	Investigation Report	9/30/2004				
		2	1028	Bldg. 6560 Septic System and Seepage Pit (TA-III)	Investigation Report	9/30/2004				
		3	1079	Bldg. 6643 Septic System (TA-III)	Investigation Report	9/30/2004				
		4	1083	Bldg. 6570 Septic System (TA-III)	Investigation Report	9/30/2004				
		5	1108	Bldg. 6531 Seepage Pits (TA-III)	Investigation Report	9/30/2004				
		6	1120	Bldg. 6643 Drywell (TA-III)	Investigation Report	9/30/2004				
		1	52	LWDS Holding Tank	Investigation Report ¹	9/30/2004				
		2	87	Bldg. 9990 Firing Site	Investigation Report ¹	9/30/2004				
		1	76	Mixed Waste Landfill (TA-III)	Corrective Measures Implementation Plan	9/30/2004				
7	Misc. Sites	1	276	Former Bldg. 829X Silver Recovery Sump (TA-I)	Investigation Report	12/31/2004				
		2	1031	Former Bldgs. 6589 and 6600 Septic System (TA-III)	Investigation Report	12/31/2004				
		3	1034	Bldg. 6710 Septic System (TA-III)	Investigation Report	12/31/2004				
		4	1035	Bldg. 6715 Septic System (TA-III)	Investigation Report	12/31/2004				
		5	1036	Bldg. 6922 Septic System (TA-III)	Investigation Report	12/31/2004				
8	Landfills	1	76	Mixed Waste Landfill (TA-III)	Corrective Measures Implementation Plan	9/30/2004				
		2	87	Bldg. 9990 Firing Site	Investigation Report ¹	9/30/2004				
9	Drains & Septic Systems ²	1	276	Former Bldg. 829X Silver Recovery Sump (TA-I)	Investigation Report	12/31/2004				
		2	1031	Former Bldgs. 6589 and 6600 Septic System (TA-III)	Investigation Report	12/31/2004				
		3	1034	Bldg. 6710 Septic System (TA-III)	Investigation Report	12/31/2004				
		4	1035	Bldg. 6715 Septic System (TA-III)	Investigation Report	12/31/2004				
		5	1036	Bldg. 6922 Septic System (TA-III)	Investigation Report	12/31/2004				

10	Misc. Sites	6	1078	Bldg. 6640 Septic System (TA-III)	Investigation Report	12/31/2004
		7	1080	Bldg. 6644 Septic System (TA-III)	Investigation Report	12/31/2004
		8	1084	Bldg. 6505 Septic System (TA-III)	Investigation Report	12/31/2004
		9	1087	Bldg. 6743 Seepage Pit (TA-III)	Investigation Report	12/31/2004
		10	1098	TA-V Plenum Rooms Drywell (TA-V)	Investigation Report	12/31/2004
		11	1102	Former Bldg. 889 Septic System (TA-I)	Investigation Report	12/31/2004
		12	1104	Bldg. 6595 Seepage Pit (TA-V)	Investigation Report	12/31/2004
		13	1113	Bldg. 6597 Drywell (TA-V)	Investigation Report	12/31/2004
		1	45	Liquid Discharge (behind TA-IV)	Investigation Report	12/31/2004
		2	46	Old Acid Waste Line Outfall	Investigation Report	12/31/2004
		1	137	Bldg. 6540/6542 Septic System (TA-III)	Investigation Report	3/31/2005
		2	1052	Bldg. 803 Seepage Pit (TA-I)	Investigation Report	3/31/2005
		11	Drains & Septic Systems ²	3	1081	Bldg. 6650 Septic System (TA-III)
4	1090			Bldg. 6721 Septic System (TA-III)	Investigation Report	3/31/2005
5	1092			MO 228-230 Septic System (TA-III)	Investigation Report	3/31/2005
6	1004			Bldg. 6969 Septic System (Robotic Vehicle Range) [Active Site ³]	Investigation Report	3/31/2005
1	28-2			Mine Shafts	Investigation Report	3/31/2005
1	8			Open Dump (Coyote Canyon Blast Area)	Investigation Report	4/26/2005
12	Misc. Sites	2	58	Coyote Canyon Blast Area	Investigation Report	4/26/2005
		1	49	Bldg. 9820 Drains (Lurance Canyon)	Investigation Report ¹	6/30/2005
13	Misc. Sites	2	116	Bldg. 9990 Septic System (Coyote Test Field)	Investigation Report ¹	6/30/2005
		3	138	Bldg. 6630 Septic System (TA-III)	Investigation Report	6/30/2005
		4	146	Bldg. 9920 Drain System (Coyote Test Field)	Investigation Report	6/30/2005
		5	148	Bldg. 9927 Septic System (Coyote Test Field)	Investigation Report	6/30/2005
		6	149	Bldg. 9930 Septic System (Coyote Test Field)	Investigation Report ¹	6/30/2005
		14	Drains & Septic Systems ²			

15	Misc. Sites	7	152	Bldg. 9950 Septic System (Coyote Test Field)	Investigation Report	6/30/2005
		8	154	Bldg. 9960 Septic System and Seepage Pits (Coyote Test Field)	Investigation Report	6/30/2005
16	Drains & Septic Systems ²	1	35	Vibration Facility Oil Spill (TA-III)	Investigation Report ¹	6/30/2005
		2	91	Lead Firing Site (Thunder Range)	Investigation Report	6/30/2005
		1	101	Bldg. 9926/9926A Septic System and Seepage Pit (Coyote Test Field)	Investigation Report	9/30/2005
		2	153	Bldg. 9956 Septic Systems (Coyote Test Field)	Investigation Report	9/30/2005
		3	161	Bldg. 6636 Septic System (TA-III)	Investigation Report ¹	9/30/2005
		4	1095	Bldg. 9938 Seepage Pit (Coyote Test Field)	Investigation Report	9/30/2005
		5	1117	Bldg. 9982 Drywell (Solar Tower Complex)	Investigation Report	9/30/2005
		6	1094	Live Fire Range East Septic System (Lurance Canyon) [Active Site ³]	Investigation Report	9/30/2005
		1	78	Gas Cylinder Disposal Pit	Investigation Report	9/30/2005
		2	196	Bldg. 6597 Cistern (TA-5)	Investigation Report	9/30/2005
17	Misc. Sites	3	68	Old Burn Site	Investigation Report	9/30/2005
		1	TAG	Tijeras Arroyo Groundwater area	Corrective Measures Evaluation Report	9/30/2005
		2	TA-V	TA-V Groundwater	Corrective Measures Evaluation Report	9/30/2005
18	Groundwater	3	Burn Site	Burn Site Groundwater	Corrective Measures Evaluation Report	9/30/2005
		1	140	Bldg. 9965 Septic System and Drywell (Thunder Range)	Investigation Report	12/31/2005
		2	147	Bldg. 9925 Septic Systems (Coyote Test Field)	Investigation Report	12/31/2005
		3	150	Bldgs. 9939/9939A Septic System and Drainfield (Coyote Test Field)	Investigation Report ¹	12/31/2005
		4	1114	Bldg. 9978 Drywell (Coyote Test Field)	Investigation Report	12/31/2005
		5	1115	Former Offices Septic System (Solar Tower Complex)	Investigation Report	12/31/2005
19	Drains & Septic Systems ²	6	1116	Bldg. 9981A Seepage Pit (Solar Tower Complex)	Investigation Report	12/31/2005
		1	140	Bldg. 9965 Septic System and Drywell (Thunder Range)	Investigation Report	12/31/2005
		2	147	Bldg. 9925 Septic Systems (Coyote Test Field)	Investigation Report	12/31/2005
		3	150	Bldgs. 9939/9939A Septic System and Drainfield (Coyote Test Field)	Investigation Report ¹	12/31/2005

SNL Consent Order
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20	Landfills	1	76	Mixed Waste Landfill (TA-III)	Corrective Measures Implementation Report	1/20/2006
21	Misc. Sites	1	4	LWDS Surface Impoundments	Investigation Report ¹	3/31/2006

1. Deliverable for SWMU/AOC has been submitted to the Department.
2. Substitutions between Drains and Septic Systems may be made with written notification only; see Section IV.E.
3. Active DSS Site - Status of characterization will be reported in an Investigation Report, but SWMU/AOC will also be subject to requirements in the Facility's RCRA Permit.

Table X1-A: Reports Submitted On or Before September 30, 2003

SWMU or AOC Description	Report	Due Date	Date Delivered to NMED
1001 Bldg. 898 Septic System (TA-I)	Investigation Report	September 30, 2003	9/25/03
1003 Former Bldg. 915/922 Septic System (TA-II)	Investigation Report	June 30, 2003	7/10/03
1008 Bldg. 6750 Septic System (TA-III)	Investigation Report	June 30, 2003	7/10/03
1014 Former T-12, T-42, and T-43 Septic System (TA-V)	Investigation Report	September 30, 2003	9/25/03
1030 Bldg. 6587 Septic System (TA-III)	Investigation Report	September 30, 2003	9/25/03
1032 Bldg. 6610 Septic System (TA-III)	Investigation Report	September 30, 2003	7/10/03
1072 Bldg. T-52 and Former Bldg. 6500 Septic System (TA-V)	Investigation Report	June 30, 2003	7/10/03
1073 Bldg. 6580 Seepage Pit (TA-V)	Investigation Report	September 30, 2003	9/25/03
1077 Bldg. 6920 Septic System (TA-III)	Investigation Report	September 30, 2003	9/25/03
1082 Bldg. 6620 Septic System (TA-III)	Investigation Report	June 30, 2003	7/10/03
1089 Bldg. 6734 Seepage Pit (TA-III)	Investigation Report	September 30, 2003	9/25/03
1091 Bldg. 6720 Septic System (TA-III)	Investigation Report	June 30, 2003	7/10/03
1096 Bldg. 6583 Septic System (TA-III)	Investigation Report	September 30, 2003	9/25/03
1111 Bldg. 6720 Drywell (TA-III)	Investigation Report	² N/A	9/2001
30 PCB Spill (Reclamation Yard)	Investigation Report	² N/A	7/2001
33 Motor Pool Oil Spill	Investigation Report	² N/A	9/5/00
98 Bldg. 863 (TCA, Photochemical Releases: Silver Catch Boxes)	Investigation Report	December 31, 2002	9/24/02
190 Steam Plant Tank Farm	Investigation Report	March 31, 2003	3/10/03
1 Radioactive Waste Landfill	Investigation Report	² N/A	12/2002
2 Classified Waste Landfill	Investigation Report	² N/A	3/10/03
3 Chemical Disposal Pit	Combined with SWMU 1		

114	Explosive Burn Pit	Investigation Report	December 31, 2002	1/31/03
18	Concrete Pad	Investigation Report	² N/A	11/6/00
26	Burial Site (West of TA-3)	Investigation Report	December 31, 2003	8/14/01
83	Long Sled Track	¹ Active Site	² N/A	³ TBD
84	Gun Facilities	¹ Active Site	² N/A	³ TBD
107	Explosive Test Area (South-East TA-III)	Investigation Report	December 31, 2002	9/28/01
240	Short Sled Track	¹ Active Site	² N/A	³ TBD
241	Storage Yard	Investigation Report	² N/A	6/1996
5	LWDS Drainfield (TA-V)	Investigation Report	December 31, 2002	12/10/02
230	Storm Drain System Outfall (for TA-IV)	Investigation Report	December 31, 2002	1/31/03
231	Storm Drain System Outfall (for TA-IV)	Investigation Report	December 31, 2002	1/31/03
232	Storm Drain System Outfall	Investigation Report	December 31, 2002	1/31/03
233	Storm Drain System Outfall	Investigation Report	December 31, 2002	1/31/03
234	Storm Drain System Outfall	Investigation Report	December 31, 2002	1/22/03
66	Boxcar Site	Investigation Report	December 31, 2002	10/9/01
94-B	Debris/Soil Mound Area	Investigation Report	December 31, 2002	10/9/01
94-F	LAARC Discharge Pit	Investigation Report	December 31, 2002	9/5/00
9	Burial Site/Open Dump (Schoolhouse Mesa)	Investigation Report	² N/A	6/2001
Bldg 828	Mechanical Test Laboratory (TA-I)	Investigation Report	² N/A	
TNT Site	High Explosive Detonation Site	Investigation Report	March 31, 2003	9/24/02
94H Spill	Fuel Spill at 94H	Investigation Report	March 31, 2003	9/24/02

1. Active Site - SWMU/AOC will also be addressed in the Facility's RCRA Permit.
2. N/A - Due date not previously established.
3. TBD - submittal due date to be determined by RCRA Permit condition.

SNL Consent Order
April 29, 2004

The undersigned persons executing this Consent Order represent that they have all the requisite authority to bind the Party that they represent to the terms of this Consent Order, and further agree that this representation of authority as to each such Party shall be legally sufficient evidence of actual or apparent authority to bind each of them to all of the terms and conditions of this Consent Order.

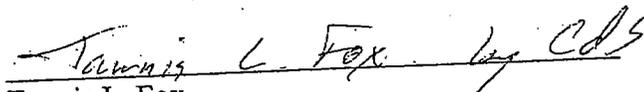
The foregoing is hereby AGREED and CONSENTED TO by the Parties:

NEW MEXICO ENVIRONMENT DEPARTMENT



Ron Curry
Secretary

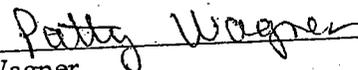
4/29/04
Date



Tannis L. Fox
Deputy General Counsel
Charles de Saillan
Assistant General Counsel

4-29-04
Date

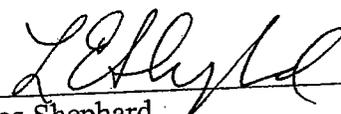
UNITED STATES DEPARTMENT OF ENERGY

MAA 

Patty Wagner
Manager, Sandia Site Office

4-28-04
Date

SANDIA CORPORATION

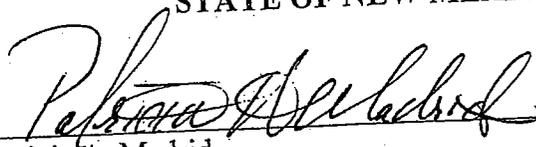


Les Shephard
Vice President, Energy, Information and Infrastructure Surety

April 28, 2004
Date

Section III of Consent Order approved by:

STATE OF NEW MEXICO ATTORNEY GENERAL



Patricia A. Madrid
Attorney General
Stephen R. Farris
Assistant Attorney General

Apr. 22 '04
Date

APPENDIX B
Detailed List of SNL/NM SWMUs Requiring Investigation
Under the HSWA Module of SNL's RCRA Permit

Detailed List of SNL/NM SWMUs Requiring Investigation Under the
HSWA Module of SNL's RCRA Permit

Site #	Site Name	Operable Unit
Solid Waste Management Units (SWMUs)		
1	Radioactive Waste Landfill	1303
2	Classified Waste Landfill	1303
3	Chemical Disposal Pits	1303
4	LWDS Surface Impoundments	1307
5	LWDS Drainfield	1307
6	Gas Cylinder Disposal Pit (Bldg. 9966)	1335
7	Gas Cylinder Disposal Pit	1309
8	Open Dump (Features 8Y and 58B) - Phase 1	1332
9	Burial Site: Open Dump	1334
10	Burial Mounds (N of Pendulum Site)	1333
11	Explosive Burial Mounds	1334
13	Oil Surface Impoundment	1333
14	Burial Site (Bldg. 9920)	1335
15	Trash Pits (Frustration Site)	1332
16	Open Dumps	1309
18	Concrete Pad	1306
19	TRUPAK Boneyard Storage Area	1332
20	Schoolhouse Mesa Burn Site	1334
21	Metal Scrap (Coyote Springs)	1334
22	Storage Burn (West of DEER)	1334
23	Disposal Trenches	1309
25	Burial Site (South of TA-I)	1302
26	Burial Site	1306
27	Bldg 9820 Animal Disposal Pit	1332
30	Reclamation Yard	1302
31	Transformer Oil Spill	1306
32	Steam Plant Oil Spill (TA-I)	1302
33	Motor Pool Oil Spill	1302
34	Centrifuge Oil Spill	1306
35	Vibration Facility Oil Spill	1306
36	HERMES Oil Spill	1306
37	PROTO Oil Spill	1306
38	Oil Spills (BLDG 9920)	1335
39	Oil Spill - Solar Facility	1335
40	Oil Spill	1309
41	Building 838 Mercury Release (TA-I)	1302
42	Building 870 Water Treatment Facility (TA-I)	1302
43	Radioactive Materials Storage Yard	1303
44	Decontamination Site and	1303
45	Liquid Discharge	1309
46	Old Acid Waste Line Outfall	1309
47	Unmanned Seismic Observatory	1334
48	Bldg. 904 Septic System	1303

Detailed List of SNL/NM SWMUs Requiring Investigation Under the
HSWA Module of SNL's RCRA Permit (Continued)

Site #	Site Name	Operable Unit
49	Bldg 9820 Drains	1295
50	Old Centrifuge Site	1309
51	Bldg 6924 Pad, Tank, and Pit	1306
52	LWDS Holding Tanks	1307
53	Bldg. 9923 Storage Igloo	1335
54	Pickax Site (Thunder Range)	1335
55	Red Towers Site (Thunder Range)	1335
56	Old Thunderwells (Thunder Range)	1335
58	Coyote Canyon Blast Area	1332
59	Pendulum Site	1333
60	Bunker Area	1333
62	Greystone Manor Site	1334
64	Gun Site (Madera Canyon)	1333
66	Boxcar Site	1332
67	Frustration Site	1332
68	Old Burn Site	1334
69	Old Borrow Pit	1334
70	Explosives Test Pit (Water Towers)	1334
71	Moonlight Shot Area	1334
72	Operation Beaver Site	1333
73	Hazardous Waste Repackaging/Storage (Building 895)	1302
74	Chemical Waste Landfill Closure Plan	1267
76	Mixed Waste Landfill	1289
77	Oil Surface Impoundment	1309
78	Gas Cylinder Disposal Pit	1306
82	Old Aerial Cable Site Scrap	1332
83	Long Sled Track (Active Site)	1306
84	Gun Facilities (Active Site)	1306
85	Firing Site (Bldg 9920)	1335
86	Firing Site (Bldg 9927)	1335
87	Building 9990 Firing Site	1332
90	Beryllium Firing Site (Thunder Range)	1335
91	Lead Firing Site (Thunder Range)	1335
92	Pressure Vessel Test Site	1333
96	TA-I Storm Drain System	1302
98	Building 863, TCA and Photochemical Releases (also was 185 until 11/93)	1302
100	Bldg 6620 Drain/Sump	1306
101	Explosive Contaminated Sumps, Drains (Bldg. 9926)	1295
102	Radioactive Disposal Area	1306
103	Scrap Yard	1335
104	PCB Spill, Computer Facility	1302
105	Mercury Spill @ Bldg 6536	1306
107	Explosives Test Area	1306
108	Firing Site (BLDG 9940)	1335

Detailed List of SNL/NM SWMUs Requiring Investigation Under the
 HSWA Module of SNL's RCRA Permit (Continued)

Site #	Site Name	Operable Unit
109	Firing Site (BLDG 9956)	1335
111	Bldg 6715 Sump/Drain	1306
112	Explosive Contaminated Sump	1335
113	Area II Firing Sites	1303
114	Explosive Burn Pit (Area II)	1303
115	Firing Site (BLDG 9030)	1335
116	Building 9990 Septic System	1295
117	Trenches (BLDG 9939)	1335
135	Bldg. 906 Septic System	1303
136	Bldg. 907 Septic System	1303
137	Bldg 6540/6542 Septic System	1295
138	Bldg 6630 Septic System	1295
139	Bldg. 9964 Septic System	1295
140	Bldg. 9965 Septic System (Thunder Range)	1295
141	Bldg. 9967 Septic System (Thunder Range)	1295
142	Bldg. 9970 Septic System	1295
143	Bldg. 9972 Septic System	1295
144	Bldg. 9980 Septic System	1295
145	Bldgs. 9981/9982 Septic System	1295
146	Bldg 9920 Drain System	1295
147	Bldg 9925 Septic Systems	1295
148	Bldg 9927 Septic System	1295
149	Bldg 9930 Septic System	1295
150	Bldg 9939/9939A Septic Systems	1295
151	Bldg 9940 Septic Systems	1295
152	Bldg 9950 Septic Systems	1295
153	Bldg 9956 Septic Systems	1295
154	Bldg 9960 Septic Systems	1295
155	Bldg 6597 25,000 Gallon Tank (TA-V)	Archival/1300
159	Bldg. 935 Septic System	1303
160	Bldg 9832 Septic Systems	1295
161	Bldg 6636 Septic Systems	1295
165	Bldg. 901 Septic System	1303
166	Bldg. 919 Septic System	1303
167	Bldg. 940 Septic System	1303
168	Bldg 901 UST (TA-II)	Archival/1300
169	Bldg 910 UST (TA-II)	Archival/1300
170	Bldg 911 UST (TA-II)	Archival/1300
171	Bldg 912 UST (TA-II)	Archival/1300
172	Bldg 888 UST (TA-I)	Archival/1300
173	Bldg 6525 UST (TA-III)	Archival/1300
174	Bldg 6581 UST (TA-IV)	Archival/1300
175	Bldg 6588 UST (TA-IV)	Archival/1300
176	Bldg 605 UST (TA-I)	Archival/1300

Detailed List of SNL/NM SWMUs Requiring Investigation Under the
 HSWA Module of SNL's RCRA Permit (Continued)

Site #	Site Name	Operable Unit
178	Bldg 6587 UST (TA-III)	Archival/1300
179	Bldg 7570 UST	Archival/1300
180	Bldg 6503 UST (TA-III)	Archival/1300
181	Bldg 6500 UST (TA-V)	Archival/1300
186	Building 859 TCE Disposal	1302
187	TA-I Sanitary Sewer Lines	1302
188	Bldg 6597 Aboveground Spill Containment	1306
190	Steam Plant Tank Farm	1302
191	Equus Red	1335
192	TA-I Waste Oil Tank	1302
193	Sabotage Test Area	1335
194	Gen. Purpose Heat Source Test Area	1335
195	Experimental Test Pit	1306
196	TA-V Cistern Bldg 6597	1306
211	Building 840 Former UST	1302
226	TA-I Former Acid Waste Line	1302
227	Bunker 904 Outfall	1309
229	Storm Drain System Outfall	1309
230	Storm Drain System Outfall	1309
231	Storm Drain System Outfall	1309
232	Storm Drain System Outfall	1309
233	Storm Drain System Outfall	1309
234	Storm Drain System Outfall	1309
235	Storm Drain System Outfall	1309
240	Short Sled Track (Active Site)	1306
241	TA-V Storage Yard	1306
275	TA-V Seepage Pits	1306
12A	Open Arroyo (Lurance Canyon)	1333
12B	Buried Debris in Graded Area	1333
17A-H	Scrap Yards/Open Dump	1335
228A	Centrifuge Dump Site	1309
228B	Centrifuge Dump Site	1309
28-1	Mine Shafts - 28A (IPABS)	1332
28-10	Mine 28J (IPABS)	1332
28-2	Mine 28B (IPABS)	1332
28-3	Mine 28C (IPABS)	1332
28-4	Mine 28D (IPABS)	1332
28-5	Mine 28E (IPABS)	1332
28-6	Mine 28F (IPABS)	1332
28-7	Mine 28G (IPABS)	1332
28-8	Mine 28H (IPABS)	1332
28-9	Mine 28I (IPABS)	1332
57A	Workman Site: Firing Site	1334
57B	Workman Site: Target Area	1334

Detailed List of SNL/NM SWMUs Requiring Investigation Under the
HWSA Module of SNL's RCRA Permit (Continued)

Site #	Site Name	Operable Unit
61A	Schoolhouse Mesa Test Site: Blast Area	1334
61B	Schoolhouse Mesa Test Site: Cratering Area	1334
61C	Schoolhouse Mesa: Schoolhouse Building	1334
63A	Balloon Test Area: PDSP Site	1333
63B	Balloon Test Area: Balloon/Helicopter Site	1333
65A	Small Debris Mound	1333
65B	Primary Detonation Area	1333
65C	Secondary Detonation Area	1333
65D	Near Field Dispersion Area	1333
65E	Far Field Dispersion Area	1333
6A	Gas Cylinder Disposal Pit	1335
81A	Catcher Box/Sled Track	1333
81B	Impact Pad	1333
81C	Former Burial Location	1333
81D	Northern Cable Area	1333
81E	Gun Impact Area	1333
81F	Scrap Yard	1333
88A	Firing Site: Ranch House	1334
88B	Firing Site: Instrumentation Pole	1334
89A-C	Shock Tube Site (Thunder Range)	1335
93A,B,C	Madera Canyon Rocket Launcher	1333
94A	Above Ground Tanks	1333
94B	Debris/Soil Mound	1333
94C	Bomb Burner Discharge Line	1333
94D	Bomb Burner Discharge Pit	1333
94E	Small Surface Impoundment	1333
94F	LAARC Discharge Pit	1333
94G	Scrap Yard	1333
Total SWMUs: 203		
Miscellaneous AOCs		
TNT	TNT Site	1335
94H	Fuel Spill at Open Pool Test Area, Lurance Canyon Burn Site	1333
277	New Firing Site East of Optical Range	1332
278 ^a	Building 828 (TA-I)	1302
Total AOCs: 4		
Drains & Septic Systems AOCs (DSS) ^b		
276	Former Bldg. 829X Silver Recovery Sump (TA-I)	1295
1001	Bldg. 898 Septic System (TA-I)	1295
1003	Former Bldg. 915/922 Septic System (TA-II)	1295
1004	Bldg. 6969 Septic System (Robotic Vehicle Range)	1295
1006	Bldg. 6741 Septic System (TA-III)	1295
1007	Bldg. 6730 Septic System (TA-III)	1295

Detailed List of SNL/NM SWMUs Requiring Investigation Under the
HWSA Module of SNL's RCRA Permit (Continued)

Site #	Site Name	Operable Unit
1008	Bldg. 6750 Septic System (TA-III)	1295
1009	Bldg. 6620 Internal Sump (TA-III)	1295
1010	Bldg. 6536 Septic System and Seepage Pit (TA-III)	1295
1014	Former T-12, T-42, and T-43 Septic System (TA-V)	1295
1015	Former MO 231-234 Septic System (TA-V)	1295
1020	MO-146, MO-235 and T-40 Septic System (TA-III)	1295
1024	MO 242-245 Septic System (TA-III)	1295
1025	Bldg. 6501East Septic System (TA-III)	1295
1026	Bldg. 6501West Septic System (TA-III)	1295
1027	Bldg. 6530 Septic System (TA-III)	1295
1028	Bldg. 6560 Septic System (TA-III)	1295
1029	Bldg. 6584 North Septic System (TA-III)	1295
1030	Bldg. 6587 Septic System (TA-III)	1295
1031	Bldgs. 6589 and 6600 Septic System (TA-III)	1295
1032	Bldg. 6610 Septic System (TA-III)	1295
1033	Bldg. 6631 Septic System (TA-III)	1295
1034	Bldg. 6710 Septic System (TA-III)	1295
1035	Bldg. 6715 Septic System (TA-III)	1295
1036	Bldg. 6922 Septic System (TA-III)	1295
1052	Bldg. 803 seepage pit (TA-I)	1295
1072	T-52 and Former Bldg. 6500 septic system (TA-V)	1295
1073	Bldg. 6580 seepage pit (TA-V)	1295
1077	Bldg. 6920 septic system (TA-III)	1295
1078	Bldg. 6640 septic system (TA-III)	1295
1079	Bldg. 6643 septic system (TA-III)	1295
1080	Bldg. 6644 septic system (TA-III)	1295
1081	Bldg. 6650 septic system (TA-III)	1295
1082	Bldg. 6620 septic system (TA-III)	1295
1083	Bldg. 6570 septic system (TA-III)	1295
1084	Bldg. 6505 septic system (TA-III)	1295
1086	Bldg. 6523 septic system (TA-III)	1295
1087	Bldg. 6743 seepage pit (TA-III)	1295
1089	Bldg. 6734 seepage pit (TA-III)	1295
1090	Bldg. 6721 septic system (TA-III)	1295
1091	Bldg. 6720 septic system (TA-III)	1295
1092	MOs 228-230 septic system (TA-III)	1295
1093	Bldg. 6584 West septic system (TA-III)	1295
1094	Live Fire Range East septic system (Lurance Canyon)	1295
1095	Bldg. 9938 seepage pit (Coyote Test Field)	1295
1096	Bldg. 6583 septic system (TA-V)	1295
1098	TA-V Plenum Rooms drywell (TA-V)	1295
1101	Bldg. 885 septic system (TA-I)	1295
1102	Former Bldg. 889 septic system (TA-I)	1295
1104	Bldg. 6595 seepage pit (TA-V)	1295

Detailed List of SNL/NM SWMUs Requiring Investigation Under the
HWSA Module of SNL's RCRA Permit (Concluded)

Site #	Site Name	Operable Unit
1105	Bldg. 6596 drywell (TA-V)	1295
1108	Bldg. 6531 Seepage Pits (TA-V)	1295
1110	Bldg. 6536 Drain System (TA-III)	1295
1111	Bldg. 6720 Drywell (TA-III)	1295
1112	Bldg. 6590 Reactor Sump Drywell, TA-V	1295
1113	Bldg. 6597 Drywell (TA-V)	1295
1114	Bldg. 9978 Drywell (Coyote Test Field)	1295
1115	Former Offices Septic System (Solar Tower Complex)	1295
1116	Bldg. 9981A Seepage Pit (Solar Tower Complex)	1295
1117	Bldg. 9982 Drywell (Solar Tower Complex)	1295
1120	Bldg. 6643 Drywell (Solar Tower Complex)	1295
Total DSS Sites: 61		
Total All Sites: 268		

Note: **Bold** indicates an active site.

^aSite 278, more commonly known as Building 828, was assigned after most activities had been completed..

^bThere may be some discrepancy in the DSS site names due to changes implemented to more accurately describe each site.

APPENDIX C
SNL/NM ER Site Characteristics for Stewardship June 2001

Table C-1. SNL/NM ER Site Characteristics for Stewardship

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
Engineered Units/Landfills—Criteria: Sites will have some type of engineering done as a remedy																
74	1267	Chemical Waste Landfill	III	1.90	5,421	505	VOCs, Metals	DOE Owned		Industrial	Yes			This site will be fenced.	Yes	This site is an RMMA.
76	1289	Mixed Waste Landfill	III	5.00	5,381	470	H-3	DOE Owned		Industrial	Yes			This site will be fenced, This site will also have long term ground water monitoring, this site will be capped.	Yes	This site is an RMMA.
107		Corrective Action Management Unit	III	22.73	5,407	475	DU, HE, Heavy metals	DOE Owned		Industrial	Yes			This site is fenced.	Yes	Containment cell.
Signed and Fenced Units—Criteria: 1. Physical hazard at the site; 2. Potential for future erosion; 3. Mineshafts																
1	1303	Radioactive Waste Landfill & Chemical Disposal Pits	II	0.30	5,421	520		DOE Owned		Industrial	Yes		VCM/Confirmatory Sampling/Risk-Based (September 1997)		None	This site is an RMMA.
28	1332	Mine Shafts, Mine & Spoil Pile 28-1		0.11	6,200	40–80	None	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational			Confirmatory Sampling/Risk-Based (August 1995)	Barriers to entry	Yes	This site is an RMMA.
28B	1332	Mine Shafts, 28-2, MS-B, 2 Shafts		0.04	6,570	40–80	Metals, HE	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational			Confirmatory Sampling/Risk-Based (August 1995)	Barriers to entry	Yes	This site is an RMMA.
28C	1332	Mine Shafts, 28-3, MS-C		0.02	6,342	40–80	None	USFS Withdrawal	None	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.
28D	1332	Mine Shafts, RW-50, 28-4, MS-D		0.30	6,273	40–80	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.
28E	1332	Mine Shafts, MS-E, 28-5		0.02	6,430	40–80	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.
28F	1332	Mine Shafts, MS-F, 28-6		0.02	6,213	40–80	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information	
28G	1332	Mine Shafts, MS-G, 28-7		0.02	6,238	40-80	None	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.	
28H	1332	Mine Shafts, 28-8, MS-H		0.02	6,243	40-80	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.	
28I	1332	Mine Shafts, 28-9, MS-I		0.02	7,310	40-80	None	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational		Approved NFA/Off HSWA Permit	Confirmatory Sampling/Risk-Based (August 1995)	None	None	This site is an RMMA.	
28J	1332	Mine Shafts, 28-10, MS-J		0.15	6,201	40-80	Metals	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational			Confirmatory Sampling/Risk-Based (August 1995)	Barriers to entry	Yes	This site is an RMMA.	
55	1335	Red Towers Site (Thunder Range)		13.26	5,405	300	DU	KAFB	None	Industrial		Approved 9/30/99			Soil Disturbance Restrictions	This site is an RMMA.	
87	1332	Bldg. 9990 Firing Site		97.46	6,140	350	Metals, DU, HE	USFS Withdrawal	40	Recreational					Soil Disturbance Restrictions	This site is an RMMA. This is also an active site.	
Signed Units—Criteria: 1. Risk-based NFA; 2. Residual contamination greater than background; incremental human health and ecological risk greater than residential land-use scenario, but less than industrial land-use scenario.																	
91	1335	Lead Firing Site (Thunder Range)		21.19	5,411	300	Pb	USAF Permitted to DOE	28	Industrial					Soil Disturbance Restrictions	This site is an RMMA.	
8	1332	Open Dump (Coyote Canyon Blast Area)		30.10	5,920	150	Metals, DU, HE, Asbestos, JP-4, Th, H-3	USAF Permitted to DOE	17A	Industrial							This site is an RMMA. Not remediated yet.
10	1333	Burial Mounds (Bunker Area North of Pendulum Site)		2.86	6,175	180	None	KAFB	None	Industrial		Approved 12/13/99	VCM/Confirmatory Sampling/Risk-Based (September 1998)	None	None	This site is an RMMA.	
11	1334	Explosive Burial Mounds		1.01	5,720	88	Metals, SVOCs	KAFB	None	Industrial		Approved 12/6/99	VCM/Confirmatory Sampling/Risk-Based (September 1997)	None	Soil Disturbance Restrictions		

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
12A	1333	Burial Site/Open Dump: Open Dump (Lurance Canyon)		0.26	6,358	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 12/7/99	Confirmatory Sampling (May 1997)	None	None	This site is an RMMA.
12B	1333	Burial Site/Open Dump: Buried Debris in Graded Area		0.35	6,340	130	Metals, HE, VOCs, SVOCs	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 12/13/99	VCM/Confirmatory Sampling/Risk-Based (September 1998)	None	None	This site is an RMMA.
16	1309	Open Dumps (Arroyo del Coyote)		25.36	5,540	500	None	KAFB	None	Recreational		Approved 3/27/2000		None	None	This site is an RMMA.
17A	1335	Scrap Yards/Open Dump (Thunder Range)		0.42	5,419	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17B	1335	Scrap Yard/Open Dump (Thunder Range)		2.11	5,409	167	DU, Pb	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17C	1335	Scrap Yard/Open Dump (Thunder Range)		8.04	5,502	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17D	1335	Scrap Yard/Open Dump (Thunder Range)		0.32	5,476	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17E	1335	Scrap Yard/Open Dump (Thunder Range)		0.06	5,417	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17F	1335	Scrap Yard/Open Dump (Thunder Range)		0.02	5,417	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17G	1335	Scrap Yard/Open Dump (Thunder Range)		0.67	5,467	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
17H	1335	Scrap Yard/Open Dump (Thunder Range)		1.86	5,427	167	None	USAF Permitted to DOE	28	Industrial		Approved 12/6/99		None	None	This site is an RMMA.
18	1306	Concrete Pad	III, V	1.13	5,387	470	DU, HE, PBCs, Metals (Cd, Cr, Zn, others)	DOE Owned		Industrial			VCM/Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site is an RMMA.
19	1332	TRUPAK Boneyard Storage Area (Northwest end of Old Aerial Cable)		1.85	6,150	400	Radionuclides, Metals	KAFB	None	Recreational	Yes	Approved 6/99	VCM/Confirmatory Sampling/Risk-Based (September 1997)	This site is fenced.	None	This site is an RMMA.
21	1334	Metal Scrap (Coyote Springs)		0.98	5,849	15	None	KAFB	None	Industrial		Approved 3/18/99 & 12/6/99	Administrative (August 1994); Confirmatory Sampling/Risk-Based (September 1997)	None	None	

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
27	1332	Bldg 9820 - Animal Disposal Pit (Coyote Springs)		0.57	6,040	160–200	Radionuclides, VOCs, SVOCs, Metals, Pesticides, Herbicides, HE	USAF Withdrawn from USFS Permitted to DOE	106A	Recreational		Approved 6/99	Confirmatory Sampling (August 1995); VCM/Confirmatory Sampling/Risk-Based (June 1998)	None	None	This site is an RMMA.
44A	1303	Decontamination Site & Uranium Calibration Pits	II	0.01	5,414	520	Radionuclides (especially U), Metals	DOE Owned		Industrial		Approved 12/6/99	Confirmatory Sampling (August 1994); VCM/Confirmatory Sampling/Risk-Based (September 1997)	None	None	This site is an RMMA.
44B	1303	Decontamination Site & Uranium Calibration Pits	II	0.03	5,415	520	Radionuclides (especially U), Metals	DOE Owned		Industrial		Approved 12/6/99	Confirmatory Sampling (August 1994); VCM/Confirmatory Sampling/Risk-Based (September 1997)	None	None	This site is an RMMA.
45	1309	Liquid Discharge	IV	0.78	5,406	350	Metals	DOE Owned		Industrial			Confirmatory Sampling/Risk-Based (September 1997)	None	Soil Disturbance Restrictions	
57A	1334	Workman Site: Firing Site		4.22	5,706	88	Metals, SVOCs, HE, PCBs	KAFB		Industrial		Approved 12/13/99	VCM/Confirmatory Sampling/Risk-Based (September 1998)	None	Soil Disturbance Restrictions	
57B	1334	Workman Site: Target Area		11.12	5,952	125–220	Metals	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational		Approved 12/6/99	VCM/Confirmatory Sampling/Risk-Based (September 1997)	None	Soil Disturbance Restrictions	
58	1332	Coyote Canyon Blast Area		254.60	5,940	150	HE, Metals, Organics, Argon, Radionuclides	KAFB	17A	Industrial, part Recreational						This site is an RMMA.
59	1333	Pendulum Site		0.20	6,129	180	None	KAFB	None	Industrial		Approved 6/99	Administrative (August 1995); Confirmatory Sampling (September 1997)	None	None	
61A	1334	Schoolhouse Mesa Test Site		33.93	5,876	95	Metals, HE, SVOCs, VOCs, Radionuclides	KAFB	None	Industrial		Approved (uncertain date)	VCM/Confirmatory Sampling/Risk-Based (September 1998)	None	Soil disturbance restrictions	This site is an RMMA.
61B	Archival	Schoolhouse Mesa Test Site: Cratering Area		41.80	5,716	50	This site was given back to KAFB in May 1995	KAFB	None	Industrial		Transferred to KAFB		None	None	

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
61C	1334	Schoolhouse Mesa Test Site: Schoolhouse Bldg		4.49	5,798	95	Metals, VOCs, SVOCs, HE	KAFB/USAF Permitted to DOE	27B	Industrial		Approved 9/30/99		None	Soil Disturbance Restrictions	This site is an RMMA.
63A	1333	Balloon Test Area: PDSP Site		4.08	6,165	150	None	USAF Withdrawn from USFS Permitted to DOE, DOE Withdrawn from USFS	42, 61	Recreational		Approved 12/6/99	Administrative (August 1995); Confirmatory Sampling (September 1997)	None	None	This site is an RMMA.
63B	1333	Balloon Test Area: Balloon/Helicopter Site		9.25	6,173	200	None	USAF Withdrawn from USFS Permitted to DOE, DOE Withdrawn from USFS	42, 61, 105	Recreational		Approved 6/99	Confirmatory Sampling (September 1997)	None	None	This site is an RMMA.
64	1333	Gun Site (Madera Canyon)		1.61	6,500	150	None	DOE Withdrawn from USFS	6A	Recreational		Approved 12/6/99	Administrative (August 1995); Confirmatory Sampling (September 1997)			
65A	1333	Lurance Canyon Explosive Test Site: Small Debris Mound		0.02	6,363	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 3/2000		None	None	This site is an RMMA.
65B	1333	Lurance Canyon Explosive Test Site: Primary Detonation Area		3.39	6,348	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 3/2000				This site is an RMMA.
65C	1333	Lurance Canyon Explosive Test Site: Secondary Detonation Area		1.33	6,355	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 3/2000				This site is an RMMA.
65D	1333	Lurance Canyon Explosive Test Site: Near Field Dispersion Area		7.98	6,325	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 9/30/99				This site is an RMMA.
65E	1333	Lurance Canyon Explosive Test Site: Far Field Dispersion Area		76.85	6,365	130	DU	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 12/13/99	Confirmatory Sampling/Risk-Based (September 1998)	None	Soil Disturbance Restrictions	This site is an RMMA.

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
68	1334	Old Burn Site		6.48	5,862	115-125	Metals, VOCs, SVOCs, Radionuclides	KAFB	None	Industrial						This site is an RMMA.
70	1334	Explosives Test Pit (Water Towers)		0.23	5,730	73	Metals	USAF Permitted to DOE	23	Industrial		Approved 12/6/99	Confirmatory Sampling/Risk-Based (September 1997)	None	None	
71	1334	Moonlight Shot Area		83.11	5,864	115-125	DU, Metals	KAFB	None	Industrial		Approved 12/13/99 & 3/18/99	Administrative (August 1994); Confirmatory Sampling/Risk-Based (September 1998)	None	None	This site is an RMMA.
81C	1333	New Aerial Cable Site: Former Burial Location		0.12	6,445	150	Metals, HE, SVOCs, VOCs	USAF Withdrawn from USFS Permitted to DOE	32	Recreational		Approved 9/30/99		None	None	
85	1335	Firing Site (Bldg. 9920)		0.94	5,454	347	DU, Metals (Be, Li, Pb), HE, Cadmium sulfide, Manganese dioxide	USAF Permitted to DOE	24	Industrial		Approved 12/31/99	Confirmatory Sampling/Risk-Based (September 1998)	None	None	This site is an RMMA. This site is an active site.
88B	1334	Firing Site: Instrumentation Pole		15.34	5,816	50	Metals, HE	KAFB	None	Industrial		Approved 12/6/99	Confirmatory Sampling/Risk-Based (September 1997)	None	None	This site is an RMMA.
89A	1335	Shock Tube Site (Thunder Range)		0.78	5,416	480	None	USAF Permitted to DOE	28	Industrial		Approved 12/13/99	Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site is an RMMA.
89B	1335	Shock Tube Site (Thunder Range)		0.72	5,423	480	None	USAF Permitted to DOE	28	Industrial		Approved 12/13/99	Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site is an RMMA.
89C	1335	Shock Tube Site (Thunder Range)		1.84	5,422	480	None	USAF Permitted to DOE	28	Industrial		Approved 12/13/99	Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site is an RMMA.
94A	1333	Lurance Canyon Burn Site: Above-Ground Tanks		0.75	6,370	150	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational			Confirmatory Sampling/Risk-Based (September 1998)	None	None	This site is an RMMA. This site is an active site.
94B	1333	Lurance Canyon Burn Site: Debris/Soil Mound Area		0.57	6,330	130	VOCs, SVOCs, HE, Metals, Radionuclides	USAF Withdrawn from USFS Permitted to DOE	42	Recreational						This site is an RMMA.

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
94C	1333	Lurance Canyon Burn Site: Bomb Burner Area and Discharge Line		0.24	6,343	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational						This site is an RMMA.
94D	1333	Lurance Canyon Burn Site: Bomb Burner Discharge Pit		0.02	6,333	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 9/30/99		None	None	This site is an RMMA.
94E	1333	Lurance Canyon Burn Site: Small Surface Impoundment		0.17	6,338	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approve 3/27/2000		None	None	This site is an RMMA.
94F	1333	Lurance Canyon Burn Site: LAARC Discharge Pit		0.03	6,348	130	JP-4, VOCs, SVOCs, HE, Metals, Radionuclides	USAF Withdrawn from USFS Permitted to DOE	42	Recreational						This site is an RMMA.
94G	1333	Lurance Canyon Burn Site: Scrap Yard		3.23	6,345	130	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational				None	None	This site is an RMMA. This site is an active site.
96	1302	Storm Drain System	I	24.00	5,420	300	Radionuclides, Metals, PCBs, Organics, Inorganics	DOE Owned		Industrial			Confirmatory Sampling/Risk-Based (May 1997)	None	None	
103	1335	Scrap Yard (Bldg. 9939)		3.34	5,612	290-330	Pb, DU	USAF Permitted to DOE	170	Industrial		Approved 12/6/99	VCM/Confirmatory Sampling/Risk-Based (June 1998)	None	None	This site is an RMMA. This site is an active site.
108	1335	Firing Site (Bldg. 9940)		0.39	5,530	530	DU, HE, Cr	USAF Permitted to DOE	17B, 25	Industrial		Approved 6/99	Confirmatory Sampling/Risk-Based (June 1998)	None	None	This site is an RMMA. This site is an active site.
109	1335	Firing Site (Bldg. 9956)		0.27	5,486	530	None	USAF Permitted to DOE	26	Industrial		Approved 12/13/99	Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site is an RMMA.
154	1295	Bldg. 9960 Septic Systems		0.15	5,588	635	HE, Metals, Phenols	USAF Permitted to DOE	22	Industrial			Confirmatory Sampling/Risk-Based (August 1997)	None	None	More information coming.
187	1302	TA-I Sanitary Sewer Lines	I	24.00	5,420	300	Radionuclides, Metals, VOCs, SVOCs, PCBs	DOE Owned		Industrial		Additional Information Requested (3/17/98)	Confirmatory Sampling/Risk-Based (May 1997)	None	None	

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
193	1335	Sabotage Test Area		0.63	5,470	350	None	USAF Permitted to DOE	28	Industrial		Approved 12/13/99	VCM/Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site is an RMMA.
226	1302	Old Acid Waste Line	I	1.42	5,413	300	Metals, VOCs, SVOCs, PCBs, Radionuclides	DOE Owned		Industrial		Additional Information Requested (3/17/98)	Confirmatory Sampling/Risk-Based (May 1997)	None	None	
228A	1309	Centrifuge Dump Site	IV	1.58	5,540	280	None	DOE Owned		Industrial		Approved 3/00		None	None	This site is an RMMA.
228B	1309	Centrifuge Dump Site	IV	6.55	5,540	545	None	DOE Owned		Industrial				None	None	This site is an RMMA.
232	1309	Storm Drain System Outfall	IV	0.03	5,338	440	Petroleum hydrocarbons	DOE Owned		Industrial			Confirmatory Sampling/Risk-Based (August 1997)	None	None	
275	1306	TA-V Seepage Pits	III, V	0.28	5,433	491	Metals, VOCs, SVOCs,	DOE Owned		Industrial		Approved 12/13/99	Confirmatory Sampling/Risk-Based (September 1998)	None	Soil Disturbance Restrictions	
No Site Control Required (Informational Stewardship)—Criteria: 1. Future use is established as industrial or recreational; 2. Passes residential risk criteria; or, 3. All constituents are below background																
2	1303	Classified Waste Landfill	II	1.93	5,418		Radionuclides, Metals, PCBs, HE, VOCs	DOE Owned		Industrial					None	This site is an RMMA. This site will be completely remediated.
4	1307	LWDS Surface Impoundments	III, V	0.84	5,410		Radionuclides, Organics, Metals, PCBs	DOE Owned		Industrial			Confirmatory Sampling/Risk-Based (September 1995)	None	Digging Restrictions	This site is an RMMA.
5	1307	LWDS Drainfield	III, V	0.11	5,430		Radionuclides, Organics, Metals, PCBs	DOE Owned		Industrial			Confirmatory Sampling/Risk-Based (September 1995)	None	None	This site is an RMMA.
6A	1335	Gas Cylinder Disposal Pit		1.37	5,402		None	KAFB	None	Industrial			VCM/Confirmatory Sampling (October 1996)	None	None	
6	1335	Gas Cylinder Disposal Pit (Bldg. 9966)		0.03	5,402		None	USAF Permitted to DOE	28	Industrial			VCM/Confirmatory Sampling (October 1996)	None	None	
7	1309	Gas Cylinder Disposal (Arroyo del Coyote)		7.03	5,466	500	None	KAFB	None	Recreational	Yes	Approved 3/27/00	Administrative (June 1995)	This site is fenced.	None	
9	1334	Burial Site/Open Dump (Schoolhouse Mesa)		1.86	5,848		DU, HE, Metals, SVOCs	KAFB	None	Industrial				None	None	This site is an RMMA.

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
13	1333	Oil Surface Impoundment (Lurance Canyon Burn Site)		0.49	6,348	120	None	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 12/13/99	Confirmatory Sampling/Risk-Based (August 1997)	None	Soil Disturbance Restrictions	This site will have long term monitoring of the groundwater.
14	1335	Burial Site (Bldg. 9920)		1.25	5,454	347	None	USAF Permitted to DOE	24	Industrial		Approved 6/99	Confirmatory Sampling/Risk-Based (June 1998)	None	None	This site is an RMMA. This site is an active Site.
15	1332	Trash Pits (Frustration Site)		2.44	6,275		None	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational		Approved 9/97	Confirmatory Sampling (August 1995)	None	None	
20	Archival	Schoolhouse Mesa Burn Site		0.16	5,802		None	KAFB	None	Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	This site is an RMMA.
22	1334	Storage/Burn (west of SOR)		0.07	5,890	55	None	KAFB	None	Industrial		Approved 10/13/99	Confirmatory Sampling (June 1995)	None	None	
23	1309	Disposal Trenches (near Tijeras Arroyo)		16.10	5,336	290	None	KAFB	None	Industrial		Approved 10/13/99	Administrative (June 1995)	None	None	This site is an RMMA.
26	1306	Burial Site (west of TA-III)	III, V	167.12	5,328		Metals, DU	DOE Owned		Industrial			Administrative (June 1996)	None	None	Wholly contained within ER Site 83, which is an active site.
30	1302	PCB Spill (Reclamation Yard)	I	6.58	5,428	300	PCBs, Organics, Metals	DOE Owned		Industrial				None	Yes	This site will need to be monitored for compliance with the "PCB Mega Rule."
31	1306	Electrical Transformer Oil Spill	III, V	0.01	5,415		PCBs, Mineral based transformer oil	DOE Owned		Industrial		Approved 5/5/00	Confirmatory Sampling (June 1996)	None	None	
32	Archival	Steam Plant Oil Spill	I	0.22	5,405	275	Petroleum hydrocarbons	DOE Owned		Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
33	1302	Motor Pool Oil Spill	I	2.32	5,429	275	Petroleum hydrocarbons, Organic solvents, Metals	DOE Owned		Industrial			Confirmatory Sampling (October 1996)	None	None	

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
34	1306	Centrifuge Oil Spill	III, V	0.16	5,433		Mineral based transformer oil, PCBs	DOE Owned		Industrial		Approved 5/5/00	Confirmatory Sampling (June 1996)	None	None	
35	1306	Vibration Facility Oil Spill	III, V	0.02	5,404		Oil, PCBs	DOE Owned		Industrial			Confirmatory Sampling (June 1996)	None	None	
36	1306	Oil Spill - HERMES	III, V	0.05	5,436		Oil, PCBs	DOE Owned		Industrial			Confirmatory Sampling (June 1996)	None	None	
37	1306	PROTO Oil Spill	III, V	0.55	5,439		Mineral based transformer oil	DOE Owned		Industrial		Approved 5/5/00	Confirmatory Sampling (June 1996)	None	None	
38	1335	Oil Spills (Bldg. 9920)		0.01	5,459	496	None	USAF Permitted to DOE	28	Industrial		Approved 12/17/99	Confirmatory Sampling (June 1996)	None	None	
39	1335	Oil Spill - Solar Facility		0.02	5,587		None	USAF Permitted to DOE	92	Industrial		Approved 9/97	Administrative (June 1995)	None	None	
40	1309	Oil Spill (6000 Igloo Area)		0.02	5,230	400	None	KAFB	35	Industrial	Yes	Approved 9/97	Confirmatory Sampling (June 1995)	This site is fenced.	None	
41	Archival	Bldg. 838 Mercury Spill	I	0.14	5,414	275	Hg	DOE Owned		Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
42	1302	Acid Spill Water Treatment Facility	I	0.46	5,430	300	Acids, Bases, Metals	DOE Owned		Industrial		Approved 12/7/99	Confirmatory Sampling/Risk-Based (May 1997)	None	None	
43	1303	Radioactive Material Storage Yard	II	0.11	5,410	300	Metals, Radionuclides	DOE Owned		Industrial		Approved 12/20/99	Administrative (August 1994)	None	None	This site is an RMMA.
46	1309	Old Acid Waste Line Outfall (Tijeras Arroyo)	IV	1.16	5,383	490	VOCs, SVOCs, PCBs, Metals, Radionuclides	DOE Owned		Industrial			Risk-Based (June 1995)	None	None	
47	Archival	Unmanned Seismic Observatory		1.02	5,980		None	USFS Withdrawal	None	Recreational		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
48	1303	Bldg. 904 Septic System	II	0.46	5,410		Organics, HE, Radionuclides, Inorganics, Metals	DOE Owned		Industrial			Confirmatory sampling (June 1995)	None	None	This site is an RMMA.
49	1295	Bldg. 9820 Drains		0.04	6,045		VOCs, SVOCs	USAF Withdrawn from USFS Permitted to DOE	106A	Recreational			Confirmatory Sampling/Risk-Based (June 1996)	None	None	This site is an RMMA.
50	1309	Old Centrifuge Site (Tijeras Arroyo)	IV	0.39	5,405	320	None	DOE Owned		Industrial		Approved 3/27/00	Risk-Based (June 1995)	None	None	

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
51	1306	Bldg. 6924 Pad, Tank, Pit	III, V	0.15	5,416		VOCs, SVOCs, Metals, HE, Radionuclides	DOE Owned		Industrial		Approved 5/5/00	Confirmatory Sampling (June 1996)	None	None	
52	1307	LWDS Holding Tanks	III, V	0.58	5,420		VOCs, SVOCs, Radionuclides, Metals	DOE Owned		Industrial			Confirmatory Sampling (September 1995)	None	None	This site is an RMMA.
53	1335	Bldg. 9923 Storage Igloo		0.00	5,459		Radionuclides, Organic solvents, Heavy metals	USAF Permitted to DOE	24	Industrial		Approved 9/97	Administrative (June 1995)	None	None	
54	1335	Pickax Site (Thunder Range)		445.69	5,358	480	HE	KAFB	None	Industrial		Approved 12/17/99	Confirmatory Sampling (October 1996)	None	None	
56	1335	Old Thunderwells (Thunder Range)		0.08	5,415	480	None	USAF Permitted to DOE	28	Industrial		Approved 12/17/99	Confirmatory Sampling (October 1996)	None	None	
60	1333	Bunker Area (north of Pendulum Site)		0.01	6,181		DU, Metals	KAFB	None	Industrial				None	None	This site is an RMMA.
62	Archival	Greystone Manor Site		6.43	5,854		None	KAFB	None	Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
66	1332	Boxcar Site		3.91	5,980		Metals, VOCS	USFS Withdrawal	None	Recreational			Confirmatory Sampling (October 1996)	None	None	This site is an RMMA.
67	1332	Frustration Site		0.01	6,350		None	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational			Administrative (August 1995)	Barriers to entry	None	This site is also a Mine Shaft.
69	Archival	Old Borrow Pit		0.97	5,952		None	KAFB	None	Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
72	1333	Operation Beaver Site		0.41	7,855	300	None	USFS Withdrawal	None	Recreational		Approved 10/13/99? ?	Administrative (June 1995); Confirmatory Sampling (October 1996);	None	None	
73	Archival	Bldg. 895 Hazardous Waste Repackaging/Storage	I	0.36	5,418	300	RCRA Chemicals	DOE Owned		Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
77	1309	Oil Surface Impoundment (Tijeras Arroyo)	IV	0.17	5,388	490	None	DOE Owned		Industrial		Approved 10/13/99	Confirmatory Sampling (June 1995)	None	None	
78	1306	Gas Cylinder Disposal Pit	III, V	0.46	5,427		Toxic, Corrosive, Reactive and flammable gases, Radionuclides, Metals, HE	DOE Owned		Industrial			VCM/Confirmatory Sampling (June 1996)	None	None	
81A	1333	New Aerial Cable Site: Catcher Box/Sled Track		2.39	6,465	150	None	USAF Withdrawn from USFS Permitted to DOE	32	Recreational						This site is an active site.
81B	1333	New Aerial Cable Site: Impact Pad		4.07	6,393	150	None	USAF Withdrawn from USFS Permitted to DOE	32	Recreational						This site is an active site.
81D	1333	New Aerial Cable Site: Northern Cable Area		4.28	6,345	150	None	USAF Withdrawn from USFS Permitted to DOE	32	Recreational						This site is an active site.
81E	1333	New Aerial Cable Site: Gun Impact Area		0.11	6,433	150	None	USAF Withdrawn from USFS Permitted to DOE	32	Recreational						
81F	1333	New Aerial Cable Site: Scrap Yard		1.29	6,435	150	None	USAF Withdrawn from USFS Permitted to DOE	32	Recreational						This site is an active site.
82	1332	Old Aerial Cable Site Scrap		22.02	6,230		DU, Metals, HE	Joint Operating Agreement between DOE, SNL/NM and Phillips	31	Recreational						This site is an RMMA. This site is an active site.
83	1306	Long Sled Track	III, V	233.35	5,335		Metals, HE, Radionuclides, DU	DOE Owned		Industrial						This site is an RMMA. This site is an active site.
84	1306	Gun Facilities	III, V	1.41	5,351		Metals, HE, Radionuclides	DOE Owned		Industrial						This site is an RMMA. This site is an active site.

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
86	1335	Firing Site (Bldg. 9927)		1.60	5,470		DU, Be, Pb, HE	USAF Permitted to DOE	28	Industrial			VCM/Confirmatory Sampling (January 1997)	None	None	This site is an RMMA.
88A	Archival	Firing Site: Ranchhouse		1.14	5,814		None	KAFB	None	Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
90	1335	Beryllium Firing Site (Thunder Range)		0.34	5,474	300	None	USAF Permitted to DOE	28	Industrial		Approved 12/14/99	Confirmatory Sampling (January 1997)	None		This site is an RMMA.
92	1333	Pressure Vessel Test Site (Coyote Canyon Blast Area)		6.12	6,000		None	USAF Permitted to DOE	17A	Industrial		Approved NFA/Off HSWA Permit 9/97	Administrative (August 1995)	None	None	
93A	1333	Madera Canyon Rocket Launcher Pad A		0.08	6,378	300	None	DOE Withdrawn from USFS	6A	Recreational		Approved 10/13/99? ?	Administrative (June 1995); Confirmatory Sampling (October 1996)	None	None	
93B	1333	Madera Canyon Rocket Launcher Pad B		0.16	6,170	200	None	DOE Withdrawn from USFS	6A	Recreational		Approved 10/13/99? ?	Administrative (June 1995); Confirmatory Sampling (October 1996)	None	None	
93C	1333	Madera Canyon Rocket Launcher Pad C		0.17	6,205	200	None	DOE Withdrawn from USFS	6A	Recreational		Approved 10/13/99? ?	Administrative (June 1995); Confirmatory Sampling (October 1996)	None	None	
98	1302	Bldg. 863 TCA Photochemical Releases	I	0.37	5,419	300	VOCs, Acids, Bases, Ag	DOE Owned		Industrial						
100	1306	Bldg. 6620 HE Sump/Drain	III, V	0.05	5,424		HE	DOE Owned		Industrial			Administrative (June 1996)	None	None	
101	1295	Explosive Contaminated Sumps, Drains (Bldg. 9926)		0.13	5,460		VOCs, SVOCs, Cn, Metals (Cr)	USAF Permitted to DOE	25	Industrial			VCM/Confirmatory Sampling/Risk-Based (June 1996)	None	None	This site is an RMMA.
102	1306	Radioactive Disposal (east of TA-III)	III, V	155.54	5,476		Radionuclides	DOE Owned		Industrial		Approved 5/5/00	VCM/Confirmatory Sampling (June 1996)	None	None	This site is an RMMA.
104	Archival	PCB Spill, Computer Facility	I	0.02	5,423	300	PCBs	DOE Owned		Industrial		Approved NFA/Off HSWA Permit 12/31/99	Administrative (August 1994)	None	None	
105	Archival	Mercury (Bldg. 6536)	III					DOE Owned		Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
111	1306	Bldg. 6715 Sump/Drains	III, V	0.01	5,393		HE, Ag, VOCs, SVOCs	DOE Owned		Industrial			Confirmatory Sampling (June 1996)	None	None	
112	1335	Explosive Contaminated Sump (Bldg. 9956)		0.00	5,483	300	None	USAF Permitted to DOE	26	Industrial		Approved 12/7/99	Confirmatory Sampling (May 1997)	None	None	This site is an RMMA. This site is an active site.
113	1303	Area II Firing Sites	II	0.34	5,424		HE, Metals	DOE Owned		Industrial			Confirmatory Sampling (August 1994); Confirmatory Sampling (June 1996);	None	None	
114	1303	Explosive Burn Pit	II	0.00	5,409		HE, TNT, RDX, HMX	DOE Owned		Industrial			VCM/Confirmatory Sampling (June 1996)	None	None	
115	1335	Firing Site (Bldg. 9930)		6.13	5,546	300	None	USAF Permitted to DOE	18, 132, 170	Industrial		Approved 12/14/99	Confirmatory Sampling (January 1997)	None	None	This site is an RMMA. This site is an active site.
116	1295	Bldg. 9990 Septic System		0.06	6,107		VOCs, Cn	USAF Permitted to DOE	40	Recreational			VCM/Confirmatory Sampling (June 1996)	None	None	This site is an RMMA.
117	1335	Trenches (Bldg. 9939)		2.73	5,690		DU, Sodium	USAF Permitted to DOE	170	Industrial				None		This site is an RMMA.
135	1303	Bldg. 906 Septic System	II	0.03	5,415		Metals, Radionuclides, VOCs, PCBs, HE	DOE Owned		Industrial			Confirmatory Sampling (August 1994)	None	None	This site is an RMMA.
136	1303	Bldg. 907 Septic System	II	0.47	5,420		HE, Cleaning solvents, Metals, Radionuclides	DOE Owned		Industrial			Confirmatory Sampling (June 1995)	None	None	This site is an RMMA.
137	1295	Bldg. 6540/6542 Septic System	III, V	0.63	5,403		VOCs, Metals (Ag, Cr), SVOCs, Cn	DOE Owned		Industrial			VCM/Confirmatory Sampling/Risk-Based (January 1997)	None	None	This site is an RMMA.
138	1295	Bldg. 6630 Septic System	III, V	0.27	5,409		VOCs, SVOCs, Metals (Ag, Ni)	DOE Owned		Industrial			VCM/Confirmatory Sampling (June 1996)	None	Soil Disturbance Restrictions	This site is an RMMA.
139	Archival	Bldg. 9964 Septic System		0.03	5,474		None	USAF Permitted DOE	28	Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	This site is an RMMA.
140	1295	Bldg. 9965 Septic System		0.08	5,487		VOCs, SVOCs, Metals (Se)	USAF Permitted to DOE	28	Industrial			VCM/Confirmatory Sampling (January 1997)	None	None	This site is an RMMA.
141	1295	Bldg. 9967 Septic System		0.01	5,502		VOCs, Metals (Se)	USAF Permitted to DOE	28	Industrial		Approved 6/9/2000	VCM/Confirmatory Sampling (June 1996)	None	None	This site is an RMMA.

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
142	1295	Bldg. 9970 Septic System		0.06	5,678	130	VOCs, SVOCs, Metals (Pb, Se)	USAF Permitted to DOE	10	Industrial			Confirmatory Sampling (August 1995)	None	None	This site is an RMMA.
143	1295	Bldg. 9972 Septic System		0.11	5,679	119	VOCs, Metals (Ag, Ba)	USAF Permitted to DOE	10	Industrial			Confirmatory Sampling (August 1995)	None	None	This site is an RMMA.
144	1295	Bldg. 9980 Septic System		0.40	5,574	111	VOCs, Metals (Pb), Radionuclides (U-234, U-238)	USAF Permitted to DOE	93	Industrial		Approved 12/7/99	VCM/Confirmatory Sampling/Risk-Based (May 1997)	None	None	This site is an RMMA.
145	1295	Bldg. 9981/9982 Septic Systems		0.45	5,568	140	VOCs, SVOCs, Cn, Metals (Pb, Ba)	USAF Permitted to DOE	93	Industrial		Approved 12/7/99	VCM/Confirmatory Sampling/Risk-Based (May 1997)	None	None	This site is an RMMA.
146	1295	Bldg. 9920 Drain System		0.03	5,459		VOCs	USAF Permitted to DOE	24	Industrial			Confirmatory Sampling (August 1995)	None	None	This site is an RMMA.
147	1295	Bldg. 9925 Septic Systems		0.92	5,701		VOCs, SVOCs, Metals (Pb, Ba)	USAF Permitted to DOE	27B	Industrial			VCM/Confirmatory Sampling/Risk-Based (May 1997)	None	None	This site is an RMMA.
148	1295	Bldg. 9927 Septic System		0.05	5,473		VOCs, Metals, DU, SVOCs, Inorganics	USAF Permitted to DOE	28	Industrial			Confirmatory Sampling (August 1995)	None	None	This site is an RMMA.
149	1295	Bldg. 9930 Septic System		0.11	5,531		VOCs	USAF Permitted to DOE	18	Industrial			VCM/Confirmatory Sampling/Risk-Based (June 1996)	None	None	This site is an RMMA.
150	1295	Bldg. 9939/9939A Septic Systems		0.15	5,615		VOCs	USAF Permitted to DOE	170	Industrial			VCM/Confirmatory Sampling (January 1997)	None	None	This site is an RMMA.
151	1295	Bldg. 9940 Septic System		0.13	5,524		VOCs, Metals (Ba)	USAF Permitted to DOE	17B, 25	Industrial			VCM/Confirmatory Sampling/Risk-Based (June 1996)	None	None	This site is an RMMA.
152	1295	Bldg. 9950 Septic System		0.08	5,485		VOCs	USAF Permitted to DOE	26	Industrial			VCM/Confirmatory Sampling (January 1997)	None	None	This site is an RMMA.
153	1295	Bldg. 9956 Septic Systems		0.17	5,476		VOCs, Cn, Metals (Pb, Cr)	USAF Permitted to DOE	26	Industrial			VCM/Confirmatory Sampling (January 1997)	None	None	This site is an RMMA.
155	Archival	Bldg. 6597 25,000 Gallon	V	0.17						Industrial		Removed from RCRA Permit	LUST	None	None	
159	1303	Bldg. 935 Septic System	II	0.03	5,409			DOE Owned		Industrial			Confirmatory Sampling (June 1995)	None	None	This site is an RMMA.

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
160	1295	Bldg. 9832 Septic System		0.12	6,245		VOCs, Cn, Metals (Cr, Ag, Ba)	USAF Withdrawn from USFS Permitted to DOE	42	Recreational		Approved 6/9/00	Confirmatory Sampling (June 1996)	None	None	This site is an RMMA.
161	1295	Bldg. 6636 Septic System	III, V	0.16	5,383		VOCs, Cn, Metals (Ag)	DOE Owned		Industrial			VCM/Confirmatory Sampling (June 1996)	None	None	This site is an RMMA.
165	1303	Bldg. 901 Septic System	II	1.16	5,408			DOE Owned		Industrial			Confirmatory Sampling (August 1994)	None	None	This site is an RMMA.
166	1303	Bldg. 919 Septic System	II	0.06	5,415			DOE Owned		Industrial			Confirmatory Sampling (June 1995)	None	None	This site is an RMMA.
167	1303	Bldg. 940 Septic System	II	0.07	5,409			DOE Owned		Industrial			Confirmatory Sampling (June 1995)	None	None	
168	Archival	Bldg. 901 UST	II							Industrial		Removed from RCRA Permit	LUST	None	None	
169	Archival	Bldg. 910 UST	II							Industrial		Removed from RCRA Permit	LUST	None	None	
170	Archival	Bldg. 911 UST	II							Industrial		Removed from RCRA Permit	LUST	None	None	
171	Archival	Bldg. 912 UST	II							Industrial		Removed from RCRA Permit	LUST	None	None	
172	Archival	Bldg. 888 UST	I	0.10			None			Industrial		Removed from RCRA Permit	LUST	None	None	
173	Archival	Bldg. 6525 UST	III	0.00			None			Industrial		Removed from RCRA Permit	LUST	None	None	
174	Archival	Bldg. 6581 UST	IV	0.01			None			Industrial		Removed from RCRA Permit	LUST	None	None	
175	Archival	Bldg. 6588 UST	IV	0.00			None			Industrial		Removed from RCRA Permit	LUST	None	None	

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Continued)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
176	Archival	Bldg. 605 UST	I	0.10			None			Industrial		Removed from RCRA Permit	LUST	None	None	
178	Archival	Bldg. 6587 UST	III	0.10			None			Industrial		Removed from RCRA Permit	LUST	None	None	
179	Archival	Bldg. 7570 UST		0.10			None			Industrial		Removed from RCRA Permit	LUST	None	None	
180	Archival	Bldg. 6503 UST	III	0.10			None			Industrial		Removed from RCRA Permit	LUST	None	None	
181	Archival	Bldg. 6500 UST	V	0.10			None			Industrial		Removed from RCRA Permit	LUST	None	None	
186	1302	Bldg. 859 TCE Disposal	I	0.24	5,422	300	TCE and other VOCs	DOE Owned		Industrial		Approved 3/00	Confirmatory Sampling (October 1996)	None	None	
188	Archival	Bldg. 6597 Above Ground Containment Spill Tank	V					DOE Owned		Industrial		Approved NFA/Off HSWA Permit 12/31/95	Administrative (August 1994)	None	None	
190	1302	Steam Plant Tank Farm	I	2.95	5,398	275	Petroleum hydrocarbons	DOE Owned		Industrial				None	None	
191	1335	Equus Red		3.58	5,398		DU	KAFB	None	Industrial			VCM-Based (January 1997)	None	None	This site is an RMMA.
192	1302	Waste Oil Tank	I	0.19	5,457	300	Petroleum hydrocarbons, Metals, VOCs, SVOCs	DOE Owned		Industrial		Approved 12/17/99	Confirmatory Sampling (October 1996)	None	None	
194	1335	General Purpose Heat Source Test Area		0.31	5,414		None	USAF Permitted to DOE	28	Industrial		Approved 9/97	Administrative (August 1995)	None	None	This site is an RMMA.
196	1306	Bldg 6597 Cistern	III, V	0.04	5,438		Oil, Metals, PCBs	DOE Owned		Industrial			Confirmatory Sampling (June 1996)	None	None	
211	1302	Bldg. 840 Former UST 840-1	I	0.02	5,416	300	Chlorinated solvents, Metals, Coolant oil, PCBs	DOE Owned		Industrial		Approved 3/00	Confirmatory Sampling (October 1996)	None	None	
225	Archival	AEC Storage Facility/KAFB	Off Site									Site Transferred to KAFB 12/05/96		None	None	
227	1309	Bunker 904 Outfall (Tijeras Arroyo)	IV	0.07	5,400	300	Metals, VOCs, SVOCs, HE, Radionuclides	DOE Owned		Industrial			Risk-Based (June 1995)	None	None	This site is an RMMA.
229	1309	Storm Drain System Outfall	IV	0.16	5,374	300	Metals, VOCs, SVOCs, HE, Radionuclides	DOE Owned		Industrial			Risk-Based (June 1995)	None	None	

Refer to footnotes at end of table.

Table C-1. SNL/NM ER Site Characteristics for Stewardship (Concluded)

Site No.	ADS	Site Name	TA	Site Size (Acres)	Mean Elevation (ft)	Depth to Ground Water (ft)	COCs	Land Use Permit Type	Land Use Permit No.	Future Land Use	Fenced	NFA Status	NFA Type	Physical Control	Land Use Restrictions	Additional Information
230	1309	Storm Drain System Outfall	IV	0.02	5,346	300	None	DOE Owned		Industrial			Risk-Based (June 1995)	None	None	
231	1309	Storm Drain System Outfall	IV	0.04	5,336	300	None	DOE Owned		Industrial			Risk-Based (June 1995)	None	None	
233	1309	Storm Drain System Outfall	IV	0.03	5,360	300	None	DOE Owned		Industrial			Risk-Based (June 1995)	None	None	
234	1309	Storm Drain System Outfall	IV, KAFB	0.09	5,354	300	None	DOE Owned	Partly not permitted	Industrial			Risk-Based (June 1995)	None	None	
235	1309	Storm Drain System Outfall		1.20	5,318	450	None	KAFB	None	Industrial		Approved 3/27/2000	Confirmatory Sampling/Risk-Based (June 1995)	None	None	
240	1306	Short Sled Track	III, V	165.18	5,390			DOE Owned		Industrial				Yes	Yes	This site is an RMMA. This site is an active site.
241	1306	Storage Yard	III, V	3.32	5,420		Metals, HE, Radionuclides	DOE Owned		Industrial			VCM/Confirmatory Sampling (June 1996)	None	None	This site is an RMMA.

Note: As of June 6, 2001, the data presented in this table have not been verified and are considered to be DRAFT.

ADS = Activity data sheet.
 AEC = Atomic Energy Commission.
 Ag = Silver.
 Ba = Barium.
 Be = Beryllium.
 Bldg. = Building.
 Cd = Cadmium.
 Cn = Cyanide.
 COC = Constituent of concern.
 Cr = Chromium.
 DOE = U.S. Department of Energy.
 DU = Depleted uranium.
 ER = Environmental Restoration.
 ft = Foot (feet).
 H-3 = Tritium.
 HE = High explosive(s).
 HERMES = High Energy Radiation Megavolt Electron Source.
 Hg = Mercury.
 HMX = 1,3,5,7-Tetranitro-1,3,5,7-tetrazacyclooctane.
 HSWA = Hazardous and Solid Waste Amendments.
 JP-4 = Jet propulsion fuel grade 4.
 KAFB = Kirtland Air Force Base.
 LAARC = Light Airtransport Accident Resistant Container.
 Li = Lithium.
 LUST = Leaking underground storage tank.

LWDS = Liquid Waste Disposal System.
 NFA = No further action.
 Ni = Nickel.
 Pb = Lead.
 PCB = Polychlorinated biphenyl.
 PDSP = Plutonium Dispersal Studies Project.
 RCRA = Resource Conservation and Recovery Act.
 RDX = 1,3,5-Trinitro-1,3,5-triazacyclohexane.
 RMMA = Radiological Materials Management Area.
 Se = Selenium.
 SNL/NM = Sandia National Laboratories/New Mexico.
 SOR = Starfire Optical Range.
 SVOC = Semivolatile organic compound.
 TA = Technical Area.
 TCE = Trichloroethylene.
 Th = Thorium.
 TNT = 2,4,6-trinitrotoluene.
 U = Uranium.
 USAF = U.S. Air Force.
 USFS = U.S. Forest Service.
 UST = Underground storage tank.
 VCM = Voluntary Corrective Measure.
 VOC = Volatile organic compound.
 Zn = Zinc.

APPENDIX D
Major Environmental Restoration Documents

Major Environmental Restoration Documents

The list below includes the major documents produced by the Environmental Restoration Project. There are two locations available for viewing these documents. Project Implementation Plan (1995) consisting of:

- Program Management Plan
- Quality Assurance Program Plan
- Health and Safety Program Plan
- Information Management Plan
- Community Relations Management Plan

RCRA Facility Investigation Work Plans:

- Chemical Waste Landfill (OU 1267)
- Kauai Test Facility (OU 1281)
- Mixed Waste Landfill (OU 1289)
- Septic Tanks and Drain fields (OU 1295)
- TA-I (OU 1302)
- TA-II (OU 1303)
- TA-III and V (OU 1306)
- Liquid Waste Disposal System (LWDS) (OU 1307)
- Tijeras Arroyo (OU 1309)
- Foothills Test Area (OU 1332)
- Canyons Test Area (OU 1333)
- Central Coyote Test Area (OU 1334)
- Southwest Test Area (OU 1335)
- Tonopah Test Range (OU 1338)
- Fuel Oil Spill (OU 1351)
- Navy Landfill (OU 1352)
- Miscellaneous Sites (OU 1353)

ER SNL/NM Background Concentrations Report

OU and Site-Specific Health and Safety Plans

ER Site-Wide Hydrogeologic Characterization Report (1995)

Environmental Assessment for SNL/NM ER Project, 1996

No Further Action Proposals/VCM Reports

Future Land Use Workbooks (7 sectors, each with land-use recommendations)

Class II Permit Modification Request for Temporary Unit Treatment Operations at the Corrective Action Management Unit, Technical Area III

Class III Permit Modification Request for the Management of Hazardous Remediation Waste in the Corrective Action management Unit, Technical Area III