SANDIA REPORT
SAND2008-5069P
Unlimited Release
Printed September 2008

Calendar Year 2007

Annual Site Environmental Report for Sandia National Laboratories, New Mexico

Puma drinking from a watering hole.

Rebecca Sanchez, Karen Agogino, Susan Koss, Eleni Otto and Jacqueline Orozco

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under Contract DE-AC04-94Al85000.

Sandia National Laboratories

National Nuclear Security Administration

Issued by Sandia National Laboratories, operated for the United States Department of Energy by Sandia Corporation.

Printed in the United States of America. This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from
U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831

Telephone: (865)576-8401
Facsimile: (865)576-5728
E-Mail: reports@adonis.osti.gov
Online ordering: http://www.osti.gov/bridge

Available to the public from
U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

Telephone: (800)553-6847
Facsimile: (703)605-6900
E-Mail: orders@ntis.fedworld.gov
Online order: http://www.ntis.gov/ordering.htm

SAND2008-5069P
Unlimited Release
Printed September 2008

Calendar Year 2007
Annual Site
Environmental Report
Sandia National Laboratories, Albuquerque, New Mexico

<u>DOE/NNSA/SSO</u>
Project Lead
Karen Agogino

<u>SANDIA CORPORATION</u>
Project Lead
Rebecca Sanchez

Team Lead, Graphics and Document Specialist
Susan Koss

Technical Editor and Graphics
Eleni Otto

Document Production Team Support
Jacqueline Orozco

Produced by:
Sandia National Laboratories
P.O. Box 5800
Albuquerque, New Mexico 87185-1042

ABSTRACT

Sandia National Laboratories, New Mexico (SNL/NM) is a government-owned/contractor-operated facility. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates the laboratory for the U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA). The DOE/NNSA Sandia Site Office (SSO) administers the contract and oversees contractor operations at the site. This annual report summarizes data and the compliance status of Sandia Corporation's environmental protection and monitoring programs through December 31, 2007. Major environmental programs include air quality, water quality, groundwater protection, terrestrial surveillance, waste management, pollution prevention (P2), environmental restoration (ER), oil and chemical spill prevention, and implementation of the National Environmental Policy Act (NEPA). Environmental monitoring and surveillance programs are required by DOE Order 450.1, *Environmental Protection Program* (DOE 2007a) and DOE Manual 231.1-1A, *Environment, Safety, and Health Reporting* (DOE 2007).

Calendar Year 2007 Annual Site Environmental Report
Sandia National Laboratories, Albuquerque, New Mexico
Final Approval date: August 2008

Work performed under Contract No. DE-ACO4-94AL85000

Prepared for:
U.S. Department of Energy, National Nuclear Security Administration,
Sandia Site Office, Albuquerque, New Mexico

Prepared by:
Sandia Corporation, Albuquerque, New Mexico
ES&H and Emergency Management Center

ACKNOWLEDGMENTS

We wish to thank the following individuals who contributed their time and expertise assisting in the production of this annual report.

Karen Agogino	*Paul Freshour*	*Pamela Puissant*
Karen Armstrong	*Linda Gonzales*	*Anita Reiser*
Brenda Bailey-White	*Susan Gorman*	*Charles Roma*
Linda Bayliss	*Tim Jackson*	*Stephanie Salinas*
Joseph Bonaguidi	*Adrian Jones*	*Dianne Sanchez*
Mendy Brown	*Susan Koss*	*Rebecca Sanchez*
Amber Cantwell	*Franz Lauffer*	*Mike Skelly*
Dave Castillo	*Margie Marley*	*Richie Spangler*
Randy Castillo	*Lucie Mayeux*	*Rebecca Ullrich*
Christopher Catechis	*Mark Miller*	*Katrina Wagner*
Charlene Cunningham	*Jack Mizner*	
Gina Deola	*Stephanie Oborny*	
Michael du Mond	*Jacqueline Orozco*	
Leroy Duran	*Eleni Otto*	
Joanna Eckstein	*Jennifer Payne*	

NOTE TO THE READER

The goals for the Annual Site Environmental Report are to present summary environmental data regarding environmental performance, compliance with environmental standards and requirements, and to highlight significant facility programs. In addition, the U.S. Department of Energy views this document as a valuable tool for maintaining a dialogue with our community about the environmental health of this site.

We are striving to improve the quality of the contents as well as include information that is important to you. Please provide feedback, comments, or questions to:

U.S. Department of Energy
National Nuclear Security Administration
Sandia Site Office
P.O. Box 5400
Albuquerque, NM 87185-5400
Attention: Karen Agogino

This page intentionally left blank.

NOTE: Appendices are either located after Chapter 9 or on the CD that is affixed to the back cover of this document.

<u>FIGURES</u>

TABLES

This page intentionally left blank.

ACRONYMS AND ABBREVIATIONS

A	ABC/AQCB	Albuquerque-Bernalillo County/Air Quality Control Board
	ABCWUA	Albuquerque Bernalillo County Water Utility Authority
	ACRR	Annular Core Research Reactor
	ACE	Army Corps of Engineers
	AEA	Atomic Energy Act
	AFV	alternative fuel vehicles
	AHCF	Auxiliary Hot Cell Facility
	AIRFA	American Indian Religious Freedom Act
	ALARA	as low as reasonably achievable
	ALT	annual limits on intake
	AMPF	Advanced Manufacturing Prototype Facility
	AMPL	Advanced Manufacturing Process Laboratory
	ANOVA	Analysis of Variance
	APPDL	Advanced Pulse Power Development Laboratory
	AQC	Air Quality Compliance
	AOC	area of concern
	ARCOC	Analysis Request and Chain-of-Custody
	ARPA	Archaeological Resources Protection Act
	ASER	Annual Site Environmental Report
	AST	above-ground storage tank
	ATC	authority-to-construct
	AT&T	American Telephone and Telegraph Company
	AWN	Acid Waste Neutralization
B	BGS	below ground surface
	BMP	Best Management Practice
	BSG	Burn Site Groundwater
	BTU	British Thermal Units
	BV	Background Volume
C	C&D	Construction and Demolition
	CA	Compliance Agreement
	CAA	Clean Air Act
	CAAA	Clean Air Act Amendments
	CAC	Corrective Action Complete
	CAMU	Corrective Action Management Unit
	CAN	Clean Air Network
	CAP	Consolidated Audit Program
	CAP88	Clean Air Act Assessment Package-1988
	CCCL	Cleaning and Contamination Control Laboratory
	CEARP	Comprehensive Environmental Assessment and Response Program
	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
	CFCs	Chlorofluorocarbons
	CFR	Code of Federal Regulations
	CFRC	Customer Funded Records Center
	CINT	Center for Integrated Nanotechnologies
	CMS	Corrective Measures Study
	CMI	Corrective Measures Implementation
	COA	City of Albuquerque
	COC	Contaminants of Concern
	COD	Chemical Oxygen Demand
	COOC	Compliance Order on Consent
	CPMS	Criteria Pollutant Monitoring Station
	CPR	Corporate Process Requirements
	CPV	Compliance Plan Volume

	CRIO	Community Resources Information Office
	CWA	Clean Water Act
	CWL	Chemical Waste Landfill
	CWP	Corporate Work Process
	CY	Calendar Year
D	D&D	decontamination and demolition
	DCG	Derived Concentration Guide
	DESIGN	Design Engineering and Science Integration for Generating Neutrons
	DI	de-ionized
	DoD	U.S. Department of Defense
	DOE	U.S. Department of Energy
	DQO	data quality objective
	DSO	Disassembly Sanitization Operation
	DSS	Drain and Septic Systems
	DSSI	Diversified Scientific Services, Inc.
E	EA	Environmental Assessment
	ECF	Explosive Components Facility
	ECO	energy conservation opportunities
	EDE	effective dose equivalent
	EEANM	Environmental Education Association of New Mexico
	EID	Environmental Information Document
	EIS	Environmental Impact Statement
	EHD	Environmental Health Department
	EM	Environmental Management
	EMS	Environmental Management System
	EO	Executive Order
	EPA	U.S. Environmental Protection Agency
	EPEAT	Electronic Product Enviromental Assessment Tool
	EPCRA	Emergency Planning and Community Right-to-Know Act
	EPP	Environmentally Preferable Purchasing
	ER	Environmental Restoration
	ES&H	Environment, Safety, and Health
	ESA	Endangered Species Act
F		
	FEC	Federal Electronics Challenge
	FFCA	Federal Facilities Compliance Act
	FFCO	Federal Facility Compliance Order
	FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
	FLAME	Fire Laboratory used for the Authentication of Modeling and Experiments
	FONSI	finding of no significant impact
	FOP	field operating procedures
	FY	Fiscal Year
G	GEL	General Engineering Laboratories
	GIF	Gamma Irradiation Facility
	GPP	General Plant Projects
	GSA	General Services Administration
	GSF	Gross Square Footage
	GWPP	Groundwater Protection Program
	GWS	groundwater system
H	HAP	hazardous air pollutant
	HAZWOPER	Hazardous Waste Operations and Emergency Response
	HBWSF	High-Bay Waste Storage Facility
	HCECs	Hydrochlorofluorocarbons

	HCF	Hot Cell Facility
	HDRV	Historical Disposal Requests Validation
	HE	high explosives
	HF	hydrofluoric
	HERMES-III	High Energy Radiation Megavolt Electron Source-III
	HLW	high-level radioactive waste
	HPML	High Power Microwave Laboratory
	HSWA	Hazardous and Solid Waste Amendments
	HWB	Hazardous Waste Bureau
	HWMF	Hazardous Waste Management Facility
I	IC	Institutional Control
	ICM	Interim Corrective Measure
	IGPP	Institutional General Plant Projects
	ILMS	Integrated Laboratory Management System
	IPOC	International Programs Building, and the Innovation Parkway Office Center
	IRP	Installation Restoration Program
	ISMS	Integrated Safety Management System
	ISO	International Organization for Standardization
J	JCEL	Joint Computational Engineering Laboratory
	JIT	Just-In-Time
K	KAFB	Kirtland Air Force Base
	KTF	Kauai Test Facility
L	LANL	Los Alamos National Laboratory
	LCBS	Lurance Canyon Burn Site
	LDR	Land Disposal Restrictions
	LE	Landfill Excavation
	LECS	Liquid Effluent Control System
	LEED	Leadership in Energy and Environmental Design
	LEED-CI	LEED for Commercial Interiors
	LEED-EB	LEED for Existing Buildings: Operations and Maintenance
	LEED-NC	LEED New Construction and Major Renovations
	LLRI	Lovelace Respiratory Research Institute
	LLW	low-level waste
	LTES	Long-Term Environmental Stewardship
	LTS	Long-Term Stewardship
	LTTD	Low-Temperature Thermal Desorption
	LWDS	Liquid Waste Disposal System
M	MAC	maximum allowable concentration
	MAPEP	Mixed Analyte Performance Evaluation Program
	MBTA	Migratory Bird Treaty Act
	MCL	maximum contaminant level
	MDA	minimum detectable activities
	MDL	Micorelectronics Development Laboratory (Chapters 1, 5, 6)
	MDL	minimum detection limit (Chapters 4, 7)
	MEI	maximally exposed individual
	MESA	Microsystems and Engineering Sciences Application
	MicroFab	Microsystems Fabrication facility
	MicroLab	Microsystems Integration Laboratory
	MIPP	Medical Isotope Production Project
	MNA	monitored natural attenuation
	MOC	Management and Operating Contract
	MP	monitoring point

	mrem/yr	millirems per year
	MSB	Manzano Storage Bunkers
	MSDS	Material Safety Data Sheet
	MW	mixed waste
	MWL	Mixed Waste Landfill
N	N/A	not available or not applicable
	NAAQS	National Ambient Air Quality Standards
	NARAC	National Atmospheric Release Advisory Center
	NDWS	National Drinking Water Standard
	NELAC	National Environmental Laboratory Accreditation Conference
	NEPA	National Environmental Policy Act
	NESHAP	National Emission Standards for Hazardous Air Pollutants
	NFA	No Further Action
	NGF	Neutron Generator Facility
	NGPF	Neutron Generator Production Facility
	NHPA	National Historic Preservation Act
	NISAC	National Infrastructure Simulation and Analysis Center
	NMAC	New Mexico Administrative Code
	NMSA	New Mexico Statutes Annotated
	NMAAQS	New Mexico Ambient Air Quality Standards
	NMED	New Mexico Environment Department
	NMHWA	New Mexico Hazardous Waste Act
	NMWQCC	New Mexico Water Quality Control Commission
	NNSA	National Nuclear Security Administration
	NOD	Notice of Disapproval
	NON	Notification on Non-compliance
	NOV	Notice of Violation
	NPDES	National Pollutant Discharge Elimination System
	NPL	National Priorities List
	NPN	nitrate plus nitrite
	NRC	National Response Center (Chapter 6)
	NRC	U.S. Nuclear Regulatory Commission (Chapter 2)
	NSPS	New Source Performance Standards
	NSR	New Source Review
	NWS	National Weather Service
O	ODS	Ozone-depleting substance
	OEM	Original Equipment Manufacturer
	OR	Occurrence Reporting
	ORPS	Occurrence Reporting Processing System
P	P2	Pollution Prevention
	PA/SI	Preliminary Assessment/Site Inspection
	PCB	polychlorinated biphenyl
	PCCP/PA	Post-Closure Care Plan/Permit Application
	PDWS	Primary Drinking Water Standard
	PEP	Performance Evaluation Plan
	PER	Performance Evaluation Report
	PETL	Processing and Environmental Technology Laboratory
	PGWS	perched groundwater system
	pH	potential of Hydrogen
	PM	particulate matter
	PM_{10}	respirable particulate matter (diameter equal to or less than 10 microns)
	$PM_{2.5}$	respirable particulate matter (diameter equal to or less than 2.5 microns)
	POTW	Publicly-owned Treatment Works
	PPOA	Pollution Prevention Opportunity Assessment

	PQL	Practical quantitation limit
	PRD	Process Research Development
	PSL	Primary Subliner
	PVC	polyvinylchloride
Q	QA	quality assurance
	QAP	Quality Assurance Program
	QAPP	Quality Assurance Project Plan
	QC	quality control
	QNR	Qualified NEPA Reviewers
	QSAS	Quality Systems Analytical Services
R	RAP	Remedial Action Proposal
	RCRA	Resource Conservation and Recovery Act
	R&D	research and development
	RFP	Request for Proposals
	RHEPP	Repetitive High Energy Pulsed Power (an accelerator facility)
	RITS	Radiographic Integrated Test Stand
	RMMA	Radioactive Material Management Areas
	RMWMF	Radioactive and Mixed Waste Management Facility
	ROD	Record of Decision
	RPSD	Radiation Protection Sample Diagnostics
	RQ	reportable quantity
	RSI	Request for Supplemental Information
	RWNMDD	Radioactive Waste/Nuclear Material Disposition Department
S	Sandia	Sandia Corporation
	SAP	Sampling and Analysis Plan
	SARA	Superfund Amendments and Reauthorization Act
	SD	sustainable design
	SDWA	Safe Drinking Water Act
	SEIS	Supplement Environmental Impact Statement
	SER	Sandia Engineering Reactor
	SGWS	shallow groundwater system
	SHPO	State Historic Preservation Officer
	SIC	Standard Industrial Classification
	SMO	Sample Management Office
	SNL/CA	Sandia National Laboratories, California
	SNL/NM	Sandia National Laboratories, New Mexico
	SOP	Standard Operating Procedure
	SOW	statement of work
	SPEIS	Supplemental Programmatic Environmental Impact Statement
	SPCC	Spill Prevention Control and Countermeasures (plan)
	SPHINX	Short Pulse High Intensity Nanosecond X-Radiator (an accelerator facility)
	SSO	Sandia Site Operations
	ST	stabilization treatment
	START	Sandia Tomography and Radionuclide Transport Laboratory
	STP	Site Treatment Plan
	SURF	Sandia Underground Reactor Facility
	SUWCO	Sewer Use and Wastewater Control Ordinance
	SVOC	Semi Volatile Organic Compound
	SWEIS	Site-Wide Environmental Impact Statement
	SWMU	Solid Waste Management Unit
	SWP3	Storm Water Pollution Prevention Plan
	SWTF	Solid Waste Transfer Facility
T	TA	Technical Area
	TAG	Tijeras Arroyo Groundwater

	TAL	Target Analyte List
	TCE	trichloroethylene
	TCLP	toxicity characteristic leaching procedure
	TDS	total dissolved solids
	TESLA	Tera-Electron Volt Energy Superconducting Linear Accelerator
	TLD	Thermoluminescent Dosimeter
	TLV	threshold limit value
	TMDL	Total Maximum Daily Load
	TNMHC	total non-methane hydrocarbon
	TOC	Total Organic Carbon
	TOMP	Toxic Organic Management Plans
	TOP	Technology and Operations Prototype
	TOX	total halogenated organics
	TPH	Total Petroleum Hydrocarbons
	TRI	Toxic Release Inventory
	TRU	transuranic (radioactive waste)
	TSCA	Toxic Substances Control Act
	TSD	treatment, storage, and disposal
	TSP	total suspended particulate
	TSS	total suspended solids
	TTC	Thermal Test Complex
	TTF	Thermal Treatment Facility
	TTR	Tonopah Test Range
U	UAW	unaccounted for water
	UNM	University of New Mexico
	USAF	U.S. Air Force
	USDA	U.S. Department of Agriculture
	USFS	U.S. Forest Service
	USGBC	U.S Green Building Council
	USGS	U.S. Geological Survey
	UST	underground storage tank
V	VCA	Voluntary Corrective Action
	VCM	Voluntary Corrective Measure
	VOC	volatile organic compound
	VSA	Vertical Sensor Array
	VZMS	Vadose Zone Monitoring System
W	WERC	a consortium for environmental education and technology development established through a cooperative agreement with DOE
	WFO	work for others
	WIF	Weapons Integration Facility
	WIPP	Waste Isolation Pilot Plant
	WQG	Water Quality Group
Z	Z-Machine	Z Accelerator

UNITS OF MEASURE

bgs	below ground surface
°C	degrees Celsius
cm	centimeter
°F	degrees Fahrenheit
fasl	feet above sea level
ft	feet
g	gram
gal	gallon
gpcd	gallons per capita per day
kg	kilogram
km	kilometer
kW	kilowatt
L	liter
lb	pound
mb	millibar
m/s	miles per second
mg	milligram
mm	million
mph	miles per hour
ppb	parts per billion
ppbv	parts per billion by volume
ppm	parts per million
scf	standard cubic feet
tpy	tons per year
yr	year

RADIOACTIVITY MEASUREMENTS

rem	roentgen equivalent man	Sv	Sievert
mrem	millirem (unit of radiation dose)	Ci	curie
person-Sv	person-Sievert (unit of radiation dosage)	pCi	picocurie
person-rem	radiation dose to population (also man-rem)	µg	microgram
mSv	millisievert (unit of radiation dosage)	mR	milliroentgen
µR/hr	microroentgen per hour	Std Dev	standard deviation

APPROXIMATE CONVERSION FACTORS FOR SELECTED SI (METRIC) UNITS

Multiply SI (Metric) Unit	By	To Obtain U.S. Customary Unit
Cubic meters (m^3)	35.32	Cubic feet (ft^3)
Centimeters (cm)	0.39	Inches (in.)
Meters (m)	3.28	Feet (ft)
Kilometers (km)	0.61	Miles (mi)
Square kilometers (km^2)	0.39	Square miles (mi^2)
Hectares (ha)	2.47	Acres
Liters (L)	0.26	Gallons (gal)
Grams (g)	0.035	Ounces (oz)
Kilograms (kg)	2.20	Pounds (lb)
Micrograms per gram (mg/g)	1	Parts per million (ppm)
Milligrams per liter (mg/L)	1	Parts per million (ppm)
Celsius (°C)	9/5 °C+ 32=°F	Fahrenheit (°F)
Sievert (Sv)	100	roentgen equivalent man (rem)

This page intentionally left blank.

EXECUTIVE SUMMARY

"Smoke - Free at SNL" 2007 Photo Contest - Honorable Mention, photo by Don M. Watenpaugh.

Included are summaries of the following Environmental Programs in place at Sandia National Laboratories, New Mexico (SNL/NM):

Waste Management and Pollution Prevention (P2)
Environmental Restoration (ER) Project
Long-Term Environmental Stewardship (LTES)
Terrestrial Surveillance
Water Quality
Groundwater Protection
Air Quality
National Environmental Policy Act (NEPA) Activities

Sandia National Laboratories, New Mexico (SNL/NM) is one of the nation's premier multi-program national security laboratories. Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, manages and operates the laboratory for the U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA). The DOE/NNSA Sandia Site Office (SSO) administers the contract and oversees contractor operations at the site. This Annual Site Environmental Report (ASER) was prepared in accordance with and as required by DOE Order 450.1, *Environmental Protection Program* (DOE 2007a) and DOE Manual 231.1-1A, *Environment, Safety, and Health Reporting* (DOE 2007).

This ASER summarizes the environmental protection, restoration, and monitoring programs in place at SNL/NM for Calendar Year (CY) 2007. It also discusses Sandia's compliance with environmental statutes, regulations, DOE orders and permit provisions, and it highlights significant environmental program efforts and accomplishments. This ASER is a key component of DOE's effort to keep the public informed about environmental conditions throughout the DOE/NNSA nuclear weapons complex.

Environmental Programs

Sandia's methodology for managing and implementing its Environment, Safety, and Health (ES&H) Program is outlined in the Integrated Safety Management System (ISMS). The ISMS is centered upon five safety management functions that provide processes to guide management in identifying and controlling hazards. Furthermore, Sandia implemented an Environmental Management System (EMS) to enhance the ISMS. The EMS is the component of ISMS that addresses the environmental aspects and impacts of SNL/NM's activities, products, and services. In 2007, SNL/NM continued to improve environmental management by utilizing best management practices (BMPs), benchmarking, and process improvements. Further information about EMS and ISMS can be found in Chapters 3 and 8, respectively.

In December 2005, Sandia informed the DOE/NNSA/SSO that it had fully implemented its EMS in accordance with the requirements outlined in DOE Order 450.1. Thus, the EMS fully serves as Sandia's proactive approach to managing environmental risks and protecting the environment.

While all 2007 program activities are performed continuously, they are reported in this ASER on a calendar year basis, unless otherwise noted (programs based on the Fiscal Year [FY] run from October 1st through September 30th, annually). A summary of the primary environmental programs in place at SNL/NM are summarized in the following sections.

Waste Management and Pollution Prevention (P2)

Waste at SNL/NM is processed at five facilities: the Hazardous Waste Management Facility (HWMF), the Thermal Treatment Facility (TTF), the Radioactive and Mixed Waste Management Facility (RMWMF), the Manzano Storage Bunkers (MSB), and the Solid Waste Transfer Facility (SWTF).

The P2 program provides assessment and guidance to the line to implement measures that reduce resource use and generated waste and to enhance the overall efficiency of processes and organizations within SNL/NM. In 2007, SNL/NM received several awards for P2 accomplishments.

Environmental Restoration (ER) Project

The ER Project collects groundwater samples at five general project areas: the Chemical Waste Landfill (CWL), the Mixed Waste Landfill (MWL), Technical Area (TA) -V, Tijeras Arroyo Groundwater (TAG), and Burn Site Groundwater (BSG). Water quality results reported by the ER Project were consistent with past years' results.

At the close of CY 2007, there were 61 regulated ER sites remaining to be completed at SNL/NM; 54 sites are pending final regulatory approval by the New Mexico Environment Department (NMED) through the Class III Permit modification process. Of the seven remaining sites, five have received Corrective Action Complete (CAC) determinations from NMED, which is required prior to the final approval for Class III Permit Modification. The two remaining sites consist of the CWL, which is on a separate regulatory path requiring a stand-alone permit, and the MWL which will continue into FY 2009 or beyond. Final remedies are pending for three groundwater Areas of Concern (AOCs) – TA-V, TAG, and BSG.

Long-Term Environmental Stewardship (LTES)

The SNL/NM LTES Program provides environmental stewardship for past, present, and future activities at Sandia. LTES "*promotes the long-term stewardship* *of a site's natural and cultural resources throughout its operational, closure, and post-closure life cycle*" (DOE/SNL 2006). The environmental programs referred to in this document support that stewardship.

Long-Term Stewardship (LTS)

A component of the LTES Program is LTS of legacy sites. Stewardship of legacy sites is defined as activities necessary to maintain long-term protection of human health, the environment, and natural and cultural resources from hazards associated with residual radioactive and hazardous contamination at former ER sites. Sandia's LTS activities are increasing as remedial activities required by ER sites are completed. The LTS Program conducts compliance oversight activities, including long-term monitoring, to comply with NMED's requirements. It also conducts institutional control and community outreach to keep the public informed of the LTS Program activities.

Compliance Oversight Activities, Institutional Control (IC) Activities and Community Liaison and Stakeholder Involvement Activities for 2007 are summarized in Section 3.2.3 of this year's ASER.

Terrestrial Surveillance

The terrestrial surveillance sampling objectives are conducted to detect any potential releases or migration of contaminated material to off-site locations. Soil, sediment, and vegetation are collected from on-site, perimeter, and off-site locations (community locations outside Kirtland Air Force Base [KAFB] boundaries). In 2007, there were no terrestrial sample results indicating concerns that would prompt actions at locations that are not already being addressed by the ER Project.

In lieu of routine sampling at all locations for non-radiological parameters, a special sampling campaign and summary report of non-radiological results was prepared for several locations. The southern end of the Long Sled Track and the area refered to as Thunder Range serve as a baseline for future reference regarding non-radiological results in nearby soils. Furthermore, in the future, routine sampling for non-radiological parameters at fixed locations will be reduced, and more emphasis will be placed on sampling specific areas of interest with potential environmental impact. The total number of samples collected annually, however, should remain approximately the same.

Water Quality

- ***Wastewater –*** Wastewater from SNL/NM is discharged from six on-site outfalls permitted by the Albuquerque Bernalillo County Water Utility Authority (ABCWUA). Wastewater monitoring is conducted to ensure that all discharges meet the standards set by the ABCWUA's publicly owned treatment works (POTW). During CY 2007 there were no reportable events, and all discharge parameters were met; this resulted in SNL/NM receiving six "Gold Pre-Treatment Awards" from the ABCWUA for 2006-2007.

- ***Surface Discharge –*** All water that will be discharged to the ground surface, either directly or to lined containments, must meet State of New Mexico surface discharge standards. There were 22 internal requests made for individual discharges to the surface in 2007. All requests met the NMED / New Mexico Water Quality Control Commission (NMWQCC) standards, and were approved by Sandia. Additionally, routine surface discharges are made to two evaporation lagoons that service the Pulsed Power Facility under an existing discharge permit. During CY 2007, all permit requirements for both lagoons were met, however, there were three unplanned surface releases reported to NMED. These reportable releases are documented in Sections 2.2.2 and 6.2.2 of this report.

- ***Storm Water Runoff*** – In FY 2007, the only analytical monitoring that was required under SNL/NM's National Pollutant Discharge Elimination System (NPDES) Multi-Sector General Permit for Storm Water Discharges Associated with Industrial Activities (Multi-Sector General) was for an annual fecal coliform analysis required by the State of New Mexico. A fecal coliform sample was not collected in CY 2007 due to insufficient water flow during normal buiness hours. The current NPDES permit requires that quarterly analytical sampling be conducted in the second and fourth year of the five-year permit, weather permitting. FY 2004 was the fourth year of the permit, and the last year that analytical monitoring was required.

The permit also requires that visual observations be performed every quarter, weather permitting. No visual observations were collected for the first three quarters of FY 2007 due to the lack of adequate runoff during normal business hours. The permit was due for renewal in FY 2005, but the U.S. Environmental Protection Agency (EPA) did not issue a new permit and extended the current permit into 2007.

- ***Oil Storage and Spill Control –*** A Spill Prevention Control and Countermeasures (SPCC) Plan is required under the Clean Water Act (CWA). Sandia's SPCC Plan describes the oil storage facilities and the mitigation controls in place to prevent inadvertent discharges of oil. The facilities at SNL/NM that are subject to regulations include oil storage tanks (above ground storage tanks [ASTs] and underground storage tanks [USTs]), bulk storage areas (multiple containers), and temporary or portable tanks. SNL/NM currently operates 51 ASTs and five USTs.

Groundwater Protection

- ***Groundwater Protection Program (GWPP)-*** The GWPP conducts general surveillance of water quality from a network of wells not directly associated with ER Project sites. Annual sampling was conducted from 11 wells and one spring. Analyses were conducted for metals, volatile organic compounds (VOCs), inorganics (including nitrate and cyanide), phenolics, alkalinity, total halogenated organics (TOXs), gross alpha, gross beta, and selected radionuclides. The final quarter of perchlorate analysis was conducted on the sample obtained from the SWTA-MW4 well as part of the perchlorate screening required by the Compliance Order on Consent (COOC) between Sandia, DOE, and NMED. The perchlorate concentration was below the 4 microgram per liter (µg/L) action level established by the NMED Hazardous Waste Bureau (HWB). Naturally occurring fluoride concentrations in excess of the NMWQCC standard of 1.6 milligram per liter (mg/L) were detected in four monitoring wells. None of the wells exceeded the National Drinking Water Standard (NDWS) of 4 mg/L. A beryllium concentration of 6.39 µg/L in the Coyote Springs sample exceeded the EPA Primary Drinking Water Standard (PDWS) maximum contaminant level (MCL) of 4.0 µg/L. Elevated beryllium levels have been consistently detected at similar levels in the springs and are assumed to be of natural origin.

- ***ER*** – The ER Project collects groundwater samples at five general project areas: the CWL, the MWL, TA-V, TAG, and BSG. Water quality results reported by the ER Project were consistent with results from past years. For the samples from the CYN-MW6 well, located at the Burn Site, the perchlorate concentration was above the 4 µg/L action level. The highest value was 8.93 µg/L. No maximum concentration limit or maximum allowable concentration currently exists for perchlorate. All quarterly perchlorate reports were submitted in compliance with the COOC.

Air Quality

- ***Ambient Air Monitoring –*** Sandia measures ambient air quality at six locations throughout SNL/NM, and compares results with National Ambient Air Quality Standards (NAAQS) and local ambient air regulations. The network monitors criteria pollutants and VOCs.

- ***Air Quality Compliance (AQC) –*** Air quality standards are implemented by regulations promulgated by local and federal governments in accordance with the Clean Air Act (CAA) and the CAA Amendments (CAAA) of 1990. The Albuquerque Bernalillo County Air Quality Control Board (ABC/AQCB), the State of New Mexico and the EPA determine applicable air quality standards for non-radiological pollutants.

  The AQC program currently maintains 14 issued authority-to-construct (ATC) New Source Review (NSR) permits; and four issued NSR registrations from the City of Albuquerque (COA). Currently, there is one ATC NSR permit and 11 NSR source registrations pending issuance with the COA. The AQC program and the COA are currently negotiating the consolidation of applicable permits and registrations into three sitewide permits—sitewide generators, sitewide boilers, and sitewide chemicals—so that management can more efficiently comply with permitting units.

- ***Radiological National Emission Standards Hazardous Air Pollutants Compliance*** (NESHAP) **–** Subpart H of NESHAP regulates radionuclide air emissions from DOE/NNSA facilities, with the exception of naturally occurring radon. In 2007, there were 15 SNL/NM facilities reporting NESHAP regulated emissions. Of these 15 sources, 14 were point sources and one a diffuse source. In 2007, the primary radionuclides released were tritium and argon-41. In 2007, the on-site maximally exposed individual (MEI) was located on KAFB. The MEI dose of 9.98E-04 millirems per year (mrem/yr) at the Chestnut Site resulted primarily from releases of tritium from the Annular Core Research Reactor (ACRR) in TA-V and the Radioactive and RMWMF in TA-III. The off-site MEI was located at the Eubank Gate Area. The MEI of 7.01E-04 mrem/yr at the Eubank Gate Area resulted primarily from releases of tritium from the Neutron Generator Facility (NGF) in TA-I. Both doses are well below the 10 mrem/yr EPA standard.

National Environmental Policy Act (NEPA) Activities

The Site-Wide Environmental Impact Statement (SWEIS) update process was significantly revised during CY 2007 to better track and evaluate environmental operational limits at both the facility and site level. Environmental Planning personnel met with representatives from 37 facilities to discuss environmental operating limits and their significance within the SWEIS and other NEPA coverage. Discussions were held regarding the reasons for exceeding operational parameters, as well as contextualizing future exceedences. For example, is an exceedance a one-time event, or did it effect permanent change in facility configuration or operations?

"Metal Boxes with Rods" 2007 Photo Contest, photo by Don M. Watenpaugh. (copy shown was modified from the original photo).

Operating parameter projections for CY 2007 and CY 2008 were developed using the best available information for future activities. To aid in the evaluation of operational limits, the format for the SWEIS update report was modified to discuss exceedances within the context of environmental impacts analyzed in the SWEIS, to enable better judgment about whether an exceedance could result in effects to the environment. For the first time, projections for environmental parameters at facilities were rolled up to develop site-wide projections for CY 2007 and CY 2008, alerting decision-makers to the potential for future exceedances of site-wide parameters.

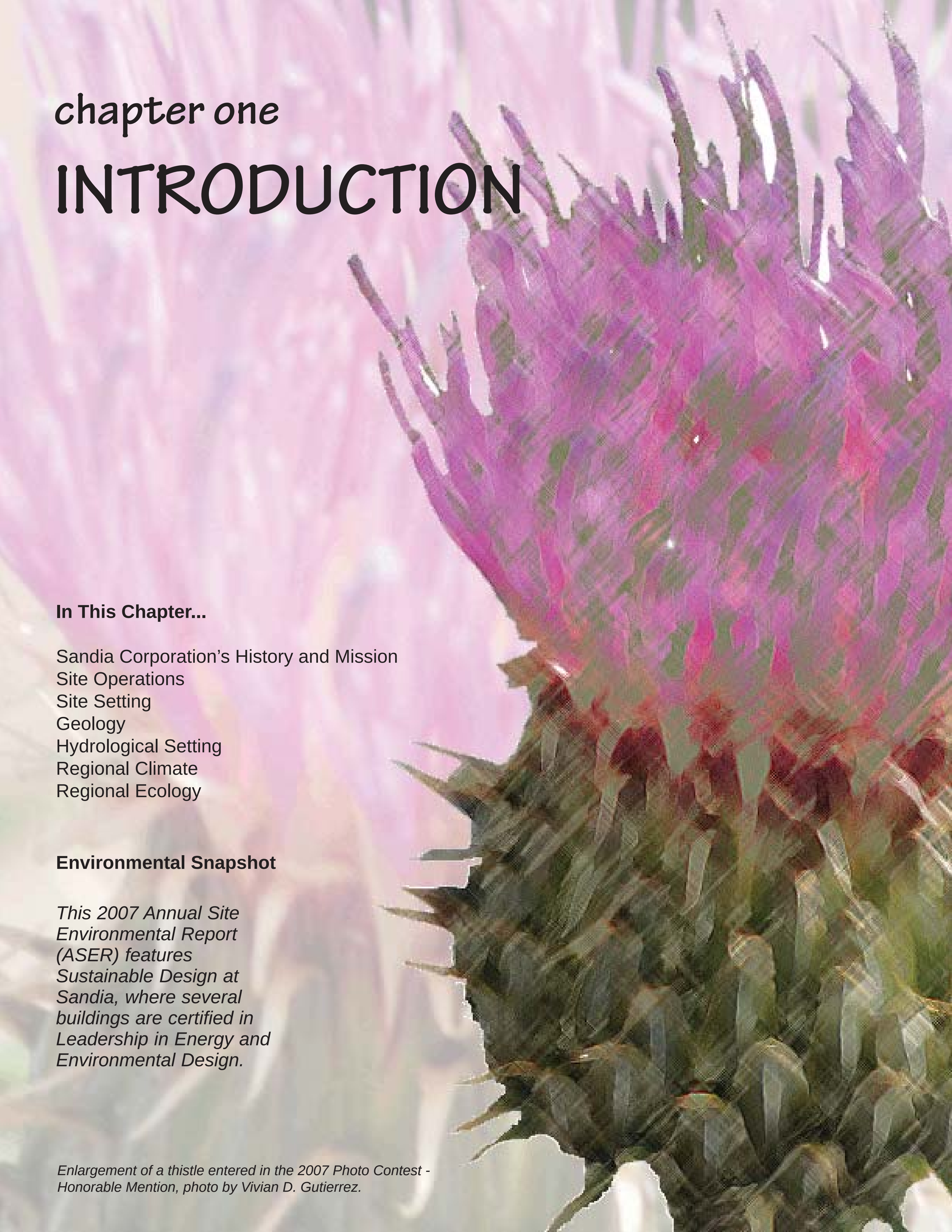
The SWEIS Update Report for CY 2006 is similar to the annual reviews performed in previous years by the NEPA Team. It was written to examine values for key parameters used in the SWEIS analyses (as updated in subsequent NEPA documentation) to identify resource areas where there may be environmental concerns and/or gaps in NEPA coverage.

The NEPA Team participated in the initial planning and data collection for:

(1) the Draft Environmental Assessment (EA) for the Expansion of Permitted Land and Operations at the 9940 Complex and Thunder Range at SNL/NM;
(2) a Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement (Draft Complex Transformation SPEIS, formerly Complex 2030 Supplement Environmental Impact Statement [SEIS]) (DOE/EIS-0236-S4); and
(3) a Draft Environmental Impact Statement/ Overseas Environmental Impact Statement for the Hawaii Range Complex.

The NEPA Team reviewed a total of 485 proposed projects in the ISMS NEPA Module or Experiment Development Plan (EDP) system and provided 50 NEPA checklists to DOE/NNSA/SSO for review and determination in 2007.

This page intentionally left blank.



chapter one

INTRODUCTION

In This Chapter...

Sandia Corporation's History and Mission
Site Operations
Site Setting
Geology
Hydrological Setting
Regional Climate
Regional Ecology

Environmental Snapshot

This 2007 Annual Site Environmental Report (ASER) features Sustainable Design at Sandia, where several buildings are certified in Leadership in Energy and Environmental Design.

Enlargement of a thistle entered in the 2007 Photo Contest - Honorable Mention, photo by Vivian D. Gutierrez.

This Annual Site Environmental Report (ASER) describes the environmental protection programs currently in place at Sandia National Laboratories, New Mexico (SNL/NM). This report is prepared in accordance with the requirements set forth for all large U.S. Department of Energy (DOE) National Nuclear Security Administration (NNSA) facilities, which includes SNL/NM. This ASER represents a key component of DOE's effort to keep the public informed about environmental conditions at DOE/NNSA sites.

SNL/NM is located on Kirtland Air Force Base (KAFB) in Albuquerque, New Mexico. The regional setting of SNL/NM provides a diverse range of geological, hydrological, climatic, and ecological settings. The Sandia Mountains were named for the rosie pink color (comparable to the fruit inside a watermelon) that the mountains turn at sunset—"watermelon" translates to "sandia" in Spanish. The Manzanita Mountains (just to the south of the Sandias) provide the beautiful setting at SNL/NM.

Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation, has provided technological innovations "in exceptional service to the national interest" since its inception. The majority of SNL/NM activities are conducted within five technical areas (TA-I, II, III, IV, and V) and several remote locations.

In support of its mission, Sandia addresses environment, safety, and health (ES&H) issues through its environmental management (EM) programs. These programs include waste management, pollution prevention (P2), environmental restoration (ER), long-term environmental stewardship (LTES), terrestrial surveillance, water quality (surface and waste water), oil storage, spill prevention, groundwater, air quality, National Enviromental Policy Act (NEPA), chemical inventory management, and quality assurance (QA).

General Site Location and Characteristics

KAFB is a 51,559 acre military installation that includes 20,486 acres withdrawn from the Cibola National Forest through an agreement with the U.S. Forest Service (USFS) (Figure 1-1). Located at the foot of the Manzanita Mountains, it has a mean elevation of 5,384 feet and a maximum elevation of 7,986 feet. KAFB and SNL/NM are located adjacent to the City of Albuquerque (COA), which borders KAFB on its north, northeast, west, and southwest boundaries.

KAFB is host to more than 150 tenant groups. SNL/NM is located on the east side of KAFB. The total area of DOE/NNSA owned property dedicated to SNL/NM facilities and operations is approximately 8,585 acres. Sandia conducts operations within 2,841 acres of that land. An additional 5,817 acres in remote areas are provided to DOE through land use agreements with the U.S. Air Force (USAF) and Isleta Pueblo indian reservation. An additional 9,000 acres serve as a buffer zone near the southwest boundary of KAFB. This buffer zone, leased from the State of New Mexico and Isleta Pueblo (both own the land), provides margins of safety and sound buffers for SNL/NM testing activities. Additional information on local geology, hydrology, and ecology is located in Sections 1-4 of this chapter.

The development of a 12,500 acre mixed-use urban community named Mesa del Sol, which began in 2006 on the COA land adjacent to the western boundary of KAFB, is still under development. The development's master plan projects that the community will ultimately reach 90,000 residents. To date, several business and industrial facilities have been completed, however, no residential development has begun.

Operations Contract

Sandia, like all regulated industries, complies with specific environmental regulations promulgated by local, state, and federal agencies. The Management and Operating Contract (MOC) between Sandia and DOE defines the primary contractual obligations for operating SNL/NM. This contract also drives Sandia's ES&H standards and requirements. Additionally, as stated in the MOC, Sandia must comply with DOE directives that establish specific requirements for environmental programs. The six primary DOE directives currently on the contract baseline that pertain to environmental protection and management, starting with the most recent, are listed below:

- DOE Order 450.1, *Environmental Protection Program* (DOE 2007)
- DOE Manual 231.1-1A, *Environment, Safety, and Health Reporting* (DOE 2007)
- DOE Manual 231.1-2, *Occurrence Reporting and Processing of Operations Information* (DOE 2003)
- DOE Order 435.1, Chg 1, *Radioactive Waste Management* (DOE 2001)
- DOE Order 5400.5, Chg 2, *Radiation Protection of the Public and the Environment* (DOE 1993)
- SEN-22-90, *DOE Policy on Signatures of RCRA Permit Applications* (DOE 1990)

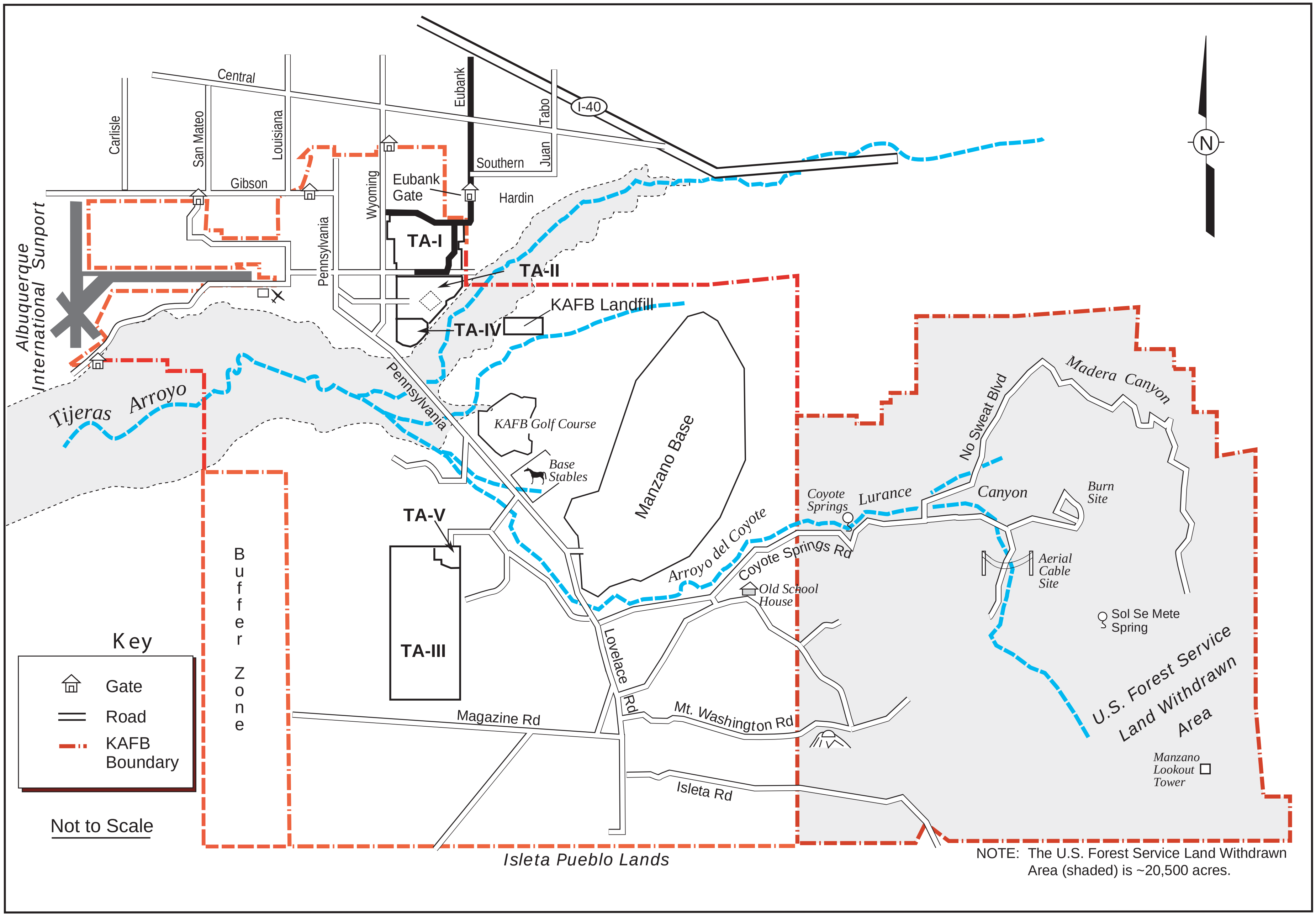


FIGURE 1-1. SNL/NM Technical Areas and the U.S. Forest Service Land Withdrawn Area

1.1 SANDIA CORPORATION'S HISTORY AND MISSION

History

SNL/NM began operations in 1945 as Z Division, the ordnance design, testing, and assembly arm of Los Alamos National Laboratory. The division moved to Sandia Base (now merged into KAFB) which is located on the perimeter of the City of Albuquerque, to be near an airfield and to work closely with the military. Due to its growth, Z Division became a separate branch of Los Alamos in 1948 and was renamed "Sandia Laboratory." On November 1, 1949, Sandia, a subsidiary of Western Electric, began managing SNL/NM. In 1979, Congress recognized Sandia as a national laboratory. In 1993, Sandia became a wholly owned subsidiary of Lockheed Martin Corporation (formerly Martin Marietta).

Mission

Sandia's enduring mission is to provide science and engineering support for the nation's nuclear weapons stockpile. Today, that mission has grown to include other critical aspects of national security such as preventing the spread of nuclear, chemical, and biological weapons; developing technologies and strategies for responding to emerging threats such as terrorism; and protecting and preventing the disruption of critical infrastructures such as the nation's energy supply and financial networks. Sandia also collaborates with representatives from the industrial sector, universities, and other government agencies to develop and commercialize new technologies. Information about recent technologies developed at SNL/NM can be found at this web site:

http://www.sandia.gov/LabNews

Managing a Legacy of Contamination

In a ranking of DOE sites, SNL/NM was ranked one of the least contaminated facilities. Currently, 263 of 265 ER sites are considered complete based on a New Mexico Environmental Department (NMED) determination. One of the remaining sites, Solid Waste Management Unit (SWMU) 58, is scheduled for completion in 2007, however, there has been a significant delay in the receipt of final regulatory approval for the Mixed Waste Landfill (MWL). Some sites require long-term monitoring to ensure that any residual contamination does not migrate from the site. Detailed information about EM cleanup efforts throughout DOE can be found at DOE's website, and at Sandia's LTES website:

http://www.em.doe.gov/pages/emhome.aspx

http://www.sandia.gov/ltes

A History of Progress

Sandia has achieved substantial growth and progress in building its comprehensive ES&H Program. The ES&H Manual (SNL 2008) is a dynamic online resource. It is available to all Sandia personnel and clearly describes ES&H requirements for all levels of work conducted. Improved waste management practices have been implemented, and state-of-the-art waste handling facilities have been constructed to handle and properly dispose of hazardous, radioactive, and solid waste. Recycling programs, P2, and other waste minimization practices have been very successful at SNL/NM. Several audits have been conducted in recent years by the U.S. Environmental Protection Agency (EPA), various DOE/NNSA offices, the COA, and the State of New Mexico. The results of these audits, as well as SNL/NM internal audits, support Sandia's ongoing commitment to ES&H practices at SNL/NM.

Sandia's strategy for managing and implementing its ES&H Program is described in the Integrated Safety Management System (ISMS). The ISMS is structured around five safety management functions: (1) plan work, (2) analyze hazards, (3) control hazards, (4) perform work, and (5) feedback and improvement. The ISMS provides processes that guide line management to identify and control hazards. For further information on audits and appraisals, see Section 2.3.

Environmental Management System (EMS)

Sandia implemented an EMS to improve the environmental elements of ISMS. The EMS serves as the basis to manage environmental compliance, controls, and improvements. Furthermore, P2 goals were incorporated to strengthen the EMS. This strategy ensures that ES&H considerations are incorporated into each element of all work processes being conducted by Sandia. For further information on EMS, see Section 3.1.

1.2 SITE OPERATIONS

TA-I

TA-I is the focus of SNL/NM's operations and houses the main administrative center and a close grouping of laboratories and offices. A majority of activities performed in TA-I are dedicated to design, research and development (R&D) of weapon systems, the limited production of weapon systems components, and energy research programs. Facilities in TA-I include the main technical library, several assembly/manufacturing areas, the Steam Plant, and various laboratories such as the Advanced Manufacturing Processes Laboratory (AMPL), the Microelectronics Development Laboratory (MDL), the Neutron Generator Facility (NGF), the Processing and Environmental Technology Laboratory (PETL), and the Joint Computational Engineering Laboratory (JCEL).

The Microsystems and Engineering Sciences Applications (MESA) Project is the largest major capital construction project ever undertaken at SNL/NM and represents a key component in the Nuclear Stockpile Transformation through integrated microsystems. The MESA Complex consists of three unique facilities: the Microsystems Fabrication Facility (MicroFab), the Microsystems Integration Laboratory (MicroLab), and the Weapons Integration Facility (WIF). Combined, the MESA Complex provides the systems designers, component designers, processes and equipment required to design and prototype qualified microsystem-based components for maintaining a national nuclear deterrent. All construction activities have been completed in support to the MESA Complex. The MicroLab is currently operational. The MicroFab is nearing completion of the semiconductor tooling process and is partially operational; it is expected to be fully operational by Fiscal Year (FY) 2009. The WIF is anticipated to be fully operational by the end of Calendar Year (CY) 2008.

TA-II

TA-II includes facilities and lands south of the TA-I boundary at Hardin Boulevard and extends to the northern boundary of TA-IV. The Explosive Components Facility (ECF), the Hazardous Waste Management Facility (HWMF), the Facilities Command Center, the Solid Waste Transfer Facility (SWTF), and the Construction and Demolition (C&D) Recycle Center are within TA-II. The National Infrastructure Simulation & Analysis Center (NISAC) was completed in 2006.

TA-III

TA-III is the largest and most remote area of all the TAs and is characterized by facilities separated by extensive undeveloped areas. TA-III is used to accommodate large-scale engineering test activities requiring large safety and/or security area buffers such as collision testing sled tracks, centrifuges, and the Thermal Test Complex (TTC). Other facilities include the Radioactive and Mixed Waste Management Facility (RMWMF), the Chemical Waste Landfill (CWL), the Mixed Waste Landfill (MWL), and the Corrective Action Management Unit (CAMU).

TA-IV

TA-IV, located south of TA-II, houses facilities used to conduct R&D activities in inertial-confinement fusion, pulsed power, and nuclear particle acceleration. Accelerators located in TA-IV include the Z Accelerator (Z-Machine), the Advanced Pulsed Power Development Laboratory (APPDL), the Radiographic Integrated Test Stand (RITS), the Tera Electron Volt Energy Superconducting Linear Accelerator (TESLA), the High Energy Radiation Megavolt Electron Source III (HERMES-III), the Saturn Accelerator, the Repetitive High Energy Pulsed Power I (RHEPP I) Accelerator, the High Power Microwave Laboratory (HPML), and the Short-Pulse High Intensity Nanosecond X Radiator (SPHINX).

TA-V

TA-V, located adjacent to the northeast corner of TA-III, includes facilities that routinely handle radioactive materials used in experimental R&D programs. TA-V houses the Gamma Irradiation Facility (GIF), the Annular Core Research Reactor (ACRR), the Hot Cell Facility (HCF), and the Auxiliary Hot Cell Facility (AHCF).

Remote Test Areas

Several remote test areas are located east and southeast of TA-III and within the canyons and foothills of the USFS withdrawn area (Lurance Canyon and Coyote Canyon). These areas are used for explosive ordnance testing, rocket firing experiments, and open burn thermal tests.

Facilities Outside KAFB Boundaries

Facilities that are (or will be) utilized by SNL/NM personnel, but outside the boundaries of KAFB, include the Center for Integrated Nanotechnologies (CINT), the MESA Technology and Operations Prototype (TOP), the International Programs Building, and the Innovation Parkway Office Center (IPOC). A new National Museum of Nuclear Science & History is currently under construction. All of these buildings are located along Eubank Boulevard SE.

1.3 SITE SETTING

Regional Topography and Layout

KAFB has a widely varied topography, ranging from rugged mountains on the east to nearly flat plains on the west. As shown in Figure 1-1, the land withdrawn area backs up to and encompasses a portion of the Manzanita Mountains within Cibola National Forest. The remainder of KAFB, with the exception of Manzano Base, is situated on gently west-sloping foothill terrain that grades to widespread flat areas where the majority of the USAF and SNL/NM facilities are located.

The Mountains

The most prominent topographic feature in the Albuquerque area is the impressive west face of the Sandia Mountains. The Sandia Mountains form a 13 mile long escarpment distinguished by steep cliffs, pinnacles, and narrow canyons. At 10,678 feet, Sandia Crest is the highest point in the region. Tijeras Canyon divides the Sandia Mountains to the north from the Manzanita and Manzano Mountains to the south. Sediments transported from the canyons and draws of these mountains have formed coalescing alluvial fans called bajadas. These broad alluvial plains slope west across KAFB and are dissected by Tijeras Arroyo and smaller arroyos and washes.

Tijeras Arroyo

At approximately ¾ of a mile wide, Tijeras Arroyo is a significant topographic feature that cuts diagonally northeast to southwest across KAFB. The watershed drained by Tijeras Arroyo includes the southern Sandia Mountains, the Manzanita Mountains, and the north end of the Manzano Mountains. The arroyo is normally dry except during heavy downpours, which can cause significant flash floods. The arroyo originates in Tijeras Canyon and runs coincident with the Tijeras Fault for several miles before deviating to the southwest, where it discharges to the Rio Grande about eight miles from the west boundary of KAFB.

Rio Grande

Today, water from the Rio Grande is primarily used for agricultural irrigation. Construction is currently underway to build a water treatment plant that will use water from the river to supplement the COA's drinking water supply.

Counties and Population

New Mexico is the fifth largest state in the U.S., with approximately 121,666 square miles in size. Its population is approximately 1.93 million. A recent count of the population within an 80-kilometer (50 mile) radius of SNL/NM was 854,211 residents (DOC 2008). Approximately 723,296 reside in the Albuquerque metro area (DOC 2008). Nine counties are contained, or partly included, in this radius (Figure 1-2).

1.4 GEOLOGY

1.4.1 Regional Setting

The regional geologic setting in which SNL/NM and KAFB are situated has been subjected to relatively recent episodes of basaltic volcanism and ongoing regional rifting (crustal extension). The Rio Grande Rift has formed a series of connected down-dropped basins in which vast amounts of sediments have been deposited. The Rio Grande Rift extends for about 450 miles from Leadville, Colorado to northern New Mexico.

1.4.2 Albuquerque Basin

The Albuquerque Basin is one of several north-south trending sediment-filled basins formed by the Rio Grande Rift. This major structural feature is approximately 30 miles wide, 100 miles long, and 3,000 square miles in area (Grant 1982). On the east, uplifted fault blocks manifested by the Sandia, Manzanita, and Manzano Mountains bound the basin. The western side of the basin is bound by the Lucero Uplift to the south, the Rio Puerco Fault Belt, and the Nacimiento Uplift at its northern end. There is relatively little topographic relief along the Rio Puerco Fault Belt on the northwestern side of the basin. Two south-flowing rivers drain the basin — the Rio Puerco to the west, and the Rio Grande to the east.

Regional Fault Systems

As shown in Figure 1-3, several major faults are located on KAFB. Tijeras Fault, which has been traced as far north as Madrid, New Mexico, trends southwesterly through Tijeras Canyon and across KAFB. Tijeras Canyon was formed by preferential erosion along the fault. The system of faults connecting with the Tijeras Fault on KAFB is collectively referred to as the Tijeras Fault Complex. The Tijeras Fault Complex marks a distinct geologic boundary between the uplifted blocks on the east and the sediment-filled basin to the west. This geologic boundary also forms a boundary between the two major groundwater regimes at KAFB. For further information on hydrological settings, see Section 1.5.

The Sandia Fault is thought to be the primary boundary between the Sandia Mountains and the Albuquerque Basin. The Sandia Fault converges with the Tijeras Fault and the Hubbell Springs Fault. Both the Sandia Fault and Hubbell Springs Fault are north-south trending, down-to-the-west, en-echelon normal faults, which are Tertiary in age (Lozinsky et al. 1991; Woodward 1982; Kelley 1977).

1.5 HYDROLOGICAL SETTING

The hydrogeological system is divided into two areas separated by the Tijeras Fault Complex, which marks a distinct geological boundary. To the east of the Tijeras Fault Complex, the geology is characterized by fractured and faulted bedrock covered by a thin layer of alluvium and shallow groundwater 45 to

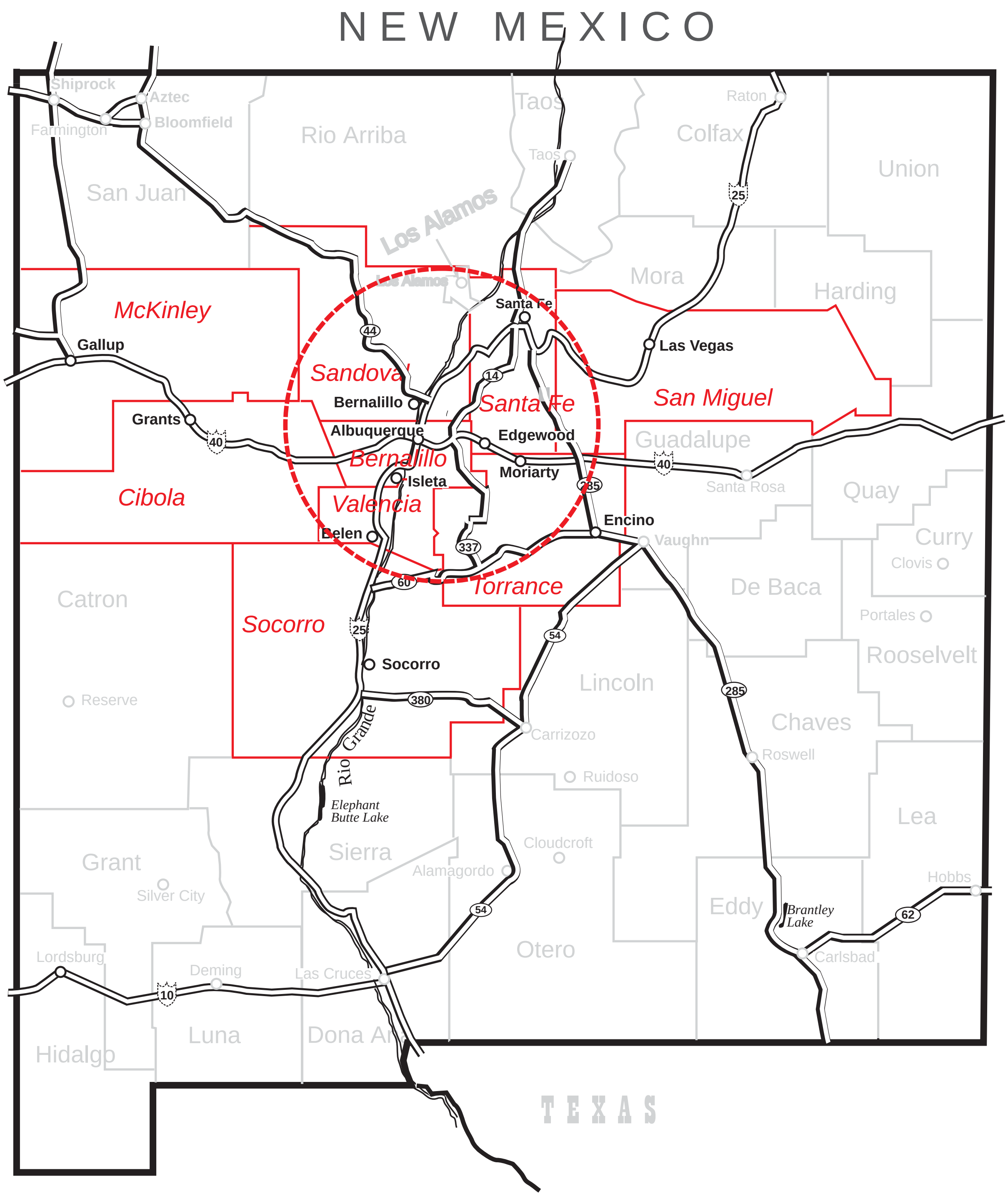


FIGURE 1-2. State of New Mexico Map

The overlay shows major roads, cities, and county lines.

The dashed circle encompasses the 50-mile radius from SNL/NM facilities.

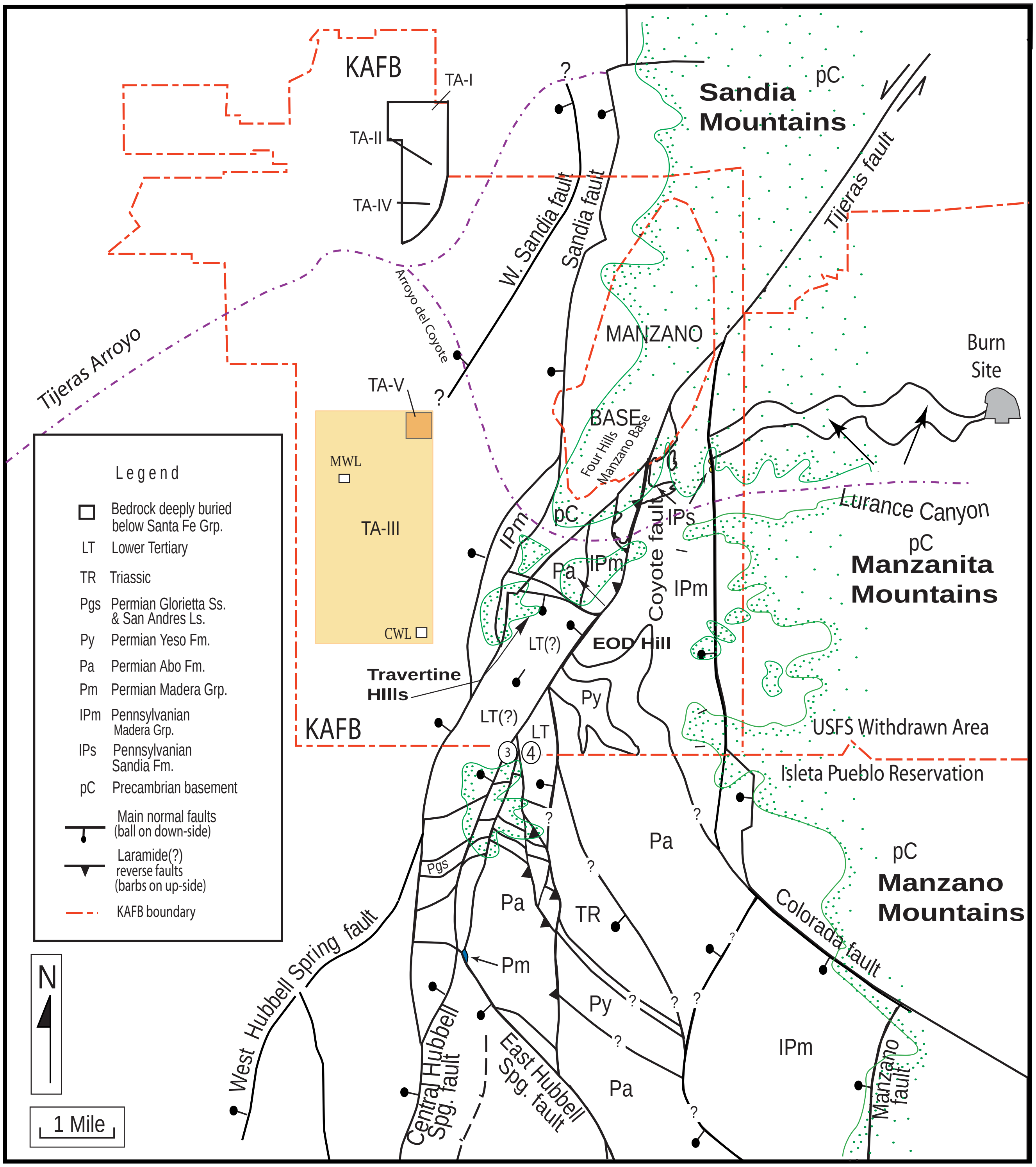


FIGURE 1-3. Generalized Geology in the Vicinity of SNL/KAFB

300 feet deep. On the west side of the Tijeras Fault Complex, within the basin, groundwater levels range from 295 feet to 570 feet below ground surface (bgs) at KAFB.

A perched groundwater system (PGWS) overlies the regional aquifer in the north portion of KAFB. The PGWS extends southward from TA-I to the KAFB Golf Course. The western extent of the PGWS is somewhere midway between Wyoming Boulevard and the Albuquerque Sunport's east-west runway. The eastern extent is just east of the KAFB landfill and may be bounded by the West Sandia Fault. The groundwater gradient within the PGWS is to the southeast with the depth to water approximately 270 feet bgs in the western part and 420 feet bgs in the east.

Natural Springs

Two perennial springs are located on KAFB — Coyote Springs and Sol Se Mete Spring. Additionally, there is one perennial spring (Hubbell Spring) located immediately south of the KAFB boundary on Isleta Pueblo. Numerous ephemeral springs occur within the foothills and in the eastern reach of Arroyo del Coyote.

Groundwater Production

The primary regional aquifer in the Albuquerque Basin is within the upper unit and, to a lesser degree, the middle unit of the Santa Fe Group. Most COA water supply wells are located on the east side of the Rio Grande, which is the most productive portion of the aquifer. The highest yield wells are screened in the sediments associated with the ancestral river channel. Prior to extensive urban development in the Albuquerque area beginning in the 1950s, the direction of regional groundwater flow in the area of KAFB was primarily to the southwest. As a result of groundwater withdrawal, the local water table has dropped by as much as 141 feet (Thorn et al. 1993). Groundwater withdrawal from KAFB and COA wells at the north end of KAFB have created a trough-like depression in the water table, causing flow to be diverted northeast in the direction of the well fields.

1.6 REGIONAL CLIMATE

Large diurnal temperature ranges, summer monsoons, and frequent drying winds are characteristic of the regional climate in the Albuquerque Basin and the Sandia, Manzanito, and Manzano Mountains.

Temperatures are typical of mid-latitude dry continental climates with summer high temperatures in the basin in the 90s° F and winter high temperatures around 50° F. Daily low temperatures range from around 60° F in the summer to the low 20s° F in the winter. The dry continental climate also produces low average humidities in the late spring and summer prior to the onset of the monsoon season. Daytime relative humidities can be between 10 and 20 percent in the spring and early summer, with an average humidity near 30 percent. Winter relative humidity averages near 50 percent.

Precipitation varies across the region with many locations in the higher elevations of the mountains receiving twice the annual rainfall of locations in the Albuquerque Basin. Most precipitation falls between July and October mainly in the form of brief, heavy rain showers. Average annual precipitation, based on 10 years of data collected between 1995 and 2004, is approximately 8.5 inches at SNL/NM, with 10.9 inches in the lower foothills. Annual precipitation recorded at National Weather Service (NWS) cooperative stations in mountain elevations varies between 10 and 23 inches. The winter season in the Albuquerque Basin, and around SNL/NM, is generally dry with an average of less than 1.5 inches of precipitation falling between December and February.

While the regional climate is described by the atmospheric state variables of temperature and humidity, site-specific meteorology at SNL/NM is influenced by the proximity to topographic features such as mountains, canyons, and arroyos. These features influence local wind patterns across the site. Canyons and arroyos tend to channel or funnel wind, whereas mountains create an upslope-downslope diurnal pattern to wind flows. Winds tend to blow toward the mountains or up the Rio Grande Valley during the day, and nocturnal winds tend to blow down the mountain towards the Rio Grande Valley. These topographically induced wind flows can be enhanced or negated by weather systems that move across the southwestern U.S. The strongest winds occur in the spring when monthly wind speeds average 10.3 miles-per-hour. Wind gusts commonly reach 50 miles-per-hour.

1.7 REGIONAL ECOLOGY

The SNL/NM facilities area is influenced by two major physiographic provinces:

Mesa and Plains – a significant portion of central New Mexico, including the middle Rio Grande and much of SNL/NM, is comprised of this physiography. Major landforms are valleys, lowlands, outwash plains, and alluvial fans and terraces. Grama and galleta grasses, four-wing saltbush, and sand sage species cover lower elevations, with piñon-pine and juniper species characterizing the higher elevations. Riparian areas grow in strips along water courses and include cottonwood, willow, and non-native salt cedar trees.

Southern Rocky Mountains – the Sandia and Manzano Mountains form the southern extension of the Rocky Mountains. The eastern portion of SNL/NM is located in, and bordered by, the Manzano Mountains. Vegetation in these steep, rugged mountains varies greatly on the basis of elevation and aspect. Due to topography, weather, fire, insect outbreaks, and disease, forests in the Southern Rocky Mountains tend to be patchy. The landscape is a complex mosaic of open meadows, composed of forest stands of varying ages and species.

These physiographic provinces each have an influence on the typical landforms, flora, and fauna predominant within the SNL/NM area. The topography at KAFB ranges from lowland grasslands to high elevation coniferous forests. With much of the area undeveloped, there is great diversity in plant and animal communities living on KAFB. At least 267 plant species and 195 animal species are found on KAFB (DOE 1999). Table 1-1 lists the most common species of birds, mammals, reptiles, amphibians, and plants that have been identified on-site.

1.7.1 Regional Life Zones Occurring on KAFB

Ponderosa Pine Forest or Transition Life Zone (7,000 – 8,000 feet) – a closed canopy of ponderosa pine, piñon-pine, juniper, scrub oak, grassy meadows, streams, marshes, and canyons are typical of this zone. The USFS withdrawn area in the eastern portion of KAFB reaches an elevation of just over 7,900 feet.

Piñon-Juniper Woodland Zone (6,000 – 7,000 feet) – a mostly open canopy of piñon-pine and juniper sparsely populate this zone of foothills and mesas. Animals typical of this woodland include the piñon mouse and piñon jay. Much of the rolling terrain in the withdrawn area is comprised of this zone.

TABLE 1-1. Common Plants and Animals Identified at KAFB

BIRDS			
American robin	*Turdus migratorius*	Horned lark	*Eremophila alpestris*
American kestrel	*Falco sparverius*	Killdeer	*Charadrius vociferus*
Black-chinned hummingbird	*Archilochus alexandris*	Loggerhead shrike	*Lanius ludovicianus*
Black-headed grosbeak	*Pheucticus melanocephalus*	Mountain bluebird	*Sialia currucoides*
Broad-tailed hummingbird	*Selasphorus platycercus*	Red-tailed hawk	*Buteo jamaicensis*
Dark-eyed junco	*Junco hyemalis*	Rufous-sided towhee	*Pipiloerythro melanocephalus*
MAMMALS			
Black bear	*Ursus americanus*	Deer mouse	*Peromyscus maniculatus*
Bobcat	*Felis rufus*	Gunnison’s prairie dog	*Cynomys gunnisoni*
Banner-tailed kangaroo rat	*Dipodomys spectabilis*	Gray fox	*Urocyon cinereoargenteus*
Black-tailed jackrabbit	*Lepus californicus*	Mule deer	*Odocoileus hemionus*
Desert cottontail	*Sylvilagus audubonii*	- - -	- - -
REPTILES AND AMPHIBIANS			
Collared lizard	*Crotaphytus collaris*	Great plains skink	*Eumeces obsoletus*
Chihuahuan spotted whiptail	*Aspidoscelis exsanguis*	Great plains toad	*Bufo cognatus*
Round-tailed horned lizard	*Phrynosoma modestum*	Western diamondback rattlesnake	*Crotalus atrox*
Prairie lizard	*Sceloporus consobrinus*	Side-blotched lizard	*Uta stansburiana*
Gopher snake	*Pituophis catenifer*	Short-horned lizard	*Phrynosoma hernandesi*
PLANTS			
Apache plume	*Fallugia paradoxa*	Goathead	*Tribulus terrestris*
One-seed juniper	*Juniperus monosperma*	India ricegrass	*Achnatherum hymenoides*
New Mexico needlegrass	*Hesperostipa neomexicana*	Ring muhly	*Muhlenbergia torreyi*
Purple three-awn	*Aristida purpurea*	Bush muhly	*Muhlenbergia porteri*
Shrub live oak	*Quercus turbinella*	Soapweed yucca	*Yucca glauca*
Spectacle pod	*Dithyrea wislizenii*	Black grama	*Bouteloua eriopoda*

Upper Sonoran Life Zone (below 6,000 feet) – this short grass prairie zone occurs on alluvial fans, mesas, and gently rolling or sloping plains. Pioneer plants include tumbleweed, goathead, and spurge; intermediate plants include galleta and burro grass, cactus, and mixed weeds; climax vegetation is grama grass. Animals include prairie dogs, burrowing owls, and kangaroo rats. The non-withdrawn area of KAFB land falls within this zone.

Each year, the ASER highlights certain programs and environmental activities. Sustainable Design at Sandia was featured in 2007. Sandia has several buildings that are certified in Leadership in Energy and Environmental Design (LEED®).

Sustainable Design at Sandia

The Joint Computational Engineering Laboratory (JCEL)

The Center for Integrated Nanotechnologies (CINT)

The Microsystems and Engineering Sciences Applications (MESA) Microsystems Fabrication (MicroFab)

SUSTAINABLE DESIGN AT SANDIA

What is LEED?

The Leadership in Energy and Environmental Design (LEED®) Green Building Rating System™ was developed by the United States Green Building Council (USGBC) as a standard to measure the environmental features and impacts of buildings. Using LEED, a building project can earn credits across multiple categories to gain the distinction of a Certified, Silver, Gold, or Platinum rating.

The LEED rating system provides national and international recognition, third-party validation, and an integrated, holistic approach to measure a building's environmental performance.

Building projects must meet prerequisites in five key categories:

- Sustainable Sites,
- Water Efficiency,
- Energy & Atmosphere,
- Materials & Resources, and
- Indoor Environmental Quality.

After meeting all prerequisites, project teams may choose which credits to pursue – either within the five key categories or within the Innovation category – to reach a final score that meets the minimum threshold for rating.

The USGBC has developed multiple rating systems for different types of buildings, including LEED for New Construction and Major Renovations (LEED-NC), LEED for Existing Buildings-Operations and Maintenance (LEED-EB), LEED for Commercial Interiors (LEED-CI), LEED for Core & Shell, LEED for Schools, LEED for Retail, LEED for Healthcare, LEED for Homes and LEED for Neighborhood Development.

Integration of Sustanable Design

Sandia National Laboratories (SNL) has over ten years of experience implementing sustainable design and applying the LEED Green Building Rating System to building projects. SNL is leading the way towards high performance green buildings in New Mexico and within the U.S. Department of Energy (DOE), with more LEED for New Construction buildings than any other entity in the state or in the DOE Complex.

Sustainable design and the LEED Green Building Rating System have been integrated into many of the construction and development processes at SNL, including:

- A facilitated sustainable design charrette at the outset of a construction project,
- A Sustainable Design Report as a contractual deliverable,
- Green building requirements in Sandia's construction specifications,
- The Campus Design Guidelines,
- The Long Range Development Plan,
- The Ten Year Site Plan, and
- The Master Landscaping Plan.

SNL is required by Executive Order (EO) 13423 to ensure that 15 percent of capital asset building stock is certified to a green standard by the year 2015. SNL is well on its way to meeting this specification; approximately 9 percent of SNL's applicable square footage is registered for LEED certification, which includes six newly constructed buildings, with two more in the design phase. SNL projects that are currently in design will meet the LEED Gold level of certification. SNL has a plan in place and has started to assess and certify the requisite number of existing buildings to a green standard, meeting and exceeding the remainder of the 15 precent requirement.

At SNL, sustainable design is implemented through successful teamwork that includes members of the EMS Team, Energy Management Team, Facilities Architects, Engineers and Project Managers, Site Planning Department, Pollution Prevention, Custodial Services, Procurement, Facilities Operations and Maintenance, and Line customers.

SANDIA'S LEED CERTIFIED BUILDINGS, FY 2007

JCEL – LEED Silver Certified – 60,000 Gross Square Footage (GSF)

The *Joint Computational Engineering Laboratory* (JCEL) is the first LEED building to be completed at SNL/NM. JCEL includes 60,000 square feet of office and computational space, and was completed using sustainable design from its inception to its completion. JCEL was the second LEED building in the state of New Mexico.

An innovative landscape design that includes a dry streambed and native plant species surrounds the building. This design allows stormwater to percolate back into the ground, eliminating the need to maintain the landscape with potable water.

CINT – LEED Certified – 97,000 GSF

The *Sandia Center for Integrated Nanotechnologies* (CINT) is a 97,000 square-foot facility that includes laboratories and office space for some of the world's most advanced research in nanotechnology.

At CINT, a comprehensive Indoor Air Quality Management Plan was implemented during construction and before occupancy. This included fastidious housekeeping procedures, covering all duct work during construction, high levels of air filtration, and a flush-out of the building using exclusively outside air.

MESA MicroFab – LEED Certified – 97,050 GSF

The *Microsystems and Engineering Sciences Applications* (MESA) *Microsystems Fabrication* (MicroFab) facility is the first microchip fabrication facility to obtain LEED certification. Its cleanrooms and transition cleanroom space, support labs, chemical and specialty gas rooms, which include sophisticated safety systems and controls — these are necessary due to the hazardous materials used in the production of compound semiconductors.

The MicroFab project incorporates an innovative, high efficiency, ultra-pure water generation process. It has a water recycling loop that reclaims or reuses water for cooling tower and scrubber applications. These processes offset the large quantity of water used in the semiconductor manufacturing process.

What Makes A Building Green?

The LEED Green Building Rating System™ uses a whole-building approach to ensure that multiple aspects of a building are considered throughout its design, construction, and ensuing operations and maintenance. It is important to consider the impacts buildings have on consumption of resources and production of waste According to the USGBC, buildings in the U.S. consume 39 percent of total energy, 71 percent of total electricity, 12 percent of potable water and 30 percent of raw materials. Buildings produce 39 percent of CO2 emissions, and 30 percent of waste.

A LEED building is not just energy efficient. Elements of each of the following categories are considered:

Sustainable Sites:
- Site selection, density and development
- Transportation
- Stormwater management

Water Efficiency:
- Efficient plumbing fixtures
- Innovative wastewater treatment
- Water efficient landscaping

Energy & Atmosphere:
- Minimum Energy performance
- Commissioning
- Renewable energy
- Measurement and verification

Materials & Resources:
- Building reuse
- Construction waste management
- Use of recycled, renewable, and regional materials

Indoor Environmental Quality:
- Increased ventilation and air filtration
- Use of low-emitting materials, paints, sealants and adhesives
- Controllability of lighting and thermal systems
- Daylighting and views

This page intentionally left blank.

chapter two

COMPLIANCE SUMMARY

"Wildlife Biologist and a Common Poorwill" Photo by Steve Cox.

In This Chapter...

Environmental Snapshot

The 2007 U.S. DOE Performance Evaluation Report indicates that Sandia's overall score is OUTSTANDING.

Sandia Corporation (Sandia) conducts operations based on environmental regulations, statutes, and U.S. Department of Energy (DOE) Directives. A variety of programs at Sandia National Laboratories, New Mexico (SNL/NM) work together to pursue complete compliance with applicable regulations. As a part of these federal, state, and local mandates, SNL/NM adheres to strict reporting and permitting requirements.

This chapter summarizes Sandia's compliance status with major environmental regulations, statutes, and DOE Directives that are applicable to operations conducted at SNL/NM (see page 2-4 and Section 2.1.16). Compliance issues, corrective actions, environmental occurrences, and environmental audits and appraisals are also discussed in this chapter.

Current permits held by Sandia, DOE, the National Nuclear Security Administration (NNSA), and the Sandia Site Office (SSO) are listed in Chapter 9.

Compliance Order on Consent (COOC)
On April 29, 2004, the New Mexico Environment Department (NMED), DOE, and Sandia entered into the COOC. The COOC provides requirements and establishes schedules and deliverables for corrective action pursuant to the New Mexico Hazardous Waste Act (NMHWA) and the New Mexico Solid Waste Act (NMSWA).

Compliance Agreement (CA)
A CA was signed by the City of Albuquerque (COA) and DOE in 2005 that requires and establishes schedules and deliverables for Steam Plant testing and reporting. The CA is mandated by and through the Environmental Health Department (EHD), which is authorized by the COA, Bernalillo County, and the Albuquerque Bernalillo County Air Quality Control Board (ABC/AQCB).

Federal Facilities Compliance Order (FFCO)
On October 4, 1995, NMED, DOE, and Sandia entered into the FFCO, which was developed pursuant to the Federal Facilities Compliance Act. The FFCO provides requirements for achieving comliance with the requirements of Title 40 of the Code of Federal Regulations (CFR), Part 268.50 for mixed hazardous/radioactive waste at SNL/NM.

2.1 COMPLIANCE STATUS WITH FEDERAL REGULATIONS

Most environmental regulations and statutes applicable to SNL/NM are discussed on page 2-4; including links to associated web sites. The following subsections detail the regulations.

2.1.1 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The CERCLA, commonly referred to as the "Superfund," provides cleanup funds and/or assessment requirements for inactive waste sites at all federal facilities. A Preliminary Assessment/ Site Inspection (PA/SI), as required by CERCLA, was performed at SNL/NM in 1988. This inspection confirmed that Sandia does not own any sites that would qualify for the National Priorities List (NPL), which lists the nation's high priority cleanup or "Superfund" sites. Therefore, with respect to inactive hazardous waste sites, Sandia has no CERCLA reporting requirements. Amendments under the Superfund Amendments and Reauthorization Act (SARA) require additional reporting in the event of a reportable quantity (RQ) release. Sandia was in full compliance with CERCLA/SARA in 2007, as illustrated in Tables 2-1 and 2-7, and Section 2.1.2.

2.1.2 Emergency Planning and Community Right-to-Know Act (EPCRA)

The EPCRA, also known as SARA Title III, establishes emergency planning requirements for federal, state, and local governments and industry.

EPCRA ensures that communities have the right to know about and be informed of potential hazards including the type and location of large quantities of toxic chemicals used and stored by facilities in or near the community. EPCRA specifically mandates that chemical information be made available to local emergency response organizations, such as fire departments and hospitals. Any inadvertent release must be reported to appropriate state and local authorities. All subsequent reports must be made accessible to the public. The four major reporting requirements designated by specific sections of EPCRA are shown in Table 2-1.

Information on EPCRA can be found at the following U.S. Environmental Protection Agency (EPA) website:

http://www.epa.gov/emergencies/content/epcra

Toxic Release Inventory (TRI) Reporting
EPCRA regulations require that facilities with activities described in the Standard Industrial Classification (SIC) Codes 20 through 39 that use toxic chemicals listed in SARA Title III over a threshold value must submit a TRI report. The threshold value for listed chemicals requiring a TRI report is 10,000 pounds per year (lb/yr), unless specified otherwise.

TABLE 2-1. 2007 SARA Title III (or EPCRA) Reporting Requirements Applicable to SNL/NM

Section	SARA Title III Section Title	Requires Reporting?		Description
		Yes	No	
302 - 303	Emergency Planning	✓		Sandia submits an annual report listing chemical inventories above the reportable Threshold Planning Quantities listed in 40 CFR Part 355 Appendix B, the location of the chemicals, and emergency contacts. The report is prepared for the DOE/NNSA/SSO, which distributes it to the required entities.
304	Emergency Notification		✓	There was no reportable RQ release in 2007.
311-312	Hazardous Chemical Storage Reporting Requirements	✓		There are two "Community Right-to-Know" reporting requirements: (a) SNL/NM completes the EPA Tier II forms for all hazardous chemicals present at the facility at any one time in amounts equal to or greater than 10,000 lb and for all extremely hazardous substances present at the facility in an amount greater than or equal to 500 lb or the Threshold Planning Quantity, whichever is lower; (b) SNL/NM provides MSDSs for each chemical entry on a Tier II form unless it decides to comply with the EPA's alternative MSDS reporting, which is detailed in 40 CFR Part 370.21.
313	Toxic Chemical Release Forms	✓		SNL/NM was above the reporting thresholds for CY 2007 for submitting a TRI Report for lead. A majority of the lead was from the use of lead-containing solders for laboratory benchmark solders.

NOTES: MSDS = Material Safety Data Sheets (gives relevant chemical information)
RQ = reportable quantity
TRI = Toxic Release Inventory
EPA = U.S. Environmental Protection Agency
SSO = Sandia Site Office
SARA = Superfund Amendments and Reauthorization Act
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
EPCRA = Emergency Planning and Community Right-to-Know Act
DOE = U.S. Department of Energy
NNSA = National Nuclear Security Administration
SNL/NM = Sandia National Laboratories, New Mexico
CFR = Code of Federal Regulations
NMED = New Mexico Environment Department

Each year, nearly 23,000 facilities report to the EPA under the TRI Program. The proposed TRI Reporting Forms Modification Rule (1674 Federal Register/ Vol. 70, No. 6/ Monday, January 10, 2005) sought comment on eliminating certain information from the reports, simplifying other reporting data, and, in some cases, reducing duplicate data collection efforts. The options being proposed reduce the cost of compiling and submitting TRI reports, while maintaining the quality and practical utility of the TRI data. This rule became effective on September 12, 2005. The first reports with the revised reporting requirements have been incorporated into the 2006 submissions.

In 2007, chemical use at SNL/NM was above the reporting threshold for submitting a TRI report for lead. Sandia continues to document its toxic chemical use in the Chemical Inventory Report Calendar Year (CY) 2007 (SNL/Outrider Environmental Planning and Technical Support 2008), which documents all purchases of chemicals at SNL/NM, Tonopah Test Range (TTR), and Kauai Test Facility (KTF) for CY 2007. This chemical inventory supports compliance with SARA Title III, as well as reporting for COA inventory requirements.

2.1.3 Resource Conservation and Recovery Act (RCRA)

RCRA regulates the generation, transportation, treatment, storage, and disposal of hazardous chemical waste and non-hazardous solid wastes, and the storage of hazardous or petroleum products in underground storage tanks (USTs). Under the authority of the NMHWA, and with delegated authority from the EPA under RCRA, the NMED administers hazardous and solid waste regulatory programs in New Mexico. Hazardous and solid waste management activities at SNL/NM are conducted under NMED regulations. Some additional RCRA requirements and EPA regulations also apply. Applicable regulations are listed in Chapter 9.

The hazardous component of hazardous/radioactive mixed waste (MW) is regulated as hazardous waste

Major Environmental Regulations & Statutes Applicable to SNL/NM

Atomic Energy Act (AEA)
Directs U.S. Department of Energy (DOE) and the U.S. Nuclear Regulatory Commission (NRC) in the management of nuclear materials and radioactive waste. *http://www.hss.energy.gov/nuclearsafety/nsea/oepa/*

Clean Air Act (CAA) and CAA Amendments (CAAA)
Provides standards to protect the nation's air quality. *http://www.epa.gov/air/caa/*

Clean Water Act (CWA)
Provides general water quality standards to protect the nation's water sources and byways. *http://www.epa.gov/region09/water/*

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
Provides federal funding for cleanup of inactive waste sites on the National Priorities List (NPL) and mandates requirements for reportable releases of hazardous substances. *http://www.epa.gov//lawsregs/laws/cercla.html*

Cultural Resources Acts
Includes various acts that protect archeological, historical, religious sites, and resources. *http://recreation.usgs.gov/env_guide/cultural.html*

Endangered Species Act (ESA)
Provides special protection status for federally listed endangered or threatened species. *http://www.epa.gov//lawsregs/laws/esa.html*

Executive Orders (EOs)
Several EOs provide specific protection for wetlands, floodplains, environmental justice in minority and low-income populations, and encourages greening the government through leadership in EM. *http://www.archives.gov/federal-register/executive-orders/disposition.html*

Federal Facility Compliance Act (FFCA)
Directs federal agencies regarding environmental compliance. *http://www.hss.energy.gov/nuclearsafety/nsea/oepa*

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Controls the distribution and use of various pesticides. *http://www.epa.gov//lawsregs/laws/fifra.html*

Migratory Bird Treaty Act (MBTA) of 1918
Prevents the taking, killing, possession, transportation and importation of migratory birds, their eggs, parts, and nests. *http://tis.eh.doe.gov/oepa/laws/mbta.html*

National Emission Standards for Hazardous Air Pollutants (NESHAP)
Specifies standards for radionuclide air emissions and other hazardous air releases under the CAA. *http://www.epa.gov/radiation/neshaps/*

National Environmental Policy Act (NEPA)
Requires federal agencies to review all proposed activities so as to include environmental aspects in agency decision-making. *http://tis.eh.doe.gov/NEPA/*

Resource Conservation and Recovery Act (RCRA)
Mandates the management of solid and hazardous waste and certain materials stored in underground storage tanks (USTs). *http://www.epa.gov//lawsregs/laws/rcra.html*

Safe Drinking Water Act (SDWA)
Enacts specific health standards for drinking water sources. *http://www.epa.gov/safewater/sdwa/sdwa.html*

Superfund Amendments and Reauthorization Act (SARA)
SARA,Title III, also known as the Emergency Planning and Community-Right-to-Know Act (EPCRA), mandates comunication standards for hazardous materials over a threshold amount that are stored or used in a community. *http://www.epa.gov//lawsregs/laws/epcra.html*

Toxic Substance Control Act (TSCA)
Specifies rules for the manufacture, distribution, and disposal of specific toxic materials such as asbestos and polychlorinated biphenyls (PCBs). *http://www.epa.gov/compliance/civil/tsca/index.html*

and subject to the requirements of state and federal regulations. The radioactive component of MW is regulated under the Atomic Energy Act (AEA) of 1946.

Sandia generates hazardous waste and MW through normal operations and through its ongoing environmental restoration (ER) project, which is responsible for the cleanup of sites that were formerly used for operations such as testing and disposal. Sandia currently implements an active and successful program to minimize hazardous waste and MW through product substitutions, process changes, material re-use, and recycling. See Chapter 3, which summarizes Sandia's hazardous waste management activities during 2007, and specifically Section 3.3 - Waste Management.

Operating Permits – Sandia and DOE operate hazardous waste management units at SNL/NM under the following permits issued by NMED:

- Hazardous Waste Management Facility (HWMF), Permit NM5890110518-1
- Thermal Treatment Facility (TTF), Permit NM5890110518-2
- Corrective Action Management Unit (CAMU), Permit NM5890110518-1, Module IV

On February 6, 2002, Sandia and DOE submitted a comprehensive RCRA Part B (final) permit request to renew the operating permits for these units. The request included updated permit applications for nine mixed waste management units, including the Radioactive and Mixed Waste Management Facility (RMWMF), the High Bay Waste Storage Facility (HBWSF), the seven Manzano Storage Bunkers (MSB) and new application request for operation of the Auxiliary Hot Cell Facility (AHCF). Sandia and DOE operate under the existing permits and interim status during the permit application and renewal process. The HBWSF and two of the seven MSB were withdrawn from the permit application in 2003, and closure of those units was completed in 2006. Treatment operations were completed at the CAMU in 2003. Closure of the unit was completed later that year, and DOE and Sandia currently conduct post-closure care and maintenance, as detailed in Chapter 3, Section 3.2.4.

On August 20, 2007, NMED issued a draft operating permit to DOE and Sandia and invited public comments for 60 days. The draft permit includes requirements for operations or post-closure care at each of the waste management units, together with requirements for investigating and remediating releases of hazardous wastes and hazardous constituents at SNL/NM. The comment period was extended twice in 2007 — once at the request of DOE and Sandia, and once at the request of other citizens. DOE and Sandia prepared extensive comments for submittal to the NMED in accordance with the 2008 deadline.

Post-Closure Care Permit, *Chemical Waste Landfill (CWL)* **–** The CWL was used for hazardous waste disposal under interim status until 1985. From 1981 to 1989, the CWL was also used for storage of hazardous wastes in drums. Waste management operations ceased and closure activities began in 1989. Closure included two voluntary corrective measures, which included vapor extraction (trichloroethylene) and excavation of the entire landfill. Sandia and DOE submitted a post-closure care plan in 2005, and submitted additional permit materials in March 2007. Details about closure and post-closure care activities are in Section 3.2.4.

On May 21, 2007, NMED issued a draft permit to DOE and Sandia and invited public comments for 60 days. The draft permit included requirements for post-closure care at the CWL. DOE and Sandia submitted comments to NMED. The comment period was extended for 30 days at the request of citizens.

2.1.4 Federal Facility Compliance Act (FFCA)

The FFCA requires federal facilities to comply with all federal, state, and local requirements for hazardous and solid waste, including full compliance with the restrictions and prohibitions on extended storage of wastes that do not meet the applicable hazardous waste treatment standards. On October 4, 1995, NMED, DOE, and Sandia entered into a FFCO for management of MW in extended storage at SNL/NM. A general Site Treatment Plan (STP) and a schedule for processing the waste were developed. In 2007, Sandia continued to characterize and treat MW and to package wastes for shipment to permitted off-site treatment, storage, and disposal (TSD) facilities. Sandia met all of the milestones outlined in the STP.

2.1.5 Atomic Energy Act (AEA)

In 1946, the AEA was enacted to encourage the development and use of nuclear energy for general welfare, common defense, and security. The purpose of the AEA is to assure the proper management of nuclear materials and radioactive waste. The AEA, as amended, delegates control of nuclear energy and nuclear materials primarily to DOE, the U.S. Nuclear Regulatory Commission (NRC), and the EPA. Federal regulations control radioactive emissions and the transportation of nuclear materials. The authority for controlling radioactive waste is retained by DOE and governed by DOE Directives.

2.1.6 Clean Air Act (CAA) and Clean Air Act Amendments (CAAA) of 1990

The objectives of the CAA and the CAAA are to protect and enhance the nation's air quality. The EPA is responsible for describing and regulating air pollutants from stationary and mobile sources and for setting ambient air quality standards. The COA has direct delegation from EPA Region VI to locally administer these standards as well as specific air emission permits and registrations, as shown in Chapter 9, Table 9-1.

The CAA requires the EPA to develop a list of air pollutants from all sources that could harm public health or the environment. The EPA identified six substances as "criteria pollutants" and subsequently developed National Ambient Air Quality Standards (NAAQS) for these pollutants.

The EPA program for the attainment and maintenance of NAAQS requires local agencies to develop a comprehensive permitting program. The Air Quality Control Board (AQCB) has developed a set of regulations governing mobile and stationary sources of air pollution.

In addition to the regulations for criteria pollutants, the EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) program prescribes emission limitations for hazardous air pollutants (HAPs).

Radiological NESHAP

Subpart H of 40 CFR 61 specifically regulates radionuclide emissions (other than radon) from DOE facilities. As required by the regulation, Sandia calculates an annual dose from actual or calculated emissions to potentially exposed members of the public. The regulation requires that Sandia determine the maximum possible dose that could be delivered to an individual residing at a nearby location 24 hours-per-day. The result is the effective dose equivalent (EDE) to the maximally exposed individual (MEI). The dose is compared to the EPA standard of 10 millirem per year (mrem/yr) allowed from radioactive air emissions from a DOE facility.

In 2007, the MEI was located at the Chestnut Storage Site. The dose at this location was 9.98E-4 mrem/yr, primarily the result of releases of H-3 from the Neutron Generator Facility (NGF) and the Radioactive Waste and Mixed Waste Management Facility (RMWMF). The off-site MEI was located at the Eubank Gate Area. The dose at this location was 7.01E-04 mrem/yr, primarily the result of releases of tritium from the Neutron Generator Facility (NGF) in TA-I. Both doses are well below EPA standards. For perspective, the annual radiation dose from natural background radiation is approximately 360 mrem/yr. Sandia met all NESHAP compliance requirements in 2007.

Fugitive Dust Permitting

The COA enforces 20.11.20 New Mexico Administrative Code (NMAC) to ensure that all persons conducting active operations that result in disturbed surface areas, or that involve bulk material handling, use reasonably available control measures (or other effective measures) on an ongoing basis to prevent or abate injury to human health, animal and plant life, and to prevent or abate unreasonable interference with public welfare, visibility, and the reasonable use of property.

National Emissions Inventory (NEI)

As required by the Consolidated Emission Reporting Rule (CERR), 67 Federal Register (FR) 3960, the emission inventory requests annual emissions of volatile organic compounds (VOCs), nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), lead (Pb), ammonia (NH_3), particulate matter with a diameter of equal to or less than 10 microns (PM_{10}), particulate matter with a diameter of equal to or less than 2.5 microns ($PM_{2.5}$), and HAPs.

New Source Review (NSR) Requirements

The NSR permitting program was established as part of the 1977 CAAA.

NSR requirements provide assurance to the public that any large, new, or modified industrial source in their neighborhood will be as clean as possible, and that advances in pollution control occur concurrently with industrial expansion.

New Source Performance Standard (NSPS) Requirements

As part of an effort to control pollution in the U.S., the EPA provides NSPS requirements that dictate the level of pollution that a new stationary source may produce. These standards are authorized by Section 111 of the CAA, and the regulations are published in 40 CFR Part 60. An NSPS has been established for a number of individual industrial or source categories, including boilers and generators.

Open Burn Permitting

The COA enforces 20.11.21 NMAC to ensure that all persons conduct open burning in a manner that prevents or abates emissions that are visible and that produce noxious by-products of combustion.

Ozone Depleting Substances (ODS) Requirements

Based on the requirements of the CAA, the EPA has established regulations that affect many aspects of the refrigeration industry.

Title V Operating Permit

The CAAA of 1990 contained provisions under Title V requiring all existing major air emission sources to obtain an operating permit. A major source is defined as the combined emissions from any facility with the potential to emit:

- 100 tons per year (tpy) or greater of any criteria pollutant,
- 10 tpy of any HAP, or
- 25 tpy of any combination of HAPs.

Details on the applicability of Title V to SNL/NM and 2007 activities are in section 5.5.2.

2.1.7 Clean Water Act (CWA)

The CWA establishes guidelines to protect the "Waters of the U.S." by regulating the discharge of pollutants. At SNL/NM, the CWA applies to sanitary and septic system wastewater effluents, storm water runoff, and surface water discharges.

The CWA is implemented through local, state, and federal water quality standards as follows:

(1) the Albuquerque Bernalillo County Water Utilities Authority (ABCWUA) administers regulations for sanitary sewer discharges based on federal pretreatment standards,
(2) the EPA and the NMED administer regulations concerning oil storage and surface discharges, and
(3) the NMED administers regulatory authority over storm water discharges and mandates requirements for oil storage and secondary containment.

New Mexico Stream Standards

EPA Region VI is the permitting agency for discharges under the National Pollutant Discharge Elimination System (NPDES). NMED is currently seeking primacy over NPDES, but the delegation of authority from the EPA has been held up because there is some opposition to New Mexico primacy. New Mexico has enacted 20.6.4 NMAC Standards for Interstate and Intrastate Surface Waters to protect the quality of surface waters in the state. Beginning in 2008 SNL/NM, Sandia will monitor for compliance with these standards.

ABCWUA Sewer Discharge Regulations

There are six wastewater monitoring stations, or outfalls, operating under the ABCWUA permits at SNL/NM. Four of these stations discharge directly to the ABCWUA's public sewer; the two remaining are categorical pre-treatment stations located upstream of the general outfalls. During 2007, there were no reported events that exceeded permitted limits established by the ABCWUA.

Surface Discharge

All discharges made to the ground or to containment areas must be evaluated for compliance with regulations implemented through the New Mexico Water Quality Control Commission (NMWQCC) standards for the protection of ground waters and surface waters prior to discharge. Sandia reviewed and approved 22 one-time internal surface discharge permits in 2007. Sandia also investigated three reportable environmental releases that met NMED reporting standards. Detailed information regarding the releases can be found in Section 6.2.2. Sandia maintains two evaporation lagoons in TA-IV which are permitted by NMED Discharge Permit [DP-530]. The TA-IV lagoons are used to contain and evaporate accumulated storm water pumped from the secondary containment areas around seven oil tanks that support the pulsed power accelerators. All permit conditions for the TA-IV permitted lagoons were met in 2007. The permit for DP-530 was re-issued in 2007.

NPDES

NPDES implements the requirements that are specific to all discharges made to "Waters of the U.S." as defined in the CWA and "Surface Waters of the State" and as defined in New Mexico's *Standards for Interstate and Intrastate Surface Waters* (20.6.4 NMAC). At SNL/NM, all point sources discharge to either state or federal waters and are evaluated for compliance with their respective regulations.

Historically, collecting visual and analytical samples at SNL/NM has been a challenge due to Albuquerque's climate. Analytical sampling was not required in Fiscal Year (FY) 2007, but visual assessments are conducted every quarter, sufficient runoff permitting (see Section 6.3.4).

2.1.8 Safe Drinking Water Act (SDWA)

The SDWA authorizes the EPA to set national standards for drinking water sources, treatment systems, and water distribution. These standards are promulgated by the EPA as primary and secondary drinking water regulations. Specific drinking water quality criteria are established to protect human health, which limits the maximum contaminant level (MCL) of specific organic and inorganic chemical substances and biological organisms in potable water.

Drinking Water Supply at SNL/NM

Potable water for most facilities on Kirtland Air Force Base (KAFB) (including SNL/NM) is provided by the KAFB Water System. The system derives its water from deep groundwater wells (discussed in Section 7.3, Groundwater Levels). KAFB routinely samples its water and conducts analyses to establish that its water quality conforms to EPA standards. In support of KAFB compliance with NMED Drinking Water Standards, DOE/NNSA/SSO and Sandia operates the water distribution system on their property in conformance with the Safe Drinking Water Act regulations. DOE/NNSA/SSO and Sandia provide KAFB with an annual certification that all backflow preventers installed in the Sandia potable water distribution system have been properly tested and maintained.

Information on the KAFB Water System is located on the EPA's SDWA website, which details the compliance status for all drinking water systems in the U.S. :

http://www.epa.gov/safewater

Specific water quality data and system performance are published by KAFB in the Annual Consumer Confidence Report on the Quality of Drinking Water.

2.1.9 Toxic Substances Control Act (TSCA)

TSCA provides regulations regarding the import, export, use, and disposal of specifically listed toxic chemicals. At SNL/NM, compliance with TSCA primarily involves the handling and disposal of polychlorinated biphenyls (PCBs) and asbestos. Sandia was in full compliance with TSCA in 2007. Details related to TSCA are in Chapter 3, Section 3.2.1.

2.1.10 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA regulates pesticide use and is enforced under the New Mexico Pesticide Control Act. Sandia's Biological Control Activity compiles information on pesticide use at SNL/NM, as discussed in Section 3.5. Sandia was in full compliance with FIFRA in 2007.

2.1.11 National Environmental Policy Act (NEPA)

NEPA requires federal agencies (and other organizations that perform federally sponsored projects) to consider environmental issues associated with proposed actions, be aware of the potential environmental impacts associated with these issues, and include this information in early project planning and decision making. Additionally, if a proposed action is not within a class of actions previously determined to have environmentally "insignificant" impacts, the agency must prepare an environmental assessment (EA) or an environmental impact statement (EIS) before making an irretrievable commitment of resources or funding. Although a major objective of NEPA is to preserve the environment for future generations, the law does not require an agency to choose a course of action with the least environmental impacts. Details are provided in Section 3.6.

2.1.12 Endangered Species Act (ESA)

The ESA ensures that any action authorized, funded, or carried out by a party will not jeopardize the continued existence of a "threatened or endangered species" or result in adverse modifications to its habitat. At SNL/NM, ESA compliance is coordinated with NEPA compliance reviews and the Ecology Program. Table 2-2 lists the threatened and endangered species potentially occurring in Bernalillo County.

2.1.13 Migratory Bird Treaty Act (MBTA)

The MBTA of 1918 put the 1916 Convention for the Protection of Migratory Birds into effect. The original statute implemented the agreement between the U.S. and Great Britain (for Canada), and later amendments implemented treaties between the U.S. and Mexico, the U.S. and Japan, and the U.S. and Russia. The MBTA prevents the taking, possession, killing, transportation, or importation of migratory birds, their eggs, parts, or nests. At SNL/NM, the MBTA is coordinated with NEPA compliance reviews and the Ecology Program.

2.1.14 Cultural Resources Acts

The three primary cultural resources acts applicable at SNL/NM include:

- *National Historic Preservation Act* (NHPA),
- *Archaeological Resources Protection Act* (ARPA), and
- *American Indian Religious Freedom Act* (AIRFA).

At SNL/NM, cultural resources compliance is coordinated through the NEPA Program. Actions that could adversely affect cultural resources

TABLE 2-2. Threatened and Endangered Species Potentially Occurring in Bernalillo County, New Mexico

Species		Federal Status	State Status	Observed at KAFB
Mammals				
Spotted Bat	*Euderma maculatum*	--	Threatened	
New Mexican Jumping Mouse	*Zapus hudsonius luteus*	--	Endangered	
Fish				
Rio Grande Silvery Minnow	*Hybognathus amarus*	Endangered	Endangered	
Birds				
Baird's sparrow	*Ammodramus bairdii*	---	Threatened	
Common black-hawk	*Buteogallus anthracinus anthracinus*	---	Threatened	
Yellow-billed cuckoo	*Coccyzus americanus*	Candidate	---	
Broad-billed hummingbird	*Cynanthus latirostris magicus*	---	Threatened	
Southwest willow flycatcher	*Empidonax traillii extimus*	Endangered	Endangered	
Aplomado falcon	*Falco femoralis septentrionalis*	Endangered	Endangered	
American peregrine falcon	*Falco peregrinus anatum*	---	Threatened	✓
Arctic peregrine falcon	*Falco peregrinus tundrius*	---	Threatened	
Bald eagle	*Haliaeetus leucocephalus*	---	Threatened	
White-eared hummingbird	*Hylocharis leucotis borealis*	---	Threatened	
Brown pelican	*Pelecanus occidentalis carolinensis*	---	Endangered	
Neotropic Cormorant	*Phalacrocorax brasilianus*	---	Threatened	
Mexican Spotted owl	*Strix occidentalis lucida*	Threatened	---	
Bell's Vireo	*Vireo bellii*	---	Threatened	✓
Gray Vireo	*Vireo vicinior*	---	Threatened	✓

NOTE: There are no listed endangered or threatened plant, reptile, or amphibian species in Bernalillo County.

are initially analyzed in a NEPA checklist. Historical properties, as defined by NHPA and other implementing regulations, include archaeological sites and historic buildings and structures. Historic buildings and structures may include those over 50 years of age that are historically significant or younger structures of exceptional significance. There are historic buildings on property owned by DOE/NNSA. Planning assists in avoiding potential impacts to these sites, and appropriate historic documentation is undertaken to mitigate effects when necessary.

There are no known archaeological sites located on DOE/NNSA owned property. However, cultural and historic sites do exist on and in close proximity to DOE/NNSA permitted property and ER sites. These areas are located on U.S. Air Force (USAF) property and on portions of the Cibola National Forest land withdrawn area. Sandia's activities are planned to avoid potential impacts to these sites. It is DOE/NNSA's responsibility to ensure that impacts to cultural resources are assessed and appropriate actions taken to mitigate any impact.

Historical Building Assessment

In 2007, SNL/NM, DOE/NNSA/SSO completed consultation with the New Mexico State Historic Preservation Office (SHPO) on actions at nine individual buildings. Although some of the activities undertaken involved historic properties, none of the specific actions were found to have an adverse effect on cultural resources. In addition, documentation continued on the environmental test facilities included in the Test Capabilities Revitalization Project, which includes one building and four districts eligible for the National Register of Historic Places.

2.1.15 Environmental Compliance Executive Orders (EOs)

Floodplain Management (EO 11988), as amended, as minimal impact for SNL/NM since all active SNL/NM facilities are located outside the 500 year floodplain as described by the U.S. Army Corps of Engineers (ACE) (USACE 1979). This applies to both major on-site drainages: Tijeras Arroyo and Arroyo del Coyote.

Protection of Wetlands (EO 11990), as amended. Wetlands are areas inundated by surface or groundwater with a frequency sufficient to support a prevalence of aquatic plant and/or animal life. Wetlands generally include swamps, bogs, potholes, ponds, mud flats, and areas around natural springs. There are several natural springs on KAFB with a limited wetland setting. These springs, located on lands withdrawn from Cibola National Forest, are managed by the USAF and the U.S. Forest Service (USFS). These springs provide an important source of drinking water for wildlife and create a unique biological niche in an otherwise arid habitat.

Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898), as amended. To the greatest extent practicable and permitted by law, consistent with the principles set forth in the Report on the National Performance Review (Gore 1993), each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the U.S. and its territories and possessions. DOE/NNSA/SSO and SNL/NM perform a periodic analysis to assess whether their existing or proposed operations cause any disproportionate impacts on minority or low-income populations within the area of influence of SNL/NM operations.

Strengthening Federal Environmental, Energy, and Transportation Management (EO 13423), was issued in January 2007, Executive Order 13423, sets goals in the areas of energy efficiency, acquisition, renewable energy, toxics reductions, recycling, sustainable buildings, electronics stewardship, fleets, and water conservation. EO 13423 also requires more widespread use of Environmental Management Systems as the framework in which to manage and continually improve these sustainable practices. EO 13423 incorporates the requirements of and cancels Executive Orders 13101, 13123, 13134, 13148, and 13149, which were implemented through DOE Order 450.1 in 2007. DOE revised Order 450.1 to include the requirements of EO 13423 in June 2008. Anticipating this change, SNL/NM established new EMS objectives and targets starting in fiscal year 2008 to support upcoming requirements.

2.1.16 DOE Directives

DOE directives on the contract baseline that pertain to environmental protection and management are discussed in Chapter 1, "Operations Contract." In

2006, Sandia met all requirements stated in these DOE directives.

2.1.17 Summary of Radiological Releases

A summary of radiological releases and public doses resulting from Sandia operations is provided in Table 2-3. Additional detailed information is found in Chapters 5 and 6 of this report.

2.2 2007 RELEASES, COMPLIANCE ISSUES, AND ENVIRONMENTAL OCCURRENCES

Under DOE Manual 231.1-2, an *occurrence* is defined as "one or more (i.e., recurring) events or conditions that adversely affect, or may adversely affect, DOE (including NNSA) or contractor personnel, the public, property, the environment, or the DOE mission." Events or conditions meeting criteria thresholds identified in DOE M 231.1-2, or determined to be recurring through performance analysis, are considered occurrences. There are environmental releases that may not meet DOE M 231.1-2 reporting thresholds, however, they are still reportable to outside agencies (see Sections 2.2.2 and 6.2.2).

2.2.1 Occurrence Tracking

DOE Occurrence Reporting (OR) is tracked by the Environment, Safety, and Health (ES&H) Assurance, Strategic Planning, ISM, and Behavior Based Safety (BBS) Department. All SNL/NM occurrences are entered into DOE's Occurrence Reporting Processing System (ORPS) database, which also tracks corrective actions and closure of occurrence reports.

For all categories, during 2007 there were 77 occurrences, 13 of these were environmentally related at SNL/NM.

DOE Manual 231.1-2 2007 Environmental Occurrences

Table 2-4 lists the DOE Manual 231.1-2 environmental and environmentally related occurrences for the five year period from 2003 to

TABLE 2-3. SNL/NM Radiological Dose Reporting for Calendar Year 2007

Pathway	Dose to MEI		Percent of DOE 100 mrem/yr Limit	Estimated Population Dose (80 km radius)		Population within 80 km radius of site	Estimated Background Radiation Population Dose	
	mrem	mSv		Person-rem	Person-Sv		Person-rem	Person-Sv
Air	9.98E-04	9.98E-06	0.001 percent	8.02E-02	8.02E-04	793,740	-	-
Water	0	0	0	0	0	0	-	-
Other Pathways	0	0	0	0	0	0	-	-
All Pathways	9.98E-04	9.98E-06	0.001 percent	8.02E-02	8.02E-04	793,740	2.9E+05	2.9E+03

Radiological Atmospheric Releases for 2007 (in Curies)							
Tritium	Noble Gases ($t_{1/2}$ <40 days)	Fission and Activation Products ($t_{1/2}$ <3 hr)	Fission and Activation Products ($t_{1/2}$ >3 hr)	Total Radio-strontium	Total U	Other Actinides	Other
26.4	3.98	8.86E-04	7.68E-08	3.26E-07	1.72E-12	1.12E-05	0

Liquid Effluent Releases of Radioactive Material for 2007						
Tritium	Fission and Activation Products ($t_{1/2}$ <3 hr)	Fission & Activation Products ($t_{1/2}$ >3 hr)	Total Radio-iodine	Total Radio-strontium	Total U	Pu
0	0	0	0	0	0	0

NOTES: mrem = millirem
mSv = millisievert
DOE = U.S. Department of Energy
km = kilometer
U = Uranium
Pu = Plutonium
MEI = maximally exposed individual

2007. The table shows all occurrences for which the "nature of occurrence" (pre-August 25, 2003) and "reporting criteria" (post-August 25, 2003) included "environmental." As stated previously, there were 13 reportable environmental occurrences in 2007 — none were categorized as Significance Category 2, eight were categorized as Significance Category 3 and five were categorized as Significance Category 4 (the lowest level occurrence).

Table 2-5 summarizes each DOE Manual 231.1-2 2007 Reportable Environmental Occurrence.

2.2.2 Environmental Release Tracking

Environmental releases include notifications that are not tracked through ORPS, as well as notifications to outside agencies.

2007 Environmental Releases

In 2007, there were three reportable environmental releases — all three were reportable to the NMED , and none were reported to the ABCWUA. Detailed information regarding these releases can be found in Sections 6.1.6 and 6.2.2.

2.3 2007 AUDITS AND APPRAISALS

Operations at SNL/NM and DOE/SSO are routinely subjected to audits by external regulatory agencies. Sandia also conducts its own self-assessments and appraisals. Environmental audits and appraisals conducted by external agencies in 2007 are listed in Table 2-6. During 2007, the NMED and ABCWUA performed inspections of the wastewater discharges and the surface water containment lagoons. No findings or observations resulted from these inspections.

2.4 SUMMARY OF REPORTING REQUIREMENTS

External reporting requirements (other than to DOE) are necessary for both routine and non-routine releases of pollutants or hazardous substances. Release information may be used to evaluate facility operation compliance, waste handling activities, and emergency response programs. Table 2-7 summarizes the primary reporting requirements for releases applicable to SNL/NM.

2.5 SUMMARY OF ENVIRONMENTAL PERMITS

Table 9-1 in Chapter 9 lists all environmental permits and registrations that were in effect in 2007. It includes pending permit applications under review by various agencies.

2.6 ENVIRONMENTAL PERFORMANCE MEASURES

Environmental performance at SNL/NM is tracked through performance measures and indicators. It is reported through management reports and annual summaries (such as this report).

SNL/NM executive management has established the following high-level corporate ES&H objectives:

- Zero job-related injuries and illnesses,
- Zero environmental incidents, and
- Zero operations fines, violations, or penalties.

In support of these objectives, seven key ES&H measures have been adopted that have specific numerical expectations for each. Four of these regard environmental performance measures, and are listed in Table 2-8.

Environmental performance is also assessed through performance measures in the Performance Evaluation Plan (PEP) agreement between DOE/NNSA/SSO and Sandia. On the basis of the PEP, DOE/NNSA/SSO prepares an annual Performance Evaluation Report (PER) that assesses SNL/NM's performance for the FY. For FY 2007, the overall score for Sandia was listed as "Outstanding."

TABLE 2-4. Environmentally-related Occurrences for Five Years (2003-2007)

Nature of Occurrence or Reporting Criteria					
	2003	2004	2005	2006	2007
Group 2 - Personnel Safety and Health					
Environmental - Radionuclide Releases - 2A NOTE: This is a pre-August 2003 Nature of Occurence.					
Personal exposure to chemical, biological, or physical hazards above limits - 2A(5) (Post-August 2003 Reporting Criteria).				4	2
Environmental - Release of Hazardous Substance/Regulated Pollutants/Oil - 2B NOTE - this is a pre-August 2003 Nature of Occurrence					
Group 5 - Environmental					
Environmental releases above permitted levels and exceeds report quantities specified in 40 CFR 302 or 40 CFR 355 - 5A(1).	1			1	
Any discharge that exceeds 100 gallons in any form - 5A(2).			1		
Release of Hazardous Substance, Material or Waste above permitted levels and exceeds percent of report quantities specified in 40 CFR 302 or 40 CFR 355 - 5A(3).					
Release of Hazardous Substance, Material, or Waste that must be reported to outside agencies in a format other then routine periodic reports (oil spills <10 gal need not be reported) - 5A(4).		4	2	1	1
Group 7 (Pre-August 2003 Nature of Occurrence - does not exist in post-2003 Reporting Criteria)					
Value Basis Reporting - Cost Based Occurrences - 7A.					
Group 9[1] - Noncompliance Notifications					
Any enforcement action (other than associated with the Price Anderson Amendment Act) involving ten or more cited violations, and/or an assessed fine of $10,000 or more - 9(1).				3	
Any written notification from an outside regulatory agency that a site/facility is considered to be in noncompliance with a schedule or requirement - 9(2).	2	1	1	1	1
Group 10 - Management Concerns					
Any event, condition, or series of events that does not meet any of the other reporting criteria, but is determined by the Facility Manager or line management to be of safety significance or of concern to other facilities or activities in the DOE complex - 10(2).		3	1	1	6
A near miss, where no barrier or only one barrier prevented an event from having a reportable consequence - 10(3).				1	3
An event that results in a significance concern by affected state, tribal, or local officials, press, or general population; that could damage the credibility of the Department or that may result in inquiries to Headquarters - 10(4).			1		

TABLE 2-5. DOE Manual 231.1-2 Reportable Environmental Occurrences, 2007

Date	Occurrence Significance Category	Reporting Criteria	Description
February	3	10(3)	During a review of equipment at the SNL Reapplication Yard, personnel found four different types of chemical hazards and a radiation labeled bag containing a wire array, in a vacuum chamber. Preliminary information indicates that the vacuum chamber had come from Building 10421 and was in storage for five years. Hazardous Waste and Radiation Protection personnel handled the chemical hazards and potential radiological hazards. Surveys and tests found no radioactivity from the radiation labeled bag. The chemical hazards were transferred to a safe storage location for future disposal. Notifications were made per requirements throughout the event.
March	3	2A(5)	Exposure monitoring performed during sheetrock activities at the Sandia WIF Building 898 construction site found respirable silica levels to be below the OSHA permissible exposure limit (PEL) of 0.050 mg/m3, but above the 2006 American Conference for Governmental Industrial Hygienists (ACGIH) PEL of 0.025 mg/m3. The workers wore nuisance dust masks; however no exposure reduction was credited because they were not working under an active respiratory protection program. All activities that require monitoring have been stopped until exposure monitoring methodology can be examined.
March	3	10(3)	A Technologist in the Explosives Technologies Group was assembling components in preparation for an explosive test, when one of the detonators prematurely and unexpectedly detonated without any obvious outside stimulus. He saw a flash, heard a loud blast, and wood dust and light debris sprayed across his upper torso. He was wearing a grounding strap and safety glasses. He was transported to medical, and experienced ringing in his ears, but no external physical injuries. A hearing test was performed and initial results were inconclusive. An additional test has been scheduled. There was no property damage to the facility or adjacent structure. The detonators were quarantined in a locked explosives storage cabinet.
July	3	2A(5)	Three individuals working at SNL Fleet Services exceeded the American Conference of Government Industrial Hygienists (ACGIH) 9-hour Threshold Limit Value (TLV) for noise. This was determined after reading noise dosimeter instruments worn by the affected employees. No hearing protection was being worn by the employees at the time. Hearing protection has since been issued.
July	3	10(2)	A grass fire started in the field east of Building 907 in the Buffer Zone during grass cutting. The field was being cut using a hay cutting machine, in order to allow vehicle access for perform water sampling at monitoring wells, and to reduce habitat and hiding spots for mountain lions recently spotted in the area. The fire was apparently caused by the cutting operation. The operator was not injured. Grass cutting operations will cease pending an evaluation of the incident, and the hay cutting machine will be inspected for any possible malfunction.

TABLE 2-5. DOE Manual 231.1-2 Reportable Environmental Occurrences, 2007 (continued)

Date	Occurrence Significance Category	Reporting Criteria	Description
August	3	10(2)	The programmable logic controller (PLC) central processing unit (CPU) associated with the 858N hazardous gas monitoring system registered a maintenance fault. Appropriate notifications were made and gases associated with the system were automatically turned off. After evaluating causes of the maintenance fault, the primary PLC and back-up systems were restored to full functionality. Gas monitoring was confirmed to be operational.
September	4	9(2)	The New Mexico Environmental Department (NMED) issued Notices of Violation to Sandia National Laboratories for failure to close two containers holding hazardous waste at Building 897 Rm. 2005 and Rm. 3081, and for failure to sign and date the original manifest upon receipt of a shipment of hazardous waste at the permitted storage facility Building 959. Upon discovery, the containers were closed and the manifest was signed. The total fine amount for these potential violations is $4504.00.
September	4	10(2)	An exothermic reaction was observed coming from a closed hazardous waste can inside Building 858N in Room 1074. The can contained rags that had been used to clean up a nitric acid spill. The 858N Emergency Response Team (ERT) was called and the SNL Emergency Operations Center was notified. Personnel were asked to temporarily leave the laboratory while the ERT secured and disposed of the hazardous waste can. Two employees were evaluated and returned to work after reporting headaches. Normal operations were reinstated.
October	4	5A(4)	While replacing a 20-year old Nitrogen Plant owned and maintained by a subcontractor, Center 1700 Facilities personnel discovered oil staining the ground under the compressor skid. The SNL Environmental Coordinator notified the SNL Spill Prevention Controls and Countermeasure Coordinator, who directed that the area be covered with plastic sheeting to prevent further leaching of oil into the soil in case there was rain. An official notification of the spill was made to the New Mexico Environmental Department. The subcontractor owner of the old nitrogen system will have another company excavate the contaminated soil and place it in a roll-off trailer for proper disposal.
October	3	10(2)	The Building Coordinator for Building 966 noticed a stored lecture bottle with no barcode identification. No record was found for the bottle in the chemical inventory storage database. The Building Coordinator discovered that a new employee had obtained the gas for a rush research project from a recognized local vendor. However the employee was unfamiliar with the proper procurement protocols and simply purchased the bottle with personal funds, circumventing the established hazards controls. Work was suspended until management could ensure the appropriate work controls are established and understood.

TABLE 2-5. DOE Manual 231.1-2 Reportable Environmental Occurrences, 2007 (concluded)

Date	Occurrence Significance Category	Reporting Criteria	Description
October	4	10(3)	Emergency response personnel responded to a vehicle fire at Building 967 involving a trash truck. Combustible trash overflowed onto a hot engine exhaust manifold, which ignited and caused the fire. The flames were extinguished by operating personnel before emergency personnel had arrived. No injuries or damage to equipment were reported, and there were no hazardous materials in the load.
November	4	10(2)	A two-person crew working for a third-tiered sheet metal subcontractor began removing overhead ductwork that was identified as having internal beryllium contamination. Although the hazard identification and controls were communicated to the prime construction contractor through contract documents, the sheet metal subcontractor was not aware that the interior of the ductwork was still identified as beryllium-contaminated and therefore, the workers did not wear the required PPE. The prime contractor suspended the work. Personnel were placed in required the PPE and work was completed.
November	3	10(2)	A radiation control technician (RCT) discovered that a front-end loader had been removed from a soil contamination area without being surveyed. The RCT had surveyed two other pieces of heavy equipment in the area and released them after lab results showed no contamination; however, the front-end loader was left unsurveyed in the controlled area because it would be used later to move barrels of contaminated soil. Later, misunderstanding the survey status, two operators drove the front-end loader out of the area to Building 9920, thereby violating a Radiological Work Permit. An RCT surveyed the operators, the front-end loader, and a truck in which the operators had ridden and found no reportable contamination.

"Sandia Employee and Cooper's Hawk"
2007 Photo Contest - 2nd Place, photo by Steve Cox.

TABLE 2-6. Environmental Program Audits and Appraisals Conducted In 2007

Appraising Agency	Title	Date	Summary
External Audits and Appraisals			
NMED	Surface water containment lagoons	2007	No findings or observations resulted from these inspections
ABCWUA	Flow Basin 2069F	November 15, 2007	No findings or observations resulted from these inspections
EPA Region VI	USTs	September 2007	No findings or observations resulted from these inspections
ABCWUA	CINT	April 5, 2007	No findings or observations resulted from these inspections
ABCWUA	Flow Basin 2069G	April 16, 2007	No findings or observations resulted from these inspections
ABCWUA	Sampled CINT w/ COA	August 14, 2007	No findings or observations resulted from these inspections
ABCWUA	Flow Basin 2069A	September 18, 2007	No findings or observations resulted from these inspections
Internal Audits and Appraisals			
Sandia 12870	Waste Management/RCRA Hazardous Waste "Management of LLRW"	January 2007	Final report issued: 2 Observations 1 Strength
Sandia 12870	Environmental Protection/Environmental Protection Support Program "Environmental Permitting"	February 2007:	Final report issued: 4 Issues 3 Observations 3 Strengths
DOE/SSO	Environmental Protection/Storm Water	September 2007	Completed: 2 Findings 1 Observation
Sandia 12870	Environmental Protection/Wastewater "Discharges to the Sanitary Sewer"	December 2007	Final report issued: 2 Issues 1 Comment 6 Noteworthy Practices
Sandia	Multi-Sector General Permit Storm Water	August 2007	2 Issues
LESA 2212	Air Quality Compliance	March 20, 2007	1 Minor Finding 1 Observation
LESA 2241	Discharge to Sanitary Sewer System - POTWs	May 31, 2007	3 Observations 2 Noteworthy Practices
LESA 2238	Oil and Fuel Storage	May 29, 2007	2 Minor Findings 5 Observations
LESA 2236	Scrap Metal from Radiological Area	May 23, 2007	1 Observation 1 Noteworthy Practice
LESA 2252	Air Permits in Bernalillo County "Open Burn Permits"	June 27, 2007	2 Observations 1 Noteworthy Practice
LESA 2250	Surface and Stormwater Discharge	June 25, 2007	7 Observations 3 Noteworthy Practices
LESA 2320	Environmental Surveillance - Terrestrial	August 27, 2007	3 Observations 1 Noteworthy Practice
LESA 2139	Potable Water	September 17, 2007	9 Observations
LESA 2265	Hazardous Waste Management	June 28, 2007	2 Observations
LESA 2146	ISO 14400 Standard Status	August 30, 2007	6 Minor Findings 9 Observations 6 Noteworthy Practices

NOTES: LLRW = Low Level Radioactive Waste
RCRA = Resource Conservation and Recovery Act
SSO = Sandia Site Office
NMED = New Mexico Environment Department
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
ABCWUA = Albuquerque Bernalillo County Water Utility Authority

TABLE 2-7. Summary of Sandia Reporting Requirements to Outside Agencies (Other than DOE) for Releases of Pollutants or Hazardous Substances

Report Title	Description	Agency
Annual NESHAP Dose Assessment Report	A dose assessment of the calculated effective dose equivalent (EDE) to the maximally exposed individual (MEI) is based on the assumption that an exposed individual resides 24 hours per day at an area of highest incident radiation. Dose assessment is discussed in Section 5.4 of this report.	EPA 40 CFR 61, Subpart H
Reportable Quantity (RQ) Accidental Release Reporting	RQ release reporting is required by CERCLA and SARA Title III, or EPCRA to the NRC. CERCLA and EPCRA are discussed in Section 2.1.1 and 2.1.2 of this report. There were no reportable releases in 2007.	NRC 40 CFR 302
Toxic Release Inventory (TRI) Report	EPCRA, Sections 302, 311, 312, and 313, requires a TRI report to be filed by facilities conducting specifically listed industrial activities and using listed toxic chemicals. As discussed in Section 2.1.2, Sandia is currently required to submit a TRI report because its chemical use is above the reporting threshold.	EPA 40 CFR 372, Subpart B
Notification of Discharge	NMED requires reporting of oil or other water contaminant, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or use of the property shall make oral notification as soon as possible after learning of such a discharge, but in no event more than 24 hours thereafter to the NMED. Within one week, the owner and/or operator shall send written notification to the appropriate Bureau Chief verifying the prior oral notification. Within 15 days, the owner and/or operator shall send written notification to the appropriate Bureau Chief describing any corrective actions taken and/or to be taken relative to the discharge. Three surface discharge releases occurred in 2007. Details are summarized in Section 6.2.2.	NMED 20.6.2.1203 NMAC
Accidental Slug Discharge Notification	The City of Albuquerque requires immediate notification to the Wastewater Utility Division of any accidental/slug discharge that may cause potential problems for the POTW. Within five days following such occurrence, the user is required to provide the Industrial Waste Engineer with a detailed written report describing the cause of the dangerous discharge and measures to be taken to prevent similar future occurrences. During the 2007 calendar year (CY) there were two events that were reportable to the ABCWUA.	Bernalillo County Water Utility Authority *Sewer Use and Wastewater Control Ordinance*

NOTES: NESHAP = National Emission Standards for Hazardous Air Pollutants
NRC = U.S. National Response Center
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
SARA = Superfund Amendments and Reauthorization Act
EPCRA = Emergency Planning and Community Right-to-Know Act
EPA = U.S. Environmental Protection Agency
NMED= New Mexico Environment Department
POTW = Publicly-Owned Treatment Works
NMAC = New Mexico Administrative Code
SNL/NM = Sandia National Laboratories, New Mexico
CFR = Code of Federal Regulations
COA = City of Albuquerque

TABLE 2-8. Environmental Performance Measures for SNL/NM only

Measure	2006 Goal	2006 Actual	2007 Goal	2007 Actual	2008 Goal
Hazardous Waste Generated (metric tons)	NA	27.5	5% reduction	21.9	< 22
Percent Solid Waste Recycled	52 percent	46 percent	50 percent	48 percent	50 percent
Number of Notices of Violation (NOV)	0	3	0	1	0
Amount of fines or penalties	$0	$20,000 Air Quality NOV' $41,150 Waste NOV	$0	Negotiated $4,504 for 2005 NMED RCRA	$0

Sandia Staff Member and Banded Juniper Titmouse (Baeolophus ridgwayi)"
2007 Photo Contest - photo by Ashli Maruster.

This page intentionally left blank.

chapter three

ENVIRONMENTAL PROGRAMS INFORMATION

"Earth Day Event" Photo by Bill Doty.

In This Chapter...

Environmental Management System (EMS)
Environmental Restoration (ER) Project
Waste Management
Pollution Prevention (P2) Program
Biological Control Activities
National Environmental Policy Act (NEPA) Compliance Activities
Environmental Outreach Program

Environmental Snapshot

The Environmental Education Outreach Program participated in the following events in 2007:

- *The Teacher Open House*
- *CNM Open House*
- *School to World*
- *The New Mexico Environmental Health Conference*

Environmental programs at Sandia National Laboratories (SNL) are in place to protect the environment, safety, and health (ES&H) of its employees and the community. These environmental programs meet or exceed the requirements of federal, state, and local environmental regulations, as well as U.S. Department of Energy (DOE) orders in the Prime Contract between Sandia and DOE. Presidential Executive Orders (EOs) and DOE guidance documents are also used to establish program criteria.

The environmental programs are part of Sandia's Environmental Management System (EMS). Sandia's EMS is its primary management approach for addressing environmental aspects of operations and activities, including energy and transportation functions.

Environmental Monitoring History

Environmental monitoring began at Sandia National Laboratories, New Mexico (SNL/NM) in 1959 when the principle objective was to monitor radioactive effluents and determine any associated environmental impacts. Since then, environmental programs, along with other ES&H activities, have greatly expanded at SNL/NM.

ES&H Policy

Sandia's ES&H policy is implemented to protect and preserve the environment and to ensure the safety and health of its employees, contractors, visitors, and the public while maintaining the corporate vision and mission. Sandia's corporate ES&H Program mandates compliance with all applicable laws, regulations, and DOE directives included in the Prime Contract between DOE and Sandia, internal Corporate Process Requirements (CPRs), and permit requirements. As such, Sandia has committed to the following:

- Plan work incorporating safety awareness, protective health practices, environmental management, Pollution Prevention (P2), and the long-term stewardship of resources;
- Identify hazards and evaluate, monitor, and manage risks with effective ES&H systems;
- Implement controls that prevent injury, exposure to hazardous materials, and the release of materials that could be hazardous to the environment;
- Perform quality work while protecting people, the environment, and our nation's security;
- Continually improve ES&H performance by establishing, meeting, and assessing measurable ES&H goals, objectives, targets, and milestones; and
- Regularly communicate ES&H issues to the Members of the Workforce, the community, regulators, and our stakeholders.

Integrated Safety Management System (ISMS)

Sandia's methodology for managing and implementing its ES&H Program is outlined in the ISMS. The ISMS is centered on five safety management functions, which provide processes to guide management in identifying and controlling hazards. These include: (1) plan work, (2) analyze hazards, (3) control hazards, (4) perform work, and (5) seek feedback and improvement.

3.1 ENVIRONMENTAL MANAGEMENT SYSTEM

In accordance with DOE Order 450.1, *Environmental Protection Program*, Sandia implemented an EMS as part of the ISMS. The EMS is the framework by which SNL/NM manages, and continually improves, its environmental compliance and sustainability practices. The EMS identifies the environmental consequences of SNL/NM's activities, products, and services and develops objectives and measurable targets to mitigate potential impacts to the environment.

SNL/NM implemented its EMS in December 2005. Since that time, Sandia has worked to fully implement and establish the EMS in conjunction with ISMS in all site operations. Some major accomplishments of the EMS for Fiscal Year (FY) 2007 include:

- Corporate- and division-level EMS objectives and targets were established and tracked quarterly to survey progress;
- Internal and external outreach events were conducted to increase environmental awareness;
- The EMS Award Program and Lecture Series was established to celebrate environmental accomplishments at Sandia;
- Corporate- and division-level EMS self-assessments were conducted, and any identified deficiencies were addressed;
- Environmental program plans that detail requirements, roles and responsibilities, schedules,

deliverables, and budgets were updated;

- EMS benchmarking exercises were conducted to determine how DOE and other facilities designed and implemented their EMS;
- Chemical Exchange Program (CEP) was implemented to reapply unused chemicals at the SNL/NM campus; and
- International Organization for Standardizations (ISO) 14001 Overview and Internal Auditor Training was conducted, and an ISO 14001 Gap Analysis was completed.

The EMS is a continuous improvement system that includes all environmental programs in an integrated approach to effectively minimize the impact of SNL/NM's operations on the environment. Each year, SNL/NM's work processes are reviewed, and new environmental objectives and measurable targets are set to ensure continual improvement in our environmental performance.

3.2 ENVIRONMENTAL RESTORATION (ER) PROJECT

Sandia's ER Project was created under the DOE Office of Environmental Management (EM) to identify, assess, and remediate sites potentially contaminated by past spill, release, or disposal activities in accordance with the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984 (with the exception of the Chemical Waste Landfill [CWL] which was closed under interim status as discussed in Section 2.1.3). HSWA requirements apply to ER sites or Solid Waste Management Units (SWMUs) at SNL/NM. A SWMU is any unit "from which hazardous constituents might migrate, irrespective of whether the units were intended for the management of solid and/or hazardous waste" (EPA 1985).

There are additional areas of concern (AOC) at SNL/NM that are not regulated as SWMUs (primarily closed-out septic systems) that have also been investigated as a part of the ER Project. These AOCs were not identified at the time of the issuance of Module IV of the RCRA Part B Operating Permit; however, they were identified by the New Mexico Environment Department (NMED) as requiring investigation. Consequently, they were investigated and addressed as if there had been SWMUs listed on the permit.

Sandia, DOE, and NMED negotiated a Compliance Order on Consent (COOC) that was signed in April 2004. The COOC is the regulatory document governing corrective action for releases of hazardous waste or hazardous constituents at SNL/NM. The COOC will terminate upon the completion of its requirements, with the exception of record preservation, and the Hazardous Waste Facility Permit will remain as the enforceable document.

3.2.1 Cleanup and Site Closures

Waste generated from SNL/NM ER sites includes hazardous waste, radioactive low-level waste (LLW), mixed hazardous/radioactive waste (MW), Toxic Substances Control Act (TSCA) waste (primarily polychlorinated biphenyls [PCBs] with some asbestos), and industrial solid waste. This chapter discusses the waste volumes generated by the ER Project in Section 3.3.

ER Project History

The initial identification of ER sites at SNL/NM was completed in 1987. At that time, 117 sites under Sandia's jurisdiction were identified in the initial Comprehensive Environmental Assessment and Response Program (CEARP) Phase I: Installation Assessment (DOE 1987).

Since then, a total of 500 individual sites, potential sites, or individual historical activities have been identified for investigation. Many of these sites were confirmed to contain little or no contamination of regulatory concern. In 1992, the ER Project at SNL/NM was officially initiated to implement assessment and remediation activities for sites that had been contaminated or potentially contaminated because of past SNL/NM operations. In addition to the SNL/NM site, other sites included in the original scope of Sandia's ER Project were Sandia National Laboratories, Livermore, California (SNL/CA), the Kauai Test Facility (KTF), and the Tonopah Test Range (TTR). There were also a number of miscellaneous sites located in other areas, nationwide and internationally.

TABLE 3-1. Summary of ER Project Status, 1992 - 2007

	A	B	C	D	E	F[2]
Year	Total ER Sites Remaining at Start of FY	ER Sites Proposed for CAC	Sites Approved for CAC	Corrective Actions Completed by End of Year	New ER Sites Identified During Year	Total ER Sites Remaining at End of FY
2007	61	1	0	0	0	61
2006	110	6	49	3	0	61
2005	126	21	18	51	+2[3]	110
2004	125	41	0	1	+1[4]	126
2003	126	15	0	5	-1	125
2002	158	3	30	2	-2	126
2001	87	7	0	4	71	158
2000	146	10	64	10	5	87
1999	146	4	0	20	0	146
1998	146	16	0	0	0	146
1997	153	30	7	4	0	146
1996	155	35	2	29	0	153
1995	191	61	36	34	0	155
1994	219[5]	48	28	3	0	191
1993	219[5]	0	0	0	0	219
1992	172	0	0	0	47	219

NOTES: FY = Fiscal Year ER = Environmental Restoration
CAC = Corrective Action Complete
Column A = Total ER Sites remaining to be removed from the Resource Conservation and Recovery Act (RCRA) Permit
Column B = ER Sites submitted for CAC including reinvestigations per New Mexico Environment Department (NMED)
Column C = ER Sites receiving final regulatory approval (Class III Permit Mod) by NMED
Column D = fieldwork completed including reinvestigations
Column E = newly identified sites or sites reopened by NMED
Column F = Total Sites remaining on the RCRA Permit at the end of the FY
[1] Includes all final submittals of CAC documentation including RSEs and Notice of Disapproval (NODs)
[2] Column totals: F = A - C + E
[3] Two Drain and Septic Systems (DSS) sites determined inactive in FY05 were submitted for CAC
[4] One DSS Area of Concern (AOC) was determined to be inactive in FY04 and submitted for CAC
[5] Some of the original 219 sites included Tonopah Test Range (TTR), Kauai Test Facility (KTF), and other off-site areas

Corrective Action Complete (CAC) Status

ER sites are proposed for CAC status based on insignificant contamination present or after remediation has been completed. The MWL is subject to a Final Order for Corrective Measures (FOCM) for the MWL issued by the Secretary of NMED. Once NMED grants CAC status, a site is placed in a table titled “Corrective Actions Complete Without Controls” or “Corrective Actions Complete With Controls,” based on its land-use category. The majority of ER sites are granted CAC status under a risk-based scenario. Risks to human health and the ecosystem are calculated for sites with residual contamination according to U.S. Environmental Protection Agency (EPA) and NMED guidelines. The level of contamination remaining, and the appropriate land-use category (i.e., industrial, residential, or recreational use) are used as inputs to determine the risk to human health and the ecosystem.

Table 3-1 (above) shows the ER project status since 1992. Sandia continues to actively pursue the closure of proposed CAC sites by working with NMED to provide adequate verification for a successful determination.

3.2.2 2007 Status and Activities

At the close of 2007, there were 61 regulated ER sites remaining on Sandia’s RCRA Permit. Subgrade preparation was completed on the MWL during FY 2007 but final corrective action is still pending approval of the Corrective Measure Implementation (CMI) plan. Remediation activities on all other ER sites have been completed. The final CAC proposal for one remaining (SWMU 58), was submitted to NMED. No sites were granted final approval for Class III Permit Modification this year, although 54 sites are expected to be approved in FY 2008. All CAC proposals and Class III Permit modifications are available for review at the University of New Mexico (UNM) Zimmerman Library.

3.2.3 Long-Term Environmental Stewardship (LTES) Activities

The SNL/NM LTES involves stewardship for past, present, and future activities at SNL/NM. The LTES program's purpose is to "promote the long-term stewardship of a site's natural and cultural resources throughout its operational, closure, and post-closure life cycle" (DOE 2005). The environmental programs mentioned in this document support that stewardship.

A component of the LTES program is long-term stewardship (LTS) of legacy sites. Stewardship of legacy sites is defined as "activities necessary to maintain long-term protection of human health, the environment, and natural and cultural resources from hazards associated with residual radioactive and hazardous contamination at former ER sites." Sandia's LTS activities are increasing as remedial activities required by ER sites are completed. The LTS Program conducts compliance oversight activities, including long-term monitoring, to meet NMED requirements, conducts institutional control activities, and outreach activities to keep the public apprised of the LTS Program. This increase in activity led to the completion of an LTES Implementation Plan in 2006 (DOE/SNL 2006).

Compliance Oversight Activities

More than 50 groundwater monitoring wells associated with former ER sites are monitored to meet NMED requirements. Water levels and water quality data are ascertained during this monitoring, and the data is reported in detail in SNL/NM's Annual Groundwater Monitoring Report. Monitoring wells are maintained or replaced as necessary. This year, one well in Technical Area (TA)-V was replaced as part of the LTS Program. The LTS Program also conducts the long-term monitoring of the Corrective Action Management Unit (CAMU). Leachate is pumped weekly, and periodically sampled and disposed. This program produces the CAMU. Vadose Zone Monitoring System Annual Montoring Results Report, which contains more details on activities conducted, and sampling results. A comprehensive information management system is used to manage data from past sampling activities and currently generated monitoring data. This system ensures that legally defensible monitoring data are created to ensure protection of human health and the environment.

Institutional Control (IC) Activities

Former ER sites that have not been cleaned up to residential risk standards are periodically inspected, and maintained when necessary. An IC tracking system has been created to help manage site IC information.

Community Liaison and Stakeholder Involvement Activities

It is important that the public be made aware of the work being conducted to maintain long-term protection of human health, the environment, and natural and cultural resources from hazards associated with residual radioactive and hazardous contamination at former ER sites. A previously developed LTS exhibit at the National Atomic Museum has been updated this year to reflect changes with the LTS Program. Bi-annual newsletters and an Annual Site Environmental Report (ASER) summary pamphlet are published and distributed to the public. An LTS website was created for public access. It contains key environmental regulatory decision documents for all former ER sites and a map with site locations. The LTS website is continually updated as new regulatory documents are submitted by DOE/NNSA/SSO and Sandia to the NMED.

Public Outreach and Communication

Stakeholders participate in semi-annual DOE/Department of Defense (DoD) meetings on environmental activities, as well as periodic LTES/LTS working groups and meetings. These meetings drive community input regarding LTES/LTS and offer the opportunity for progress reports on the current status of LTES/LTS. The LTES/LTS Program has also completed work on the Community Checklist, which was compiled by Sandia's Members of the Workforce and community members who have an interest in LTES/LTS at SNL/NM. The Community Checklist contains the community members' questions about LTES/LTS. The questions were addressed with Members of the Workforce and posted to the LTES website. The Community Checklist will be updated annually with new concerns or questions from the community.

Please visit the LTES website for more information: *http://ltes.sandia.gov/.* Click on "Legacy" for information about LTS sites.

3.2.4 ER Management Units at SNL/NM

CWL

The former CWL is approximately 1.9 acres and is located in the southeast corner of TA-III. Disposal operations at the CWL began in 1962. From 1962 until 1981, the CWL was used for the disposal of chemical and solid waste generated by SNL/NM research activities. Disposal of liquid waste in unlined pits and trenches ended in 1981; after 1982, all liquid waste disposal was terminated. From 1982 through 1985, only solid waste was disposed of at the CWL; after 1985, all waste disposal ended. The CWL was also used as a hazardous waste drum storage facility from 1981 to 1989. The primary contaminants of concern (COC) at the CWL are volatile organic compounds (VOCs) and metals.

Excavation of the landfill began September 30, 1998 as part of the Landfill Excavation (LE) voluntary corrective measure (VCM) during landfill closure. Except for one verification sampling grid point that was excavated in January 2003, all excavation was completed in February 2002. Over 52,000 cubic yards (yd^3) of soil and debris were excavated from the landfill between 1998 and 2002. The excavation process, waste management activities, final verification soil sampling analytical results, and final risk assessment were presented in the LE VCM Final Report (SNL 2003), which was approved by NMED on December 16, 2003 (Moats 2003).

The majority of the soils excavated from the CWL were managed at the CAMU, adjacent to the CWL; the soils were treated as needed and placed into the CAMU containment cell for long-term management. Sampling and final cleanup of the site operational boundary was completed in February 2004 and documented in a report approved by NMED in October 2005.

As part of the CWL closure process defined in the amended Chapter 12 of the closure plan, Sandia and DOE, National Nuclear Security Administration (NNSA), Sandia Site Office (SSO) submitted a compilation of documents to NMED on May 20, 2003 that included the CWL Corrective Measures Study (CMS) Report, Remedial Action Plan (RAP), and Post-Closure Care Plan (PCCP). This three-document compilation was submitted as a Class 3 amendment to the CWL Closure Plan, requesting the selection of the remedy (approval of the CMS Report and RAP) and approval of the PCCP for post-closure conditions. On December 12, 2003, NMED rejected the CWL CMS Report and postponed review of the RAP and PCCP, pending approval of a revised CMS Report (Kieling 2003). The December 2003 NMED letter contained general and specific comments on the CMS Report, and requested the report be resubmitted by December 31, 2004.

A revised CMS Report was submitted in December 2004, as requested by NMED, which included a revised RAP as an annex. A revised PCCP was submitted to NMED as a permit application in September 2005 after receiving an NMED request for supplemental information (RSI) in July 2005 on the revised CMS Report. In addition to submitting revised versions of the three original May 2003 documents (CMS Report, RAP, and PCCP), Sandia and DOE/NNSA/SSO requested NMED approval of an Interim Corrective Measure (ICM) to allow construction of the at-grade landfill cover design, originally presented in the May 2003 RAP, prior to NMED approval of the revised CMS Report. The ICM request was submitted to NMED in April 2004 and was approved in September 2004. Backfilling of CWL to four feet below ground surface (bgs) was completed in February 2004. The CWL cover installation began in March 2005 and was completed in September 2005.

On May 21, 2007, NMED issued the Class 3 amendment to the CWL Closure Plan for public comment, including the CMS Report and RAP (final remedy) and a draft post-closure car permit (post-closure care requirements). DOE and Sandia submitted comments to NMED. The comment period was extended for 30 days at the request of citizens. The CMS, RAP, and draft post-closure care permit are still under review and awaiting approval by the NMED.

CAMU

The CAMU is permitted under RCRA and TSCA for the management of remediation waste (primarily contaminated soil) generated during the VCM conducted by the ER Project at the CWL. Storage, treatment, and containment activities are authorized under the CAMU permit (EPA 1997). The CAMU is located in TA-III next to the CWL and the Radioactive and Mixed Waste Management Facility (RMWMF). Two treatment processes, Low Temperature Thermal Desorption (LTTD) and stabilization treatment (ST), were used as needed to treat soil wastes before they were placed in the containment cell. LTTD treatment operations were completed in December 2002. The remaining ST treatment activities at the CAMU were performed during January 2003.

The staging, treatment, and support areas at the CAMU were clean-closed under the RCRA and TSCA provisions outlined in the closure plan (SNL 2002c). The CAMU containment cell cover was installed in July 2003, which encapsulated the CWL remediation waste in place. The CAMU was certified closed on October 15, 2003 in compliance with the closure requirements documented in the RCRA Closure Report (SNL 2003a). The CAMU containment cell, where the treated waste remains, will continue to be monitored and maintained in accordance with post-closure requirements.

The CAMU containment cell consists of engineered barriers, and incorporates a bottom liner system with a leachate collection system, a final cover system, and a vadose zone monitoring system (VZMS). The VZMS provides information on soil conditions under the cell for early detection of leaks. The VZMS consists of three subsystems that include the primary subliner (PSL), a vertical sensor array (VSA), and the CWL and sanitary sewer line (CSS) monitoring subsystems. VZMS monitoring of the containment cell was conducted on a monthly basis through May 2005. In June 2005, quarterly monitoring was initiated. The PSL, VSA, and CSS monitoring subsystems were monitored for the composition of soil gases and soil moisture content.

In 2007, a total of 613 gallons (gal) of leachate were removed from the containment cell. In 2006 a total of 745 gal of leachate were produced. The leachate is pumped from the containment cell leachate collection system on a weekly basis. The leachate is a listed hazardous waste (F039). The pumped leachate is containerized in 55 gal poly drums and stored in a RCRA 90 Day Storage Area. The waste is characterized by drawing a composite sample which is sent to an off-site laboratory for analysis. Prior to the expiration of the 90 storage limit, the waste is picked up and processed by the SNL/NM Hazardous Waste Management Facility (HWMF). The waste is subsequently shipped to and disposed by an off-site hazardous waste treatment facility.

Monitoring results for 2007 were consistent with baseline data established between January 1999 and December 2000. VZMS monitoring results are compiled and reported on an annual basis; the most recent report was submitted in September 2007 (SNL 2007). The annual VZMS monitoring reports are submitted to NMED as required by the CAMU permit (EPA also receives a copy).

Groundwater Management Units

In 2007, SNL/NM ER personnel performed groundwater monitoring at CWL, MWL, Burnsite Groundwater (BSG), TAG, and TA-V. SNL/NM personnel will continue groundwater monitoring as a part of CMI and LTES. The Corrective Measures Evaluation (CME) report for TA-V was submitted to NMED in July 2005, and the CME report for TAG was submitted in September 2005. After regulatory selection and public review of the preferred remedy, CMI Plans can be prepared for TAG and TA-V. Revised monitoring under the CMI plan for TAG and TA-V cannot begin until regulatory review and approval of the CME reports and review and approval of CMI plans.

MWL

The MWL was established in 1959 as a disposal area for radioactive waste and MW generated at SNL/NM research facilities. The landfill accepted approximately 100,000 cubic feet (ft^3) of LLW and minor amounts of mixed waste from March 1959 through December 1988. Tritium is the contaminant of primary concern at the MWL. It has been detected in surface and subsurface soils in and around the classified area of the landfill. However, there is no indication that tritium or other contaminants have migrated to groundwater, which is approximately 500 feet bgs at the MWL. Tritium is released from MWL soils to the atmosphere at low levels, which do not pose a threat to human health or the environment.

A monitoring well network consisting of seven wells has been installed at the MWL. These wells are sampled annually for radionuclides, metals, VOCs and major ion chemistry. Sampling of these wells has been conducted since 1990. The background well MWL-BW1 no longer has sufficient water for sampling and will be replaced in Calendar Year (CY) 2008. Additional information can be found in Section 7.2.2.

MWL Closure Status

On October 11, 2001, NMED directed Sandia and DOE/NNSA/SSO to conduct a CMS for the MWL. The MWL CMS Report was submitted to NMED on May 21, 2003 for technical review and comment. The purpose of the CMS was to identify, develop, and evaluate corrective measures alternatives and recommend the corrective measures to be taken at the MWL. Based upon detailed evaluation and risk assessment, using guidance provided by EPA and NMED, Sandia and DOE/NNSA/SSO recommended that a vegetative soil cover be deployed as the preferred corrective measure for the MWL.

NMED held a public comment period on the MWL CMS from August 11, 2004 to December 9, 2004. Public hearings were conducted on the MWL CMS on December 2-3 and 8-9, 2004. On May 26, 2005, the Secretary of NMED selected a vegetative soil cover with a bio-intrusion barrier as the remedy for the MWL. The selection was based on the administrative record and the hearing officer's report. The Secretary requested that a CMI Plan incorporating the final remedy be developed within 180 days following the selection of the remedy.

On November 9, 2005, DOE/NNSA/SSO and Sandia submitted a CMI Plan to NMED documenting the plans for construction of a cover for the MWL. The document contains a description of the selected remedy, the objectives for the remedy, detailed engineering design drawings and construction specifications, a construction quality assurance (QA) plan, and a health and safety plan. The cover design consists of a vegetated 3-foot-thick soil cover overlying a 1-foot-thick rock bio-intrusion barrier. The design will rely upon soil thickness and evapotranspiration to provide long-term performance and stability.

The CMI Plan also included the results of a comprehensive fate and transport model that was used to assess the performance of the MWL and monitoring triggers for future action. The triggers identify and detail specific monitoring results that would initiate an evaluation process to determine whether corrective action was necessary.

In June 2006, the DOE/NNSA/SSO and Sandia began clearing and grubbing the subgrade at the MWL in preparation for eventual cover construction activities. NMED submitted a Notice of Disapproval (NOD) for the MWL CMI Plan in November 2006, requesting additional information regarding landfill construction plans and performance modeling. The MWL NOD also requested additional and more restrictive triggers for corrective action in the event that the proposed remedy designs fail to protect human health and the environment. DOE/NNSA/SSO and Sandia responses to the MWL NOD were submitted to NMED in December 2006 and January 2007. Once NMED has completed their review of the NOD response documents, their approval of the MWL cover design is anticipated and cover construction activities will commence.

In September 2007, DOE/NNSA/SSO and Sandia submitted to the NMED a Long-Term Monitoring and Maintenance Plan (LTMMP) to address monitoring, maintenance, and physical and institutional controls for the MWL. The LTMMP is currently in regulatory review and going through the public comment process.

3.3 WASTE MANAGEMENT

Waste at SNL/NM is managed at ten facilities: the HWMF, the Thermal Treatment Facility (TTF), the RMWMF, five Manzano Storage Bunkers (MSB), the Auxiliary Hot Cell Facility (AHCF), and the Solid Waste Transfer Facility (SWTF). The primary waste types handled by these waste management facilities are shown below.

3.3.1 Hazardous and Chemical Waste

The HWMF packages, segregates, stores, and ships hazardous and chemical wastes. A lined catchment pond within the HWMF perimeter is used to contain all storm water runoff; if there is a spill or release, this is monitored before discharging. Hazardous waste is tracked from the point of generation to final disposal through meticulous "cradle to grave" documentation at each waste handling step. Each waste item received at the HWMF is labeled with a unique bar code, linking the item to the original disposal request. An individually coded waste item typically is a bottle, plastic bag, or other small item that contains chemical materials.

All waste is reviewed at the HWMF before being placed in temporary storage. After sufficient quantities of items have accumulated in the storage bays, the items are packed into larger containers, which are also bar-coded. These packages are moved to an adjacent building to await shipment to a permitted treatment, storage, and disposal (TSD) facility or recycling center. Waste is usually processed and shipped off-site within 90 days of receipt.

TABLE 3-2. Waste Shipped By the HWMF in 2007

Waste Categories Handled at the HWMF	2007 Waste Shipped	
RCRA Waste	**(kg)**	**(lb)**
Hazardous Waste	46,397	102,073
Hazardous Waste (Generated by ER Project)	0	0
Hazardous Waste (Recycled)	4,380	9,636
Total	50,777	111,709
TSCA		
Asbestos	67,308	148,078
PCB (recycled NR)	4,309	9,480
PCB (incin NR)	0	0
PCB (incin RCRA)	3	7
Total	71,620	157,565
BIOHAZARDOUS		
Infectious Waste	600	1,320
OTHER		
NR Waste (minus asbestos, PCB, subtitle D, ER, recycled)	209,154	460,139
Non-hazardous Solid Waste (RCRA Subtitle D)	1,501	3,302
Non-RCRA (Generated by ER Project)	0	0
Used Oil	13,882	30,540
Other (recycled) – various batteries, fluorescent lamps, and non-PCB (ballasts, capacitors, and oils)	56,732	124,810
Total	281,269	618,791
Total Waste and Recyclables Shipped	404,266	889,385

NOTES: PCB = Polychlorinated Biphenyl
ER = Environmental Restoration
lbs = pounds
RCRA = Resource Conservation and Recovery Act
TSCA = Toxic Substances Control Act (primarily regulates asbestos and PCBs)
NR = non-RCRA regulated
kg = kilograms
HWMF = Hazardous Waste Management Facility

Applicable regulations for hazardous and chemical waste handled by the HWMF are listed in Chapter 9.

2007 Activities at the HWMF

In 2007, a total of 12,551 package items were handled by the HWMF. The HWMF shipped a total of 50,777 kilograms (kg) (111,709 pounds [lb]) of RCRA-regulated hazardous waste, including recyclable waste. Specific waste categories handled and shipped in 2007 are shown in Table 3-2.

Hazardous and Chemical Waste Minimization

In accordance with the requirements of Module IV, Section B.1 of the RCRA Operating Permit, Sandia annually certifies that there is a “program in place to reduce the volume and toxicity of hazardous waste generated by the facility’s operation to the degree determined by the Permittee to be economically practicable” at SNL/NM. Waste minimization efforts are promoted throughout SNL/NM by the P2 program and investigated and implemented by line organizations with the support and technical assistance of the P2 program.

Hazardous and Chemical Recycling

Sandia recycles all categories of hazardous and chemical waste, where feasible. RCRA recycled waste includes various batteries, silver compounds, mercury compounds, lamps, capacitors, and toxic metals. A total of 4,380 kg (9,636 lb) of RCRA hazardous waste and 13,882 kg (30,540 lb) of used oil was recycled. “Other recyclable waste” includes miscellaneous recycled categories not regulated under RCRA or TSCA. This category includes various batteries, fluorescent lamps, various oils, and non-polychlorinated biphenyl (PCB) ballasts, lead, and capacitors. A total of 56,732 kg (124,810 lb) of material was recycled in this category. Waste recycled at SNL/NM in 2007 is summarized in Table 3-3.

Asbestos Waste Handling

The abatement of asbestos-containing equipment and building materials is ongoing. Removal of asbestos material is only done if the material is an inhalation hazard, or if the building is slated to be torn down or renovated. Typical asbestos-containing building materials are contained in floors, ceilings, and roofing tile, certain types of insulation, and other fire-retardant construction materials.

Similarly, in instances where laboratory equipment has asbestos-containing material in a non-friable form (which poses no inhalation risk), the item is allowed to remain in service or is redistributed through the property reapplication program. Typical asbestos waste generated from equipment abatement consists of fume hoods, ovens, and cable insulation. In 2007, a total of 67,308 kg (148,078 lb) of asbestos waste was generated and disposed.

PCB Handling

PCBs are a class of organic chemicals that were widely used in industrial applications due to their practical physical and chemical properties. Use of PCBs included dielectric fluids (used in transformers, capacitors, etc.), hydraulic fluids, and other applications requiring stable, fire retardant materials. The domestic production and distribution of PCBs was banned in 1979, and their use continues to be phased out.

Sandia has identified and replaced most PCBs and PCB-containing equipment. Previously, the largest quantity of regulated PCB-containing equipment in use at SNL/NM was capacitors contained inside fluorescent light ballasts manufactured before July 2, 1979. These have been almost completely eliminated due to an aggressive lighting retrofit program instigated in 1998. This program has removed all known PCB-containing ballasts running T12 lamps , replacing them with energy efficient, electronic (non-PCB) ballasts and T8 lamp technology. Other than fluorescent light ballasts, six PCB regulated items remain in use at SNL/NM. Seven areas of existing PCB spill contamination from old transformers that have been removed from service are being actively managed in compliance with an EPA/TSCA use authorization.

In 2007, a total of 4,312 kg (9,486c lb) of PCB waste was shipped from the HWMF for disposal and recycle (see Table 3-2). The majority of PCB waste items came from building demolition.

Explosive Waste

Explosive waste generated at SNL/NM is generally managed at the point of generation until it can be shipped to a treatment facility. Sandia operates the TTF, a unit permitted for the treatment of certain explosive waste generated by research and test activities at an adjacent facility. In 2007, 169 kg (371 lb) of waste was treated at the TTF. In 2007, 16,877 kg (37,129 lb) of other explosive waste was transferred to KAFB for treatment.

SNL/NM's Radioactive Waste and Mixed Waste

Low Level Waste (LLW) *is primarily contaminated with isotopes of strontium, plutonium, cobalt, americium, thorium, cesium, tritium, and uranium (plutonium and americium in LLW are below the activity level designated for TRU waste). Sandia's LLW inventory generally consists of laboratory waste, decontamination and demolition (D&D) debris, and personnel protection equipment (PPE).*

Mixed Waste *generally consists of a radioactive component with the addition of RCRA-hazardous component such as a metal or solvent..*

Transuranic (radioactive) Waste *may derive from sealed instrument sources, D&D waste, PPE, and laboratory waste. The radioactive component in TRU is generally americium, plutonium, neptunium, and curium.*

3.3.2 Radioactive Waste and MW

The RMWMF, AHCF, and MSB are used to manage LLW, MW, transuranic (TRU) waste, and mixed TRU waste (MTRU). The waste processing functions at the RMWMF include waste characterization, segregation, treatment, packaging, storage, and shipment to permitted off-site facilities. Wastes are stored at the MSB. The AHCF was not operational and did not manage wastes during 2007.

No high-level radioactive waste (HLW) is generated at SNL/NM. Although Sandia operates several nuclear reactors, no spent fuel has ever been produced since the original fuel rods are still viable. Furthermore, because SNL/NM is not a power producing utility, any spent fuel that would eventually be removed from the research reactors would not be classified as HLW.

All LLW, TRU, MTRU, and MW generators must contact the Radioactive Waste Program to obtain prior approval before generating waste. This will ensure that a proper waste pathway is in place before any waste is generated. The LLW and MW managed at the RMWMF is generated through a variety of processes. During 2007, both LLW and MW consisted of legacy wastes (wastes originally generated between 1990 and 1998), newly generated wastes from production processes, wastes from

ER activities, and wastes generated during waste management activities at the RMWMF. MW also included wastes that had been treated at the RMWMF. TRU and MTRU wastes consisted of legacy wastes.

Applicable DOE orders and regulations for LLW and MW management are listed in Chapter 9. Normally, radioactive waste is shipped off-site within a one-year time frame. This is similar to the requirements for hazardous waste and MW. Some LLW may remain on-site longer than one year. Generally, this is to achieve full utilization of transport vehicles by ensuring that vehicles are full prior to leaving the site.

2007 Activities at the RMWMF and MSB

In 2007, the RMWMF managed all four waste types (LLW, MW, TRU, and MTRU). Wastes were stored at both locations. On-site treatment at the RMWMF included chemical deactivation (including neutralization), thermal deactivation, stabilization and solidification, macro-encapsulation, and physical treatment (volume reduction).

In 2007, the RMWMF shipped 25,977 kg (57,253 lb) of LLW, and 12,489 kg (27,526 lb) of MW (562 cubic feet [ft^3]) to permitted off-site facilities for treatment and/or disposal. A five-year summary of radioactive waste shipped at SNL/NM that includes 2007 is shown in Figure 3-1.

In 2007, 1,717 kg (3,785 lb) of MW was treated at the RMWMF to meet applicable hazardous waste treatment standards. Of the treated waste, 267 kg (588 lb) were rendered non-hazardous. The treated wastes were then stored at the RMWMF or MSB, or they were shipped to permitted off-site facilities.

TRU and MTRU were stored at SNL/NM during 2007. The TRU and MTRU will be routed through Los Alamos National Laboratory (LANL) or directly to the Waste Isolation Pilot Plant (WIPP) for final disposal.

3.3.3 MW Regulatory Status

As discussed in Section 2.1.4, Sandia manages MW that is subject to the Federal Facilities Compliance Order (FFCO) (NMED 2004). The requirements include:

- Deadlines for processing and/or disposing of various types of waste, and
- Providing an annual update of activities and the current inventory of stored waste still on-site.

SNL/NM compliance history regarding MW and the FFCO is shown in Chapter 9, Table 9-3.

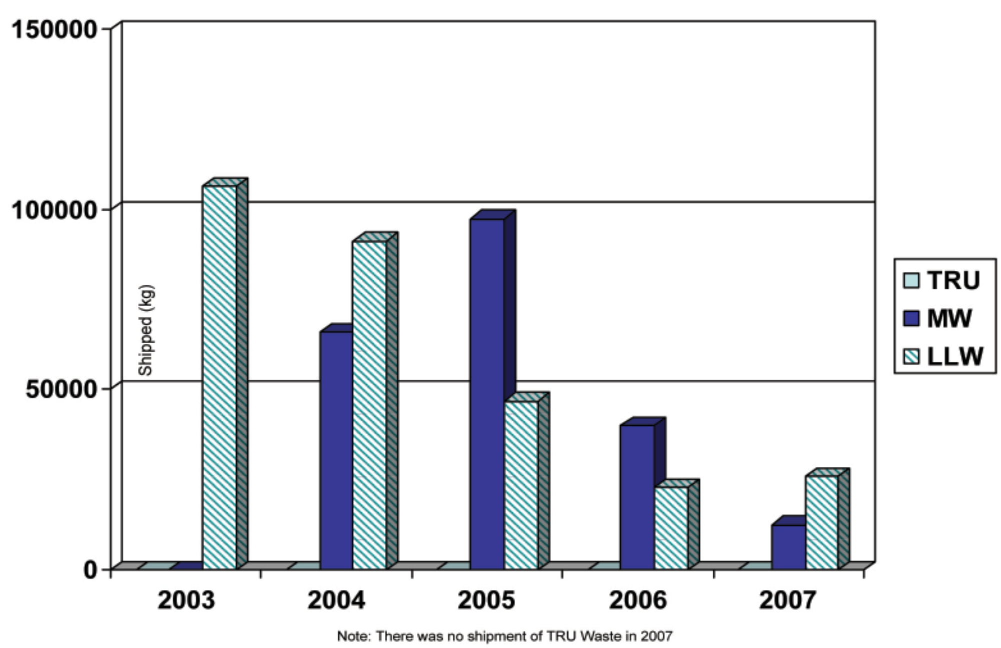


FIGURE 3-1. Five-Year Summary of Total Radioactive Waste Shipped at SNL/NM

MW Treatment

Chapter 9, Table 9-4 lists the current MW categories (TG-1 to TG-27, including TRU/MW) with the preferred treatment options and the status for each category. Five of the treatment technologies listed in Table 9-4 are performed on-site at the RMWMF as described in the current RCRA Part B permit request (most recently submitted to NMED in 2005).

MW Inventory in 2007

At the end of 2007, the majority of MW stored on-site consisted of inorganic debris and radioactive metallic objects with hazardous waste constituents and wastes that have been treated to meet hazardous waste treatment standards.

3.3.4 Solid Waste

The primary function of the SWTF is to collect, process, and ship for disposal solid waste from SNL/NM in compliance with all applicable regulations. The SWTF primarily accepts solid waste. It does not accept hazardous, radioactive, residential, or food service wastes.

SWTF Operations

Processing solid waste at the SWTF consists of screening 100 percent of the waste for prohibited materials, which are removed if identified. The waste is further screened when it is placed on a conveyor that passes under a radiation detection system. If radiation is detected above background levels, the conveyor is automatically shut down and the source

TABLE 3-3. Categories of Waste Recycled at SNL/NM in 2007

	Material	Pounds
Increments of 1,000	Aluminum Cans	2,004
	Tires	8,200
Increments of 10,000	Computers	23,168
	Toner Cartridges	27,471
	Batteries	84,249
	Other (e.g., light bulbs, ballasts, PCB)	88,482
	Used Oil	95,122
Increments of 100,000	Electric Scrap	381,290
	Paper/ Cardboard	879,179
Increments of 1,000,000	Scrap Metal	1,995,490
	Construction/ Remodeling (includes concrete, wallboard, ceiling tiles, wood, carpet, and asphalt)	15,377,569

Recycling at SNL/NM

Recycled Steel

White Paper

Aluminum Cans

is investigated. Note that screening 100 percent of the solid waste is not a requirement of any regulations, and is a good faith effort to prevent prohibited materials from inadvertently ending up in the landfill. The conveyor then feeds the waste into a baler where it is compressed into desk-sized bales. The bales are weighed, individually tracked, and loaded into a trailer for transport to a local landfill.

The SWTF also processes and ships (but does not collect) solid waste from Kirtland Air Force Base (KAFB) and DOE/NNSA. In 2007, the SWTF received 1,080,286 kg (2,379,485 lb) of SNL/NM solid waste and 1,048,547 kg (2,309,575 lb) of KAFB and DOE/NNSA solid waste.

Recyclables

The secondary function of the SWTF is to collect, process (screen, bale, and track), market, and ship the following recyclable materials from SNL/NM: cardboard, white paper, mixed paper, aluminum cans, scrap metals, printer consumables, and plastics (see Table 3-3). Proceeds from the sale of recyclable materials are used to reinvest in the recycling program. The SWTF also provides some recycling support for KAFB and DOE/NNSA.

In support of small SNL/NM construction and demolition projects, the Construction and Demolition (C&D) Recycle Center accepts small quantities of C&D waste, but it is managed separately from the solid waste. The C&D Recycle Center provides contractors of small C&D projects a location to recycle cardboard, wood, and scrap metal.

3.4 P2 PROGRAM

3.4.1 Program Scope

The focus of the P2 Program is to provide guidance and technical support to reduce waste generation and resource consumption, and to enhance the overall efficiency of processes and organizations within SNL/NM. The program focuses on reducing hazardous, radioactive, and solid wastes, with the associated goal of optimization of processes. Additionally, the P2 program sets annual targets for recycling, waste reduction, environmentally preferable purchasing (EPP), and reduction of environmental releases.

The P2 Program partners with numerous organizations at SNL/NM, including ES&H. P2 researches waste reduction technologies, products, and strategies applicable to SNL/NM work processes, performs cost-benefit analyses, and assists with developing proposals or requests for funding for new waste reduction processes. The P2 program is directed and guided by federal laws, DOE Orders, and federal Executive Orders, such as EO 13423 "*Strengthening Federal Environmental, Energy, and Transportation Management" (see Chapter 9).*

3.4.2 Awareness and Outreach

The P2 staff conducts awareness programs and outreach activities that promote and teach P2 strategies and technologies to waste generators. P2 has an internal website and a recently updated external website (http://p2.sandia.gov) that presents P2 information and successes. Articles and press releases are regularly created that showcase P2 activities. P2 staff submit nominations for federal (DOE, EPA) and local award programs.

The P2 Program's premier awareness event each year is the celebration of Earth Day. In 2007, Sandia's event was held on April 19 at SNL/NM's Steve Schiff Auditorium. It was estimated that the auditorium, with a capacity of 475 people, was nearly full to hear Dr. Paul MacCready's presentation on the "Future of Surface Transportation: A Future Very Different

Recycling Bins at SNL/NM

from the Past". The event included 18 displays, depicting a virtual house (sustainable products and options for the home) in the Steve Schiff Auditorium Lobby.

P2 Awards

In 2007, SNL/NM received several awards for P2 accomplishments, as detailed below.

EPA Waste Wise Award

SNL/NM received an EPA Waste Wise Gold Achievement award in the Federal Facilities category in May 2007. This is the seventh consecutive year that Sandia has been recognized by the EPA for its accomplishments in waste minimization, recycling collection, and buying recycled-content products. EPA's Waste Wise Program is a voluntary partnership program to help businesses and institutions find practical methods for reducing solid waste.

The Gold Achievement award was for SNL/NM's efforts in aggressively pursuing continuous improvement in green purchasing. Through the availability of new tools and programs, advancements were made in 2006 in recycled content (affirmative) procurement, electronics purchasing, bio-based purchasing and closed loop contracts.

DOE Awards for P2 Accomplishments

Sandia won a 2007 DOE P2 Star Award (highest level P2 award in DOE) for the HERMES III Accelerator program waste minimization results for 2006. At the High-Energy Radiation Megavolt Electron Source (HERMES III) Accelerator Sandia developed and implemented procedures and measures to reduce waste by minimizing the use of hazardous chemicals, extending the life of the de-ionized (DI) resin beds, reusing and modifying test hardware, and reducing the venting of Sulfur Hexafluoride (SF6) process gas. These comprehensive waste minimization techniques annually save thousands of dollars.

For work completed in 2007, Sandia received five awards in four different categories from the DOE/NNSA P2 Program. Three of the five awards have been submitted to be considered for the prestigious White House Closing the Circle Award, to be announced in April 2008. The NNSA P2 awards are:

- ***Electronics Stewardship–Best-in-Class:*** SNL/NM began its electronics stewardship program officially when it signed up to be a partner in the Federal Electronics Challenge (FEC) in February 2006. With new FEC goals set in February 2007, the SNL/NM P2 program partnered with several groups to achieve significant improvements and efficiency gains in purchasing Electronic Product Environmental Assessment Tool (EPEAT) computers, enabling monitor Energy Star operations and in the recycling of excess electronics for reduced environmental impact. In 2007, SNL/N purchased 11,101 computer units, 96.9 percent of which were EPEAT-compliant, and recycled 136.3 metric tons (mT) of electronic scrap. Energy Star monitor operations were estimated to save over 1.6 million kWh in FY 2007, for a savings of $41,000.

- ***Waste Minimization–Best-in-Class:*** Scientists in the Ceramic and Glass Department, tasked with scaling up a bench-top process, realized the new process would generate an excessive amount of hazardous waste. By using a green chemistry approach, they eliminated 3,216 kg of waste, saving $90,000 for this one-time process.

  According to the University of Massachusetts, green chemistry is the utilization of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design, manufacture and application of chemical products.

  The original bench scale process was developed to produce powder used for a hydrogen generation application. The customer wanted the process size scaled up 50 times to accommodate larger batches of material. Simply scaling the bench process would have generated 3,304 kg of liquid waste to produce 4 kg of the desired material, with a disposal cost over $92,500. By altering the stoichiometry and making three significant changes to the process, the total waste was reduced to 88 kg, a savings to Sandia of $90,000**.**

- ***Green Buildings–Best-in-Class:*** In 2007, three new buildings at SNL/NM were certified according to the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design for New Construction (LEED-NC) green building rating system. These projects represent SNL/NM's continuing commitment to the application of high performance, sustainable green building principles and practices to complex, research and development and laboratory-type facilities, and include:

- Weapons Evaluation Test Laboratory (WETL),
- Center for Integrated Nanotechnologies (CINT) facility, and
- MESA Microsystems Fabrication (MFAB) facility.

The three new LEED-NC certified buildings successfully diverted the following amounts of waste from the landfill:

- WETL: 369 tons diverted from landfill (83.8 percent Diversion)
- CINT:1,210 tons diverted from landfill (89.5 percent Diversion)
- MFAB:679 tons diverted from landfill (75.7 percent Diversion)

- ***Recycling–Honorable Mention:*** Sandia implemented a comprehensive concrete and asphalt (C&A) recycling program in 2007. The new Program recycled over 8,000 tons of C&A debris. In addition, the cost recovery process established provides dependable funding to maintain the Program.

Crushed concrete base course produced in 2007 was used for the MESA Entrance Road project (400 tons) and the Bldg. 800 Parking Lot Reconfiguration project (266 tons). In addition, approximately 5,500 tons of crushed concrete base course was produced for the FY 2008 G&H Avenue Reconstruction project. The cost of the 100 percent recycled content base course is approximately $5 per ton less than the cost of virgin aggregate material. As a result, the MESA Entrance Road project avoided approximately $2,000 in cost, and the Bldg. 800 Parking Lot Reconfiguration project avoided approximately $1,330 in cost.

- ***Recycling–Honorable Mention:*** The Fleet Services organization utilizes large quantities of a wide variety of materials in order to accomplish their vehicle fleet management at SNL/NM. They have been one of the most proactive groups at the site in recycling its waste and piloting environmentally preferable products.

Fleet improved its tire recycling to make it a closed loop process, made improvements to increase cardboard recycling and initiated new recycling of a bio-based hydraulic fluid. Annual savings reached $45,000 due to the avoided waste disposal. Additionally, a new contract was implemented to recycle used antifreeze instead of disposing it, with an annual savings of $35,000.

3.4.3 Environmentally Preperable Purchasing EPP Program

Sandia seeks to purchase environmentally preferable products and employ the most environmentally aware companies. Sandia communicates these requirements through its contracts and has issued single-source contracts to supply selected items. When a single-source contract is not appropriate, EPP requirements are included in Request for Proposals (RFPs) and used to evaluate the award of a contract. The toner cartridge and motor oil single-source contracts also require the vendor to collect and recycle their used product. These two commodity streams are examples of Sandia "closing the loop," by recycling used products and then buying replacement products that have recycled content. Sandia recognizes the importance of training and awareness in maintaining high levels of EPP. Throughout the year, P2 communicates with counterparts in the procurement, fleet, and construction departments, as well as the general population at SNL/NM.

According to the EPA's comprehensive procurement guidelines for recycled content products, Sandia tracks the purchase of approximately 40 different product types, in six different categories. In 2007, Sandia achieved 96 percent compliance with the EPA CPG. In the past three years, more procurement data was pulled, and as a result, the dollar amount of products being tracked increased by about 60 percent from 2004 to 2005, and totaled approximately six million dollars in 2007.

As a FEC Partner, Sandia has committed to improve the purchase, use, and recycling or disposal of computer electronics. The FEC promotes the EPEAT for computer purchases. In August 2007, SNL/NM's computer maintenance support department endorsed the proposal to purchase only EPEAT-Silver compliant computers and monitors. In 2007, Sandia purchased 11,101 computer units, 96.9 percent of this was EPEAT-compliant. The largest source of non-EPEAT purchases in FY 2007 were Apple laptops, this was corrected in August by the decision of the computer maintenance support administrators.

To comply with bio-based purchasing regulations from U.S. Department of Agriculture (USDA), Sandia continues to evaluate bio-based equivalents to replace petroleum and other chemical-based products currently being purchased. In addition to procuring and utilizing bio-based products well in advance of the March 2007 mandatory date, and meeting the current USDA bio-based purchasing requirements, Sandia is striving to stay ahead of the curve by piloting numerous bio-based products. Some of the products are not even on the future-use lists of the USDA yet, but have met a particular need at SNL/NM. For mandated products in 2007, Sandia achieved 98.4 percent compliance in spending $12,293.

3.4.4 Sustainable Design (SD)

Sandia pursues the concept of SD in a majority of its new construction projects. The goal of SD is to incorporate resource productivity and P2 for life-cycle savings into a facility's construction and operation. Aspects of SD include proper site selection, energy and water efficiency, environmentally preferable materials, recycling construction waste and enhancement of the indoor environmental quality for the building occupant through the use of day lighting, elimination of indoor air pollutant sources, and connection to the outdoors.

Integrating SD into construction projects at SNL/NM involves the collaborative effort of project manangers, building owners, operations, maintenance personnel, environmental professionals, engineers, and architects. Design team members look at materials, components and systems from different perspectives and work together for optimum solutions. For more information on SD, refer to Chapter 1 of this report.

"Wildlife Biologist releasing a Red-Tail Hawk." Photo by Jennifer Payne

3.4.5 Waste Reduction

Sandia continues to work on reducing the quantities of waste generated. Through a structured analysis known as P2 Opportunity Assessments (PPOA), processes generating wastes are assessed and waste reduction measures and strategies are investigated and recommended. The P2 program routinely conducts PPOAs and provides less structured technical assistance on an ongoing basis. Two PPOAs were completed in 2007, one for a microelectronics fabrication process, and the other for the P2 program in SNL/CA, to identify improvements to their site-wide recycling program. Implementation is ongoing in 2008.

Additionally, personnel in Sandia's mission programs accomplish waste minimization on their own initiative, like those identified in the awards section of this chapter, and through implementation of their division's EMS. For example, one division included reductions of 10 percent for both chemical inventories and hazardous waste reduction. The implementation of activities to support hazardous waste reductions helped SNL/NM achieve a 20 percent decrease in RCRA waste in 2007 from that generated in 2006.

This year a team tasked with scaling up a bench-top process realized the new process would generate an excessive amount of hazardous waste. By altering the stoichiometry and adding simple changes to the process, they eliminated the generation of 3,216 kg of waste (97 percent reduction) and prevented the expenditure of $90,000 in waste disposal fees.

3.4.6 Recycling

SNL/NM Property Reapplication Services receive and reapply material that still has value. A large portion of the material received that usually cannot be reapplied are computers, monitors and other office electronics equipment. With a total of ten shipments, SNL/NM was able to recycle 3,943 desktop computers, 1,764 laptop computers, 948 Cathode-ray tube (CRT) monitors and 100 Liquid Crystal Display (LCD) monitors and miscellaneous e-scrap, totaling 136.3 mT, achieving 100 percent recycling of this potential waste stream. Another 7.8 mT was transferred for reuse or donations.

The specification for Construction Waste Management was finalized at the end of 2006, and was employed as a site-wide requirement for recycling C&D waste on construction projects and renovation work. In 2007, 77 percent of C&D waste was recycled. As a result of the specification and several years of dedicated efforts, Sandia diverted 15,377,569 lbs of C&D waste from the landfill. C&A Waste were sent to the new accumulation and recycling staging area.

An ongoing marketing program is being used to raise recycling awareness with small construction project contractors. The construction contractors were informed about the SWTF C&D Recycling Center for collecting construction/remodeling project recyclables.

Site-wide recycling awareness continues with articles discussing aspects of the recycling program routinely published in on-site publications. In 2007, the P2 Program requested feedback from SNL/NM's Members of the Workforce. Almost 1,200 responses (about 1 in 6 polled) were received that provided insight into their recycling habits and valuable information about where to add new locations for recycling collection containers. A total of 200 new aluminum cans and plastic bottle collection containers were purchased and began being deployed.

The waste management chapter (Section 3.3) describes Sandia's routine recycling of a variety of materials at their waste management facilities. Also, Fleet Services sends tires to be retreaded and the facilities department sends construction materials and demolished building components for recycling. Used toner cartridges are sent for remanufacturing. In 2007, 48 percent of routinely generated materials that may have become solid waste disposed in landfills were diverted to recycling.

3.5 *BIOLOGICAL CONTROL ACTIVITIES*

The Biological Control Activity provides customer support related to animal control issues and compiles information on pesticide use at SNL/NM. Animal control support includes providing general information and resolving issues related to removing nuisance animals. Requests for assistance in resolving nuisance animal problems are relayed and documented through Sandia's Facilities Telecon Organization. This effort may involve interacting, as necessary, with U.S. Air Force (USAF) and State of New Mexico agencies to resolve animal control issues. The Biological Control Activity also involves providing support in addressing animal-borne disease concerns (e.g., Hantavirus) through activities such as disinfecting, sanitizing, and cleaning up areas infested with rodents or pigeons.

Pesticide use at SNL/NM includes the use of herbicides for weed control, rodenticides for controlling mice, and insecticides for the control of insects in food service and work areas. Sandia uses EPA-registered pesticides that are applied by certified pest control agencies. Material Safety Data Sheets (MSDSs) and product labels for pesticides used at SNL/NM are maintained under the program. Pesticide use (product names and amounts applied) are documented in quarterly reports. Documents related to the program are listed in Chapter 9.

3.6 *NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) COMPLIANCE ACTIVITIES*

Sandia provides DOE/NNSA/SSO with technical assistance supporting compliance with NEPA and the National Historic Preservation Act (NHPA). The SNL/NM NEPA Team reviews projects for conformance to existing DOE NEPA documents and determinations. The use of the ISMS NEPA Module software facilitates SNL/NM NEPA Compliance Reviews, citing existing NEPA documentation as appropriate. The ISMS NEPA Module also streamlines DOE/NNSA/SSO's review and approval of NEPA compliance, when required, and supports QA by providing a consistent framework that makes NEPA compliance documentation and information

TABLE 3-4. Summary Data for SNL/NM NEPA Compliance Reviews Performed in 2007

NEPA Reviews	Review Breakouts	Quantity
NEPA Module Reviews[1]	Total Reviewed by NEPA Team	353
	DOE Checklist Submittals[2]	48
EDP Reviews[3]	Total Reviewed by NEPA Team	82
	DOE Checklist Submittals[2]	2
	SNL/NM Reviews (Total)	485
Air Force (AF) NEPA Reviews[4]	Land Use Permit Renewals	8
	Land Use Permit Terminations	10
	Land Use Permit Modifications	1
	AF-813 Submittals (Total)	19
Verification of Work For Others (WFO) NEPA Citations[6]		714
Verification of Cooperative Research and Development Agreement (CRADA) NEPA Citations[7]		33
GRAND TOTAL of ALL NEPA REVIEWS (485 + 19 + 714+ 33)		1,251
PERCENTAGE of TOTAL REVIEWS REQUIRING SUBMITTAL to DOE[5]		5.5 percent
Total DOE Reviews (48 + 2 + 19 = 69) divided by Total NEPA Reviews (1,251) = ~0.055 = 5.5%		

NOTES:

[1] SNL reviews cite existing NEPA documents; where existing documents are not available, NEPA checklists are prepared and submitted to DOE.

[2] These are proposed projects that, after initial review, needed to be transmitted to DOE for review and determination in CY2007.

[3] Experiment Development Plan (EDP): An electronic system used by the Albuquerque Full-Scale Experimental Complex (AFSEC) to record project information, including NEPA reviews.
DOE/SSO has approved the EDP review process to be equivalent to the NEPA Module reviews. The NEPA Team subsequently reviews all EDPs. The EDP system was taken off-line in December 2007.
In 2008, AFSEC reviews will be included in the NEPA Module.

[4] The NEPA Team, in cooperation with the project originator, prepares all Air Force NEPA documents, which are submitted to DOE/SSO for transmittal to the U.S. Air Force.

[5] SNL/NM supports DOE/SSO in verifying WFO NEPA citations accompanying funding requests.

[6] SNL/NM supports DOE/SSO in verifying CRADA NEPA citations accompanying funding requests.

readily available. For some projects, a NEPA Compliance Review or an Air Force Form 813 is prepared for DOE review and determination, if the proposed action:

1. Does not fall within the analysis of an existing SNL/NM NEPA document, or
2. Would occur on USAF property (permitted, or requested to be permitted, for SNL/NM use).

NEPA program documents and regulations are listed in Chapter 9. See Table 3-4 for summary of compliance reviews.

The SNL/NM NEPA program includes the training and employing of Qualified NEPA Reviewers (QNRs), who are usually ES&H Coordinators. Once qualified and approved by DOE/NNSA/SSO, QNRs use the ISMS NEPA Module software (under supervision of the NEPA Team) to review proposed project activities against existing NEPA assessments and reviews (becoming expert in the process) on environmental aspects and impacts associated with their organizations.

SNL/NM Site-Wide Environmental Impact Statement (SWEIS)

The SWEIS update process was significantly revised during CY 2006 to better track and evaluate environmental operational limits at both the facility and site level. Environmental Planning personnel met with representatives from 37 facilities to discuss environmental operating limits and their significance within the SWEIS and other NEPA coverage. Reasons for exceeding operational parameters were discussed and noted. Exceedances were also put into the context of future activities, for example, whether an exceedance was a one-time event or represented a permanent change in facility configuration or operations. Operating parameter projections for CY 2007 and CY 2008 were developed using the best available information on future activities. To aid in the evaluation of operational limits, the format for the SWEIS update report was modified to discuss exceedances within the context of environmental impacts analyzed in the SWEIS, to enable better judgment about whether an exceedance could result in effects to the environment. For the first time, projections for environmental parameters at facilities were rolled up to develop site-wide projections for CY 2007 and CY 2008, alerting decision-makers to the potential for future exceedances of site-wide parameters. Similar to the annual reviews performed in previous years by the NEPA Team, the SWEIS Update Report was written to examine CY 2006 values for key parameters used in the SWEIS analyses, as updated in subsequent NEPA documentation, to identify resource areas where there may be environmental concerns and/or gaps in NEPA coverage.

2007 NEPA Documentation

The NEPA Team participated in the initial planning and data collection for: (1) the Draft Environmental Assessment for the Expansion of Permitted Land and Operations at the 9940 Complex and Thunder Range at Sandia National Laboratories/New Mexico, (2) a Draft Complex Transformation Supplemental Programmatic Environmental Impact Statement (Draft Complex Transformation SPEIS; formerly Complex 2030 SEIS) (DOE/EIS-0236-S4), and (3) a Draft Environmental Impact Statement/Overseas Environmental Impact Statement for the Hawaii Range Complex, HI.

The NEPA team reviewed a total of 436 proposed projects in the ISMS NEPA Module or in the Experimental Development Plan System (the TA-III project review system with its own environmental evaluation component), and they transmitted 50 NEPA checklists to the DOE/NNSA/SSO for review and determination in 2007.

Summary data for SNL/NM NEPA reviews performed in 2007 are detailed in Table 3-4.

3.7 ENVIRONMENTAL OUTREACH PROGRAM

SNL/NM's Environmental Outreach Program reaches out to the community at large. Presentations and information booths on both local and national environmental issues and concerns are held at community centers, schools, environmental conferences, and on-site at SNL/NM. In 2007, Sandia participated in the Teacher Open House and the New Mexico Environmental Health Conference. SNL/NM's Environmental Outreach Program also attended public meetings and worked with community members to update the Community Checklist as part of the LTES Program (Section 3.2.3).

For additional information, please visit the following website:

http://ltes.sandia.gov

SNL/NM also co-sponsors the Annual Youth Conference on the Environment. Additional sponsors included the Environmental Education Association of New Mexico (EEANM), and the City of Albuquerque's (COA) South Broadway Cultural Center. The 2007 conference theme was "Urban Environmental Issues." During the day, students attended seminars about wildlife displacement, air quality, urban sprawl and mass transit. Students also attended a panel discussion that addressed the San Juan Chama Drinking Water Project that will begin supplying drinking water to Albuquerque.

In 2007, the Environmental Outreach Program also focused on "Inreach" to Members of the Workforce at SNL/NM by holding the semi-annual awards ceremony and lecture series to recognize individuals or teams that demonstrated exemplary advancements that contributed to the vision of Sandia's EMS. The Environmental Outreach Program also participated in SNL/NM's "Take Your Daughters and Sons to Work Day" and the "Girl Scout Fair Play Camp."

For additional information, please visit the website:

http://www.sandia.gov/ciim/ASK/html/elementary/environment.htm

"Students signing in at the Youth Conference in April." Photo by Staff.

chapter four
TERRESTRIAL AND ECOLOGICAL SURVEILLANCE

"Coyote Track" 2007 Photo Contest, photo by Jennifer Payne.

In This Chapter...

Terrestrial Surveillance Program
- Objectives
- Sample Media
- Sampling Locations
- Radiological Parameters and Results
- Non-Radiological Parameters and Results

Ecological Surveillance

Environmental Snapshot

Routine sampling for non-radiological parameters at fixed locations was reduced and greater emphasis was placed on sampling specific areas with potential environmental impact.

4.1 TERRESTRIAL SURVEILLANCE PROGRAM

Terrestrial surveillance is conducted at Sandia National Laboratories, New Mexico (SNL/NM) to detect the possible deposition or migration of contaminants to off-site locations and to determine the impact, if any, of SNL/NM's operations on human health or the environment.

The Terrestrial Surveillance Program samples surface soils, arroyo and river sediments, and vegetation from various on-site, perimeter, and off-site locations. The samples are used to detect the presence of anomalous radiological and non-radiological constituents.

Various locations have been used for sample collection for one to 20 years. Some of the older sampling locations are no longer relevant to current operations. In the future, routine sampling for non-radiological parameters at fixed locations will be reduced, and greater emphasis will be placed on sampling specific areas with potential environmental impact. However, the total number of samples collected annually should remain approximately the same as in the past. Several significant programmatic changes have occurred over the years, and are documented in this chapter.

4.1.1 Program Objectives

The Terrestrial Surveillance Program is designed to meet the objectives of the U.S. Department of Energy (DOE) Order 450.1, *Environmental Protection Program* (DOE 2007a):

- Collect and analyze samples in order to characterize environmental conditions and identify trends,
- Establish baseline (or background) levels of radiological and non-radiological constituents,
- Assess the effectiveness of Pollution Prevention (P2) and abatement programs,
- Identify new or existing environmental quality problems and their potential impacts on human health or the environment, and
- Verify compliance with applicable laws and regulations, as well as commitments made in official documents (such as Environmental Impact Statements [EISs], in accordance with the National Environmental Policy Act [NEPA]).

Standards for Comparison

No regulatory limits are available to directly compare concentrations of some radiological or non-radiological constituents in surface soils, vegetation, or sediments. However, Sandia conducts statistical analyses to compare the results from on-site and perimeter samples to off-site results, and to establish trends in order to identify possible pollutants and their potential impact on human health or the environment. However, if anomalies are observed, there are various documents used for guidance with risk assessment, such as DOE Order 5400.5 *Radiation Protection of the Public and the Environment* (DOE 1993).

In addition, sample results for metals in surface soils are compared to U.S. surface soil average concentrations (Kabata-Pendias 2000), local/regional surface soil average concentrations, (Dragun and Chekiri 2005), or site-specific surface soil concentrations (Dinwiddie 1997). A summary report of metals-in-soils at SNL/NM collected annually between 1993 and 2005 has been prepared and serves as another point of reference (SNL 2006).

In summary, the mean value of non-radiological constituents in soils is less than the residential level of the State of New Mexico soil screening guidelines, with the exception of arsenic. However, the mean value for arsenic is less than the industrial level set by state soil screening guidelines. For an added measure of sample verification, the DOE Oversight Bureau of the New Mexico Environment Department (NMED) split samples with Sandia at several locations.

Statistical Analysis

Samples are generally collected from fixed locations to effectively enable statistical comparisons with results from previous years. Statistical analyses are performed to determine if a specific on-site or perimeter location differs from off-site values and to identify trends at a specific sampling location. Since multiple data points are necessary to provide an accurate view of a system, the Terrestrial Surveillance Program does not rely on the results from any single year's sampling event to characterize on-site environmental conditions. Results from a single sampling point may vary from year to year due to slight changes in sampling locations, differences in climatic conditions, and laboratory variations or errors. Therefore, as the amount of data increases, the accuracy of the characterization increases.

The results of the statistical analyses allow Sandia to prioritize sample locations for possible follow-up action. The prioritization process is a decision-making tool used to assist in the determination of the appropriate level of concern for each sample result. The Statistical Analysis Prioritization Methodology (Shyr, Herrera, and Haaker 1998) is based on two “yes or no” questions resulting in a matrix of four priority levels. The matrix is shown in Table 4-1. In addition, a qualitative visual inspection of a graphical presentation of the data is conducted to compare sampling results to regional, local, and site-specific concentrations. This step is performed to ensure that anomalous data that would otherwise pass statistical scrutiny is flagged for further investigation.

Beginning in 2001, the analysis was limited to a five-year period. The reason for the change was that in 2000, Sandia changed to analytical laboratories with lower detection capabilities for many of the metals. As a result, a large number of false decreasing trends were noted for non-radiological parameters when the entire data set was analyzed. By limiting the analysis to a five-year period (or five sample events where samples are not collected annually), the trend analysis is more meaningful. The analysis in 2007 utilized data from the same analytical laboratory for the five-year period.

In some instances, this qualitative inspection of the data is augmented by the graphical evaluation methodology described and documented in Section 4.1.5 (SNL 2007). This enables the visual identification of anomalies in the data that stand out from the data population for the entire site, or just that location. This is particularly useful where insufficient data exists for trending, but comparison of new data to “expected values” is desired.

4.1.2 Sample Media

Samples of surface soils, arroyo and river sediments and vegetation are collected as part of the Terrestrial Surveillance Program and analyzed for radiological and non-radiological constituents.

Soil

Soil samples are collected to ascertain the presence or buildup of pollutants that may have been transported by air or water and deposited on the ground surface. Approximately 1,500 grams (g) of sample is collected from the top two inches of soil in accordance with SNL/NM field operating procedures (FOPs). In 2007, soil samples were collected from locations indicated in Tables 4-2, 4-3 and 4-4. In addition, a special sampling campaign and summary report of non-radiological parameters (Target Analyte List [TAL]) was prepared for several locations near the southern end of the Long Sled Track (Appendix C-15) in Technical Area (TA) III, and two areas in Thunder Range (as described in Section 4.1.5, Appendix C-16) to serve as a baseline for future reference regarding non-radiological results in nearby soils.

Sediment

Sediment samples are collected from arroyo beds and from the banks of rivers and creeks to ascertain the presence, or buildup, of pollutants deposited

TABLE 4-1. Decision Matrix for Determining Priority Action Levels

Priority	Are results higher than off-site?*	Is there an increasing trend?	Priority for further investigation
1	**Yes**	**Yes**	Immediate attention needed. Specific investigation planned and/or notifications made to responsible parties.
2	**Yes**	No	Some concern based on the level of contaminant present. Further investigation and/or notifications as necessary.
3	No	**Yes**	A minor concern since contaminants present are not higher than off-site averages. Further investigation and/or notifications as necessary.
4	No	No	No concern. No investigation required.

NOTES: Based on Statistical Analysis Prioritization Methodology (Shyr, Herrera, and Haaker 1998).
*Some sites may appear higher than off-site. However, there may not be a statistically significant difference.

from surface waters. Approximately 1,500 g of sample is collected from the top two inches of soil in accordance with SNL/NM FOPs. Sediment samples were collected from locations listed in Tables 4-2, 4-3 and 4-4.

Vegetation

Vegetation is sampled to monitor for potential uptake of radioactive pollutants, which could provide an exposure pathway to foraging animals and to humans through the food chain. In actuality, human exposure to contaminants through the food chain is highly unlikely on Kirtland Air Force Base (KAFB) since there is no hunting, livestock, or commercial farming within the boundaries of the base. Approximately 500 g of sample is collected, preferably from perennial grass, by cutting back several inches of growth from the plant. If grass is not available, samples from small leafy plants may be collected. In 2007, vegetation was collected from locations listed in Tables 4-2, 4-3 and 4-4.

Gamma Radiation Levels

Gamma radiation levels are measured using thermoluminescent dosimeters (TLDs) to determine the impact, if any, of SNL/NM's operations on ambient radiation levels. The TLDs are changed out on a quarterly basis and processed at an on-site laboratory. TLDs were collected from locations listed in Tables 4-2, 4-3 and 4-4.

4.1.3 Sampling Locations

To the extent practicable, "sentinel" sampling locations are consistent from year to year in order to establish trends. Occasionally, sampling locations are added or dropped for different reasons, including the start-up of a new facility or operation, closure of an existing facility or operation, additional characterization of areas with elevated concentrations or increasing trends, or other technical or budgetary reasons. These locations are shown in Figure 4-1. Locations sampled are shown in Tables 4-2 ,4-3 and 4-4.

In some instances, special "sampling campaigns" (radiological or non-radiological) near operations of interest (such as described in Section 4.1.5) may be conducted in addition to, or in partial substitution for, fixed "sentinel" locations.

On-site

On-site locations are selected within or near areas of past or current SNL/NM operations (see Figure 4-1 and Table 4-2). Sample locations are chosen near sites with known contamination from past operations, or near facilities that have the potential to discharge radiological or non-radiological pollutants to the environment. Other considerations in the selection of sampling locations include local topography and meteorology.

Perimeter

Perimeter locations (Figure 4-1 and Table 4-3) are selected to determine if contaminants are migrating from SNL/NM sites toward the off-site community. With a few exceptions, perimeter locations are typically situated off SNL/NM property, but within the boundaries of KAFB.

Off-site

Off-site locations are selected to establish concentrations of radiological and non-radiological constituents for comparison with on-site and perimeter results (see Figure 4-2 and Table 4-4). Sample locations have been selected within a 25 mile (mi) radius of SNL/NM.

4.1.4 Radiological Parameters and Results

Radiological analyses are performed on all soil, sediment, and vegetation samples and are summarized in this section. The 2007 radiological parameters and analytical results are found in Appendix C of this report. The detailed statistical analyses are documented in the 2007 *Data Analysis in Support of the Annual Site Environmental Report* (SNL 2008).

Radiological Results

The results of the statistical analysis showed no on-site or perimeter soil, sediment, or vegetation locations that were Priority-1 (both higher than off-site and with an increasing trend). Four locations were identified as Priority-2 (higher than off-site) and two locations were identified as Priority-3 (increasing trend). The Priority-2 locations and parameters are listed in Table 4-5. The Priority-3 locations and parameters are listed in Table 4-6.

<u>Cesium-137</u>

Two perimeter locations (12 and 64) continue to be identified as Priority-2 for cesium-137 in surface soils. Location 12 is located on the U.S. Forest Service (USFS) land withdrawn area. Location 64 is located north of Manzano Base near the KAFB boundary. These locations are at a slightly higher elevation, which receives greater precipitation and results in slightly higher cesium-137 levels from fallout. Cesium-137 is prevalent in surface soils

TABLE 4-2. On-site Terrestrial Radiological Surveillance Locations and Sample Types

Location Number	Sampling Location	Soil	Sediment	Vegetation	TLD
1	Pennsylvania Ave.	X			X
2NW	Mixed Waste Landfill (MWL) (northwest)	X			X
2NE *	MWL (northeast)	X			
2SE	MWL (southeast)	X			
2SW	MWL (southwest)	X			
3	Coyote Canyon Control	X			X
6	Tech Area (TA) III (east of water tower)	X			X
7 *	Unnamed Arroyo (north of TA-V)	X			X
20*	TA-IV (southwest) (KAFB Skeet Range)	X		X	X
27	Albuquerque Fire Station 11, Southern SE				X
31	TA-II Guard Gate				X
33	Coyote Springs	X		X	
34	Lurance Canyon Burn Site	X			
35	Chemical Waste Landfill (CWL)	X			
41	TA-V (northeast fence)	X			X
42	TA-V (east fence)	X			X
43	TA-V (southeast fence)	X		X	X
45	Radioactive and Mixed Waste Management Facility (RMWMF), TA-III (northwest corner)	X			X
45E	RMWMF, TA-III (east fence)				X
46	TA-II (south corner)	X			X
47	Tijeras Arroyo (east of TA-IV)				X
48	Tijeras Arroyo (east of TA-II)				X
49	Near the Explosive Components Facility (ECF)	X			
51	TA-V (north of culvert)	X			
52	TA-III, northeast of Bldgs. 6716 and 6717	X			
53 *	TA-III south of long sled track	X			
54	TA-III, Bldg. 6630	X			
55	Large Melt Facility (LMF), Bldg. 9939	X		X	
56	TA-V, Bldg. 6588 (west corner)	X			
57	TA-IV, Bldg. 970 (northeast corner)	X			
66	KAFB Facility	X			X
72	Arroyo del Coyote (midstream)		X		
74N	TA-IV, Tijeras Arroyo (midstream)		X		
75	Arroyo del Coyote (down-gradient)		X		
76	Thunder Range (north)	X			
77	Thunder Range (south)	X			
78	School House Mesa	X			
79	Arroyo del Coyote (up-gradient)	X	X		
83	Tijeras Arroyo GW Well		X		
84	Storm Water Monitoring Point (SWMP)-10		X		
85	Arroyo del Coyote Cable Site		X		
86	Corner of Wyoming and S Street	X			X

NOTES: * = Replicate sampling locations: In addition to single samples taken for each medium, two replicate samples are collected for internal checks on comparability of sampling and analysis.

TLD = thermoluminescent dosimeter

TABLE 4-3. Perimeter Terrestrial Radiological Surveillance Locations and Sample Types

Location Number	Sampling Location	Soil	Sediment	Vegetation	TLD
4	Isleta Reservation Gate	X			X
5	McCormick Gate	X			X
12	Northeast Perimeter	X			
16	Four Hills	X			X
18	North Perimeter Road				X
19	USGS Seismic Center Gate	X			X
39	Northwest DOE Complex				X
40	Tech Area I, northeast (by Bldg. 852)				X
58	North KAFB Housing	X			
59	Zia Park (southeast)	X			
60	Tijeras Arroyo (down-gradient)	X	X		
61	Albuquerque International Sunport (west)	X			
63	No Sweat Boulevard	X			
64 *	North Manzano Base	X			
73 *	Tijeras Arroyo (up-gradient)		X		
80	Madera Canyon	X			
81	KAFB West Fence	X			X
82	Commissary	X			
87	Mesa del Sol (North)	X			
88	Mesa del Sol (Middle)	X			
89	Mesa del Sol (South)	X			

NOTES: * Replicate sampling locations: In addition to single samples taken for each medium, two replicate samples are collected for internal checks on comparability of sampling analysis.
TLD = thermoluminescent dosimeter

TABLE 4-4. Off-site Terrestrial Radiological Surveillance Locations and Sample Types

Location Number	Sampling Location	Soil	Sediment	Vegetation	TLD
8	Rio Grande, Corrales Bridge (up-gradient)	X	X	X	
9	Sedillo Hill, I-40 (east of Albuquerque)	X			
10	Oak Flats	X			X
11 *	Rio Grande, Isleta Pueblo (down-gradient)	X	X	X	X
21	Bernalillo Fire Station 10, Tijeras				X
22	Los Lunas Fire Station				X
23	Rio Rancho Fire Station, 19th Ave.				X
24	Corrales Fire Station				X
25	Placitas Fire Station	X			X
26	Albuquerque Fire Station 9, Menaul NE				X
27	Albuquerque Fire Station 11, Southern SE				X
28	Albuquerque Fire Station 2, High SE				X
29	Albuquerque Fire Station 7, 47th NW				X
30	Albuquerque Fire Station 6, Griegos NW				X
62	East resident	X			
68	Las Huertas Creek		X		

NOTES: * Replicate sampling locations: In addition to single samples taken for each medium, two replicated samples are collected for internal checks on comparability of sampling and analysis.
TLD = thermoluminescent dosimeter

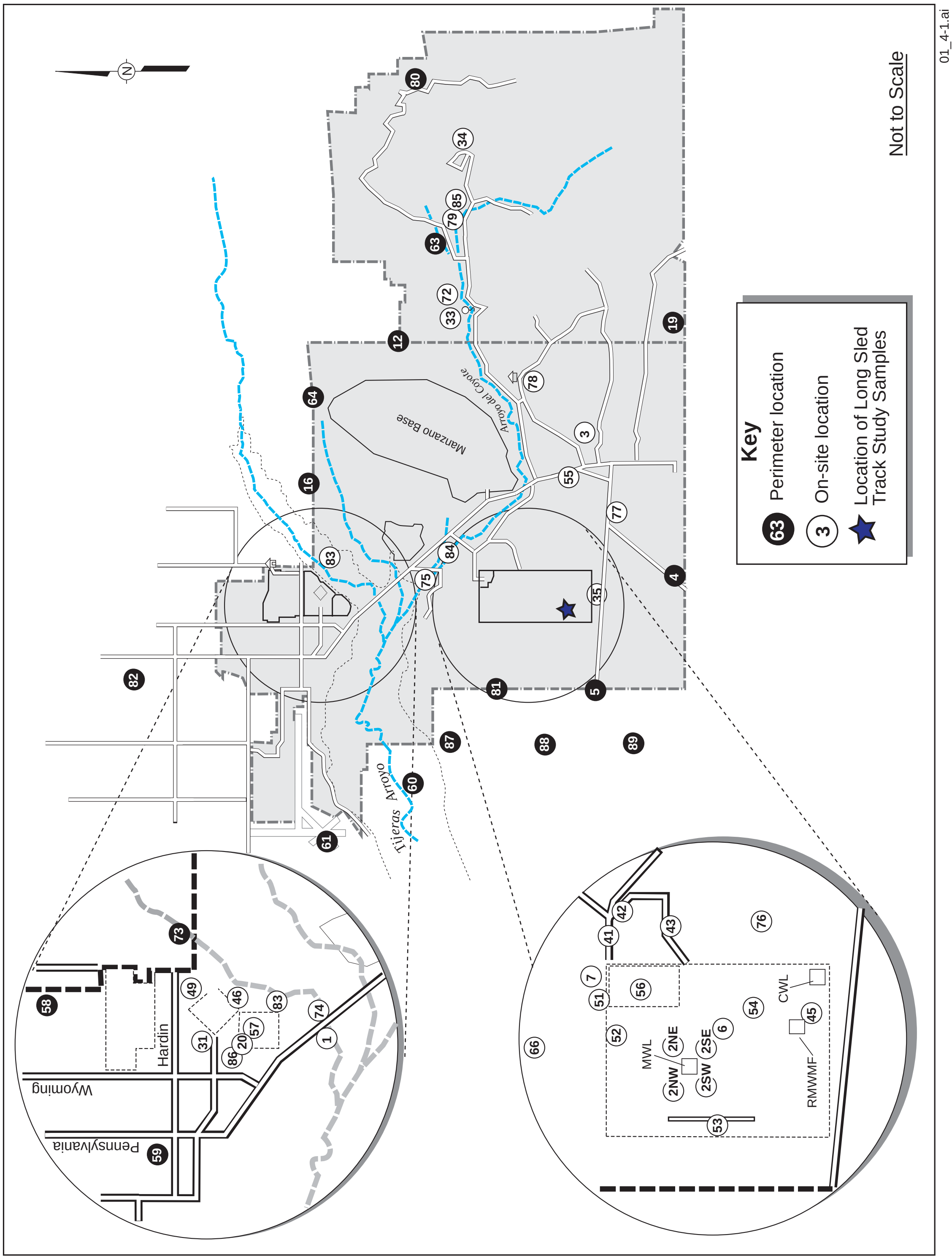


FIGURE 4-1. Terrestrial Surveillance Program On-site and Perimeter Sampling Locations

On-site locations are within areas of SNL/NM operations. Perimeter locations are located both on and off KAFB property.

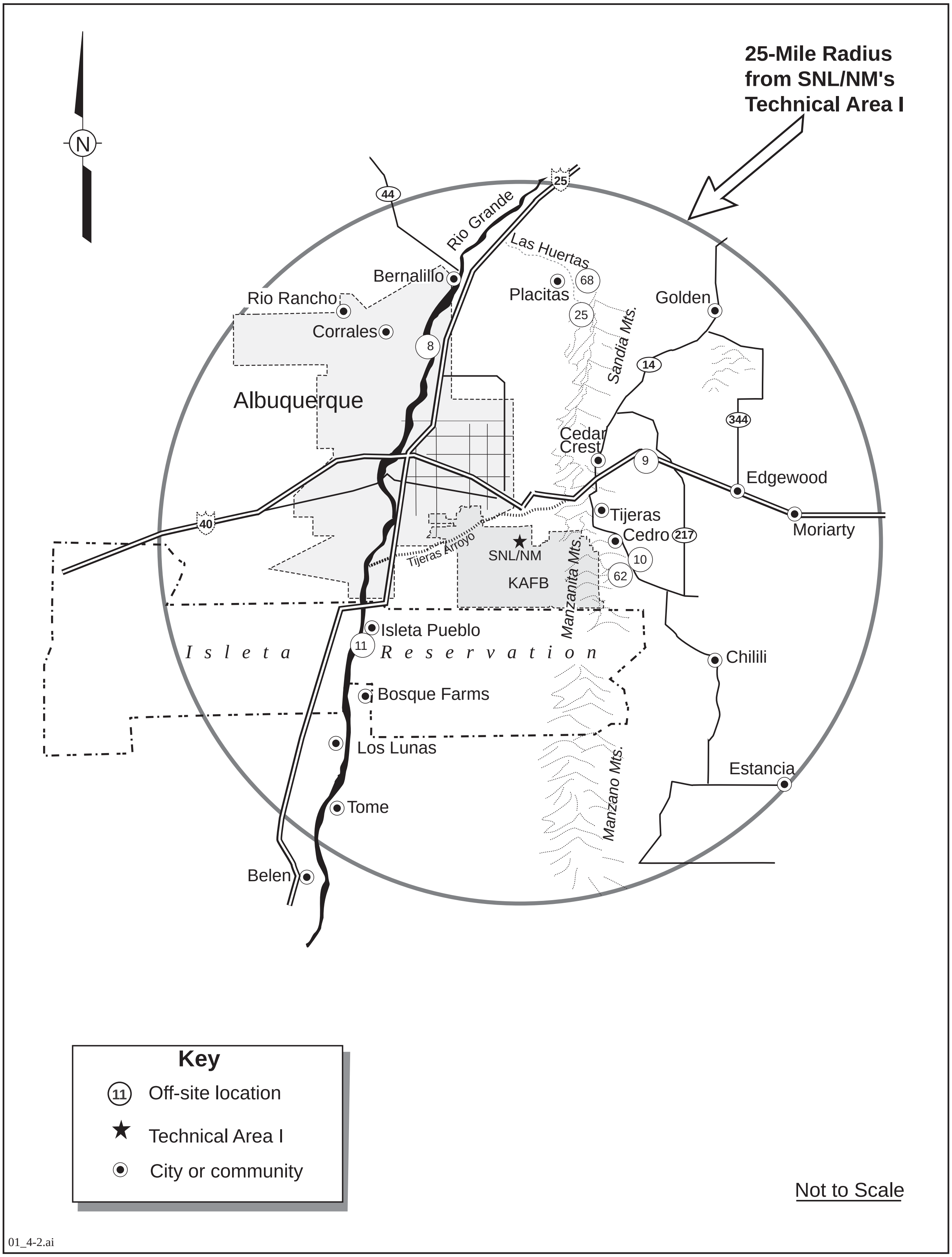


FIGURE 4-2. Terrestrial Surveillance Program Off-site Sampling Locations

worldwide as a result of historical nuclear weapons testing. Over the past five years, the values for cesium-137 at these perimeter locations ranged from 0.47 to 1.82 picocuries per gram (pCi/g). The highest recorded levels of Cesium-137 were recorded this year. However, these levels are not cause for concern.

All sediment and vegetation sample locations were identified as Priority-4 (consistent with off-site results and no increasing trends) for cesium-137.

Tritium

Tritium is not a significant indicator radionuclide for operations at SNL/NM, and the low soil moisture in the area will always make low activity assay difficult. There was no unusual Tritium concentrations noted for any of the soil, sediment or vegetation samples collected.

Total Uranium

One soil and one sediment location (33 and 79, respectively) were identified as Priority-2 for Total Uranium. Both locations are in the higher elevations of Coyote Canyon, where uranium concentrations tend to be elevated. Over the past five years, the values ranged from 0.84 pCi/g to 1.43 pCi/g at location 33 and 0.19 mg/kg to 1.58mg/kg at location 79. However, these labels are not cause for concern.

One soil and one sediment location (2NE and 11, respectively) were identified as Priority-3 for Total Uranium. Both locations were consistent with previous observations and are consistent with the expected background concentration for SNL/NM soils.

There was no significant difference noted for any of the vegetation samples collected.

TABLE 4-5. Radiological Results Summary Statistics for Sample Locations (2003-2007) noted as Priority-2 During 2007

Sample Media	Analyte	Units	Location	No. of Samples	Average	Median	Std Dev	Min	Max
Soil	Cesium-137	pCi/g	12	5	1.06	0.96	0.60	0.49	1.82
			64	5	0.78	0.76	0.31	0.47	1.24
	Total Uranium	mg/kg	33	5	1.13	1.18	0.27	0.84	1.43
Sediment	Total Uranium		79	5	1.30	1.32	0.19	1.10	1.58

NOTES: Std Dev = Standard deviation pCi/g = picocurie per gram mg/kg = milligram per kilogram
Data presented is only for the current five years.

TABLE 4-6. Radiological Results Summary Statistics for Sample Locations (2003-2007) noted as Priority-3 During 2007

Sample Media	Analyte	Units	Location	No. of Samples	Average	Median	Std Dev	Min	Max
Soil	Total Uranium	mg/kg	2NE	5	0.38	0.37	0.06	0.33	0.49
Sediment	Total Uranium	mg/kg	11	5	0.62	0.64	0.19	0.38	0.87

NOTES: Std Dev = Standard deviation mg/kg = milligram per kilogram
Data presented is only for the current five years.

TABLE 4-7. Summary Statistics for TLD Exposure Rates (2003-2007)

Location Class	No. of Observations	Units	Mean	Median	Std Dev	Minimum	Maximum
Community	55	mR/hr	96.6	94.0	14.1	76.4	147.6
Perimeter	40	mR/hr	97.1	96.9	11.6	78.5	132.2
On-Site	66	mR/hr	95.6	93.6	9.6	80.9	118.3

NOTES: mR/hr = milliroentgen per hour (10^{-3} roentgen per hour) Std Dev = Standard deviation
TLD = thermoluminescent dosimeter

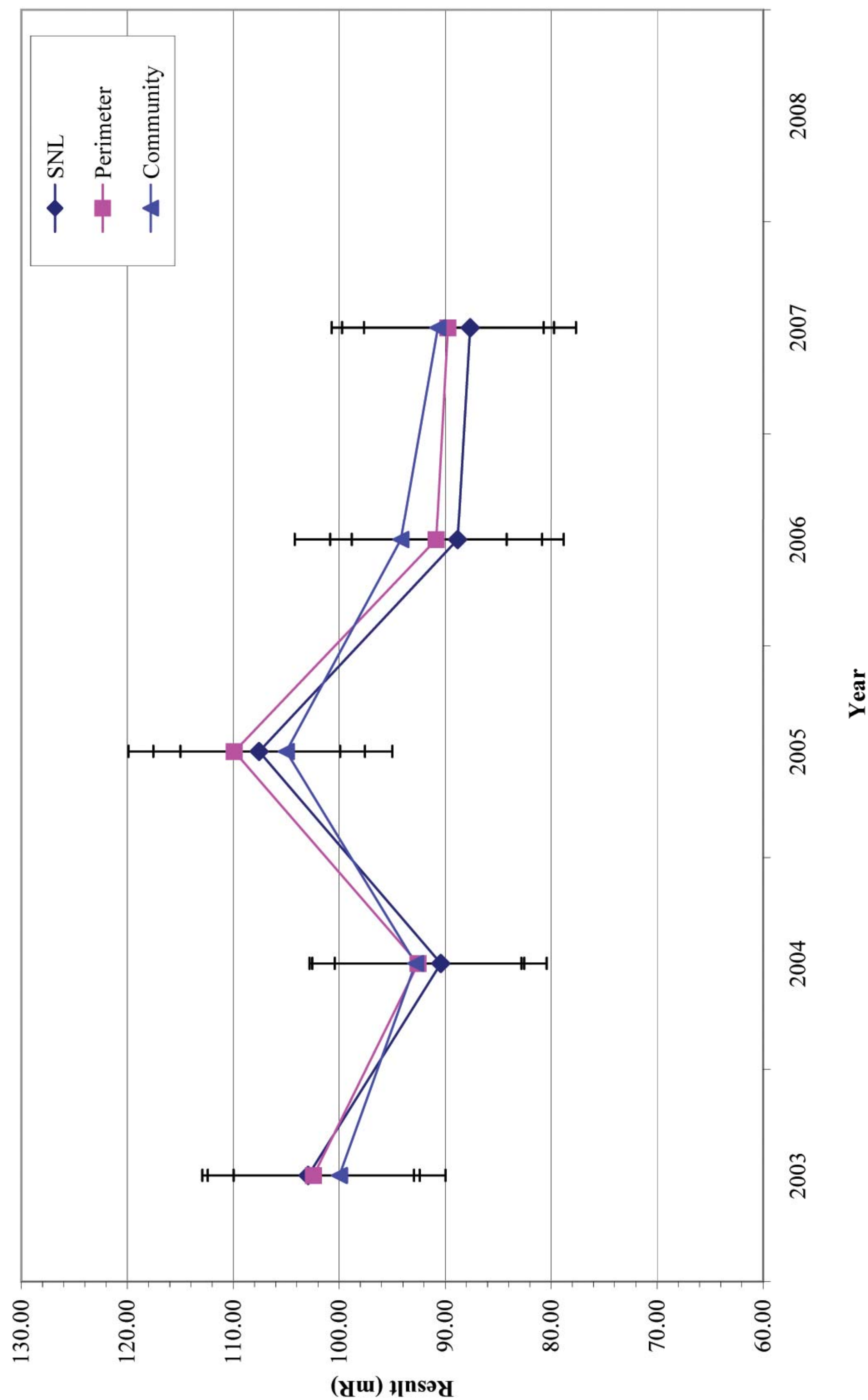


FIGURE 4-3. TLD Exposure Rates by Year and Location Class

TLDs

TLD exposure by quarter and the exposure rate for each location class for 2007 is shown in Appendix C. The exposure rate summary statistics for each location class is also in Appendix C. In 2007, all TLDs were collected every quarter. If a TLD is not collected for a quarter, it is excluded from the statistical analysis.

Data for 2003 through 2007 were analyzed to determine if any statistical differences were observed for either location class (on-site, perimeter, or community) or year. If a TLD was missing a quarter sample in any of the five years of interest, it was deleted from the analysis. Operational locations are also excluded from the statistical analysis. There was no statistical difference between on-site, perimeter, or off-site locations. Table 4-7 shows the overall exposure rate summary statistics for 2003 through 2007. Figure 4-3 shows the TLD exposure rates by year and location class.

4.1.5 Non-Radiological Parameters and Results

In June 2007, several soil samples from the area near the south end of the Long Sled Track were collected to estimate the background concentration of various metals in the soil. The purpose of this effort was to determine if there had been any cumulative impact from the activities at the Long Sled Track during its many years of operation.

There were two areas sampled. One was a rectangular grid centered on the very end of the track (where most impacts/effects were studied). The other was a radial grid centered on the north end of the concrete pad about 100 yards (yd) south of the end of the Sled Track. This pad is used for various testing activities, some of which involve the detonation of explosive packages. A radial pattern corresponding to the upwind and downwind predominant winds for daytime and nighttime were chosen, since these would be the most likely directions that potential deposition of any residues might have occurred (if at all). These sampling patterns are shown in Figures 4-4 and 4-5. The Summary Statistics for this effort are shown in Table 4-8. Figure 4-1 shows the general location within SNL/NM of the Long Sled Track.

There are no anomalous indications of elevated metals in the soil near the Long Sled Track, or the Concrete Pad immediately South of the Track. The apparently elevated maximum arsenic in soil value that was observed is attributed to naturally occurring levels of arsenic found in SNL/NM soils. Later in 2007, two unrelated areas were also sampled to characterize their existing levels of metals and/or explosives residues in soils. One of the areas was on Thunder Range, Range 1, where future explosive testing is planned. The full report can be found in *Thunder Range, Range 1 2007 Field Report on Baseline Sampling* (SNL 2007e). Summary statistics from this investigation are gound in Table 4-9 (see Appendix D).

The other area was near the 9930 Complex on Thunder Range, where tungsten/cobalt/nickel alloy projectiles were tested. The full report can be found at *9930 Tungsten-in-Soil Study 12/2007 Field Report* (SNL 2007h). Summary statistics from this investigation are found in Table 4-10 (see Appendix E).

This information can be used to establish "baseline" conditions for metals in soil in the areas studied. It will also serve as a useful point of reference for future characterization of the site if and when the site is no longer used and it is to be returned to unrestricted use for others.

The results are consistent with Table 4-11, and in no instance do they exceed NMED industrial/occupational soil screening guidelines.

Site-wide Non-Radiological Results

No sampling location was noted to be Priority-1 (both higher than off-site and with an increasing trend). Six locations were identified as Priority-2 and Priority-3 (higher than off-site or increasing trend). The Priority-2 and Priority-3 locations and parameters are listed in Tables 4-12 and 4-13. All metals were listed as Priority-4 for all sediment and vegetation samples.

Refer to Figure 4-1 for an illustration of the locations listed in the following descriptions.

Arsenic

One on-site location (33) was identified as Priority-2 (higher than off-site) for arsenic in surface soils. The concentration is well within the range of background identified for New Mexico surface soils and is expected to be naturally occurring. All remaining soil, sediment and vegetation samples were identified as Priority-4 for arsenic.

Figure 4-4. South End of Long Sled Track with Rectangular Sampling Grid

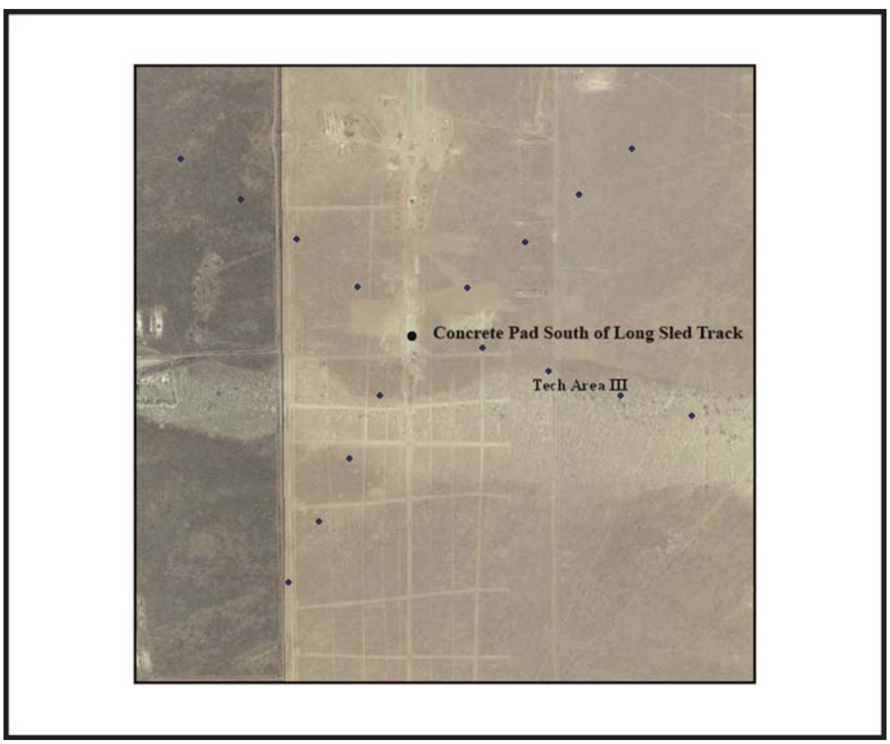


Figure 4-5. Concrete Pad South of Long Sled Track

Barium
Two on-site locations (45 and 51) were identified as Priority-2 (higher than off-site) and perimeter location (4) was identified as Priority-3 (increasing trend) for barium in surface soils. The concentration of barium at both locations is well within the range of background identified for New Mexico surface soils and is expected to be naturally occurring. All remaining soil, sediment and vegetation samples were identified as Priority-4 for barium.

Beryllium
One on-site location (33) was identified as Priority-2 (higher than off-site) for beryllium in surface soils. The concentration of beryllium at this location was well within the range of background identified for New Mexico surface soils, and is expected to be naturally occurring. All remaining soil, sediment and vegetation samples were identified as Priority-4 for beryllium.

Cobalt
One site and one perimeter location (33 and 60, respectively) continue to be identified as Priority-2 (higher than off-site) for cobalt in surface soils. One perimeter location (4) was identified as Priority-3 (increasing trend). The concentrations at all three locations are within the range of background for cobalt in New Mexico surface soils, and is expected to be naturally occurring. All remaining soil, sediment and vegetation samples were identified as Priority-4 for cobalt.

Copper
One on-site location (6) was identified as Priority-2 (higher than off-site) and two on-site locations (6 and 45) were identified as Priority-3 (increasing trend) for copper in surface soils. The results were well within the range of background identified for New Mexico surface soils, and are expected to be naturally occurring. All remaining soil, sediment and vegetation samples were identified as Priority-4 for copper.

Iron
One perimeter location (60) was identified as Priority-2 (higher than off-site) for iron in surface soils. The concentration is well within the range of background for iron in Western U.S. surface soils, and is expected to be naturally occurring. All remaining soil, sediment and vegetation samples were identified as Priority-4 for iron.

Lead
Two on-site locations (6 and 33) were identified as Priority-2 (higher than off-site) and one location (4) was identified as Priority-3 (increasing trend) for lead in surface soils. The concentrations at these locations are well within the range of background for lead in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil, sediment and vegetation samples were identified as Priority-4 for lead.

Magnesium
One on-site location (33) and one perimeter location (60) were identified as Priority-2 (higher than off-site) for magnesium in surface soils. The concentration at all soil and sediment locations is within the range of background identified for magnesium in New Mexico surface soils. All remaining soil, sediment and vegetation samples were identified as Priority-4 for magnesium.

Mercury
One sampling location (45) was identified as Priority-2 (higher than off-site) for mercury in surface soils. However, this concentration is within the range of background identified for mercury in New Mexico surface soils, and is expected to be naturally occurring. All remaining soil, sediment and vegetation samples were identified as Priority-4 for mercury.

Nickel
Three locations (6, 33 and 52) were identified as Priority-2 (higher than off-site) for nickel in surface soils. One on-site location (45) was identified as Priority-3 (increasing trend) for nickel in surface soils. The concentrations at these location are well within the range of background for nickel in New Mexico surface soils, and are expected to be naturally occurring. All remaining soil, sediment and vegetation samples were identified as Priority-4 for nickel.

Potassium
One on-site soil location (6) was identified as Priority-3 (increasing trend). This soil concentrations is within soil concentrations identified in the Western U.S. soils concentrations. All remaining soil, sediment and vegetation samples were identified as Priority-4 for potassium.

TABLE 4-8. Summary Statistics for Metals in Soil Near the Long Sled Track (all units in mg/kg)

Analyte	Mean	Standard Deviation	Minimum	Median	Maximum	NMED Residential Screening Level*	NMED Industrial Screening Level *	SNL/NM Mean Concentrations ***
Aluminum	10034	4413	803	8885	24000	77,800	100,000	8977
Antimony	0.123	0.133	0.096	0.098	0.848	31.3	454	14.9
Arsenic	1.73	0.95	0.30	1.38	5.52**	3.9	17.7	13.4
Barium	72.67	38.66	6.18	62.65	228.00	15,600	100,000	115.2
Beryllium	0.40	0.17	0.03	0.36	1.04	156	2250	0.52
Cadmium	0.275	0.117	0.024	0.234	0.615	39	564	0.46
Calcium	4823	7825	175	1730	35000	NC	NC	24829
Chromium	8.96	3.31	0.93	8.08	20.90	100,000	100,000	19.2
Cobalt	3.16	1.24	0.30	2.80	7.59	1,520	20,500	4.4
Copper	10.55	23.92	0.59	5.81	141	3,130	45,400	10.3
Iron	8608	3026	797	7725	18300	23,500	100,000	11391
Lead	9.84	4.23	0.92	8.85	23	400	800	288
Magnesium	2523	1383	192	2290	7290	NC	NC	3327
Manganese	164	81	16	141	479	3,590	48,400	241.4
Mercury	0.007	0.004	0.003	0.005	0.022	100,000	100,000	0.053
Nickel	6.2	2.8	0.6	5.5	17.4	1,560	22,700	8.2
Potassium	2399	1148	176	2020	6270	NC	NC	2206
Selenium	0.489	0.006	0.478	0.489	0.498	391	5,680	2.6
Silver	0.060	0.021	0.039	0.054	0.122	391	5,680	3.3
Sodium	50.4	18.6	15.9	45.5	122.0	NC	NC	95.1
Thallium	0.123	0.051	0.078	0.104	0.316	5.16	74.9	7.2
Vanadium	16.0	5.1	1.3	14.5	30.3	78.2	1,140	21.4
Zinc	26.9	11.1	2.5	25.1	68.4	23,500	100,000	37.6

NOTES: * (NMED 2006)

** Arsenic SNL site-wide background is 13.4 mg/kg, S.D. = 49.4 mg/kg, (SNL 2006).

*** Chemical Analyses of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993–2005, March 2006. (SNL 2006).

NC = Not Calculated

mg/kg = milligram per kilogram

TABLE 4-9. Thunder Range, Range 1 Summary Statistics (all units in mg/kg)

Analyte	Mean	Std Dev	Minimum	Maximum	Lab Qualifier	Detection Limit	SNL/NM Mean Concentrations[b]
1,3,5-Trinitrobenzene	50	0	50	50	U	150	N/A
2-Amino-4,6-dinitrotoluene	50	0	50	50	U	150	N/A
2,4-Dinitrotoluene	87.7	125.6	50	573	U	150	N/A
2,4,6-Trinitrotoluene	50	0	50	50	U	150	N/A
2,6-Dinitrotoluene	50	0	50	50	U	150	N/A
4-Amino-2,6-dinitrotoluene	50	0	50	50	U	150	N/A
Aluminum	6971	799	5260	8770		20	8977
Antimony	0.66	0.46	0.30	1.76	BU	4.86	14.9
Arsenic	4.47	0.43	3.54	5.21		1.46	13.4
Barium	147.95	39.47	118.00	280.00		0.49	115.2
Beryllium	0.47	0.05	0.37	0.58		0.50	.052
Cadmium	0.18	0.08	0.10	0.36		0.50	0.46
Calcium	33242	6709	21900	51600		10	24829
Chromium	9.35	1.36	7.58	13.90		0.50	19.2
Cobalt	3.94	0.47	3.20	4.71		0.41	4.4
Copper	41.5	135.3	6.7	600.0		1.0	10.3
HMX	50	0	50	50	U	150	N/A
Iron	10405	809	8770	11400		10	11391
Lead	119.4	69.6	35.9	248.0		1.0	288
m-Dinitrobenzene	50	0	50	50	U	150	N/A
4-Amino-2,6-dini	50	0	50	50	U	150	N/A
Magnesium	2973	412	2400	4100		30	3327
Manganese	196.84	31.31	153.00	266.00		1.00	241.4
Mercury	0.004	0.003	0.001	0.014		0.009	0.053
Nickel	8.87	1.73	6.57	14.40		0.49	8.2
Nitrobenzene	50	0	50	50	U	150	N/A
o-Nitrotoluene	50	0	50	50	U	150	N/A
p-Nitrotoluene	50	0	50	50	U	150	N/A
Perchlorate	0.012	0.004	0.011	0.029	U	0.039	N/A
Potassium	1352	204	1050	1890		15	2206
RDX	119.8	209.3	50	730	U	150	N/A
Selenium	0.73	0.17	0.48	1.05		1.48	2.6
Silver	0.18	0.19	0.10	0.73		0.49	3.3
Sodium	97	29	62	181		15	95.1
Tetryl	50	0	50	50	U	150	N/A
Thallium	0.490	0.006	0.476	0.498	U	0.195	7.2
Vanadium	21.4	2.0	18.8	25.4		0.5	21.4
Zinc	34.7	10.3	24.4	68.4		1.0	37.6

NOTES: [b] SAND2006-1468, Chemical Analyses of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993–2005, March 2006 (SNL 2006a).

B = The analyte was found in the blank above the Minimum Detection Limit (MDL) for organics or the effective Practical Quantitation Limit (PQL) for inorganics.

U = The analyte was analyzed for, but not detected below this concentration.

mg/kg = milligram per kilogram

Std Dev = standard deviation

TABLE 4-10. 9930 Blast Study Area Summary Statistics for Soil Concentrations (all units in mg/kg)

Analyte	Mean	Standard Deviation	Minimum	Median	Maximum	NMED Industrial Screening Level [a]	NMED Residential Screening Level [a]	SNL/NM Mean Concentrations [b]
Aluminum	3628	976	1840	3410	5360	100,000	77,800	8977
Antimony	0.77	0.38	0.31	0.66	1.34	454	31.3	14.9
Arsenic	10.1	8.08	2.34	7.07	26.3	17.7	3.9	13.4
Barium	108.3	107.5	43.6	76.2	493	100,000	15,600	115.2
Beryllium	0.35	0.11	0.20	0.34	0.61	2250	156	0.52
Cadmium	0.43	0.12	0.31	0.40	0.76	564	39	0.46
Calcium	37388	17891	10700	32250	79800	NC	NC	24829
Chromium	6.64	5.87	2.81	5.42	27.4	3,400/100,000[c]	234/100,000[c]	19.2
Cobalt	2.778	1.567	1.38	2.35	7.17	20,500	1,520	4.4
Copper	221	419	8	41	1360	45,400	3,130	10.3
Iron	8784	3406	6030	7690	19400	100,000	23,500	11391
Lead	18.42	12.23	4.86	14.2	37.6	800	400	288
Magnesium	2431	1131	1160	1970	4940	NC	NC	3327
Manganese	399	1053	73	113	4340	48,400	3,590	241.4
Mercury	0.003	0.001	0.001	0.002	0.006	100,000	100,000	0.053
Nickel	5.06	2.54	2.64	4.31	11.10	22,700	1,560	8.2
Potassium	856.4	269.8	455	877	1300	NC	NC	2206
Selenium	17.53	6.69	3.83	16.3	31	5,680	391	2.6
Silver	0.192	0.204	0.096	0.100	0.765	5,680	391	3.3
Sodium	78.5	85.1	33.9	59.2	388	NC	NC	95.1
Thallium	4.18	4.35	1.64	2.38	14.1	74.9	5.16	7.2
Tungsten	1.714	1.217	0.196	1.985	4.74	NC	NC	NC
Uranium	0.65	0.17	0.44	0.64	1.00	NC	NC	NC
Vanadium	21.8	9.7	12.9	17.35	47.4	1,140	78.2	21.4
Zinc	28.46	23.49	12.7	23.15	114	100,000	23,500	37.6

NOTES: [a] NMED June 2006, *Technical Background Document for Development of Soil Screening Levels*, Revision 4.0, New Mexico Environment Department, Hazardous Waste.
Bureau and Ground Water Quality Bureau Voluntary Remediation Program, Santa Fe, New Mexico (SNL 2006).
[b] SAND2006-1468, Chemical Analyses of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993–2005, March 2006.
[c] The Soil Screening Levels are provided for both Chromium VI and Chromium III, with the Chromium VI value provided first.
NC = Not calculated.
mg/kg = milligram per kilogram
Std Dev = standard deviation

TABLE 4-11. Various Reference Values for Metals-in-Soil (all units in mg/kg)

	NM Soil Concentrations[1]		NMED Soil Screening Levels[2]		US Soil Concentrations[3]	
Analyte	**Lower Limit**	**Upper Limit**	**Residential**	**Industrial**	**Lower Limit**	**Upper Limit**
Aluminum	5000	100000	74000	100000	4500	100000
Antimony	0.2	1.3	30	92	0.25	0.6
Arsenic	2.5	19	4	17	1	93
Barium	230	1800	5200	15000	20	1500
Beryllium	1	2.3	150	440	0.04	2.54
Cadmium	ND	11	70	190	0.41	0.57
Calcium	600	320000	N/A	N/A	N/A	N/A
Chromium	7.6	42	230	660	7	1500
Cobalt	2.1	11	4500	13000	3	50
Copper	2.1	30	2800	8500	3	300
Iron	1000	100000	23000	69000	5000	50000
Lead	7.8	21	400	1000	10	70
Magnesium	300	100000	N/A	N/A	N/A	N/A
Manganese	30	5000	7800	14000	20	3000
Mercury	0.01	0.06	7	20	0.02	1.5
Molybdenum	1	6.5	380	1200	0.8	3.3
Nickel	2.8	19	1500	4400	5	150
Potassium	1900	63000	N/A	N/A	N/A	N/A
Selenium	0.2	0.8	380	1200	0.1	4
Silica (Silicon)	150000	440000	N/A	N/A	24000	368000
Silver	0.5	5	380	1200	0.2	3.2
Sodium	500	100000	N/A	N/A	N/A	N/A
Strontium	88	440	37000	89000	7	1000
Thallium	N/A	N/A	6	18	0.02	2.8
Titanium	910	4000	N/A	N/A	20	1000
Vanadium	15	94	530	1600	0.7	98
Zinc	18	84	23000	69000	13	300

NOTES: NMED = New Mexico Environmental Department
N/A = not applicable
ND = not detected
mg/kg = milligram per kilogram
(1) Dragun, James, A. Chiasson, *Elements in North American Soils*, 1991, Hazardous Materials Control Resources Institute, (Used *San Juan Basin, A Horizon* to determine values).
(2) NMED Soil Screening Levels (SSL), *New Mexico Environmental Department Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program*, Technical Background Document for Development of Soil Screening Levels, NMED 2000
(3) US Soil Surface Concentrations, Kabata-Pendias, A., Pendias, H., CRC, *Trace Elements in Soils and Plants*, 2nd Edition, 1992

Table 4-12. Summary Statistics for All Locations (2003-2007) Identified as Priority-2 for Metals During Calendar Year 2007 (all units in mg/kg)

Sample Media	Analyte	Location Type	Location	Average	Std Dev	Min	Max
Soil	Arsenic	On-site	33	16.7	11.8	5.1	32.7
	Barium	On-site	45	83.9	18.8	68.3	110
			51	156	64.8	118	253
	Beryllium	On-site	33	1.26	0.34	0.79	1.59
	Cobalt	On-site	33	6.14	0.65	5.2	6.6
		Perimeter	60	5.5	0.59	5	6.4
	Copper	On-site	6	42.7	13.4	26.8	55.8
	Iron	Perimeter	60	15925	3085	12100	19500
	Lead	On-site	6	11.8	1.37	10.2	13.5
			33	12.3	0.98	11.2	13.2
	Magnesium	On-site	33	4608	633	3750	5270
		Perimeter	60	4678	228	4360	4900
	Mercury	On-site	45	0.03	0.02	0.014	0.06
	Nickel	Onsite	6	14.2	1.8	12	16.3
			33	11.9	2.4	8.8	14.2
			52	10.2	4.8	6.2	16.5

NOTES: Std Dev = Standard deviation
mg/kg = milligram per kilogram

Table 4-13. Summary Statistics for Soil Locations (2003-2007) Identified as Priority-3 for Metals During Calendar Year 2007 (all units in mg/kg)

Sample Media	Analyte	Location Type	Location	Average	Std Dev	Min	Max
Soil	Barium	Perimeter	4	82.4	12.1	132	159
	Cobalt	Perimeter	4	2.9	0.28	2.5	3.2
	Copper	On-site	6	42.7	13.4	26.8	55.8
			45	7.5	1.4	5.6	9.1
	Nickel	On-site	45	7.2	2.0	5.6	10
	Potassium	On-site	6	2775	699	2070	3520

NOTES: Std Dev = Standard deviation
mg/kg = milligram per kilogram

4.2 ECOLOGICAL SURVEILLANCE

Biota monitoring began in 1996 as an additional element of environmental monitoring within the Terrestrial Surveillance Program. The objectives of the Ecological Surveillance Program are to:

- Collect ecological resource inventory data to support site activities while preserving ecological resources and to maintain regulatory compliance,
- Collect information on plant and animal species present to further the understanding of ecological resources on-site,
- Collect biota contaminant data on an as needed basis in support of site projects and regulatory compliance,
- Assist SNL/NM organizations in complying with regulations and laws,
- Educate the SNL/NM community regarding ecological resource conservation, and
- Support line organizations with biological surveys in support of site activities.

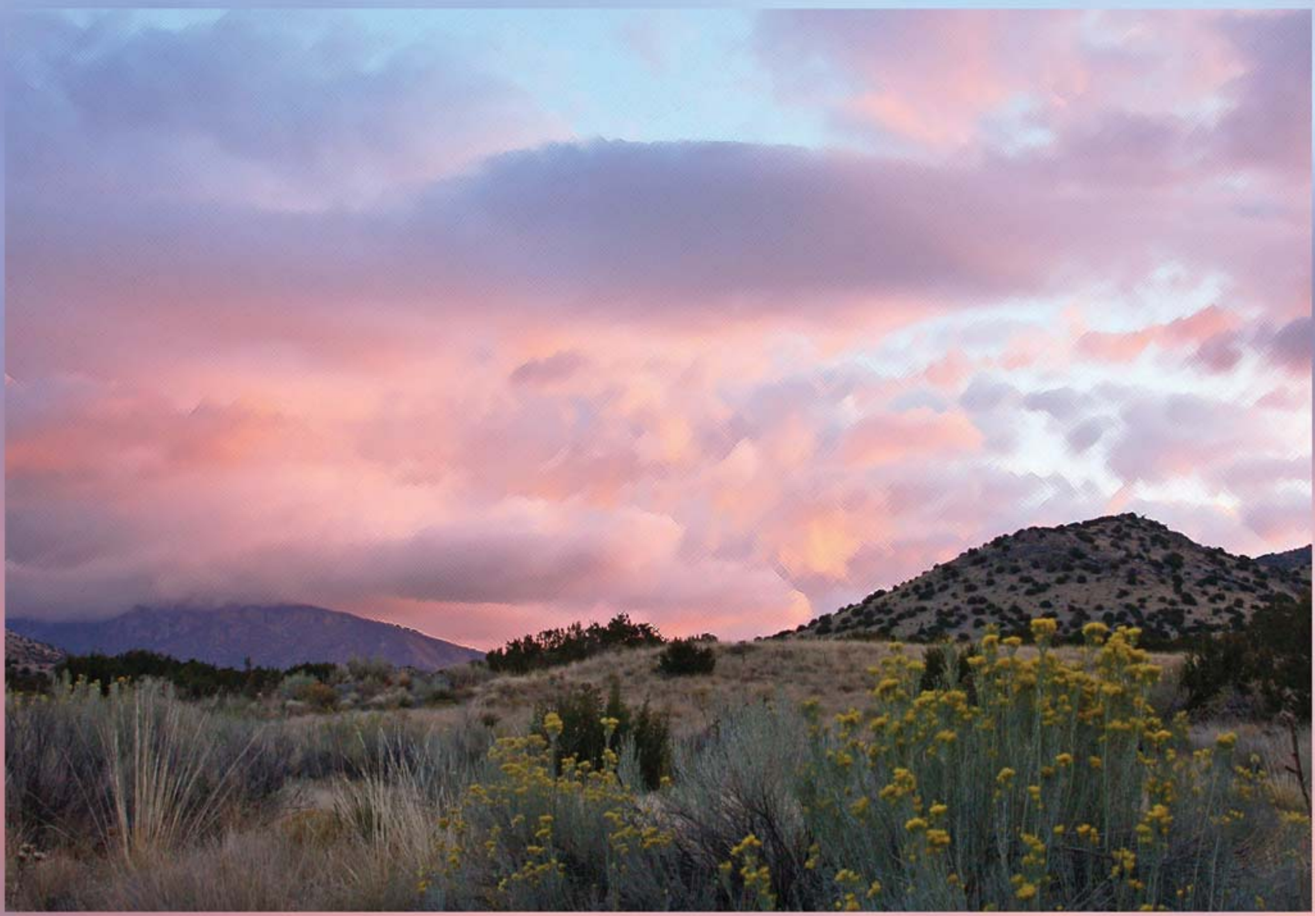
The biota data collected are consistent with the requirements under DOE Order 450.1 (DOE 2005). Data are collected on mammal, reptile, amphibian, bird, and plant species that currently inhabit SNL/NM. Data collected include information on presence, abundance, species diversity, and land use patterns. Since no significantly elevated levels of radionuclides or metals were observed in soil or vegetation samples, no contaminant analysis of radionuclides and metals on wildlife were performed in 2007. Table 1-1 in Chapter 1 represents common species identified at KAFB.

These data are primarily utilized to support NEPA documentation and land use decisions on a corporate level. Data also support wildlife communication campaigns to ensure safe work environments and sustainable decision-making strategies.

"Tarantula" 2007 Photo Contest, photo by Jennifer Payne.

This page intentionally left blank.

chapter five
AIR QUALITY COMPLIANCE AND METEOROLOGICAL MONITORING



"Sunrise at Old SC Dome" 2007 Photo Contest - Honorable Mention, photo by Ashli Maruster.

In This Chapter...

Environmental Snapshot

The new 30-meter tower built near the A13 site is meeting the needs of the expanding laboratory and can be used to reflect meteorological conditions of Sandia National Labs (SNL/NM) facilities just outside the Eubank gate.

Sandia National Laboratories, New Mexico (SNL/NM) personnel conduct air quality monitoring and surveillance under three programs:

- **Clean Air Network (CAN) Program** conducts meteorological monitoring and ambient air surveillance,
- **National Emission Standards for Hazardous Air Pollutants (NESHAP) Program** coordinates with facility owners to meet radiological air emission regulations, and
- **Air Quality Compliance (AQC) Program** ensures that all non-radiological air emission sources at SNL/NM, such as generators, boilers, chemical users, and vehicles, meet applicable air quality standards and permitting requirements.

> **Meteorological Monitoring Towers**
>
> All meteorological towers are instrumented to measure temperature and wind velocity* at 3- and 10-meter levels. Temperature and wind velocity are also measured at the top of the two tallest towers (30- and 60-meters).
>
> In addition, relative humidity is measured at the 3-meter level. Rainfall is measured at the 1-meter level at towers A36, A21, and SC1. Barometric pressure is measured at the 2-meter level at towers A36 and A21.
>
> ** including the standard deviation of horizontal wind direction (sigma theta).*

5.1 METEOROLOGICAL MONITORING PROGRAM

The main objective of the Meteorological Monitoring Program is to provide site-specific representative data for SNL/NM. The data are used for air dispersion and transport modeling, to support emergency response activities, and to support regulatory permitting and reporting processes. Additional uses of meteorological data include supporting various environmental activities and programs, and providing data to SNL/NM research and development (R&D) projects.

U.S. Department of Energy (DOE) orders and regulations applicable to the Meteorological Monitoring Program are listed in Chapter 9.

Tower and Network Instrumentation

Sandia Corporation (Sandia) conducts meteorological monitoring through a network of eight meteorological towers located throughout Kirtland Air Force Base (KAFB) on or near SNL/NM property. The network includes:

- Six 10-meter towers
- One 30-meter tower
- One 60-meter tower

Routine instrument calibrations and weekly tower site visits are performed as part of the Quality Assurance (QA) Program for the monitoring network. The CAN network of meteorological towers and ambient air monitoring locations are shown in Figure 5-1.

5.1.1 Meteorological Monitoring Results

The A36 60-meter tower is used to describe general meteorology at SNL/NM due to its central geographic position and the availability of data at all instrument levels. The 2007 annual climatic summary for tower A36 is shown in Table 5-1.

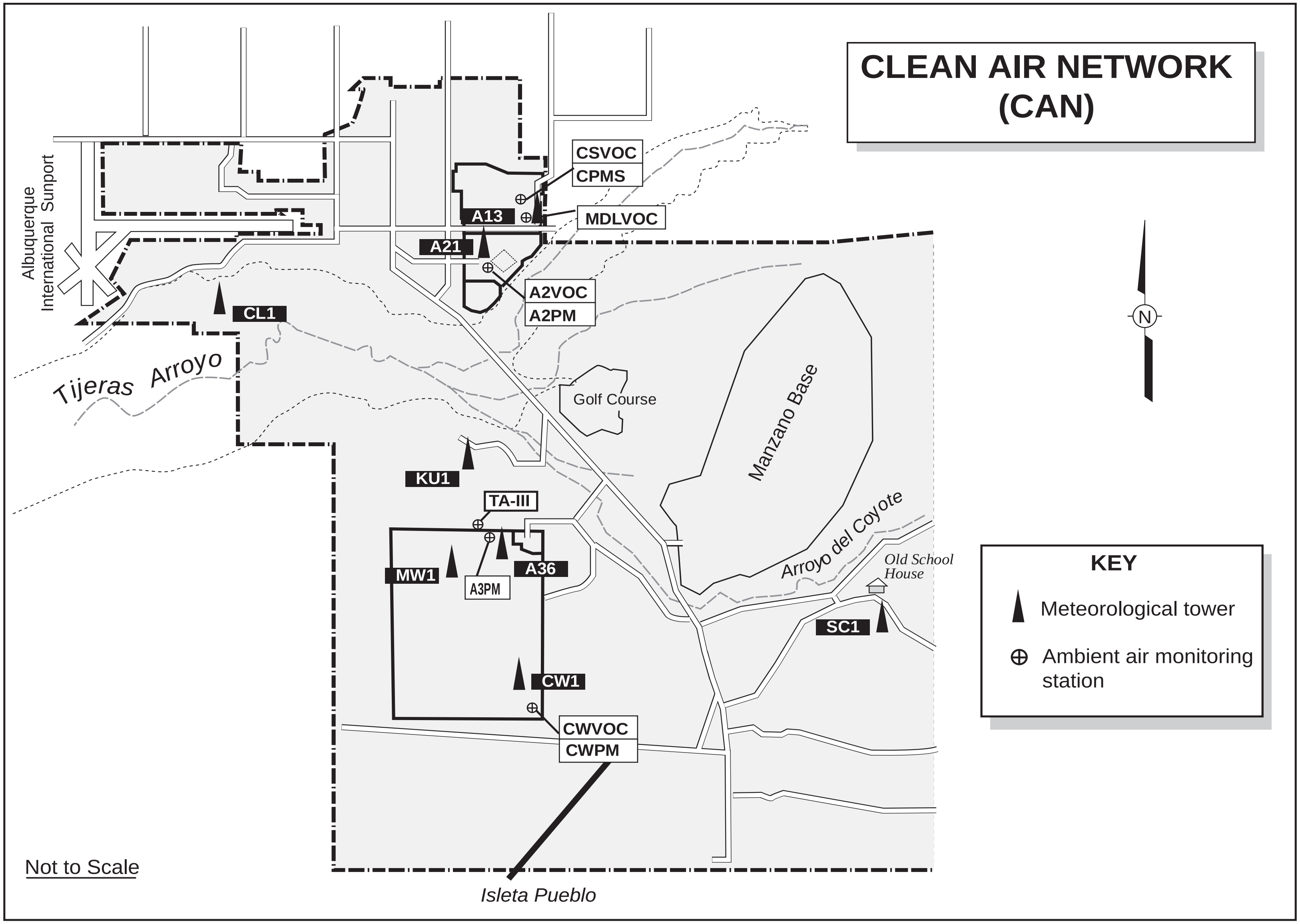
In general, the annual statistics for each of the towers are similar. However, daily meteorology varies considerably across the Meteorological network. This real-time variability of meteorological conditions has implications on the transport and dispersion of pollutants, which are important in atmospheric emergency release scenarios and air dispersion modeling. Figure 5-2 shows some of the variations and extremes found in meteorological measurements across SNL/NM.

The following website provides current weather information from the SNL/NM PhotovoltaicSysatems Evaluation Laboratory.

http://photovoltaics.sandia.gov/weather/Weather.htm

5.1.2 Wind Analysis

Annual wind roses for three locations across SNL/NM are illustrated in Figure 5-3. A *wind rose* is a graphical representation of wind speed and direction frequency distribution. Wind direction is the true bearing when facing the wind (the direction from which the wind is blowing). As shown in Figure 5-3, wind directions and speeds can vary significantly across SNL/NM. Although not shown, the annual wind frequency distribution for



02 _5-1.ai

FIGURE 5-1. The Clean Air Network (CAN) of Meteorological Towers and Ambient Air Monitoring Stations

TABLE 5-1. Annual Climatic Summary from Tower A36 – CY 2007

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Temperature (°C)													
Average Daily High	4048	10.96	16.82	19.35	23.78	31.06	32.00	32.23	27.57	22.05	15.14	6.73	20.18
Average Daily Low	-5.38	-1.39	2.68	4.59	10.24	15.00	17.56	18.50	14.58	7.51	2.10	-3.26	6.90
Monthly Mean	-0.29	5.09	10.27	12.52	16.88	23.51	24.77	25.30	21.38	15.27	9.49	2.04	13.85
Extremes (°C)													
High	11.14	17.91	24.84	26.72	28.55	35.76	37.28	35.46	31.42	28.40	21.88	16.54	37.28
Low	-15.47	-8.51	-9.11	-0.59	3.78	8.72	13.95	14.81	8.19	-1.15	-8.49	-11.28	-15.47
Relative Humidity (percent)	63.77	48.07	36.79	39.27	42.63	28.88	41.41	40.06	42.03	31.26	38.60	56.81	42.47
Precipitation (cm)													
Monthly	0.66	1.78	1.98	2.34	2.16	0.99	4.19	0.99	1.78	0.20	0.61	3.56	21.23
24 Hour Max	0.51	0.84	1.07	1.40	0.97	0.81	2.13	0.23	1.37	0.20	0.33	1.17	2.13
Wind (m/sec)													
Monthly	3.08	3.60	3.51	4.64	4.10	4.34	3.62	3.66	3.43	3.76	3.02	3.71	3.71
24 Hour Max	7.08	8.07	6.38	8.57	7.93	8.66	6.21	7.27	6.38	7.24	6.26	8.11	8.66
Maximum Gust	20.22	24.14	23.26	23.22	21.46	26.38	21.94	20.18	19.34	23.62	17.66	23.22	26.38
Barometric Pressure (mb)	834.81	832.87	834.43	831.28	833.69	833.67	835.91	835.74	835.90	835.82	836.65	833.95	834.56

NOTES: Barometric Pressure sensor slow degradation produced approximately 0.5 mb increase in Oct. - Dec. values.

Conversions to English Units:
Temperature = °F = (1.8) (°C) + 32
Wind Speed = mph = (2.2369) (m/s)
Rainfall. = in. = (2.54)(cm)
mb = millibars

°C = degree centigrade
cm = centimeter
m/sec = meters per second

Technical Area (TA) I shows yet another pattern, with the greatest direction frequency from the east and east-northeast, as winds blow from Tijeras Canyon. The predominant wind direction at most locations is produced by topographic influences that also create nocturnal drainage flows.

The diurnal pattern of wind flow common through many areas at KAFB is not apparent in the annual frequency distribution. Figure 5-4 shows the day and night wind frequency distributions for tower A36, respectively. In general, the closer to the mountains or canyons, the greater the frequency of winds coming from the easterly directions at night. Daytime wind patterns are not quite as pronounced, but winds generally flow towards the mountains and channel into canyons or up the Rio Grande Valley.

5.2 AMBIENT AIR SURVEILLANCE PROGRAM

Ambient air surveillance is conducted under the CAN Program through a network of air monitoring stations located throughout KAFB on or near SNL/NM property. The primary objective of the Ambient Air Surveillance Program is to show compliance with the National Ambient Air Quality Standards (NAAQS) (40 CFR 50) and New Mexico Ambient Air Quality Standards (NMAAQS) (20.2.3 NMAC). Ambient air surveillance is also important to establish background concentration levels for pollutants of concern and to evaluate the effects, if any, from SNL/NM operations on the public and the environment due to operations at SNL/NM. Applicable requirement are listed in Chapter 9.

Wind Speed

	Minimum (m/sec)	Maximum (m/sec)	Spread (m/sec)
• Average Annual Wind Speed	3.66 tower CL1	3.87 tower CW1 and SC1	0.21
• Greatest Difference in Wind Speed over 24 hours	7.3 tower KU1	11.9 tower A13	4.6 in April
• Greatest Difference in Daily Maximum Wind Speed	10.5 tower SC1 and A13	22.0 tower MW1	11.5 in July
• Average Difference in Daily Wind Speed	~1.0		

Temperature

	Minimum (°C)	Maximum (°C)	Spread (°C)
• Average Annual Temperature	13.65 tower SC1	14.35 tower A13	0.70
• Network Annual Temperature Extremes	-15.8 tower KU1	38.0 tower A13	53.8
• Greatest Difference in Daily Minimum Temperature	-15.8 tower KU1	-8.0 tower SC1	7.8 in Jan
• Greatest Difference in Average Daily Temperature	-7.8 tower A36	-1.9 tower SCI	5.9 in Jan
• Greatest Difference in Daily Maximum Temperature	5.4 tower CL1	10.4 tower CW1	5.0 in Jan

Precipitation

	Minimum (cm)	Maximum (cm)	Spread (cm)
• Annual Precipitation (Extremes)	18.77 tower A21	32.94 tower SC1	14.17
• Daily Rainfall Variation	.018 tower A21	3.40 tower A36 and SC1	3.22 in August
• Greatest Monthly Precipitation Difference	3.20 tower A21	9.40 tower SC1	6.20 in July
• Greatest in Monthly Rainfall occurred in August		9.40 tower SC1	

NOTE: Winter precipitation that falls as snow is underestimated (mostly at the SC1 tower). The precipitation at A21 in July and August is underestimated.

FIGURE 5-2. Variations and Extremes in Meteorological Measurements Across the Meteorological Tower Network During CY 2007.

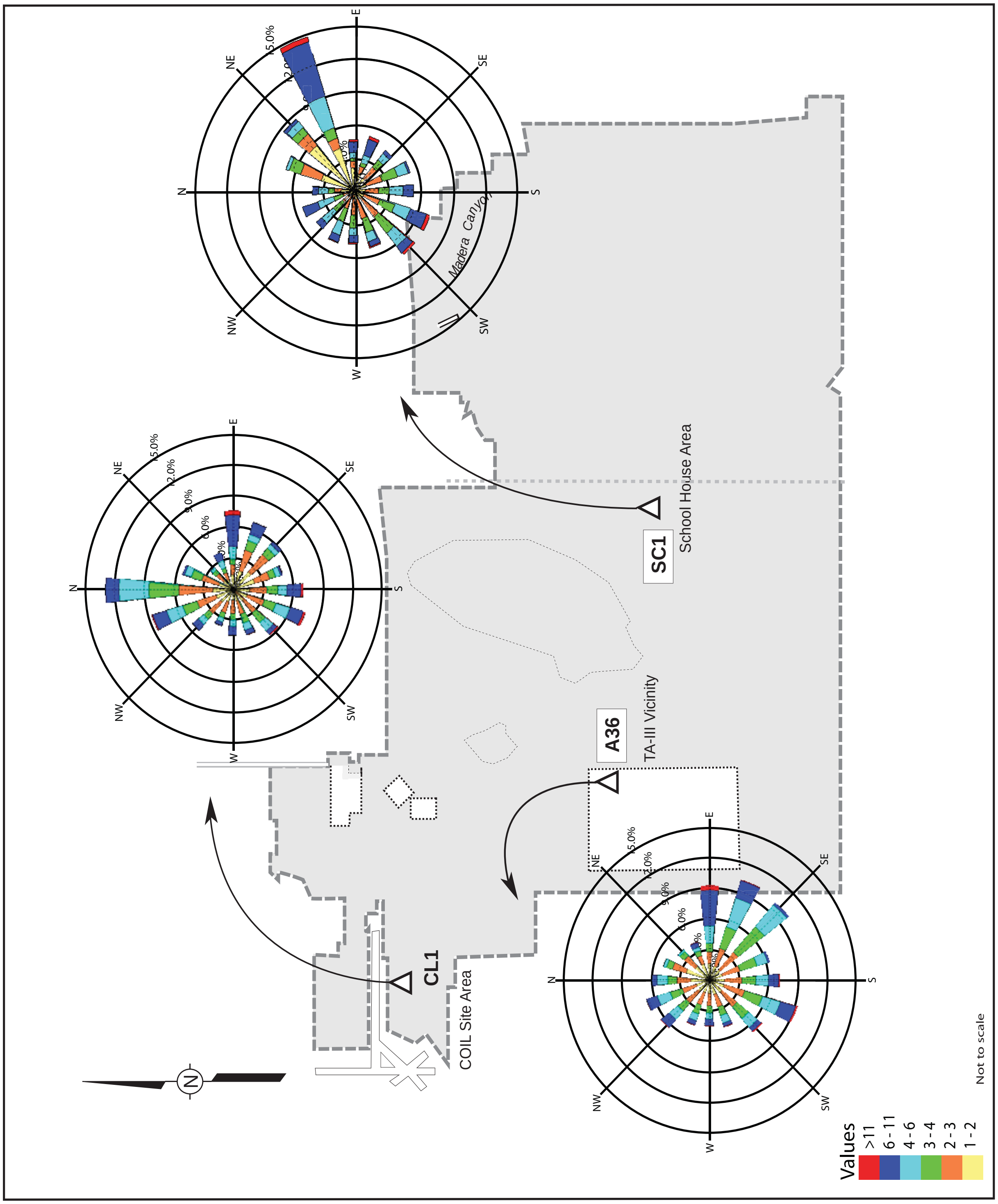


FIGURE 5-3. 2007 Annual Wind Roses for Towers CL1, A36, and SC1

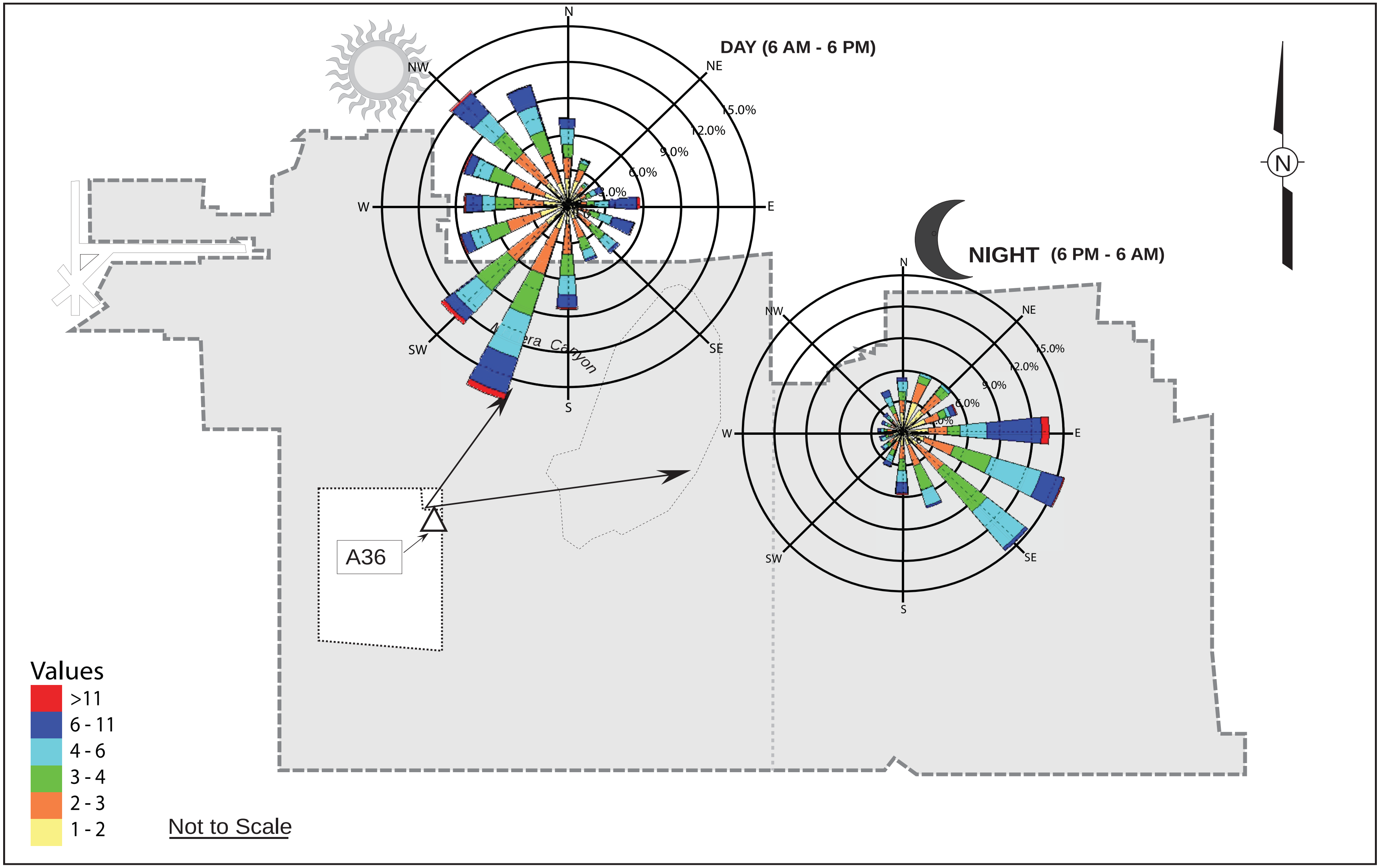


FIGURE 5-4. 2007 Annual Wind Roses for Daytime and Nighttime Wind Frequency at the A36 Tower

Ambient air surveillance is performed at six locations (illustrated in Figure 5-1).

Criteria Pollutant Monitoring Station (CPMS) – There is one CPMS in the CAN network. The CPMS is located in the northeast corner of TA-I. Criteria pollutants are the set of six common pollutants for which the U. S. Environmental Protection Agency (EPA) must set national ambient standards according to the Clean Air Act (CAA). For more information on air pollutants, follow the link provided below:

http://www.epa.gov/ebtpages/air.html

The CPMS is used to perform continuous monitoring for sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen oxides (NO_x), and ozone (O_3). Data are then compiled into hourly averages. A particulate matter (PM) monitor is a part of the CPMS. Lead, a criteria pollutant, is one of 23 metals analyzed from PM samples at this station.

PM_{10} Stations – PM with a diameter equal to or less than 10 microns are measured at four monitoring locations (CPMS, A2PM, A3PM, and CWPM). Samples are collected over a 24-hour period, starting and ending at midnight, every sixth day. This schedule is consistent with the National Air Sampling Program. Samples are analyzed for 23 metals and are radiologically screened using gross alpha, gross beta, and gamma spectroscopy.

$PM_{2.5}$ Stations – PM with a diameter equal to or less than 2.5 microns is measured at two locations (CPMS and TA-III) at SNL/NM. $PM_{2.5}$ is measured continuously and recorded in hourly concentrations 24 hours a day, 365 days a year. Filters are not manually weighed with this system. The mass is calculated with microprocessor measurements. $PM_{2.5}$ and PM_{10} measurements at SNL/NM are done with different instruments and should not be quantitatively compared with each other due to differing instrument limitations and processing techniques. $PM_{2.5}$ filters are not sent to a laboratory for chemical analysis.

Volatile Organic Compound (VOC) Stations – There are four VOC monitoring stations (CSVOC, MDLVOC, CWVOC, and A2VOC). VOC samples are collected once a month over a 24-hour period.

5.2.1 Ambient Air Monitoring Results

Criteria Pollutants

The latest EPA standards for criteria pollutants can be found using the link provided, below:

http://www.epa.gov/air/criteria.html

In 2007, the automated data recovery for criteria pollutants was approximately 99 percent. Table 5-2 lists the results from the CPMS, PM_{10} and monitors and compares them to NAAQS and NMAAQS for criteria pollutants.

Although violations of annual federal standards for criteria pollutants are not allowed, exceedances for short-term standards are allowable once a year. State standards also allow short-term exceedances due to meteorological conditions such as in the case of an atmospheric inversion where air mixing may be extremely restricted. There were no exceedances of the criteria pollutant standards in 2007.

PM_{10}

Data recovery for PM_{10} was 98 percent complete based on a sampling schedule occuring every sixth day. The highest daily particulate loading occurred at the CPMS site. A PM_{10} concentration of 42 micrograms per cubic meter (µg/m3) occurred at CPMS in March 2007.The monthly and annual averages for PM_{10} are listed in Table 5-3. The annual PM concentrations for 2007 are slightly higher, though comparable to the results for 2006.

All filters collected from the PM_{10} stations that have complete field data are analyzed for 23 metals plus the radiological analyses. Filters are collected every sixth day and are consolidated into monthly composites for analyses. In 2007, monthly composites varied from three to six filters per month, depending on the sampling schedule and sampler power problems. In an attempt to provide better analytical information, results are included in averages only when they are actually higher than the radiological decision levels or instrument detection limits. Table 5-5 lists the averaged results of the PM_{10} analysis. It should be noted that most of the radionuclides are naturally occurring, or are short-lived decay daughter products found while the sample was in the counter, and are not emitted from SNL/NM sources. Many of the radionuclide averages in Table 5-5 are based on the results of one or two samples in the year identifying small concentrations of the constituent.

An Analysis of Variance (ANOVA) was performed to determine if statistical differences existed between stations. The results of the ANOVA indicated that the concentrations of barium and zinc at the CPMS were statistically different and slightly higher than the other sites. These two metals are commonly used in industrial applications and could be expected to be higher due to the type of operations that take place in the area of the CPMS.

$PM_{2.5}$

$PM_{2.5}$ is also known as "fine particulate." Fine particulates are thought to be a greater health hazard than PM_{10} because the smaller-sized particles can lodge deep in the lungs. Most $PM_{2.5}$ is created either directly from the combustion of all types of fossil fuels, including wood burning, or by secondary reactions of gases created in the combustion process with other gases in the atmosphere. The data recovery for $PM_{2.5}$ measurements was approximately 99 percent.

TABLE 5-2. Criteria Pollutant Results as Compared to Regulatory Standards – 2007

Criteria Pollutant	Averaging Time	Unit	NMAAQS Standard	NAAQS Standard	Maximum or Measured Concentrations
Carbon Monoxide	1 hour 8 hours	ppm ppm	13.1 8.7	35 9	3.6 2.3
Nitrogen Dioxide	24 hours Annual	ppm ppm	0.10 0.05	- 0.053	0.05 0.01
Sulfur Dioxide§	3 hours 24 hours Annual	ppm ppm ppm	- 0.10 0.02	0.50 0.14 0.03	0.007 0.002 <0.001
Ozone	1 hour 8 hour	ppm ppm	d -	d 0.075	0.177 0.04[a]
PM_{10}	24 hours Annual	µg/m³ µg/m³	- -	150[b] 50	66 13.1
$PM_{2.5}$	24 hours Annual	µg/m³ µg/m³	- -	35 15.0	21.4[c] 8.3
Lead	Any quarter	µg/m³	1.5	1.5	0.001

NOTES: ppm = parts per million
µg/m³ = micrograms per cubic meter
NMAAQS = New Mexico Ambient Air Quality Standards
NAAQS = National Ambient Air Quality Standards
PM_{10} = particulate matter (diameter equal to or less than 10 microns)
$PM_{2.5}$ = respirable particulate matter (diameter equal to or less than 2.5 microns)
§ Standards are defined in µg/m³ and have been converted to ppm.
a Reported as the fourth highest average of the year – per regulatory standards.
b Not to be exceeded more than once per year - per updated regulatory standards
c Reported as the three year 98th percentile value - per regulatory standards
d As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the 8-hour ozone non-attainment Early Action Compact (EAC) Areas. Albuquerque, New Mexico is not an EAC Area.

TABLE 5-3. Monthly and Annual Averages for PM_{10} (Air) – 2007

Sample Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
A2PM	7.8	16.3	10.2	10	11.8	20.4	19.2	7.4	8.2	10.4	23.4	8.2	12.8
CPMS	8.4	12.2	14.7	12.4	13.2	23.4	15.2	13.0	10.4	6.8	18.4	9.5	13.1
CWPM	3.2	4.7	9.4	10.0	12.0	22.2	15.5	15.4	9.2	8.2	17.0	5.6	11.0
A3PM	11.8	5.5	8.4	8.8	25.7	22.0	12.8	9.8	7.6	9.2	17.6	6.0	12.1

TABLE 5-4. Monthly and Annual Averages for $PM_{2.5}$ (Air) – 2007

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
CPMS	8.3	6.8	8.1	7.9	8.6	10.6	9.4	9.2	7.8	7.4	9.2	5.6	8.3
TA-III	6.9	5.4	5.3	7.2	7.3	8.3	8.4	9.0	7.0	6.6	8.1	5.4	7.1

TABLE 5-5. Averaged Results of PM_{10} Analysis (Air) – 2007

Analyte	Units	A2PM	CPMS	CWPM	A3PM	TLV
Aluminum	ug/m^3	1.26E-01	1.01E-01	1.18E-01	1.05E-01	2,000
Antimony	ug/m^3	1.36E-04	2.68E-04	1.18E-04	3.70E-04	500
Arsenic	ug/m^3	3.21E-05	4.19E-05	2.40E-04	3.06E-04	10
Barium	ug/m^3	4.26E-03	4.76E-03	2.78E-03	2.76E-03	50
Cadmium	ug/m^3	4.85E-05	1.65E-05	6.85E-05	6.14E-05	10
Calcium	ug/m^3	4.74E-01	3.29E-01	3.20E-01	2.42E-01	2,000
Chromium	ug/m^3	2.92E-04	4.81E-04	2.04E-04	3.82E-04	10
Copper	ug/m^3	1.79E-02	9.26E-03	7.97E-03	1.00E-02	1,000
Iron	ug/m^3	1.29E-01	1.19E-01	1.11E-01	9.94E-02	5,000
Lead	ug/m^3	8.38E-04	8.97E-04	7.46E-04	8.26E-04	150
Magnesium	ug/m^3	5.32E-02	4.37E-02	4.87E-02	3.94E-02	10,000
Manganese	ug/m^3	3.23E-03	2.90E-03	2.80E-03	2.42E-03	200
Nickel	ug/m^3	1.91E-04	2.54E-04	1.40E-04	1.70E-04	50
Potassium	ug/m^3	6.03E-02	5.37E-02	5.53E-02	5.07E-02	2,000
Silver	ug/m^3	5.22E-05	4.54E-05	3.18E-05	ND	10
Sodium	ug/m^3	5.65E-02	7.39E-02	5.22E-02	6.33E-02	5,000
Thallium	ug/m^3	1.33E-05	1.41E-04	ND	ND	100
Vanadium	ug/m^3	2.79E-04	2.34E-04	2.72E-04	2.13E-04	50
Zinc	ug/m^3	5.54E-03	5.63E-03	2.81E-03	3.74E-03	10
Uranium	ug/m^3	4.21E-06	8.12E-06	4.62E-06	3.95E-06	200
Gross Alpha	pCi/m^3	4.77E-03	4.74E-03	4.67E-03	3.77E-03	
Gross Beta	pCi/m^3	2.30E-02	2.22E-02	2.30E-02	2.18E-02	
Actinium-228	pCi/m^3	ND	ND	1.84E-03	5.43E-04	100
Beryllium-7	pCi/m^3	1.86E-01	1.81E-01	1.76E-01	1.78E-01	40,000
Bismuth-214	pCi/m^3	2.44E-03	1.08E-03	3.96E-03	1.34E-03	2,000
Cesium-137	pCi/m^3	1.70E-03	4.55E-04	5.66E-04	1.19E-03	400
Cobalt-57	pCi/m^3	4.32E-04	ND	ND	3.24E-04	2,000
Cobalt-60	pCi/m^3	2.15E-03	ND	4.04E-04	2.43E-03	80
Lead-212	pCi/m^3	ND	7.26E-04	4.33E-04	1.69E-03	80
Lead-214	pCi/m^3	ND	5.09E-04	6.80E-04	2.78E-03	2,000
Mercury-203	pCi/m^3	ND	ND	1.12E-03	ND	3,000
Potassium-40	pCi/m^3	6.74E-04	1.18E-02	1.25E-02	8.02E-03	900
Radium-224	pCi/m^3	1.73E-02	1.15E-02	1.60E-02	1.18E-02	4
Radium-226	pCi/m^3	ND	ND	ND	1.02E-02	1
Thorium-234	pCi/m^3	3.98E-02	5.44E-03	2.88E-02	1.33E-02	400
Uranium-235	pCi/m^3	5.55E-03	ND	8.27E-03	ND	0.1
Uranium-238	pCi/m^3	3.98E-02	5.44E-03	1.65E-02	8.91E-03	0.1

NOTES: $\mu g/m^3$ = micrograms per cubic meter
pCi/m^3 = picocuries per cubic meter
TLV = threshold limit value (TLVs are guidelines and not legal standards.
TLV guidelines assist in the control of health hazards) (ACGIH 2008).
The TLVs listed for the radionuclides are derived from DOE Order 5400.5 derived concentration guide values defined for 100 mrem.
ND = not detected

The monthly and annual averages for $PM_{2.5}$ are listed in Table 5-4. In 2007, the highest concentrations were found in the beginning of the summer and were most likely the result of wildland fire smoke transported from areas outside of SNL/NM. Concentrations in the Sandia area dropped quickly with the onset of rains in late June to early July.

VOCs

The VOCs generally observed at SNL/NM are products or by-products of fossil fuels, or from lab operations. In 2007, the data recovery for VOC monitoring was 96 percent. Monthly VOC samples were analyzed for 23 VOC species plus total non-methane hydrocarbon (TNMHC). Table 5-6 shows the compiled results for compounds detected at four stations.

The concentrations in Table 5-6 reveal that there is not one site with the highest concentration for all analytes, though the greatest numbers of contaminants are found at the Micorelectronics Development Laboratory (MDL) VOC site.

An ANOVA was performed to determine if statistical differences existed between locations for each VOC. The ANOVA revealed that there was one statistically valid difference. The concentration of chloromethane measured at the CPMS was higher than at least one other sampling site. The concentration of chloromethane at the CPMS was only slightly higher – though still very low – than the concentrations at the other three sampling sites.

5.3 RADIOLOGICAL AIR EMISSIONS

The EPA regulates radionuclide air emissions in accordance with 40 CFR 61, Subpart H, "*National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities*." The EPA has set a maximally exposed individual (MEI) radiological dose limit of 10 millirems per year (mrem/yr) resulting from all radiological air emissions produced from a DOE facility.

5.3.1 Compliance Reporting

Sandia prepares an annual NESHAP report that summarizes radionuclide air emission releases from SNL/NM facilities and presents the results of the annual dose assessment. The DOE National Nuclear Security Administration (NNSA) Sandia Site Office (SSO) submits the annual report to EPA and the City of Albuquerque (COA) Environmental Health Division. The NESHAP report prepared in 2008 includes the *NESHAP Annual Report for Calendar Year CY07*, Sandia National Laboratories, New Mexico (SNL 2008b).

5.3.2 SNL/NM NESHAP Facilities

Currently, there are 15 potential NESHAP facilities that may be defined as either point or diffuse emissions sources at SNL/NM. Point sources are produced from an exhaust stack or vent, while diffuse sources emanate from broad areas of contamination, such as radionuclide-contaminated soils present at some Environmental Restoration (ER) sites.

Table 5-7 lists the radionuclides and the total reported emissions (in curies [Ci]) from each SNL/NM NESHAP source in 2007. Of the 15 sources, 14 were point sources and one was a diffuse source (landfill). Four of the 15 facilities reported no emissions in 2007.

The 15 SNL/NM NESHAP facilities are illustrated in Figure 5-5 and are described below.

TA-I Sources

Radiation Protection (RP) Instrument Calibration Laboratory – Calibration on radiation detection equipment resulted in small releases of tritium.

Metal Tritide Shelf-Life Laboratory – This laboratory, which conducts research on tritium materials, released negligible levels of tritium (five billionths of a curie).

Neutron Generator Facility (NGF) – The NGF is the nation's principal production facility for neutron generators. This facility currently emits only tritium. The facility has two stacks, but only utilizes the main stack in the Tritium Envelope North Wing. In 2007, the NGF emitted the largest amount of radionuclides at SNL/NM at 13.3 Ci, based on continuous stack monitoring. Although anticipated tritium releases do not exceed the regulatory threshold requiring continuous monitoring, it is performed voluntarily at NGF as a best management practice (BMP).

TABLE 5-6. VOC Average Concentrations Compiled from Monthly Results at Four Stations (Air) - 2007
Average was computed using only detected results.

Compound	CPMS VOC	CW VOC	MDL VOC	TA-II VOC	TLV
1,1,1-Trichloroethane **	ND	0.865	7.240	ND	350,000
1,1,2-Trichlorotrifluoroethane **	0.166	ND	ND	ND	1,000,000
1-Butene/Isobutene	0.243	0.220	0.182	0.160	NA
2,2,4-Trimethylpentane	0.200	ND	ND	ND	NA
2-Butanone (MEK)	1.320	0.643	0.852	0.572	200,000
2-Methylbutane	2.320	9.5	2.17	11.7	1,770,000
3-Methylpentane	0.17	0.178	0.149	0.106	500,000
Acetone	9.35	5.66	8.61	5.05	500,000
Benzene	0.618	0.242	0.434	0.345	500
Carbon tetrachloride **	0.201	ND	ND	ND	5,000
Chloromethane	0.718	0.625	0.659	0.643	50,000
Dichlorodifluoromethane **	1.2	0.607	0.671	0.634	1,000,000
Ethylbenzene	0.12	0.122	0.155	ND	1,000,000
Isohexane	0.244	0.176	0.235	0.186	100,000
Methylene chloride	ND	0.366	0.372	ND	50,000
n-Butane	1.930	0.861	1.41	1.24	800,000
n-Hexane	0.117	0.173	0.151	0.154	50,000
n-Pentane	0.742	0.713	2.53	1.38	600,000
o-Xylene	0.146	0.256	0.161	0.100	100,000
p-Xylene/m-Xylene	0.293	0.324	0.385	0.253	NA
Toluene	1.320	1.030	0.916	0.988	50,000
Trichlorofluoromethane **	0.416	0.302	0.372	0.316	1,000,000
TNMHC	28.3	42.4	47.6	29.100	NA

NOTES: ppbv = parts per billion by volume
ND = not detected
NA = not available
VOC = volatile organic compounds. VOCs may be shown as separate species as well as in combination with another analyte.
TLV= threshold limit value (TLVs are guidelines and not legal standards. TLV guidelines assist in the control of health hazards) (ACGIH 2008)
** Ozone depleting compounds

TABLE 5-7. Summary of Radionuclide Releases from the 15 NESHAP Sources – 2007

Source Name, Location	Description	Source Type	Monitoring Method	Radionuclide Emitted	Reported Release (Ci/yr)
ACRR, TA-V	Reactor used to perform in-pile experiments for severe reactor accident research projects.	Point	Periodic	^{41}Ar	3.98
Auxiliary HCF, TA-V	Facility provides full capability to handle and analyze radioactive material.	Point	Periodic	N/A	N/A
ECF, TA-II	Facility used for testing neutron generator design and manufacturing.	Point	Calculation	^{3}H	1.0E-03
HERMES-III, TA-IV	Gamma simulator used primarily for simulating the effects of prompt radiation from a nuclear burst on electronics and complete military systems.	Point	Periodic	^{13}N ^{15}O	8.05E-04 8.05E-05
MTSLL, TA-I	Research and development on tritium.	Point	Calculation	^{3}H	<5.0E-09
MWL, TA III	Environmental restoration site that acts as a diffuse source of tritium emissions into the atmosphere.	Diffuse	Periodic	^{3}H	9.0E-02
NGF, TA-I	Principal production facility for neutron generators – Tritium Envelope North Wing.	Point	Continuous	^{3}H	1.33E+01
PRD Laboratory, TA-I	Research and Development on tritium.	Point	Calculation	N/A	N/A
Radiation Laboratory, TA-I	Laboratory that performs small-scale experiments.	Point	Calculation	^{3}H ^{13}N ^{16}N ^{41}Ar	1.0E-05 2.0E-07 2.0E-07 1.0E-09
RMWMF, TA-III	Facility that handles radioactive and mixed waste products.	Point	Continuous	^{3}H (oxide) ^{3}H (elemental) ^{241}Am ^{90}Sr ^{137}Cs	1.26E+01 4.17E-01 1.12E-05 3.26E-07 3.28E-08
RPICL, TA-I	Laboratory that performs radiation detection equipment calibration.	Point	Calculation	^{3}H	4.1E-05
RPSD TA-II	Small-scale laboratory analyses, as needed.	Point	Calculation	N/A	N/A
START, TA-I	Small-scale laboratory operation.	Point	Calculation	^{60}Co ^{137}Cs ^{241}Am ^{239}Pu ^{238}U	1.20E-08 3.20E-08 3.10E-08 2.60E-08 1.72E-12
Tandem Accelerator, TA-I	Ion solid interaction and defect physics accelerator facility.	Point	Calculation	^{3}H	1.0E-05
Z Facility, TA-IV	Experimental facility for research on light-ion inertial confinement fusion. Technology involves storing large amounts of electrical energy over a period of minutes and then releasing this energy in an intense, concentrated burst at a target.	Point	Calculation	N/A	N/A

NOTES: *Monitoring Method: Periodic = Based on periodic measurements
Calculation = Calculated from known parameters
Continuous = Based on continuous air monitoring results

Ci/yr = curies per year
TA = Technical Area
N/A = not available

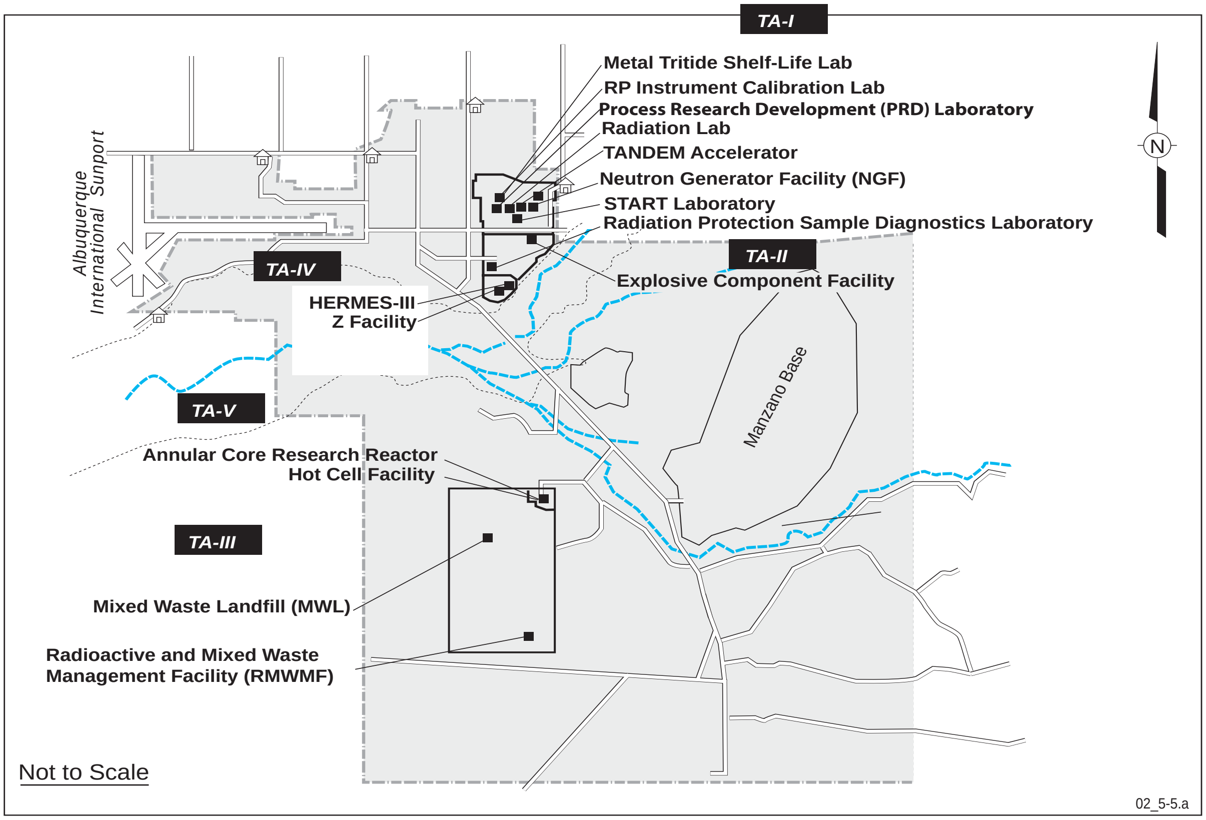


FIGURE 5-5. Locations of the 15 Facilities at SNL/NM that Provided Radionuclide Release Inventories in 2007

Process Research Development (PRD) Laboratory – This laboratory is capable of handling and conducting research on tritium materials. It is currently in standby mode and has yet to be operational; therefore, there were no emissions from this laboratory in CY 2007.

Radiation Laboratory – Small-scale radiation experiments resulted in the release of air activation products and tritium.

Radiation Protection Sample Diagnostics Laboratory (RPSD) – Small-scale radiometric sample analyses on an as-needed basis.

Sandia Tomography and Radionuclide Transport (START) Laboratory – This laboratory is used to perform small-scale experiments. In 2007, there were no radiological emissions from this laboratory.

TANDEM Accelerator – This is an ion solid interaction and defect physics accelerator facility. Although the TANDEM did not operate in 2007, the facility reported potential emissions of tritium housed in the facility.

TA-II Sources

Explosive Components Facility (ECF) – The ECF conducts destructive testing on neutron generators. In 2007, the facility reported emissions of tritium.

TA-III Sources

Mixed Waste Landfill (MWL) – The MWL was closed in 1988. Although a diverse inventory of radionuclides is present in the MWL, measurements indicate that tritium is the only radionuclide released into the air. In 1992, 1993, and 2003, special studies were conducted to quantify the tritium emissions (Anderson 2004). The most recent value, from 2003, is used for their annual inventory.

Radioactive and Mixed Waste Management Facility (RMWMF) – The RMWMF primarily handles low-level waste (LLW), mixed waste (MW), and some transuranic (TRU) waste. In 2007, the RMWMF reported tritium releases, americium-241, strontium-90, and cesium-137 as determined by continuous stack monitoring. Although anticipated tritium releases do not exceed the regulatory threshold requiring continuous monitoring, it is performed voluntarily at the RMWMF as a BMP.

TA-IV Sources

High-Energy Radiation Megavolt Electron Source - III (HERMES - III) – The HERMES-III accelerator is used to test the effects of prompt radiation on electronics and complete military systems. This facility produces air activation products, primarily nitrogen-13 and oxygen-15. In 2006, the facility reported releases of nitrogen-13 and oxygen-15.

Z Facility – The Z Facility is an accelerator used for research on light ion inertial confinement fusion. Large amounts of electrical energy are stored over several minutes, then released as an intense concentrated burst (shot) at a target. In 2007, the facility was refurbished and was not operational; thus, no emissions were generated.

TA-V Sources

Annular Core Research Reactor (ACRR) – This reactor is used primarily to support defense program projects. If required in the future, the facility also has the capability to support the Medical Isotope Production Project (MIPP). Argon-41, an air activation product, was the only reported release in 2007.

Hot Cell Facility (HCF) – The HCF provides full capability to remotely handle and analyze radioactive materials such as irradiated targets. In 2007 there were no reportable emissions.

5.4 ASSESSMENT OF POTENTIAL DOSE TO THE PUBLIC

In general, the dose received by a person is dependent on the distance from the source, the available pathways in the environment (food chain, air, and water), radionuclide quantities and properties, and meteorological conditions. Historically, radioactive releases from SNL/NM have resulted in doses to the public that are several orders of magnitude below the EPA's standard of 10 mrem/yr. Radiation protection standards specific to DOE facilities are given in Chapter 9.

5.4.1 NESHAP Dose Assessment Input

Emission Sources

To assess compliance, all NESHAP facilities at SNL/NM must submit annual facility emission data to the NESHAP program administrator. The emissions from seven "primary" sources (ACRR, SPR, HCF, Z Facility, NGF, RMWMF, and MWL) are modeled using EPA's CAA Assessment Package-1988 (CAP88) (EPA 2006) to estimate the annual dose to each of 35 identified public receptors. Primary sources are those that determine their emissions by direct measurements or by calculations based on measured operational parameters. The HCF, SPR, and the Z facility were the three primary sources that reported no emissions for 2007.

The NESHAP regulation requires DOE to continuously monitor any radionuclide air emission source that has the potential to produce a dose of 0.1 mrem/yr to the MEI; however, there are no facilities at SNL/NM that exceed this criterion. As a BMP, some SNL/NM facilities perform continuous stack monitoring. Other facilities base their emission estimates on periodic confirmatory measurements or engineering calculations. In 2007, the highest emissions were tritium and argon-41. Historically, these radionuclides have been the most significant contributors to the effective dose equivalent (EDE) of the MEI. Figure 5-6 shows the annual reported release (in Ci) of tritium and argon-41 over the past 18 years.

Demographic Data

Demographic data includes the resident population, the number of beef and dairy cattle, and the utilized food crop area fraction for a 50 mile (mi) radius study area. The densities for resident population, cattle, and food crops are calculated as the quotient of the most recent county data and the county land area (e.g., cows per acre). In 2007 the NESHAP calculation for resident population was based on the State's 2000 to 2001 estimated urban and county population data and U.S. Census Bureau data (DOC 2008). The beef and dairy cattle numbers and food crop area fraction were calculated using 1998 agricultural statistics. The statistics were supplied by the New Mexico Department of Agriculture (NMDOA 2008). The following values were used in the 2007 CAP88 calculation:

1.927	Dairy cattle/km^2
1.156	Beef cattle/km^2
8.1E0-04	Acres of food crops/m^2
793,740	Population (within 50-mi radius)

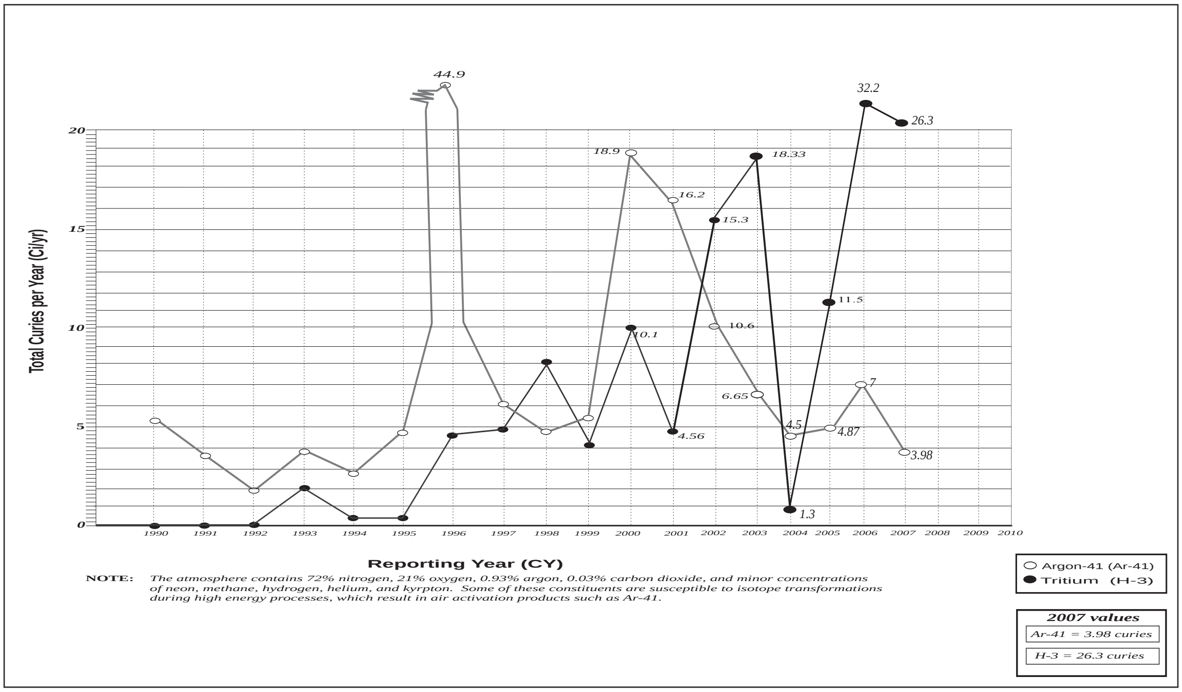


FIGURE 5-6. Summary of Atmospheric Releases in Argon-41 and Tritium from SNL/NM Facilities since 1990 (Emissions vary from year to year based on operations within the facility).

On-site and Off-site Public Receptors

A total of 35 receptor locations (24 on-site at KAFB and 12 off-site) in the vicinity of SNL/NM have been identified as potential locations of maximum exposure to a member of the public. Off-site receptor locations extend to the Isleta Pueblo Indian Reservation, the Four Hills subdivision north of KAFB, the Manzanita Mountains (with east mountain residents), and areas near the Albuquerque International Sunport west of KAFB. On-site receptors include U.S. Air Force (USAF) facilities, offices, and housing areas, as well as other non-DOE and non-U.S. Department of Defense (DoD) facilities on KAFB.

Meteorology

Data from four meteorological towers (CW1, A36, A21, and MW1) in the proximity of NESHAP emission sources were used in 2007. Data from each tower consisted of approximately 35,000 hourly observations of wind direction, wind speed, and stability class (inferred from wind and solar insulation data). The data are compiled into a normalized distribution from which all wind and stability frequency-of-occurrence data were derived.

5.4.2 Dose Assessment Results

CAP88 utilizes a Gaussian plume equation that estimates air dispersion in both horizontal and vertical directions. Individual EDEs to off-site and on-site receptors are presented in Tables 5-8 and 5-9, respectively. Dose assessment results are summarized in Table 5-10.

The total dose at each receptor location is determined by summing the individual doses resulting from each source. The dose to the MEI member of the public is then compared to the EPA limit of 10 mrem/yr.

In 2007, the on-site MEI was located on KAFB at the Chestnut Site, NW of TA-V. The MEI dose of 9.98 E0-4 mrem/yr at the Chestnut Site resulted primarily from releases of H-3 from the nearby RMWMF. The off-site MEI was located at the Eubank Gate Area. The MEI dose from both primary and secondary sources was 7.01 E-4 mrem/yr.

By comparison, the average person in the Albuquerque area receives 330 to 530 mrem/yr resulting primarily from radon emanating from earth materials, medical procedures, consumer products, and cosmic radiation (Brookins 1992).

TABLE 5-8. Annual Source-Specific Effective Dose Equivalent (EDE) from Primary Sources to \Off-site Receptors – 2007

Facility	ACRR Emission (mrem/yr)	MWL Emission (mrem/yr)	NGF Emission (mrem/yr)	RMWMF Emission (mrem/yr)	TOTAL from Primary Sources (mrem/yr)
Albuquerque City Offices	1.40E-05	4.30E-08	2.70E-04	8.20E-05	3.66E-04
East Resident	8.70E-06	2.80E-08	2.70E-04	7.70E-05	3.56E-04
Eubank Gate Area (Building 8895)	6.90E-05	1.80E-07	5.20E-04	1.10E-04	6.99E-04*
Four Hills Resident	7.20E-06	2.00E-08	2.70E-04	7.50E-05	3.52E-04
Isleta	1.20E-05	3.80E-08	2.70E-04	8.00E-05	3.62E-04
La Luz Childcare	3.90E-05	7.50E-08	2.80E-08	9.70E-05	1.36E-04
Manzano Mesa Apartments	1.40E-05	4.10E-08	2.80E-04	8.00E-05	3.74E-04
Tijeras Arroyo (West)	1.40E-05	4.30E-08	2.70E-04	8.20E-05	3.66E-04
U.S. Geological Survey	3.50E-05	8.00E-08	2.80E-04	1.10E-04	4.25E-04
Veteran's Hospital	2.40E-05	9.30E-08	2.80E-04	9.10E-05	3.95E-04
Willow Wood Housing	2.40E-05	4.80E-08	2.70E-04	8.80E-05	3.82E-04
TOTALS	**2.61E-04**	**6.89E-07**	**2.98E-03**	**9.72E-04**	**4.21E-03**

NOTES: mrem/yr = millirem per year
ACRR = Annular Core Research Reactor
MWL = Mixed Waste Landfill
NGF = Neutron Generator Facility
RMWMF = Radioactive Mixed Waste Management Facility

*Only major sources are presented in this table which total to 6.99E-04. The remaining minor contributing sources result in an overall total of 7.01E-04.

TABLE 5-9. Annual Source-Specific Effective Dose Equivalent (EDE) to On-site Receptors – 2007

Receptor	ACRR Emission (mrem/yr)	MWL Emission (mrem/yr)	NGF Emission (mrem/yr)	RMWMF Emission (mrem/yr)	TOTAL (mrem/yr)
Airport Building 761	1.50E-04	3.20E-07	1.40E-04	6.00E-05	3.50E-04
Air National Guard Communications Flight	9.00E-05	2.60E-07	1.10E-04	5.20E-05	2.52E-04
Bernalillo County Sheriff Training	1.40E-04	2.70E-07	2.70E-05	9.60E-05	2.63E-04
Capeheart West	2.10E-05	6.40E-08	7.80E-06	1.50E-05	4.39E-05
Chestnut Site	2.10E-04	6.20E-07	1.70E-05	7.70E-04	9.98E-04
Child Development Center	1.70E-05	6.60E-08	6.80E-06	1.30E-05	3.69E-05
Golf Course Club House	3.80E-04	5.70E-07	4.70E-05	7.80E-05	5.06E-04
Golf Course Maintenance Area	2.10E-04	4.40E-07	6.50E-05	6.40E-05	3.39E-04
Honeywell Systems\Support Site	7.90E-05	2.20E-07	7.00E-04	3.70E-05	8.16E-04
ITRI/Lovelace	6.50E-05	1.70E-07	1.10E-05	7.40E-05	1.50E-04
KAFB Fire Station	1.00E-04	1.80E-07	2.40E-04	3.20E-05	3.72E-04
KAFB Landfill	4.40E-05	1.00E-07	1.20E-05	4.20E-05	9.81E-05
Kirtland Elementary	1.60E-05	6.20E-08	6.30E-06	1.20E-05	3.44E-05
Kirtland Storage Site	7.60E-04	1.20E-06	4.70E-05	9.30E-05	9.01E-04
Manzano Offices (Fire Station)	1.50E-04	2.80E-07	2.60E-05	1.00E-04	2.76E-04
Maxwell Housing (SE Corner)	1.70E-05	6.70E-08	6.90E-06	1.30E-05	3.70E-05
Kirtland Family	5.70E-05	1.60E-07	1.30E-04	2.90E-05	2.16E-04
Pershing Park Housing	8.10E-05	1.50E-07	1.10E-04	2.70E-05	2.18E-04
Riding Club	4.40E-04	5.30E-07	3.30E-05	1.10E-04	5.84E-04
Sandia Area Federal\Credit Union	1.20E-04	2.10E-07	4.40E-04	3.50E-05	5.95E-04
Sandia Elementary School	5.50E-05	1.60E-07	1.80E-04	2.90E-05	2.64E-04
Shandiin Childcare	1.10E-04	2.10E-07	2.10E-04	3.50E-05	3.55E-04
Vehicle Maintenance Flight	9.90E-05	2.60E-07	1.10E-04	5.20E-05	2.61E-04
Wherry Elementary	3.50E-05	1.30E-07	1.50E-05	2.60E-05	7.61E-05
TOTALS	**3.45E-03**	**6.70E-06**	**2.70E-03**	**1.89E-03**	**8.04E-03**

NOTES: ACRR = Annular Core Research Reactor
MWL = Mixed Waste Landfill
RMWMF = Radioactive Mixed Waste Management Facility
NGF = Neutron Generator Facility
mrem/yr = millirem per year
LLRI = Lovelace Respiratory Research Institute
ANG = Air National Guard
KAFB = Kirtland Air Force Base

** Z Facility produced no radionuclide air emissions in CY 2007. The Z-Machine was off line for major modification/refurbishment from Jan through Sept. Operations were suspended by management through the end of the calendar year.

TABLE 5-10. Calculated Dose Assessment Results for On-site and Off-site Receptors and for Collective Populations – 2007

Dose to Receptor	Location	2007 Calculated Dose	NESHAP Standard
Individual Dose			
On-site Receptor EDE to the MEI	Chestnut Site	9.98 E-04 mrem/year (9.98 E-06 mSv/yr)	10 mrem/yr (0.1 mSv/yr)
Off-site Receptor EDE primary and secondary sources to the MEI	Eubank Gate Area	7.01 E-04 mrem/yr (7.01 E-06 mSv/yr)	10 mrem/yr (0.1 mSv/yr)
Collective Dose			
Collective Regional Population[1]	Residents within an 80-km (50-mi) radius	8.02 E-02 mrem/yr (8.02 E-04 mSv/yr)	No standard available
Collective KAFB Population[2]	KAFB housing	6.9 E-04 mrem/yr (6.9 E-06 mSv/yr)	No standard available

NOTES: [1] Based on a population of 793,740 people estimated to be living within an 80-km (50-mi) radius.
[2] Based on a population of 3,512 people estimated to be living in permanent on-base housing.
NESHAP = National Emissions Standards for Hazardous Air Pollutants
mSv/yr = millisievert per year
person-Sv/yr = person-sievert per year
mrem/yr = millirem per year
EDE = effective dose equivalent
MEI = maximally exposed individual
KAFB = Kirtland Air Force Base

Collective Dose

The collective population dose resulting from all SNL/NM radiological emissions was calculated for both KAFB and the regional area (Table 5-10). Collective dose calculations are not required by NESHAP regulations; however, it provides a useful numerical comparison of the public dose from year to year. Collective dose is calculated by multiplying a representative individual dose within a population, by the total population. Sandia calculates the collective population dose for both the KAFB housing areas and the general Albuquerque area population within an 80-km (50-mi) radius.

Regional

The Albuquerque regional collective population dose in 2007 was 8.02 E-2 person-mrem/yr. This is comparable with the average over the past five years of regional collective population dose data. For the purpose of calculating the collective dose, all releases are assumed to occur from a location centered in TA-V. The population dose was calculated by multiplying 793,740 residents by doses per sector.

KAFB

A collective population dose for KAFB residents was calculated based on three main housing areas (Maxwell, Pershing Park, and New Housing). Housing demolition and new housing construction at KAFB resulted in fewer residential structures during 2007. However, the overall population increased as additional new housing was completed. The total population dose for KAFB was obtained by summing the three areas based upon a total residential population of 3,512, which is a 20 percent increase over the previous year's population. The CY 2007 calculation resulted in an estimated population dose of 6.9E0-4 person-mrem/yr.

5.5 *AIR QUALITY REQUIREMENTS AND COMPLIANCE STRATEGIES*

Air quality standards are implemented by regulations promulgated by local and federal governments in accordance with the CAA and the CAA Amendments (CAAA) of 1990. The Albuquerque Bernalillo County Air Quality Control Board (ABC/AQCB), the State of New Mexico, and the EPA determine applicable air quality standards for non-radiological pollutants. Radionuclide air emissions are currently regulated by the EPA under NESHAP, as discussed in Section 5.4.1. A complete list of air quality regulations applicable to SNL/NM is provided in Chapter 9.

5.5.1 SNL/NM Air Emission Sources

As discussed in Section 5.2.1, criteria pollutants include SO_2, NO_2, CO, O_3, PM, and lead (Pb). For these criteria and other pollutants, the EPA:

- Sets ambient air quality standards – including those for motor vehicle emissions,
- Requires state implementation plans for protection and improvement of air quality,
- Institutes air quality programs to prevent the nation's air from deteriorating, and
- Establishes hazardous air pollutant (HAP control programs.

EPA standards for criteria pollutants are given in 40 CFR 50, *National Ambient Air Quality Standards* and implemented in 20.11.08 NMAC *Ambient Air Quality Standards*. Compliance with criteria pollutant standards for ambient air is met through on-going applicability determinations on potential criteria pollutant emission sources that require the following: acquisition of the necessary permits and registrations for applicable sources from the appropriate regulatory agencies; fuel throughput tracking, monitoring, and reporting; ambient air surveillance; and periodic direct emission sampling. As discussed previously, ambient air measurements taken in the vicinity of SNL/NM facilities have been well below maximum TLVs and standards for criteria pollutants.

The significant sources of criteria pollutants at SNL/NM are defined as sources that require a permit or registration from a regulatory agency. A majority of the permits and registrations held by SNL/NM are multi-source (including a combination of criteria pollutant emission sources). Significant sources at SNL/NM are listed, below.

Biolers

During CY 2007, SNL/NM maintained seven permits and registrations for applicable boilers sitewide. Table 5-11 illustrates the annual fuel usage and associated emissions for CY 2007. The boilers associated with the permits and registrations are shown in Table 5-12.

In CY 2007, Steam Plant Boiler number five (214.2 MMBtu) was disconnected**.**

During CY 2007, Phase One of the Heating System Modernization (HSM) project was completed which included the installation and startup of 53 of the 123 boilers. There are two more phases for this project to complete the installation of all boilers. The installation of the HSM boilers will eventually allow for the decommissioning of the Steam Plant Boilers.

Emergency Generators

During CY 2007, SNL/NM maintained ten permits and registrations for applicable emergency generators sitewide. Table 5-13 illustrates the annual hours of operation and associated emissions for CY 2007. The emergency generators associated with the permits and registrations are listed in Table 5-14.

TABLE 5-11. Boiler Usage and Emission Data - 2007

Permit #	Fuel Usage	Emissions (tpy)				
		NOx	CO	PM_{10}	SO_2	VOC
R#936	13,763,886 scf	4.7	4.0	0.4	0.03	0.5
R#1406	3,346,550 scf	0.084	0.141	0.013	0.001	0.009
#1705	403,227,370 scf	6.45	16.94	1.53	0.12	1.11
	0 gallons	0	0	0	0	0
#1725	8,341,180 scf	0.42	0.35	0.03	0.003	0.02
#1820	38,744,615 scf	0.97	1.63	0.15	0.03	0.11
#1830	4,867,225 scf	0.122	0.204	0.018	0.004	0.013

NOTES: tpy = tons per year scf = standard cubic feet

TABLE 5-12. Boilers Associated with Permits and Registrations – 2007

Permit	Description	Size	Fuel Type
R#547	Explosives Components Facility (ECF) Boilers used to heat the facility.	Two (2) 4.3437 MMBtu	Natural Gas
R#936	Processing and Environmental Technology Laboratory (PETL) Boilers used to heat the facility.	Ten (10) 1.4 MMBtu/hr	Natural Gas
R#1406	Advanced Manufacturing Prototype Facility (AMPF) Boilers used to heat the facility.	Two (2) 1.8 MMBtu/hr	Natural Gas
1705	Steam Plant Boilers produce steam heat for buildings in Technical Area I.	Three (3) 78.57 MMBtu/hr One (1) 117.09 MMBtu/hr One (1) 214.2 MMBtu/hr	Natural Gas (primary) / Diesel
1725	Center for Integrated Nanotechnologies (CINT) Boilers used to heat the facility.	Two (2) 6 MMBtu	Natural Gas
1820	Microsystems and Engineering Sciences Applications (MESA) Complex Boilers used to heat the facility.	Two (2) 20.412 MMBtu/hr One (1) 10.206 MMBtu/hr	Natural Gas
1830	Heating System Modernization (HSM) Boilers used to heat buildings in Technical Area I, and will eventually allow for the decommissioning of the Steam Plant Boilers.	One-Hundred-Twenty-Three (123) 2.0 MMBtu/hr or less	Natural Gas

NOTES: MM Btu = Million British Thermal Units

TABLE 5-13. Generator Hours and Emission Data - 2007

Permit Number	Hours/ CY2007	Emmissions (tpy)				
		NO_x	CO	PM_{10}	SO_2	VOC
#374-M1	8	5.8E-02	1.2E-02	4.1E-03	3.8E-03	4.6E-02
#402a	11	4.6E-01	1.22E-01	8.23E-03	5.80E-02	1.29E-02
	13					
	13					
	14					
#415-M1	5.7	1.7E-02	3.7E-03	1.2E-03	1.1E-03	1.3E-03
#924	7	6.31E-02	1.68E-02	1.13E-03	7.96E-03	1.77E-03
#925-M1	9	6.76E-02	1.80E-02	1.21E-03	6.13E-03	1.90E-03
#1678-M1	14	1.57E-01	4.16E-02	1.52E-02	1.42E-02	1.76E-02
	12	2.16E-01	5.74E-02	2.10E-02	1.96E-02	2.43E-02
#1705	10	6.76E-02	1.80E-02	6.55E-03	6.13E-03	7.60E-03
#1725	13	7.1E-02	1.5E-02	5.0E-03	4.7E-03	5.6E-03
#1828	10	9.00E-02	2.06E-02	2.63E-03	3.03E-02	2.64E-03

NOTES: a = The emission limits stated in the permit are combined emissions, therefore they are calculated annually as a summed emission for all four units.

tpy = tons per year

TABLE 5-14. Emergency Generators Associated with the Permits and Registrations – 2007

Permit	Description	Size	Fuel Type
R#547	ECF Emergency Generator provides emergency power during unplanned power outages.	One (1) 134.1 hp	Diesel
374-M1	Neutron Generator Facility (NGF) Emergency Generator provides emergency power during unplanned power outages.	One (1) 469 hp	Diesel
402	Emergency Generator Plant provides back-up power to various buildings in Technical Area I of SNL/NM.	Four (4) 805 hp	Diesel
415-M1	Radioactive and Mixed Waste Management Facility (RMWMF) Emergency Generator provides emergency power during unplanned power outage.	One (1) 192 hp	Diesel
924	Technical Area I East L Avenue Emergency Generator provides emergency power during unplanned power outages .	One (1) 805 hp	Diesel
925-M1	PETL Emergency Generator provides emergency power during unplanned power outages.	One (1) 671 hp	Diesel
1678-M1	MESA Complex Emergency Generators provide emergency power during unplanned power outages.	One (1) 999hp One (1) 1609 hp	Diesel
1705	Steam Plant Emergency Generator provides emergency power during unplanned power outages.	One (1) 603 hp	Diesel
1725	CINT Emergency Generator provides emergency power during unplanned power outages.	One (1) 469 hp	Diesel
1828	South-East Technical Area I Back-up Generator provides emergency power during unplanned power outages.	One (1) 750 hp	Diesel

NOTES: hp = Horse Power

TABLE 5-15. HAP Chemical Usage Reportable Data – CY 2007

Permit #	Pounds/Year	Tons/Year
R#936	910	0.46
R#1406	18	0.009
#374-M1	89	0.04

TABLE 5-16. Facilities with Permits or Registrations for Chemical Use

Permit #	Description	Chemical Type
R#547	ECF general chemical exhust from fume hoods.	HAP, VOC
R#936	PETL general chemical exhust from fume hoods	HAP, TAP, VOC
R#1406	AMPF general chemical exhust from fume hoods	HAP, VOC
415-M1	RMWMF general chemical exhust from fume hoods	HAP, VOC

NOTES: ECF = explosive components facility
HAP = hazardous air pollutant
VOC = volatile organic compound
RMWMF = radioactive mixed waste management facility
AMPF = advanced manufacturing prototyping facility
PETL = processing environmental technologies laboratory
TAP = toxic air pollutant

TABLE 5-17. TTC Reportable Emissions – CY 2007

Pollutant	Emissions (tpy)
NO_x	1.71E-03
CO	9.45E-02
PM_{10}	8.58E-02
SO_x	4.57E-03
VOC	1.28E-01
HAP	3.2E-02

Chemical Usage (HAPS)

During CY 2007, SNL/NM maintained six permits and registrations for applicable Hazardous Air Pollutants (HAPs) chemical usage sitewide. The HAP chemical usage associated with the permits and registrations is for general laboratory usage for R&D purposes. Table 5-15 illustrates the amount of chemicals purchased at the associated facility for CY 2007. The facilities that have permits or registrations for chemical usages are listed in Table 5-16.

Miscellaneous New Source Review (NSR) Permits

- **Document Disintegrator** is an industrial-size, classified document shredder.

- **Thermal Test Complex (TTC)** is an enclosed R&D fire test complex and an important element in the revitalization of SNL/NM test capabilities needed for test article qualification, development, surveillance, investigation, and modeling. Table 5-17 illustrates the reportable emissions associated with the TTC for CY 2007.

Open Burn Permits

Open burn permits are required for:

- **Disposal of Explosives by Burning** (avoids the hazards of transport and handling),
- **Aboveground Detonation of Explosives** (over 20 lb),
- **Burning Liquid Fuel** (2,000 gallons or more, or solid fuel of 5,000 lb in a single event, R&D activity), and
- **Igniting Rocket Motors** (with greater than 4,000 lb of fuel).

FUGITIVE DUST

As required by 20.11.20 NMAC, *Fugitive Dust Control*, DOE obtains fugitive dust permits for each of Sandia's applicable projects that will disturb greater than ¾ acre of soil.

Vehicles

The majority of government vehicles at SNL/NM are owned and managed by the General Services Administration (GSA). All GSA vehicles must comply with the same emission standards set for all personal and non-personal vehicles that are issued KAFB vehicle passes. As required by 20.11.100 NMAC, *Motor Vehicle Inspection Decentralized*, Sandia submits an annual vehicle inventory update and inspection plan to the COA for the applicable SNL/NM owned vehicles.

5.5.2 Title V

The CAAA of 1990 contained provisions under Title V requiring all existing major air emission sources to obtain an operating permit. A major source is defined as the combined emissions from any facility with the potential to emit:

- 100 tons per year (tpy) or greater of any criteria pollutant,
- 10 tpy of any single HAP,
- 25 tpy of any combination of HAPs.

Background

The DOE/NNSA/SSO submitted Operating Permit application 515 (DOE 2002) on March 1, 1996, since potential emissions for SNL/NM were greater than 100 tpy of criteria pollutants. The COA has yet to issue the final permit. An updated application will be submitted to COA during CY 2008 to reflect current emission sources and their associated potential emissions.

Permit Fee Structure

The COA regulations require source owners to pay air emission fees, which are implemented under 20.11.02 NMAC, *Permit Fees*. The sources included in the fee determination for SNL/NM include the COA NSR permitted and registered sources, as summarized in Chapter 9 Table 9-1. Total fees are based on the permitted emission limits that are requested in the NSR permit/registration applications, which are incorporated into the issued NSR permit/registration. In 2007, Sandia paid an annual fee of $9,187 based on a rate of $31 per ton of permitted emissions.

5.5.3 Stratospheric Ozone Protection

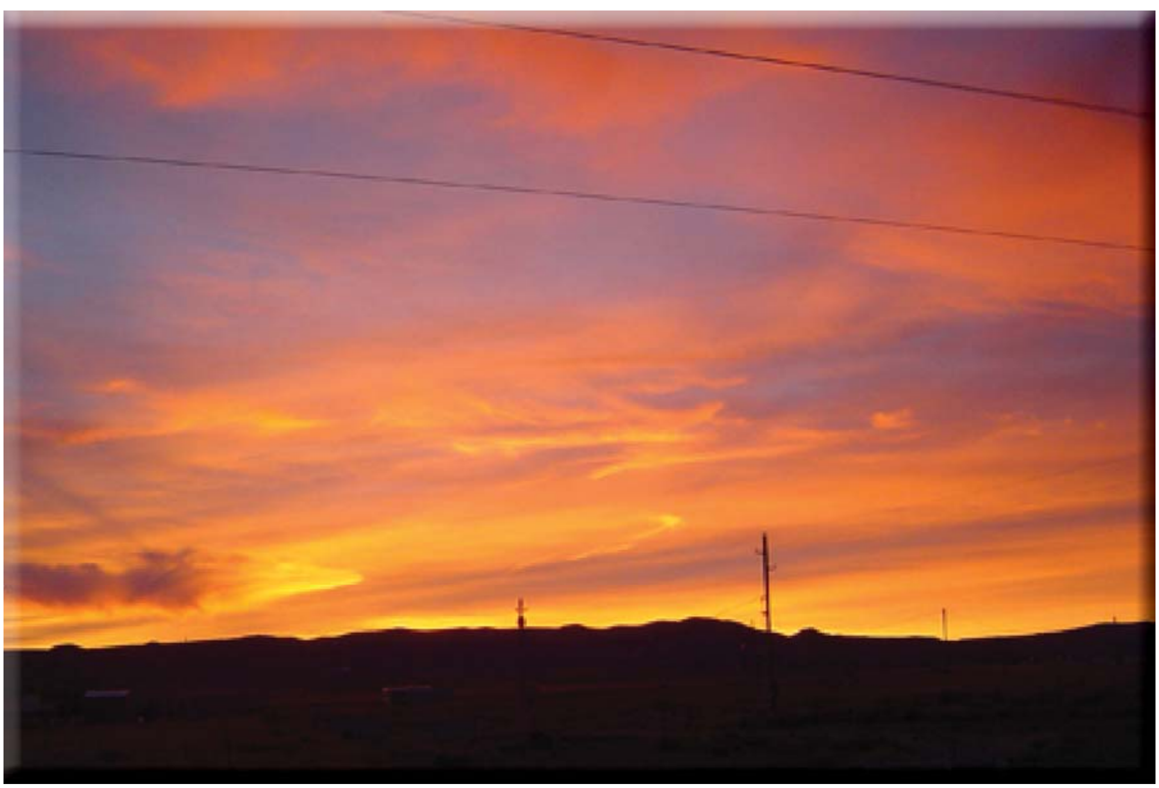
Title VI of the CAAA of 1990 required EPA to establish regulations to phase out the production and consumption of ozone depleting substances (ODS). ODS are defined as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and other halogenated chemicals that have been found to contribute to the depletion of the stratospheric ozone layer. EPA has established regulations in 40 CFR Part 82 that require the following: recycling of ODS during servicing of equipment; establishment of requirements for recycling and recovery equipment, technicians, and reclaimers; repair of substantial leaks in refrigeration equipment containing greater than 50 pounds of refrigerant; and establishment of safe disposal standards.

At SNL/NM, ODS are mainly used for comfort cooling for buildings, air conditioning units in vehicles, and water cooling units in drinking fountains. Halon is contained in some fire suppression systems and some fire extinguishers.

Sandia remains committed to the reduction of ODS and has been working towards replacing Class I refrigerant chillers with a cooling capacity of 150 tons or greater—a secretarial goal set by the DOE. Replacement is part of a larger upgrade to improve the reliability and overall efficiency of the associated chilled water systems. There are currently 92 refrigerant chillers (> 50 pounds) that exist at SNL/NM. Of the existing chillers, twelve of those contain Class I refrigerants and are on the list for replacement.

Section 5.5.4 Compliance Strategies

The AQC Program and the City of Albuquerque are currently negotiating the consolidation of applicable permits and registrations into three sitewide permits- sitewide generators, sitewide boilers, and sitewide chemicals- so that management can more efficiently comply with permitting units. DOE/NNSA/SSO and Sandia has met the condition of its permits and registrations.



“Scenic Sunrise” 2007 Photo Contest - Honorable Mention, photo by Phyllis Peterson

Location: The Radioactive and Mixed Waste Management Facility (RMWMF).

*Context: “The workday at the RMWMF starts with a 7:00 a.m. Plan of the Day meeting.
We drive to work in the dark in the winter, but then we get to see some fabulous sunrises.” - P.Peterson*

This page intentionally left blank.

chapter six

WASTEWATER, SURFACE DISCHARGE, STORM WATER MONITORING PROGRAMS & OIL STORAGE AND SPILL CONTROL

"Heavy Equipment at SNL" 2007 Photo Contest, photo by Maurice Sandoval.

In This Chapter...

Wastewater Discharge Program
Surface Discharge Program
Storm Water Program
Oil Storage and Spill Control

Environmental Snapshot

In 2007, the City of Albuquerque (COA) awarded Sandia National Labs, New Mexico six GOLD "Pretreatment Awards" for outstanding Pollution Prevention (P2) and compliance efforts.

Sandia National Laboratories, New Mexico (SNL/NM) personnel conducts effluent monitoring through wastewater, surface water, and storm water monitoring and surveillance programs. Sandia Corporation (Sandia) complies with water quality regulations established by local, state, and federal agencies. U.S. Environmental Protection Agency (EPA) standards are implemented at the state and local level by the New Mexico Environment Department (NMED) and the Albuquerque Bernalillo County Water Utility Authority (ABCWUA). Currently, EPA Region VI implements storm water regulations under the National Pollutant Discharge Elimination System (NPDES). SNL/NM's five wastewater monitoring stations are permitted by the COA. Storm water is the only discharge at SNL/NM regulated by NPDES. Sandia also adheres to the water quality guidelines contained in U.S. Department of Energy (DOE) Orders 450.1, *Environmental Protection Program* (DOE 2007a) and 5400.5, Chg 2, *Radiation Protection of the Public and the Environment* (DOE 1993).

6.1 WASTEWATER DISCHARGE PROGRAM

Wastewater that is discharged to the public sewer system from SNL/NM facilities is divided into two categories: sanitary discharges and industrial discharges. Sanitary waste streams include wastewater from restrooms and showers, food service establishments, and other domestic-type activities. Industrial discharges are produced from general laboratory research operations, including electroplating, metal finishing, microelectronic development, and photographic processes.

Sandia closely monitors its liquid effluent discharges to meet regulatory compliance. Sandia further reduces its toxic discharges by implementing Toxic Organic Management Plans (TOMPs) and general good housekeeping and engineering practices. Pollution prevention (P2) measures to reduce, substitute, or eliminate toxic chemicals are implemented, where feasible, as discussed in Section 3.4.

6.1.1 SNL/NM and the ABCWUA

ABCWUA Publicly-Owned Treatment Works (POTW)
SNL/NM's sewer system connects to the ABCWUA's sanitary sewer line at five permitted outfalls. SNL/NM also has one additional industrial permitted wastewater outfall at the Microelectronics Development Laboratory (MDL), which is upstream of the final discharge location, ABCWUA Permit 2069A. Wastewater effluent discharged from any of the six outfalls must meet the ABCWUA's Sewer Use and Wastewater Control Ordinance (SUWCO) requirements. SUWCO information can be found at the American Legal Publishing Corporation's website, which publishes the ABCWUA's Code of Ordinances:

www.amlegal.com/albuquerque_nm/

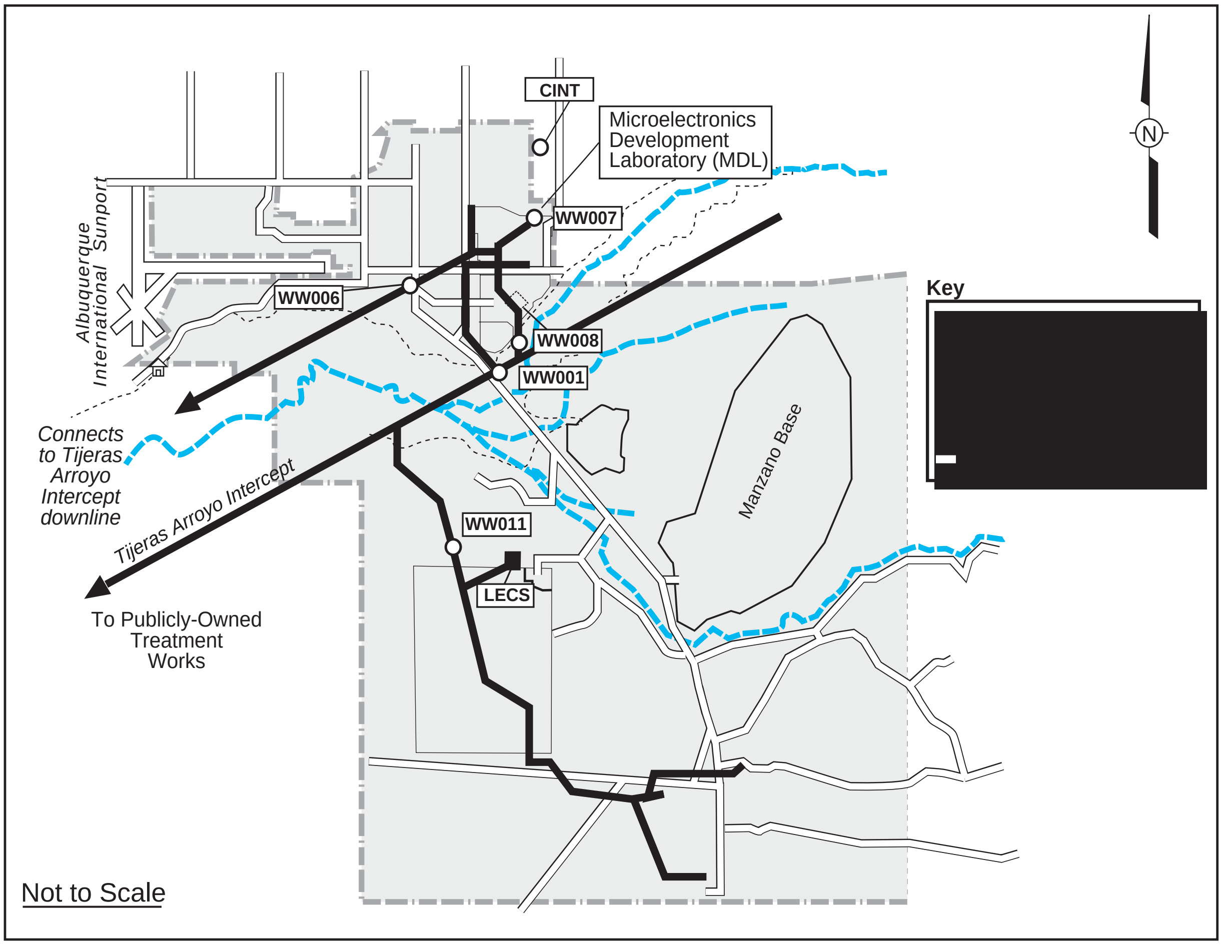
All SNL/NM effluent discharge standards were within the ABCWUA's SUWCO established limits during 2007.

Wastewater Compliance Awards
The ABCWUA's reporting requirements are defined under its SUWCO. The SUWCO specifies the discharge quality and requirements that the ABCWUA will accept at its POTW. Sandia received six "Gold Pre-treatment Awards" from the ABCWUA for the 2006 to 2007 reporting year (November 2006 through November 2007). A "Gold Pre-treatment Award" is given based on a facility's 100 percent compliance with reporting requirements and discharge limits set in its permits, or exceptional source reduction and P2.

6.1.2 Permitting and Reporting

The ABCWUA Public Works Department, Liquid Waste Division, implements the EPA's water quality standards under the authority of the SUWCO. Sandia submits semi-annual wastewater reports to the ABCWUA. The primary regulatory drivers for the Wastewater Program and important program documents and reports are listed in Chapter 9.

Discharge Control Program
The Water Quality Group (WQG) at Sandia maintains a Discharge Control Program to track wastewater discharges resulting from ongoing chemical, manufacturing, and industrial processes conducted at SNL/NM facilities. Facility processes are reviewed for contaminants, concentrations, and discharge frequencies to determine if the effluent will meet regulatory criteria. Once approved, a facility is issued an internal SNL/NM permit, which is reviewed annually. Generally, processes are well characterized and any constituents that are detected over the limits at a wastewater monitoring station can usually be tracked back to the source facility. Corrective actions to mitigate further releases are implemented, as necessary.



02_6-1.ai

FIGURE 6-1. Wastewater Monitoring Station Locations

One-time releases are approved on a case-by-case basis. Buildings that only produce domestic sewage, such as from lavatories, sinks, and fountains, are not required to obtain an internal permit.

6.1.3 Wastewater Monitoring Stations

SNL/NM has six on-site monitoring locations permitted by the ABCWUA (Figure 6-1). Wastewater permits are listed in Chapter 9, Table 9-1. Four of the stations discharge directly to the public sewer, which flows into the Tijeras Arroyo Intercept. The two remaining stations are for categorical pre-treatment processes.

The EPA has established categorical pre-treatment standards for specified classes of industrial discharges. Station WW007 (ABCWUA Permit 2069G) monitors the wastewater discharged from the Acid Waste Neutralization (AWN) System within the MDL in Technical Area (TA) I. Laboratory discharges from Buildings 858 (MDL) and the new Buildings 858EL, 858FAB and 898, which comprise the Microsystems and Engineering Sciences Applications (MESA) complex also discharge to this AWN system. The CINT facility also utilizes an AWN system for pre-treatment of its process waste. SNL/NM discharges approximately 800,000 - 1,000,000 gallons (gal) of wastewater per day to the public sewer.

Wastewater Monitoring

All outfall stations are equipped with flow meters and potential of hydrogen (pH) sensors to continuously monitor wastewater 24-hours-a-day, 365-days-a-year. In the event that flow and or pH limites are exceeded, an auto-dialer will contact personnel at SNL/NM and DOE/National Nuclear Security Administration (NNSA) will notify the ABCWUA within 24 hours. Wastewater Discharge Permits and Station Characteristics are listed in Table 6-1.

Discharge monitoring stations WW001 (permit 2069A), WW006 (permit 2069F), WW008 (permit 2069I), and WW011 (permit 2069K) are manhole-type installations with permanently installed continuous flow measuring and pH recording instrumentation. Wastewater monitoring stations

Wastewater Analyte Parameters

Metals
Aluminum, Arsenic, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Zinc

Radiological
Gamma spectroscopy, Gross alpha, Gross beta, Tritium

General Chemistry
Chemical oxygen demand (COD), Cyanide, Formaldehyde, Oil and grease, Phenolic compounds, Semi-volatile organic compounds (SVOCs), Soluble fluoride, Volatile organic compounds (VOCs)

TABLE 6-1. SNL/NM Wastewater Discharge Permits and Station Characteristics

Permit	Waste Stream Process
General Outfall	
2069A (WW001)	All waste streams
2069F (WW006)	All waste streams
2069I (WW008)	All waste streams
2069K (WW011)	All waste streams
Categorical	
2069G (WW007)	Laboratory industrial processes Acid waste from MDL activities
2238A (CINT)	Laboratory industrial processes Acid waste from CINT activities
Not Permitted	
LECS	Radiological screening of TA-V process water

NOTE: "All waste streams" include both domestic and industrial discharges.
TA-V = Technical Area V
LECS = Liquid Effluent Control System
MDL = Microelectronics Development Laboratory
CINT = Center for Integrated Nano-Technologies

WW007 (permit 2069G) and CINT are located within Buildings and are also equipped with installed continuous flow measuring and pH recording instrumentation.

Sandia splits wastewater samples taken from SNL/NM outfalls with the ABCWUA to determine compliance with permit requirements. NMED is notified when sampling is scheduled to occur and is offered the opportunity to obtain samples for analysis. All samples are obtained as 24-hour flow proportional or time-weighted composites. Sandia sends SNL/NM split samples to an EPA-approved laboratory for analysis. Sampling results are compared with results obtained by the ABCWUA. Currently, the procedure is to sample randomly from a list of potential pollutants. The ABCWUA determines which parameters it plans to analyze. Station parameters are listed in the shaded box (shown above).

Septic Systems

Sandia maintains four active septic tank systems in remote areas on Kirtland Air Force Base (KAFB), which are used only for domestic sanitary sewage collection. Since these tanks receive only domestic sewage and no industrial discharges, they do not require sampling prior to pumping and discharge to the public sewer. However, as a Best Management Practice (BMP), Sandia periodically obtains samples from these active tanks prior to pumping and discharge.

6.1.4 TA-V Radiological Screening

SNL/NM maintains research and engineering reactors in TA-V. These reactors and support facilities have the potential to produce radioactive process wastewater that includes liquids from floor drains, lab sinks and other drains located in buildings that use, process or store radioactive materials. To ensure that all wastewater from these facilities meets regulatory standards, liquid effluent is separated into two process streams defined as reactor and non-reactor wastewater. Non-reactor wastewate is water from restrooms and non-radioactive laboratory activities. Reactor process wastewater from areas that use, process or store radioactive materials is channeled to holding tanks where it can be screened for radiological contaminants within the Liquid Effluent Control System (LECS).

LECS was developed as a control system to maintain the integrity of the ABCWUA's sanitary sewer system by collecting, analyzing, and handling SNL/NM reactor process wastewater from TA-V reactor activities. Water samples are analyzed for tritium, gross alpha, gross beta, and gamma spectroscopy to ensure radiological levels meet regulatory standards before the water is released to the public sewer system. If radioactivity levels are detected above regulatory limits, the water will not be released to the sanitary sewer system and an alternative disposal path will be found or the radionuclides will be allowed to decay in place over a matter of days or weeks if the contamination is due to short-lived medical radioisotopes. Once the activity is at or below regulatory levels, the water can be safely discharged to the public sewer system. The LECS, consists of three 5,000 gal holding tanks with liquid level and radioactive alarm systems, a control room, and an ion exchange/filtration unit (treatment processor). The LECS is an engineered facility operating within an established safety envelope. Discharges to the sanitary sewer from the LECS and other SNL/NM activities have not exceeded standards for radionuclides at any of SNL/NM's wastewater monitoring stations.

6.1.5 Summary of Monitoring Results

During 2007, Sandia split wastewater samples with both the ABCWUA and the NMED. In 2007, laboratory analytical results for these wastewater samples, based on the parameters shown below, confirmed that Sandia was in compliance with all ABCWUA regulations. The ABCWUA staff also inspected SNL/NM facilities to ensure that Sandia was in compliance with the ABCWUA's discharge requirements. All water discharged from the LECS in 2007 also met federal regulatory standards and DOE Orders for radiological levels in wastewater. All analytical results can be found in Appendix A.

6.1.6 Sanitary Sewer System Releases in 2007

Reportable occurrences and environmental releases in 2007 are discussed in Sections 2.2.1 and 2.2.2 . There were no reportable events (ABCWUA permit violations) in 2007.

6.2 SURFACE DISCHARGE PROGRAM

All water and water-based compounds that discharge to the ground surface are evaluated for compliance with New Mexico Water Quality Control Commission (NMWQCC) regulations as implemented by the NMED's Groundwater Bureau. These regulations are designed to protect the groundwater and surface water of the state for potential use as a domestic potable water source. The primary regulations and important program documents are listed in Chapter 9.

6.2.1 Surface Discharge Approval and Permitting

Surface discharges are releases of water and water-based compounds made to roads, open areas, or impoundments. Surface discharges are only made with the approval of the Internal Surface Discharge Program. Proposed discharges are evaluated for potential contaminants and concentration levels to determine if the discharge complies with strict water quality guidelines for surface releases. Uncontaminated water discharges must also be approved, since large volumes of water discharged in areas of prior contamination (such as Environmental Restoration [ER] sites) could increase infiltration rates and move contaminants deeper into the soil column. If any discharges do not meet surface water quality standards, alternative methods of disposal are found.

2007 Surface Discharge Activities

Surface discharge requests are generally made when access to a sanitary sewer line is not available, such as in remote locations on KAFB where no sewer lines exist. Typical surface discharge requests include discharges made by the Groundwater Protection Program (GWPP) to dispose of well purge water from groundwater monitoring wells. Wells are purged before a representative groundwater sample can be taken. Other surface discharges are requested as a result of fire training activities, the need to flush eyewash stations, and the cleaning of building exteriors. In 2007, 22 individual surface discharge requests were made; all met state standards and were approved.

6.2.2 Surface Discharge Releases in 2007

The Surface Discharge Program must be contacted in the event of an accidental release or spill to the ground surface. In 2007, three reportable surface discharge releases occurred. Environmental releases and occurrences are briefly summarized in Section 2.2.2 . Of these three releases only one met Occurrence Reporting and Processing System (ORPS) criteria as an occurrence.

A release of domestic sewer effluent to the surface occurred North of Building 820. The release was due to a leak at a sanitary sewer cleanout. It was reported to the SNL/NM Incident Command at approximately 1400 hours on January 30, 2007. SNL/NM notified DOE/NNSA/SSO and recommended reporting of the release to NMED. The release was reported to NMED by DOE Sandia Site Office (SSO) at approximately 0855 hours on January 31, 2007. The decision to report this incident to NMED was based on the release to a storm drain. All drains in Building 820 were placed out of service until the blockage was cleared at approximately 1545. The wet asphalt was sprayed with a chlorine bleach solution then the area was pressure washed. It is estimated less than ten gal of untreated sewage was released and less than two gal entered the storm drain. The chlorine solution and ultraviolet (UV) exposure from the sunlight neutralized any active pathogens and related environment concerns.

A domestic water leak occurred Northeast of Building 802. The release was reported to SNL/NM Incident Command at approximately 0800 hours on February 18, 2007. The leaking domestic waterline was isolated and water flow stopped at approximately 1045 hours. Initial reports indicated the leak was steam condensate which may contain additives that would be potentially harmful to the environment and wildlife if released. The release was reported to NMED by DOE/SSO at approximately 1930 hours on February 18, 2007. After additional investigation the source of the release was discovered to be from a broken domestic water main supply line. The cause of the break was not immediately evident. The maximum release was less than 60,000 gal and the area was excavated on February 19, 2007 and the line was repaired.

On October 16, 2007, at approximately 930 hours, an oil release was discovered. The source of the release was an oil leak from a compressor on a Liquid Nitrogen (LN2) plant. The LN2 plant had been in service since 1987 and was being disassembled as part of a renovation project at Building 858. The release occurred in an area that was not visible while the plant was operational. The volume of the compressor oil discharge is unknown at this time. The contaminated area measures approximately fifteen by twenty feet. The location of this release does not contain any current ER sites. The following short term corrective actions were taken:

- The release area was covered with plastic sheeting to prevent further oil migration from precipitation.
- Samples were taken to characterize the soil and determine the extent of the contamination. Two samples for Total Petroleum Hydrocarbons (TPH), Diesel Range Organics and Gasoline Range Organics were obtained from the most heavily contaminated areas.
- Approximately 50 cubic yards (yd^3) of soil was removed and placed in a roll-off dumpster for disposal through the SNL Hazardous Waste Management Facility (HMWF).

6.2.3 Pulsed Power Evaporation Lagoons

The Surface Discharge Program at SNL/NM reports water quality results from routine samples taken from two surface discharge lagoons in TA-IV. Both lagoons are permitted through NMED in Discharge Plan (DP-530). The NMED performed an on site inspection of the TA-IV Lagoons prior to the issuance of the discharge permit renewal for DP-530. There were no findings from this inspection and the permit was reissued. The two surface discharge lagoons are primarily used to contain and evaporate water that collects in the secondary containments around seven outdoor oil storage tanks used to store dielectric oil. The secondary containments are designed to hold the entire contents of a tank in the event of an accidental release. Significant volumes of precipitation can collect in the containments during storm events. The water is visually inspected for oil contamination and any oil present is skimmed off prior to discharge to the TA-IV lagoons.

The original DP-530 was issued to SNL/NM for discharges from the Pulsed Power Development Facilities located in TA-IV to Lagoons #1 and #2 on March 8, 1988. The DP-530 was submitted pursuant to 20.6.2.3106 (NMAC) of the NMWQCC regulations, and was approved pursuant to 20.6.2.3109 NMAC. A permit renewal application for DP-530 was submitted to NMED and was approved on September 12, 2007, and will expire on September 12, 2012. The monitoring and reporting requirements are listed in Table 6-2.

During 2007, Lagoon #1 was cleaned, the liner inspected and the lagoon was drained to the sanitary sewer after testing for ABCWUA discharge parameters. Monthly inspections were performed and documented in checklists filed in the Customer Funded Record Center (CFRC) and with DOE/SSO. The Lagoons #2 liner was inspected and monthly inspections were performed and documented. No sampling was conducted since only storm water was collected within the lagoon from storm events. No discharges to Lagoon #2 from Pulsed Power Development Facilities occurred during 2007 and no surface discharges occurred.

6.3 STORM WATER PROGRAM

6.3.1 Storm Drain System

Storm water runoff flowing over the ground surface has the potential to pick up and transport contaminants. The Storm Water Program works in coordination with the P2 Group, the Surface Discharge Program, Facilities Engineering, and the ER Project to implement measures and BMPs to prevent or reduce potential contaminants from being transported in storm water runoff. Potential contaminants may derive from:

- Oils and solvents from machine shops and manufacturing areas,
- Vehicle residues from streets and parking lots,
- Hazardous chemicals and metals from waste handling facilities,
- Residual radioactive and hazardous constituents from Solid Waste Management Units (SWMUs),
- Building material contaminants from construction activities, and
- Pesticides and fertilizers from landscaped areas.

TABLE 6-2. NMWQCC Monitoring and Reporting Requirements

Action	Frequency	Reporting
Inspection of Lagoons	Monthly	Documented in checklists
Drain, clean and inspect lagoon and liner	Annually	Annually
Water-level readings	Monthly	Annually
Inspect sump stations and clean as needed	Quarterly	Annually
Major cations, anions, and TDS	Biennially	Biennially
Purgeable organics using EPA Method 8240	Biennially	Biennially
Extractable organics using EPA Method 8270	Biennially	Biennially

NOTES: NMWQCC = New Mexico Water Quality Control Commission
TDS = total dissolved solids

Sandia controls the potential contaminants that may be picked up by storm water runoff by routing all industrial waste water to the sanitary sewer and storing most chemicals indoors. Sandia also limits storm water contact with chemical storage containers and carefully controls runoff in areas where wastes, chemicals, and oils are stored or handled. Secondary containments for all outdoor oil storage tanks and chemical containers prevent potential pollutants from being transported in storm water runoff. Some facilities, such as the HWMF and the Radioactive and Mixed Waste Management Facility (RMWMF) are designed to divert all runoff from the facility to a lined catchment basin. Water that accumulates in these basins evaporates. If evaporation is not adequate due to meteorological conditions, the accumulated water is evaluated and pumped to either the storm drain system or to the sanitary sewer for disposal. Appropriate approvals must be granted by the state for discharges to the storm drain system or by the ABCWUA for discharges to the sanitary sewer. Required approval to outside agencies is obtained through the DOE/NNSA/SSO.

National Pollutant Discharge Elimination System (NPDES) Regulations

NPDES regulations, under the Clean Water Act (CWA), require any point source discharges to be permitted. Any runoff that flows into the Tijeras Arroyo through a channel, arroyo, conduit, or pipe is considered a discharge point. Overland surface flow or "sheet" flow that drains into Tijeras Arroyo is not considered a point source discharge.

The State of New Mexico has defined "Surface Waters of the State" to include "Waters of the U.S." and all other surface water in the State. In order to assist New Mexico in protecting its water resources, the EPA can apply NPDES regulations to discharges to New Mexico's surface waters, even if those waters are not "Waters of the U.S."

As shown in Figure 6-2, Tijeras Arroyo enters KAFB from the northeast, flows just south of TA-I, TA-II, and TA-IV, exits at KAFB's west boundary, and continues about eight miles to its discharge point at the Rio Grande River. The arroyo has created a significant topographic feature across KAFB where erosion of unconsolidated basin sediments has resulted in a channel over one half mile wide in some areas.

Watersheds at SNL/NM

NPDES permits are required if storm water runoff discharges to "Waters of the U.S." or "Surface Waters of the State." Sandia facilities in TA-I, TA-II, and TA-IV have storm drains, culverts, and channels that divert storm water runoff to discharge points on the north side of Tijeras Arroyo, which is classified as "Waters of the U.S." Sandia also conducts various activities in remote mountain and canyon areas in the Arroyo del Coyote watershed, which empties into Tijeras Arroyo northwest of the KAFB Golf Course. Activities in all of these areas are evaluated for possible NPDES permitting.

Drainages south of the Arroyo del Coyote watershed are generally short and undeveloped. Runoff in this area infiltrates quickly into highly permeable soils. Discharges from these areas do not reach any designated "Waters of the U.S.;" but they do discharge to "Surface Waters of the State;" therefore, NPDES permits are also required for facilities in these areas. TA-III, TA-V, and several remote sites are located in this area.

A new NPDES industrial permit was issued in January 2001. Four stations were added to monitor runoff in the Arroyo del Coyote watershed at that time.

NPDES Permit

The EPA provides regulatory oversight for SNL/NM's Storm Water Program. SNL/NM facilities are covered under the NPDES *Multi-Sector General Permit for Storm Water Discharges Associated With Industrial Activities* issued by the EPA in January 2001 (EPA 2001). Currently, there are nine SNL/NM monitoring points (MPs) on the permit, eight of which collect samples for analytical analysis. This permit was reissued in 2001 for five years and covers four primary industrial activities at SNL/NM as defined in 40 Code of Federal Regulations (CFR) 122.

The current industrial permit expired on September 30, 2005, and EPA has not issued a replacement. However, the EPA has authorized current permit holders to continue operations under the expired permit. The EPA has indicated that a new industrial permit will be issued sometime in 2008. Sandia anticipates adding several new monitoring locations for compliance with this new permit.

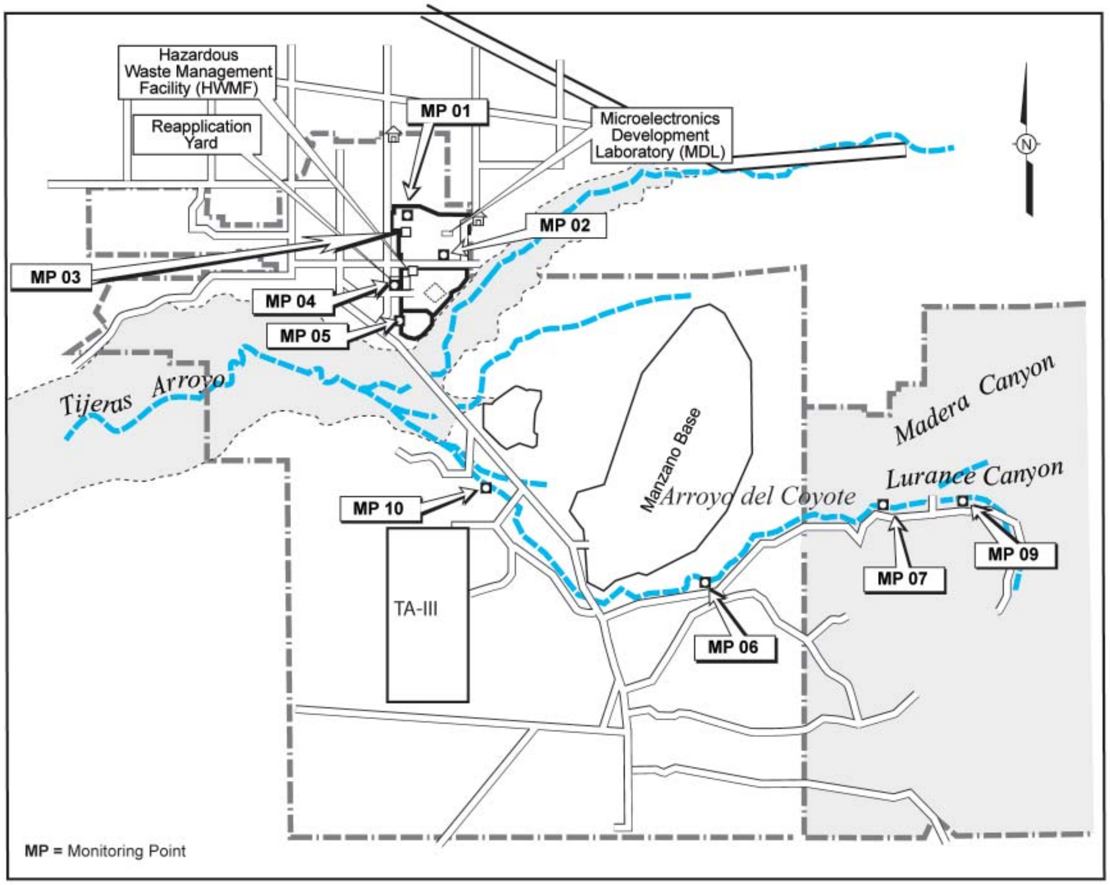


FIGURE 6-2. Storm Water Monitoring Point Locations at Nine Sites

Key facilities affected by NPDES regulations are listed in Table 6-3. Chapter 9 lists all applicable regulations and program documents.

Beginning in 2003, construction activities that disturb over one acre (previously, five acres) also require permitting under NPDES. A construction permit requires protection of storm water runoff during and after construction. All areas of the site that are susceptible to erosion must be stabilized upon completion of the project. In December 2007, 12 storm water construction permits and two permit waivers were active. Construction permits are listed in Chapter 9, Table 9-1.

6.3.2 Storm Water Monitoring Stations

Figure 6-2 illustrates nine MP locations. MPs 1 through 5 monitor runoff from the majority of industrial activities in TA-I, TA-II, and TA-IV. MPs 6, 7, 9, and 10 monitor discharges in Arroyo del Coyote. One monitoring point (MP-3) is only inspected visually.

6.3.3 Routine Inspections

All routine inspection results are attached to the Storm Water Pollution Prevention Plan (SWP3). Routine inspections include the following:

- ***Monitoring station inspections*** are conducted monthly to ensure that samplers and other equipment are functioning properly.

- ***Material storage area inspections*** are conducted quarterly. All waste handling areas, vehicle and equipment cleaning areas, and loading and unloading areas are inspected for uncovered and unprotected potential contaminant sources and spills. These inspections increase personnel awareness and responsibility for storm water P2.

- ***Wet weather inspections (visual monitoring)*** are conducted quarterly during a storm event, if possible, but generally during the rainy season from April through September. Samples are collected and visually inspected for foaminess,

TABLE 6-3. SNL/NM Facilities Subject to Storm Water Permitting

These facilities are in areas where storm water can potentially drain to Tijeras Arroyo.

Description of SIC Code*	Potential Pollutants and Impacts	Applicable SNL/NM Facilities **
NPDES Multi-Sector Storm Water Permit		
Scrap and Waste Recycling	- Various solid objects with potential residual surface contamination	- Reapplication and Storage Yard
Hazardous Waste Treatment, Storage, or Disposal Facilities	- Regulated hazardous chemical and radioac tive waste	- HWMF - Manzano Storage Complex - SWMUs (including those in Lurance and Madera Canyons)
Electronic and Electrical Equipment Manufacturing	- Raw chemical storage such as acid and sodium hydroxide - Electroplating processes	- MDL - AMPL - CSRL
Fabricated Metal Products	- Metal Fabrication - Drilling - Turning - Milling	- Machine Shop
Short-Term Construction Permits		
Major Construction Activities in 2007	- Building material pollutants - Disturbed soil	- MESA - WIF

NOTES: *The EPA requires a National Pollution Discharge Elimination System (NPDES) Storm Water Permit for all industrial facilities that have processes defined in the Standard Industrial Classification (SIC) codes listed in Appendix A of 40 CFR 122.

**Applicable facilities are monitored under the expanded Storm Water Program, which was in effect in October 2001. The expanded program is documented in the revised Storm Water Pollution Prevention Plan (SWP3) (SNL 2001).

AMPL = Advanced Manufacturing Process Laboratory
CSRL = Compound Semi-Conductor Research Laboratory
HWMF = Hazardous Waste Management Facility
SNL/NM = Sandia National Laboratories, New Mexico
MESA = Microsystems & Engineering Sciences Applications
MDL = Microelectronics Development Laboratory
SWMU = Solid Waste Management Unit
WIF = Weapons Integration Facility

clarity, and the presence of oil. The pH of the discharge is also measured and recorded. These inspections also provide an opportunity to check for broken levees and floating debris.

- ***Dry weather inspections*** are conducted quarterly when storm drains and ditches are dry, primarily to detect illicit discharges. In general, only storm water is allowed in the storm drain system; however, with approval from the Surface Discharge Program, water that meets NPDES permit conditions can be discharged to storm drains. An example of NPDES permit-approved discharges would be water used during fire training exercises or fire hydrant testing. Dry weather inspections also provide an opportunity to inspect ditches for excess vegetation, accumulated sediment, and debris. Storm channels are cleaned out annually, or as necessary.

- ***Annual inspections*** of all permitted facilities and the entire storm water system are conducted. After the inspections have been completed, a report is generated indicating the extent of the inspections and certifying that is in compliance with the NPDES permit. Any inconsistency between the SWP3 and conditions at the facilities is noted in the report. If changes to the SWP3 are required as a result of these inspections, revisions are initiated. If potential pollution problems are uncovered, they are noted in the report along with a schedule for addressing those problem areas.

Sampling Protocols

The NPDES permit requires quarterly analytical sampling to be conducted in the second and fourth year of the five year permit, weather permitting. Due to Albuquerque’s semi-arid climate and high infiltration rates, precipitation rarely produces adequate runoff for monitoring in the months of October through March (please see the link at the end of this section for Albuquerque's precipitation). In general, the most consistent storm water sampling occurs during the rainy season from April through September. After a rainfall of sufficient intensity and duration (as defined in the regulation), storm water runoff flowing through each monitoring station is collected as a grab sample by the automatic sampler. The discharge is collected within the first 30 minutes of the runoff event to allow for the sampling of any residues picked up in the soil upstream of the station. All samples are sent to off-site laboratories and analyzed according to protocols established by the EPA.

FY 2004 was the fourth year of the permit and was the last year analytical monitoring was required except for fecal coliform.

http://www.weather.gov/climate/index.php?wfo=abq

6.3.4 2007 Activities

2007 Sampling Results

Quarterly visual sampling was conducted in 2007. Analytical sampling was not required for this year of the permit.

Visual observations are not conducted at the remote MPs due to safety concerns for personnel in remote areas during inclement weather. No visual observations were made of FY 2007 due to a lack of runoff or because the runoff occurred outside normal business hours.

A fecal coliform sample was last collected on July 17, 2006 to comply with New Mexico requirements in the Multi-Sector General Permit. However, a sample was not collected during CY 2007 due to insufficient water flow during normal business hours.

6.4 OIL STORAGE AND SPILL CONTROL

There is an oil storage capacity of 3.6 million gal in 51 aboveground storage tanks (ASTs) and five USTs. This does not include oil-containing equipment and transformers. Additional oil storage capacity in 55 gal drums occurs throughout the site on an as needed basis. All oil storage sites with regulated containers must be equipped with secondary spill containment. Secondary containment structures include concrete-lined basins, retaining walls, containment reservoirs, earthen berms, sloped pads, trenches, and containment pallets.

A Spill Prevention Control and Countermeasures (SPCC) Plan is required under the CWA. SNL/NM's SPCC Plan was revised in 2005 to incorporate changes to 40 CFR 112 and 20.5 NMAC. The focus of these regulations is to protect specifically defined waterways, or "navigable waters of the United States" from potential oil contamination. "Navigable waters" is a broad term that includes rivers, lakes, oceans, and water channels (tributaries), such as streambeds and arroyos, that connect to a river. This applies to the Tijeras Arroyo, which discharges to the Rio Grande.

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

- Oil storage tanks (USTs and ASTs)
- Bulk storage areas (multiple containers)
- Temporary or portable tanks

Table 9-1 lists the permit numbers for those tanks that are registered with NMED. SNL/NM's State of New Mexico Owner ID Number is 14109.

USTs

Five USTs are currently operating at SNL/NM. Two 20,000 gal fiberglass USTs at SNL/NM are registered with NMED; one additional UST, used solely for emergency power generation, is exempt from New Mexico requirements, but is covered by federal regulations in 40 CFR 280; and two USTs in TA-III are exempt from state and federal requirements because they contain insignificant quantities of regulated substances.

ASTs

Fifty-one ASTs are currently operating at SNL/NM. In 2002, the State of New Mexico passed oil storage regulations that required the registration of all oil storage tanks with a storage capacity greater than 1,320 gal, but less than 55,000 gal. Seven ASTs at SNL/NM are registered with NMED.

This page intentionally left blank.

chapter seven
GROUNDWATER PROGRAMS

"Young Red Spotted Toads" *Photo by Jennifer Payne.*

In This Chapter...

Overview of Groundwater Programs at SNL/NM
Groundwater Quality Analysis Results
Water Levels

Environmental Snapshot

The Groundwater Protection Program (GWPP) is responsible for tracking information on all wells owned by Sandia, including Environmental Restoration (ER) Project wells and characterization boreholes. The primary purpose of the GWPP Well Registry and Oversight Task is to ensure that all wells owned by Sandia are properly constructed and maintained to protect groundwater resources.

The Groundwater Protection Program (GWPP) and the Environmental Restoration (ER) Project collect groundwater data at Sandia National Laboratories, New Mexico (SNL/NM). Both programs coordinate to monitor wells throughout SNL/NM operational areas and ER sites. Groundwater monitoring is conducted on a quarterly, semi-annual, or annual basis, depending on individual project areas. Water level measurements are conducted monthly and quarterly.

Specific tasks performed in Fiscal Year (FY) 2007 by the GWPP and ER are shown in Figure 7-1. It illustrates the coordination with outside groundwater monitoring agencies as a key component of the GWPP and the ER Project.

Groundwater wells located on and around Kirtland Air Force Base (KAFB) are illustrated in Figure 7-2. The wells include ER monitoring wells, GWPP surveillance wells, City of Albuquerque (COA) production wells, KAFB production wells, U.S. Geological Survey (USGS) monitoring wells, and KAFB Installation Restoration Program (IRP) wells. In FY 2007, 64 wells and one spring were sampled by the GWPP or the ER Project.

Please note that groundwater data is reported for the FY 2007 (from October 1, 2006 through September 30, 2007).

7.1 OVERVIEW OF GROUNDWATER PROGRAMS AT SNL/NM

7.1.1 GWPP Activities

The primary function of the GWPP is to conduct groundwater surveillance to detect possible groundwater contamination from current operations or undiscovered legacy contamination. The purpose of groundwater monitoring involves completing the following objectives:

- Establish baseline water quality and groundwater flow information for the groundwater system at SNL/NM,
- Determine the impact, if any, of SNL/NM's operations on the quality and quantity of groundwater, and
- Demonstrate compliance with all federal, state, and local groundwater requirements.

The GWPP is responsible for tracking information on all wells owned by Sandia, including ER Project wells and characterization boreholes. The primary purpose of the GWPP Well Registry and Oversight Task is to ensure that all wells owned by SNL/NM are properly constructed and maintained to protect groundwater resources, and ensure groundwater sample representativeness. The GWPP works together with well owners to review new well design proposals, record construction information, track well ownership and maintenance records, perform annual well inspections, and consult with owners if, and when, plugging for the abandonment or replacement of a well or borehole is required.

In 2007, groundwater surveillance sampling was conducted at 11 wells and one spring.

U.S. Department of Energy (DOE) Orders and the Compliance Order on Consent (COOC) – such as the requirements applicable to the GWPP – are listed in Chapter 9, and discussed in Chapter 2.

Trend Data

The GWPP performs trending on groundwater surveillance results by comparing past years' data with the current year's results. Multiyear trend plots for analytes exceeding maximum contaminant levels (MCLs) and human health related maximum allowable concentrations (MACs) are presented in Appendix B, which provides data trends and graphical representation. The data is analyzed to determine if the results are within the normal range of expected values, or if a significant difference is present — this allows early detection and possible source identification when contaminants are at levels below regulatory concern. Conversely, unchanging baseline levels demonstrate Sandia's successful best management practices (BMPs) for groundwater protection.

7.1.2 ER Project Groundwater Activities

ER Project activities are conducted per the Resource Conservation and Recovery Act (RCRA) regulations, which mandate the cleanup and management of active and inactive treatment, storage, and disposal (TSD) facilities. The COOC imposes additional requirements. Applicable regulations are listed in Chapter 9, and the regulatory basis for the ER Project is discussed in Section 3.2.

There are currently five ER Project areas with ongoing groundwater investigations:

- Chemical Waste Landfill (CWL),
- Mixed Waste Landfill (MWL),

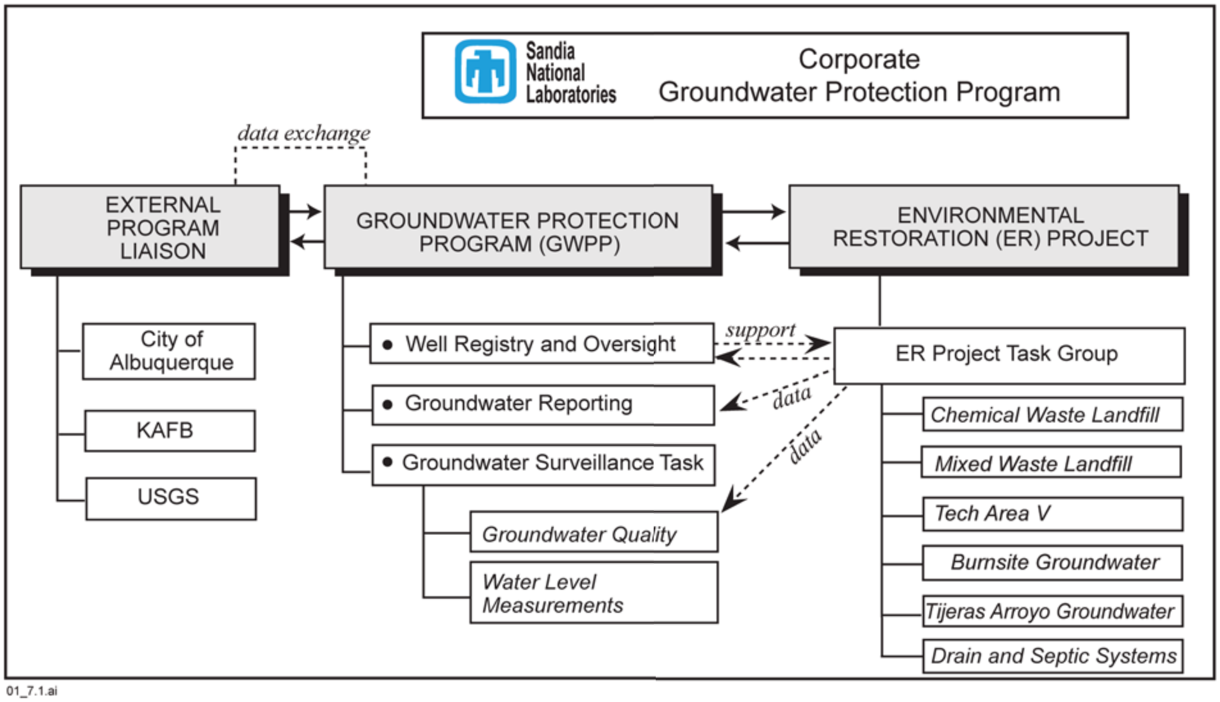


FIGURE 7-1. SNL/NM's Groundwater Programs and Interfaces, for tasks performed in FY 2007.

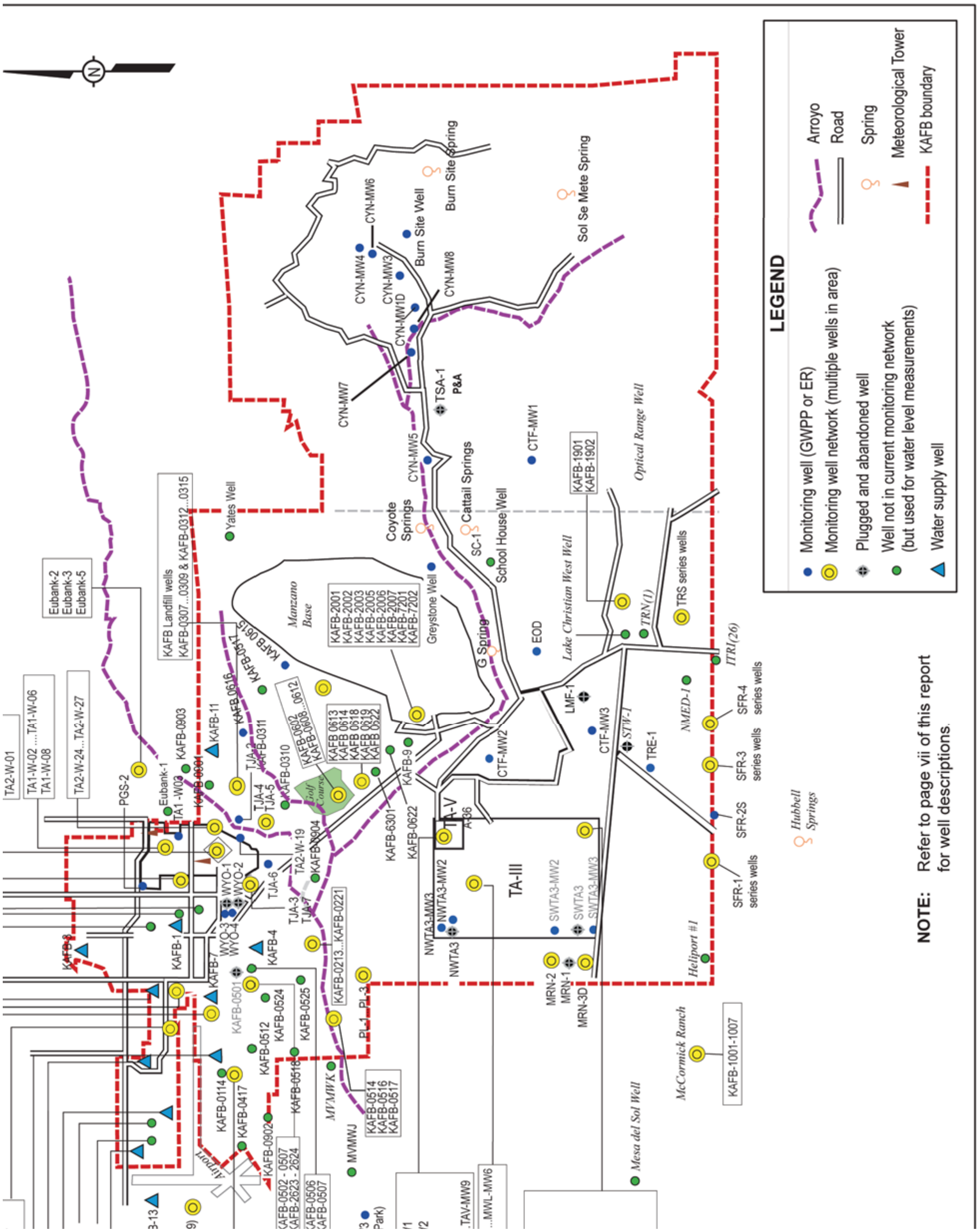
- Technical Area (TA) V Groundwater Investigation,
- Tijeras Area Groundwater (TAG) Investigation (TA-I, TA-II, & Tijeras Arroyo), and
- Burn Site Groundwater (BSGW) Investigation (Lurance Canyon).

CWL – The CWL is a 1.9 acre former disposal site at the southeast corner of TA-III. From 1962 until 1981, the CWL was used for the disposal of chemical, radioactive, and solid waste generated by SNL/NM research activities. From 1981 through 1985, only solid waste was disposed of at the CWL. In addition, the CWL was used as a hazardous waste drum storage facility from 1981 to 1989. A comprehensive summary of the CWL disposal history is presented in the NMED approved Closure Plan (SNL 1992) and Landfill Excavation Voluntary Corrective Measure (LE VCM) Final Report (SNL 2003). Groundwater contaminants of concern (COC) include Volatile Organic Compounds (VOC) and chromium. The monitoring network at the CWL consists of 13 wells. Nine monitoring wells were sampled in FY 2007, including two background wells and seven downgradient monitoring wells. The CWL is discussed further in section 7.2.2.

MWL – The MWL is a 2.6 acre former disposal site located in TA-III. It was operational from 1959 to 1988, and was used to dispose of low-level radioactive and mixed waste (MW). Tritium is the only COC that has been released to adjacent soils from the MWL. The groundwater monitoring well network at the MWL consists of seven wells. Six wells were sampled in FY 2007.

TA-V – The Gamma Irradiation Facility (GIF), the Hot Cell Facility (HCF), and two reactor facilities are located in TA-V. From 1967 to 1971, the Liquid Waste Disposal System (LWDS) located in TA-V was used to dispose of reactor coolant water in the subsurface. Groundwater COCs at the LWDS are nitrates and VOCs such as trichloroethene (TCE), which was first detected in the groundwater in 1993. There are currently 13 active monitoring wells at this site. Twelve wells were sampled in FY 2007.

TAG – The TAG Investigation includes groundwater beneath TA-I, TA-II, and Tijeras Arroyo. In FY 2007, there were 21 monitoring wells routinely sampled in the TAG study area. Of these, 11 are regional aquifer wells, and 10 are perched groundwater system (GWS) wells. The perched GWS consists of water-bearing sediments located several hundred feet above the regional water table that have insufficient yield to be developed for domestic use. TCE and nitrates are the COCs for TAG.



NOTE: Refer to page vii of this report for well descriptions.

FIGURE 7-2. Wells and Springs on SNL/NM and KAFB

BSGW – The BSGW area is located around the active Lurance Canyon Burn Site (LCBS) facility. Groundwater investigations were initiated in 1997 at the request of NMED after elevated nitrate levels were discovered in the LCBS water well. In 1997, one groundwater monitoring well was installed. In 1999, two additional wells were installed, including two piezometers to detect and monitor groundwater flow at the interface of the arroyo sediments and bedrock. To date, both piezometers have remained dry. Three new wells were installed in 2005 and 2006. All six monitoring wells were sampled in FY 2007.

7.2 GROUNDWATER QUALITY ANALYSIS RESULTS

Analytical results for groundwater quality monitoring conducted by the GWPP and the ER Project are compared to state, federal, and DOE guidelines shown in Table 7-1. The frequency of groundwater monitoring performed at SNL/NM is shown in Table 7-2. All groundwater samples are collected and analyzed in accordance with EPA protocols.

Water quality results for both the GWPP and the ER Project are summarized in the following pages and in Table 7-3. Exceedances of regulatory criteria for samples collected by SNL/NM monitoring activities are listed in Table 7-4.

7.2.1 GWPP Surveillance Results

Annual sampling of groundwater was conducted during the period of January 29, 2007 to February 16, 2007. Samples were collected from 11 wells and one spring. Groundwater surveillance samples for the GWPP were analyzed for the following parameters:

- VOCs, dissolved metals (except for mercury),
- major ions (including nitrate),
- alkalinity/total phenols,
- total halogenated organics (TOX),
- gamma spectroscopy,
- selected radionuclides, and
- gross alpha/beta activity.

Metals, excluding mercury, were analyzed from filtered groundwater samples to conform to New Mexico Water Quality Control Commission (NMWQCC) Standards for dissolved concentration limits. An unfiltered groundwater sample from each well was analyzed for total mercury.

Groundwater samples from SWTA3-MW4 were analyzed for perchlorate in addition to the above listed analytes. The perchlorate analyses were conducted per requirements of the COOC, effective in 2004.

Field measurements taken at each well included alkalinity, turbidity, dissolved oxygen, potential of hydrogen (pH), specific conductivity, oxidation reduction potential (or redox [Eh]), and temperature.

VOCs

VOCs were not detected at concentrations above established MCLs or MACs from any groundwater sample. Acetone was detected in the groundwater sample from SFR-2S at a concentration of 1.99 micrograms per liter (µg/L). Other acetone and all chloroform concentrations were qualified during data validation as not detected in various samples due to associated quality control sample contamination.

Non-metal Inorganic Compounds and Phenolics. Non-metallic inorganic constituents analyzed in groundwater samples included phenolics and TOX, total cyanide, alkalinity, and ions (including bromide, chloride, fluoride, sulfate, and Nitrate Plus Nitrite (NPN) [reported as nitrogen]). Perchlorate analysis was conducted only on the samples collected from SWTA3-MW4. Analytical results are given in Appendix A, Tables GWPP-A3 and GWPP-A4, with MCLs and MACs included for comparison.

No analytes exceeded the MCL associated with drinking water standards at any of the wells sampled. Fluoride concentrations in two wells exceeded the MAC of 1.6 milligrams per liter (mg/L) as established by the NMWQCC as the human health standard for groundwater. Fluoride was detected in SFR-4T, SWTA3-MW4, and SWTA3-MW4 duplicate sample at concentrations of 2.66 mg/L, 1.66 mg/L, and 1.64 mg/L, respectively (Figures B-1 through B-2). Historically, monitoring wells such as SFR-4T located east of the Tijeras fault zone have fluoride concentrations near or slightly above the MAC. None of the groundwater samples exceeded the NMED Drinking MCL of 4 mg/L. Perchlorate was not detected greater than MDL in the well sampled per the COOC.

Metals

The analyses were conducted for dissolved metals on filtered groundwater samples, except for mercury. The total concentration of mercury was determined in an unfiltered aliquot of sampled groundwater.

TABLE 7-1. Guidelines Used for Groundwater Quality Sample Comparisons

Regulation/Requirements	Standards and Guides	Regulating Agency
National Primary Drinking Water Regulations (40 CFR 141)	Maximum contaminant level (MCL)	U.S. Environmental Protection Agency (EPA)
New Mexico Water Quality Control Commission (NMWQCC) [(1)] Standards for Groundwater (20 6.2.3103A NMAC Human Health Standards)	Maximum allowable concentration (MAC)	NMWQCC
DOE Drinking Water Guidelines for Radioisotopes [(2)] (DOE Order 5400.5)	Derived concentration guide (DCG)	Department of Energy (DOE 1993)

NOTES: [(1)] MACs for Human Health and Domestic Water Supply Standards are identified in the analytical results tables in the appendices. Domestic water supply standards are based on aesthetic considerations, not on direct human health risks.
[(2)] DOE drinking water guidelines set allowable radionuclide levels in drinking water. The levels are calculated based on published DCGs and correspond to a 4 millirem-per-year (mrem/yr) dose from chronic exposures. This is equivalent to 4 percent of the DCG for ingestion, which is based on an exposure of 100 mrem/yr. These may be different than EPA's standards, where established.
CFR= Code of Feferal Regulation

TABLE 7-2. Sample Collection Periods for Groundwater Quality Monitoring at SNL/NM During FY 2007

Sampling Period	GWPP	CWL	MWL	TA-V	TAG	BSG
Oct 06		√			√	
Nov 06				√	√	
Dec 06				√		√
Jan 07					√	
Feb 07	√			√		
Mar 07				√		√
Apr 07		√	√			
May 07		√			√	
Jun 07			√	√		√
Jul 07					√	
Aug 07				√	√	
Sep 07				√		√

NOTES: GWPP= Groundwater Protection Program
CWL= Chemical Waste Landfill
MWL= Mixed Waste Landfill
TA-V= Technical Area Five
TAG= Tijeras Area Groundwater
BSG= Burn Site Groundwater

The groundwater standards of the NMWQCC are based on dissolved concentrations. Dissolved metals usually occur as natural trace concentrations and are generally below regulatory limits.

No metal parameters were detected above established regulatory limits in any groundwater sample, except beryllium. Beryllium was detected above the MCL of 0.004 mg/L in Coyote Springs at a concentration of 0.00639 mg/L. Elevated beryllium has been consistently detected in the water from Coyote Springs (Figure B-3) and is deemed to be of natural origin as a consequence of groundwater in contact with the bedrock in this highly faulted location. Total mercury was not detected above laboratory MDL for any groundwater sample.

Radionuclide Activity

Analyses for radioisotopes were conducted on all samples. Specific analyses included gamma spectroscopy, gross alpha/beta, radium-226 and -228, uranium-233/234, and uranium-235 & -238.

Gamma spectroscopic analysis was limited to the following key radioisotopes: americium-241, cesium-137, cobalt-60, and potassium-40. Potassium-40 was reported above the MDA in samples from SFR-2S, SWTA3-MW4, and TRE-1, but all activities were qualified as not usable during data validation due to low abundance in gamma spectroscopy analysis. No specific MCLs or MACs are established for these isotopes; however, EPA drinking water standards limit the effective dose for drinking water to 4 mrem/year. The calculated maximum activity level using this standard is 1.2 picocuries per liter (pCi/L) for americium-241, 120 pCi/L for cesium-137, 200 pCi/L for cobalt-60, and 280 pCi/L for potassium-40. None of the activity levels from the groundwater samples exceed these values within the uncertainty level reported.

TABLE 7-3. Summary of SNL/NM Groundwater Monitoring Results During FY 2007

	SNL/NM Groundwater Monitoring
Number of Active Wells Monitored	66
Number of Analyses Performed	9,256
Percent of Non-Detected Results	80.25 %

Analyte	Number of Detects	Number of Non-Detects	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	Standard Deviation for Detected Values	MCL
Detected Organic Compounds in µg/L							
Acetone	21	133	1.28	5.68	2.06	0.964	NE
Carbon disulfide	5	156	1.33	24.8	6.48	10.25	NE
Chloroform	11	150	0.254	0.417	0.325	0.0578	NE
Dichloroethane, 1,1-	14	147	0.533	0.973	0.723	0.138	NE
Dichloroethene, cis-1,2-	29	110	0.314	3.38	1.313	0.979	70
Methylene chloride	1	160	2.03	2.03	2.03	N/A	5.0
Tetrachloroethene	7	145	0.616	1.35	0.914	0.267	5.0
Toluene	9	150	0.275	1.45	0.581	0.449	1,000
Trichlorobenzene, 1,2,4-	1	39	0.434	0.434	0.434	N/A	70
Trichloroethene	75	86	0.256	17	3.282	4.02	5.0
Diesel Range Organics	7	16	34.1	66	42.14	11.21	NE
Detected Inorganic Parameters in mg/L							
Nitrate	1	0	22.2	22.2	22.2	N/A	10
Nitrate plus nitrite as N	167	5	0.102	38.4	7.913	7.56	10
Bromide	23	2	0.144	2.04	0.6052	0.459	NE
Chloride	25	0	10.8	469	76.2	96.20	NE
Fluoride	25	0	0.402	2.66	1.031	0.513	4.0
Sulfate	28	0	35.3	1900	143	346.4	NE
Cyanide, total	5	10	0.00221	0.0108	0.00468	0.00362	0.2
Total Organic Halogens	12	2	0.0022	0.043	0.01423	0.01120	NE
Carbon dioxide, total	7	0	168	207	191.43	16.60	NE
Total Organic Carbon	7	0	0.354	0.738	0.6033	0.154	NE
Biochemical Oxygen Demand	2	4	15.8	18.2	17.0	1.70	NE
Perchlorate	7	4	0.00594	0.00893	0.00746	0.00114	NE
Solids, total dissolved	7	0	308	578	421.3	100.3	NE
Alkalinity as CACO3	21	0	108	1060	281.1	216.0	NE

Refer to footnotes at end of table.

TABLE 7-3. Summary of SNL/NM Groundwater Monitoring Results During FY 2007 (continued)

	SNL/NM Groundwater Monitoring
Number of Active Wells Monitored	66
Number of Analyses Performed	9,256
Percent of Non-Detected Results	80.25 %

Analyte	Number of Detects	Number of Non-Detects	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	Standard Deviation for Detected Values	MCL
Detected Metals in mg/L							
Aluminum	53	14	0.005	0.557	0.0586	0.123	NE
Antimony	5	84	0.000503	0.00138	0.000769	0.00035	0.006
Arsenic	23	66	0.00152	0.00627	0.002712	0.00128	0.010
Barium	89	0	0.0105	0.240	0.07254	0.03807	2.0
Beryllium	4	85	0.00011	0.00639	0.00171	0.00312	0.004
Cadmium	17	72	0.000108	0.00143	0.000322	0.000309	0.005
Calcium	71	0	33.9	342	90.35	60.13	NE
Chromium	53	36	0.00113	0.426	0.01309	0.05823	0.100
Cobalt	85	4	0.000103	0.0106	0.000572	0.00132	NE
Copper	88	1	0.000344	0.0244	0.001679	0.00262	NE
Iron	89	0	0.137	6.10	0.566	0.714	NE
Lead	7	82	0.0005	0.00173	0.000818	0.000447	NE
Magnesium	71	0	3.27	64.9	20.55	11.64	NE
Manganese	28	39	0.001	1.48	0.0673	0.278	NE
Nickel	89	0	0.00073	0.436	0.0261	0.07676	NE
Potassium	71	0	1.77	29.6	3.663	3.40	NE
Selenium	44	45	0.00102	0.0313	0.005173	0.00601	0.050
Silver	5	84	0.000411	0.00103	0.000699	0.000261	NE
Sodium	71	0	18.4	1090	64.7	132.4	NE
Thallium	27	62	0.00037	0.00188	0.000561	0.000275	0.002
Tin	8	14	0.001	0.108	0.0151	0.03750	NE
Uranium	60	0	0.000281	0.0175	0.004754	0.00395	0.030
Uranium-235	20	1	0.000015	0.000126	0.000049	0.000036	NE
Uranium-238	21	0	0.00028	0.0174	0.00651	0.00502	NE
Vanadium	31	58	0.00217	0.0136	0.0056	0.00244	NE
Zinc	69	20	0.00209	0.0468	0.00953	0.00945	NE

Refer to footnotes at end of table.

TABLE 7-3. Summary of SNL/NM Groundwater Monitoring Results During FY 2007 (concluded)

	SNL/NM Groundwater Monitoring
Number of Active Wells Monitored	66
Number of Analyses Performed	9,256
Percent of Non-Detected Results	80.25 %

Analyte	Number of Detects	Number of Non-Detects	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	Standard Deviation for Detected Values	MCL/MAC
Detected Radiochemistry Activities in pCi/L							
Alpha, gross	57	3	1.47	29.6	7.858	7.03	15.0
Beta, gross	50	10	2.42	36.9	5.891	5.14	4 mrem/yr
Potassium-40	1	53	52.5	52.5	52.5	N/A	NE
Radium-226	2	12	0.886	0.969	0.9275	0.0587	5.0
Radium-228	2	12	1.1	1.54	1.32	0.311	5.0
Summary of Field Water Quality Parameters (units as indicated below)							
Potential of Hydrogen in pH	149	0	6.03	8.30	7.36	0.291	NE
Specific Conductivity in µmhos/cm	149	0	351	3,909	689	401.2	NE
Temperature in ^{0}C	149	0	11.36	25.86	19.20	3.29	NE
Turbidity in NTU	149	0	0.09	47.50	2.14	5.36	NE

Notes:

CACO3 = calcium as carbon dioxide

MCL = Maximum contaminant level. Established by the U.S. Environmental Protection Agency Primary Water Regulations (40 CFR 141.11(b)), and subsequent amendments New Mexico Environmental Improvement Board in Title 20, Chapter 7, Part 1 of the New Mexico Administrative Code (20 NMAC 6.2).

MAC = Maximun allowable concentration in Groundwater.

mg/L = milligrams per liter

N = nitrogen

N/A = not applicable

NE = not established

NTU = nephelometric turbidity units

pCi/L = picocuries per liter

pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration)

µg/L = micrograms per liter

µmho/cm = micromhos per centimeter

4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate)

^{O}C = degrees Celsius

% = percent

Uncorrected gross alpha activities for samples from SFR-2S and TRE-1 exceeded the MCL of 15 pCi/L. In this region, groundwater contacts bedrock, which contains materials that are high in naturally occurring uranium. Values of corrected Gross Alpha (by subtracting the uranium activities) are below the 15 pCi/L MCL. Gross alpha results for SFR-2S and TRE-1 are consistent with historical activities.

7.2.2 ER Project Water Quality Results

CWL Results

Groundwater monitoring at the CWL was performed during October 2006, and in April and May of 2007. Groundwater samples were collected from nine monitoring wells, and were submitted for Appendix IX VOCs and metals. Sample results were compared with MCLs, where established. Water quality parameters for specific conductivity, oxidation-reduction, pH, turbidity, and dissolved oxygen were measured prior to sampling each well.

VOCs

No VOCs were detected above established MCLs during FY 2007.

Total Metals

As required by the NMED's Hazardous Waste Bureau (HWB), all metals samples were analyzed for total metals. No metals concentrations were detected above established MCLs. Detected metals concentrations were comparable to historical values.

MWL Results

Annual groundwater sampling of five monitoring wells at the MWL was conducted in April 2007. One additional well MWL-MW4 was sampled in June of FY 2007. Groundwater samples were analyzed for the standards analytes — VOCs, Target Analyte List (TAL) metals and total uranium, NPN (reported as nitrogen), major anions, tritium, gross alpha/beta radioactivity, and gamma-emitting radionuclides. In addition, analyses for total organic carbon (TOC), carbon dioxide, total dissolved solids (TDS), ferrous iron, and biological oxygen demand (BOD) were requested. Sampling results were compared with MCLs, where established. Water quality parameters were measured at the time of sample collection at each well.

VOCs

Groundwater samples analyzed from the MWL monitoring wells revealed the presence of acetone and toluene greater than MDLs, but less than or equal to the practical quantitation limits (PQL). Some results are reported with data validation qualifiers. Acetone was detected in all samples above the MDL but these results were associated with laboratory blank contamination and qualified as not detected at the PQL. Toluene was detected above the MDL in samples collected from MWL-MW3 and MWL-MW4, but the results were below the PQL.

Major Anions

Groundwater samples were analyzed for bromide, chloride, fluoride, sulfate, NPN (reported as nitrogen), and alkalinity. Nitrate plus nitrite NPN (as nitrogen) concentrations ranged from 1.57 mg/L at MWL-MW6 to 5.21 mg/L at MWL-MW1. No sample results exceeded the established MCL of 10 mg/L. Fluoride, the only ion included in the analytical suite with a regulatory limit, was detected below the MCL of 4.0 mg/L at concentrations ranging from 0.733 mg/L at MWL-MW5 to 1.04 mg/L at MWL-MW3.

Metals

The chromium concentration in the sample from MWL-MW1 (0.426 mg/L) exceeded the EPA MCL of 0.1 mg/L.This is shown if figure B-4 in Appendix B.

Total uranium results from the unfiltered samples were below the MCL consistent with data from previous sampling events. The results are well within the range of total uranium concentrations established by the USGS for the Middle Rio Grande Basin (USGS 2002).

Radionuclide Activities

Radionuclides analyzed in MWL groundwater samples included tritium, gross alpha/beta activities, and gamma-emitting radionuclides. No radiological parameters were detected above established MCLs.

Gross alpha/beta activity levels were detected above laboratory reporting limits in all environmental samples. Gross alpha activity levels range from 5.56 ± 01.36 pCi/L in the MWL-MW3 sample to 12.0 ± 2.55 pCi/L in the MWL-MW6 sample. Gross beta activity levels range from 3.92 ± 1.16 pCi/L in the MWL-MW5 sample to 8.94 ± 1.21 pCi/L in the MWL-MW2 sample.

Tritium, analyzed by EPA Method 906.0, was not detected above the MDA in any of the seven samples.

The gamma-emitting radionuclides of concern (i.e., americium-241, cesium-137, cobablt-60, potassium-40), analyzed by EPA Method 901.1, were not detected above the MDA in any of the samples.

TA-V Results

Quarterly groundwater sampling at TA-V was performed in November/December 2006, February/March 2007, June 2007, and August/September 2007.

Analytes Sampled

Quarterly groundwater samples were analyzed for VOCs and NPN (reported as nitrogen). In addition to the quarterly analytes, analyses for cations (calcium, magnesium, and sodium), anions (bromide, chloride, fluoride, and sulfate), alkalinity, TAL metals, PCBs, total uranium, tritium, gross alpha/beta, and selected radionuclides by gamma spectroscopy were conducted on the fourth quarter samples. Water quality parameters were measured in the field immediately prior to sampling.

VOC Analyses

TCE concentrations in excess of the MCL of 5µg/L were detected in samples from TA-V monitoring wells LWDS-MW1, and TAV-MW6. The highest results obtained were 17.0 µg/L in LWDS-MW1 in November 2006 and decreased slightly in subsequent samplings. The greatest amount detected in TAV-MW6 was 8.23 µg/L in August, a slight increase over previous sampling events. The TCE concentration trends for the wells are shown in Figures B-5 and B-6. No other VOCs were detected above MCLs in any other monitoring well.

Anion Analyses

Among the anion analytes NPN (reported as nitrogen), bromide, chloride, fluoride, and sulfate, only fluoride and NPN have an MCL or MAC. Fluoride concentrations did not exceed the MAC of 1.6 mg/L, which is the lower of the two regulatory limits. NPN (reported as nitrogen) concentrations exceeded the MCL of 10 mg/L in LWDS-MW1 in all four quarters of FY 2007. The nitrate in LWDS-MW1 has consistently exceeded the MCL over the past six years, however, the concentrations appear to be decreasing over time. The nitrate concentrations in TAV-MW1 occasionaly exceeded the MCL in prior years. However, no exceedance of the MCL occurred during FY 2007. See Figure B-7 for the nitrate concentrations trend at LWDS-MW1.

Metals

Total metal analyses were conducted on the groundwater samples collected during the fourth quarter of FY 2007. No metal concentrations exceeded established MCLs.

Radionuclide Activities

Gamma spectroscopy, gross alpha/beta, and tritium analyses were conducted on all wells in the 4th quarter of FY 2007. All radionuclide activities were below MCLs, where established.

Tritium, analyzed by EPA Method 906.0, was not detected above the MDA in any of the twelve samples.

TAG Results

TAG wells are either screened in the regional aquifer or the perched GWS that is several hundred feet above the regional aquifer. COCs include TCE and nitrate, which have been detected at concentrations exceeding the EPA's established MCLs for drinking water. Samples were collected from 21 wells — 10 perched GWS wells, and 11 regional aquifer wells. Samples collected quarterly were analyzed for NPN (reported as nitrogen) and VOCs. Additional analyses including anions, metals, PCBs, tritium, gamma spectroscopy, and gross alpha/beta were conducted during the 4th quarter of FY 2007. Field water quality measurements were taken at each well prior to sample collection.

VOC Analyses

TCE concentrations above the MCL of 5 µg/L were detected in groundwater samples from two wells in the perched GWS for each of the four quarters of sample collection. Monitoring well WYO-4 had a maximum TCE concentrations of 8.56 µg/L in May 2007. See Figure B-8 for the TCE concentration trend. Monitoring well TA2-W-19, also a well constructed in the perched GWS had a TCE maximum concentration of 5.63 µg/L in October 2006. TCE concentrations in well TA2-W-19 have been generally increasing over the life of the well. Figure B-9 illustrates the TCE concentration history in TA2-W-19.

Inorganic Chemical Analyses

Inorganic chemical analyses of quarterly groundwater samples consisted of NPN (reported as nitrogen). During FY 2007 sampling, nitrate exceeded the MCL in five wells. TJA-7, TA2-SW1-320, and

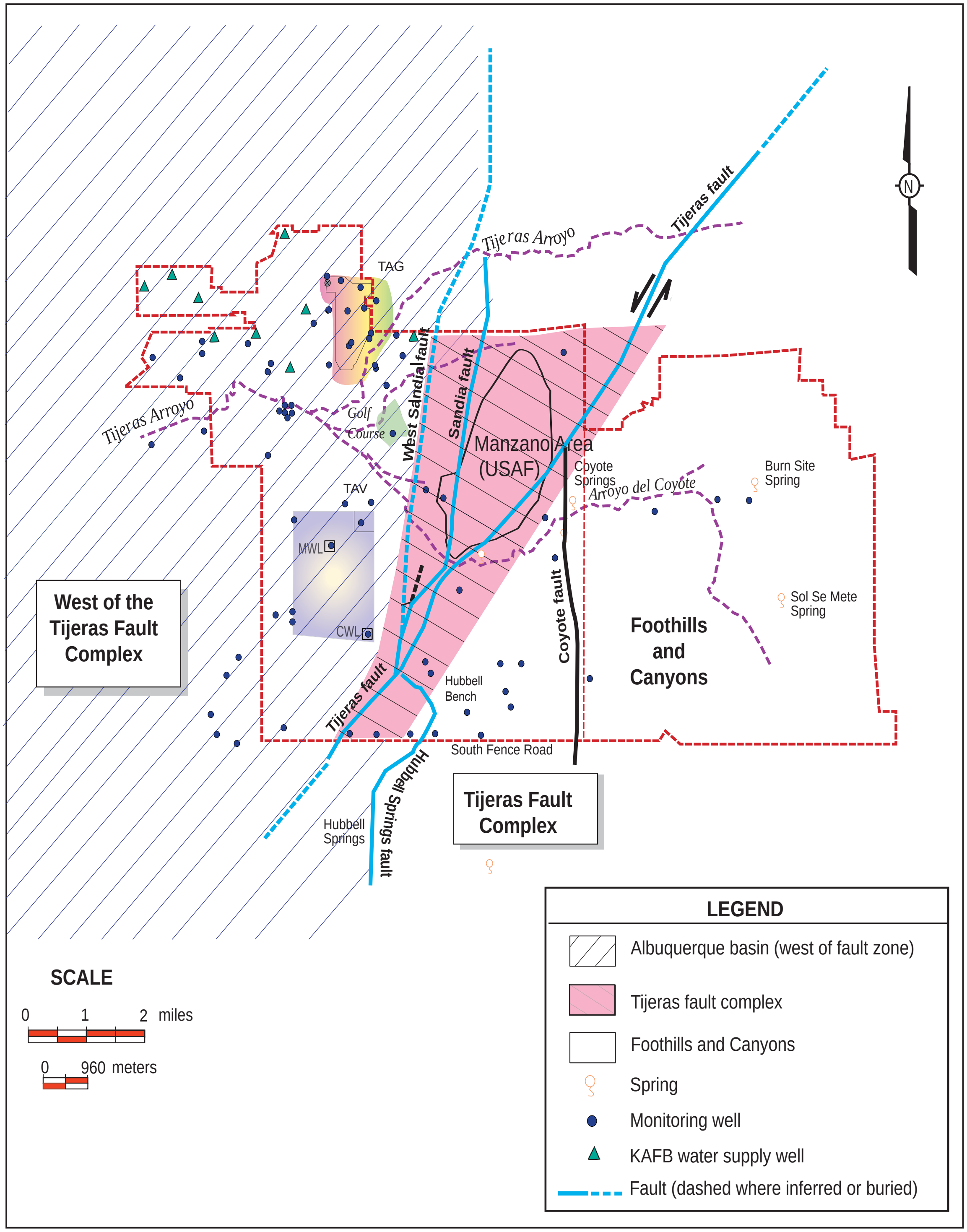


FIGURE 7-3. Hydrogeologically Distinct Areas at KAFB

FIGURE 7-3. Hydrogeologically Distinct Areas at KAFB

TJA-4 had nitrate concentrations two to three times the MCL of 10 mg/L. The highest concentration was reported for well TJA-4 at 38.4 mg/L in May. TJA-7 had a maximum concentration of 25.6mg/L; the maximum concentration for TA2-SW1-320 was 27.8mg/L. TA2-W-19 and TJA-2 had nitrate concentrations that only slightly exceeded the MCL. The maximum for TA2-W-19 was 11.9 mg/L and for TJA-2 the maximum was 12.6 mg/L Figures B-10 through B-14 show that nitrate concentrations in these five wells are generally slightly increasing to slightly decreasing over time. All other inorganic analytes were below MCLs, where established.

Metals

Total metals analyses were performed on the samples collected during the 4th quarter. The results were all below the respective MCLs, where established.

Radionuclide Activities

Gamma spectroscopy, gross alpha/beta, and tritium analyses were conducted on 21 wells in FY 2007. All radionuclide activities were below MCLs, where established.

Tritium, analyzed by EPA Method 906.0, was not detected above the MDA in any of the 21 samples.

Burn Site Groundwater Results

Quarterly sampling was conducted on six wells located in Lurance Canyon near the SNL/NM Burn Site Facility. The samples were analyzed for VOCs, SVOCs, diesel-range organics, gasoline-range organics, major ions, NPN (reported as nitrogen), TAL metals including uranium, gross alpha/beta, tritium, and radionuclides by gamma spectroscopy. Quarterly sampling for perchlorate, per the requirements of the COOC, was conducted in wells CYN- CYN-MW6, CYN-MW7, and CYN-MW8. Field water quality parameters were measured during the pre-sample purging of each well.

VOCs and Other Organic Compounds

No VOCs, or SVOCs, were detected above MCLs. Other organics found in groundwater samples included low levels of diesel-range organics in all wells, with up to 66.0 μg/L in a sample from CYN-MW6. The majority of the detections of diesel-range organics were qualified as non-detect during the post laboratory data validation process. All analyses of samples from monitor wells for gasoline-range organics were non-detect. MCLs have not been established for diesel-range organics or gasoline-range organics.

Major and Minor Anions

NPN results exceeded the MCL of 10 mg/L in all samples from CYN-MW6 in all sampling events, with a maximum 32.1 mg/L. Figure B-15 shows that nitrate concentrations in this well have consistently exceeded the MCL. NPN results from CYN-MW3 exceeded the MCL in two sampling events, with the highest value being 14.7 mg/L. Figure B-16 shows that the nitrate concentrations in this well are relatively stable. The samples from well CYN-MW6 exceeded perchlorate concentrations above the 0.004 mg/L action level established in the COOC. The highest value was 0.00893 mg/L. No MCL or MAC currently exists for perchlorate, although the NMED identifies perchlorate as a potential toxic pollutant. All other major ion results were below established MCLs.

Metals Results

No metal concentrations above MCLs were detected in any of the wells sampled in FY 2007.

Radionuclide Activity

Groundwater samples were analyzed for gross alpha/beta, tritium, and gamma spectroscopy. All radionuclide activities were below MCLs, except for gross alpha in wells CYN-MW4 and CYN-MW7. Gross alpha in CYN-MW4 was measured at 29.0 pCi/L and corrected to 16.4 pCi/L with the subtraction of the uranium activity This is shown in Figure B-17. The established MCL for gross alpha is 15 pCi/L. The value reported for CYN-MW7 was 29.6 pCi/L and corrected to 22.3 pCi/L shown in Figure B-18. Gamma spectroscopy analysis did not detect any isotopes above associated MDAs.

Tritium, analyzed by EPA Method 906.0, was not detected above the MDA in any of the six samples.

7.3 WATER LEVELS

Water levels are a means to assess the physical changes of the groundwater system over time. This includes changes in the local water table, the quantity of water available, as well as the direction and speed of groundwater movement. The GWPP gathers groundwater level measurements from a large network of wells on and around KAFB. In addition to wells owned by the DOE/National Nuclear

Security Administration (NNSA)/Sandia Site Office (SSO), data is solicited for U.S. Air Force (USAF) IRP, COA, and USGS wells. In 2007, data from 121 wells were incorporated into the monitor well water level database. Water levels were measured monthly or quarterly.

7.3.1 Regional Hydrology

Groundwater Conceptual Model

A brief overview of the regional hydrology is given in Chapter 1, Section 1.5 of this report. Although water levels may fluctuate locally over the course of the year in response to seasonal recharge and groundwater withdrawal, the overall level of the regional aquifer within the basin continues to decline at about 1 foot per year. The regional aquifer which underlies the western part of KAFB is comprised of the saturated coarse-grained strata of the upper and middle units of the Santa Fe Group. Most of the COA and KAFB water supply wells are completed in this aquifer. Groundwater withdrawl at these wells is manifested as declining water levels throughout the region.

Water level information, with respect to the regional water table in the KAFB area, can be categorized into three general areas:

- Groundwater levels east of the Tijeras Fault Complex are approximately 100 to 150 feet below the surface.
- The water table west of the Tijeras Fault Complex and the Sandia Fault are approximately 500 feet or more below ground surface (bgs). This area is part of the regional Albuquerque Basin aquifer system.
- Between the east and west region is a transition zone comprised of the fault complex. The aquifer system within the fault complex and to the east is not well documented. This is due to the complex geology of the area and the limited number of wells available to characterize the system.

Regional Groundwater Table

The 2007 Regional Groundwater Elevation Contour map for SNL/KAFB is presented in Figure 7-4. The extent of the contoured map area was constructed using static water level data from 55 wells west of the Tijeras Fault Complex. This map represents the water table in the time period spanning September/October 2007. Generally, these monitor wells are screened across the regional water table in the upper unit of the Santa Fe Group. They penetrate different depths into the aquifer and have various lengths of screened intervals. Although most of the water level data represent an unconfined water table, some water levels may represent semi-confined conditions.

The contour lines shown in Figure 7-4 represent lines of equal elevation of the groundwater table. Groundwater withdrawal as a consequence of pumping by KAFB production wells at the northern part of the KAFB and nearby COA production wells has created a depression in the regional water table. This "U" shaped depression, with the top of the "U" pointing north, extends south to Isleta Pueblo, and is a result of preferential flow through highly conductive ancestral Rio Grande fluvial deposits, which are the primary aquifer material in this area. Groundwater flow is perpendicular to the contour lines in the direction of decreasing elevation. The direction of groundwater flow within the region is toward the production wells. This pumping-induced flow to the north is in contrast with the southwesterly flow direction reported in 1961 at a time of significantly lower groundwater withdrawal (Bjorklund and Maxwell 1961).

Perched GWS Wells

A group of perched GWS wells exist in the northern part of KAFB in the vicinity of SNL/NM TAS -I, -II, and -III, extending southwest to the location of the former KAFB sewage lagoons. The eastward extent of the perched GWS wells extends to under the KAFB Landfill and to the southeast of KAFB Golf Course. The elevation data of the first saturated water interval in the perched GWS wells are illustrated in Figure 7-5. The contours indicate a gradient to the east-southeast. The highest elevation contour, near the western edge of the former lagoons, is at 5,155 feet above sea level (fasl). This elevation corresponds to a depth to water from the surface of approximately 207 feet. At the same location the regional water table is 495 feet bgs. Along the eastern boundary of the perched GWS wells the elevation of first water is at 5,006 fasl. This elevation is similar to the elevation of the regional water table, which is 4,928 fasl at this location. Because of the eastern dip of the perched GWS wells and the western dip of the regional system, the two systems appear to merge near this location.

Groundwater Recharge and Loss

The dynamics of water table fluctuations, as reflected by water levels in individual wells, are a balance between groundwater inflow to the basin, recharge, water withdrawal, and basin outflow. Recharge to the groundwater in the Middle Rio Grande Basin occurs primarily through mountain front recharge and infiltration from active arroyos, washes, and rivers within the basin.

Recharge potential for the GWS is directly related to the amount of precipitation. The regional climate for the Albuquerque Basin area is semi-arid, as described in Section 1.6. KAFB water production wells supply most of the water used by SNL/NM and KAFB. KAFB production wells extract groundwater from the upper and middle units of the Santa Fe Group at a depth of up to 1,600 feet. These units constitute the primary aquifer for the Albuquerque metropolitan area. In FY 2007, KAFB pumped approximately 970 million gallons (gal) (2,976 acre-ft) of groundwater from six water supply wells. In comparison, 1.08 billion gal (3,323 acre-ft) of water were pumped for the same period of time in 2006.

7.3.2 Groundwater Level Trends

In 1993, the USGS conducted a study on the Santa Fe Group and the Albuquerque area and found that the quantity of water in the aquifer was significantly less than previously estimated (Thorn et al. 1993). The imbalance between recharge and groundwater withdrawal has resulted in a general decline in water levels. Figure 7-6 shows the contour map of the annual water table elevation changes recorded for the western area of KAFB over the one year period between 2006 and 2007.

The largest amount of decline over the period is approximately 1.2 feet per yr, the same rate of decline reported for the previous years. The largest declines continue to be in the vicinity of McCormick Ranch, which is located along KAFB's southwestern border with Isleta Pueblo. In the eastern portion of the mapped area, including TA-III, water levels show moderate declines. In contrast to the trend of water level declines throughout most of the region, the water levels in the northeast portion of the mapped area are increasing slightly. This area coincides with a potential recharge area associated with Tijeras Arroyo. The water level trends for perched GWS wells indicate a decrease in water level elevations in the western portion of KAFB (Figure 7-7). The water level elevations in the central part of the system seem to be relatively stable. The water levels in the eastern part appear to be increasing, which is consistent with the notion that the perched GWS is draining to the east and merging with the regional system.

"Coyote Springs" 2007 Photo Contest, photo by Denise Bierley.

TABLE 7-4. Summary of Exceedances at Sampling Wells - FY 2007

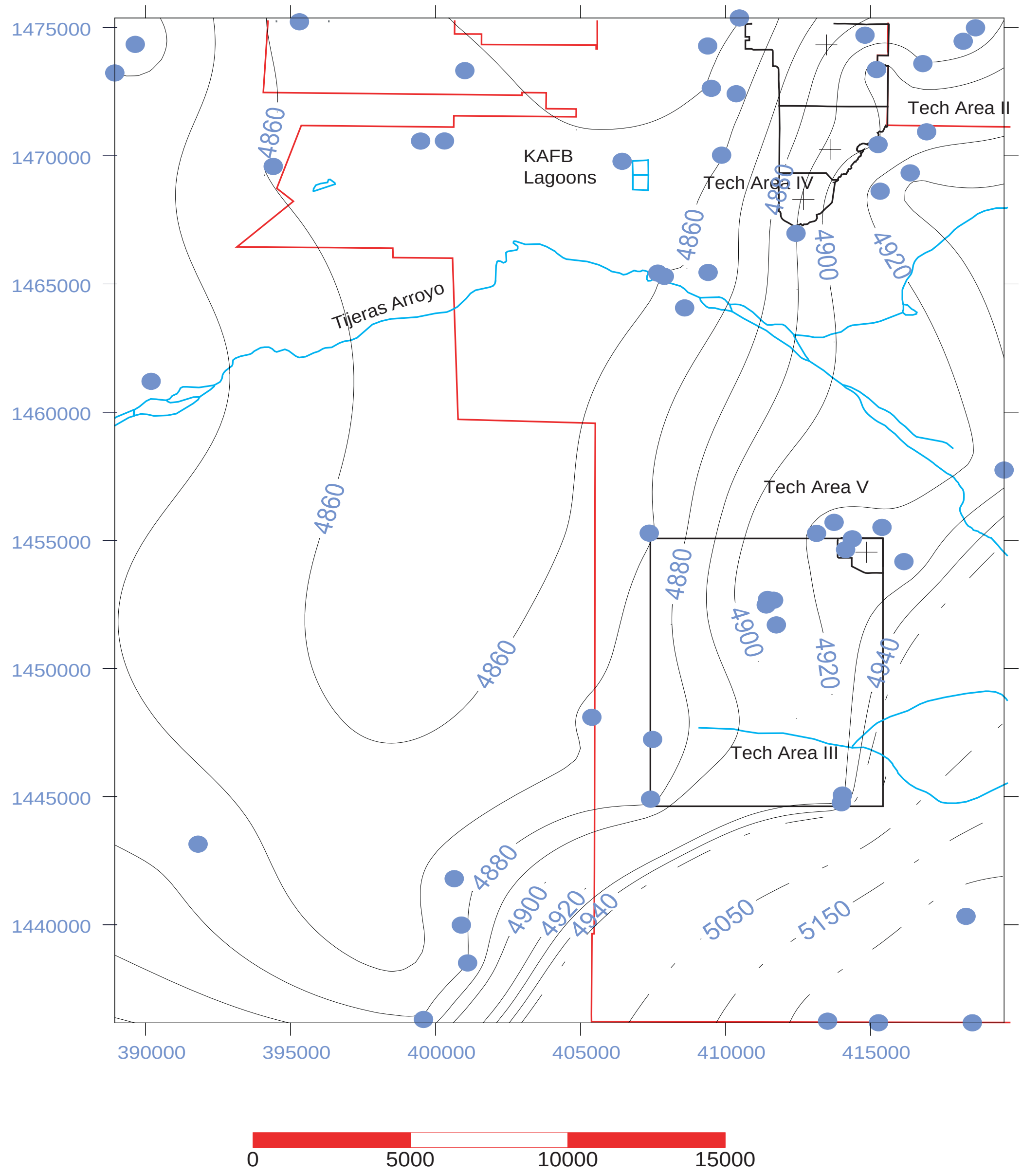
Analyte	Wells	Exceedance	Date
BERYLLIUM MCL = 0.004 mg/L	Coyote Springs	0.00639 mg/L	January/February 2007
FLUORIDE MAC = 1.6 mg/L	SFR-4T	2.66 mg/L	January/February 2007
	SWTA3-MW4	1.66 mg/L	January/February 2007
	SWTA3-MW4 (dup)	1.64 mg/L	January/February 2007
CHROMIUM MCL = 0.1 mg/L	MWL-MW1	0.426 mg/L	April 2007
TRICHLOROETHENE (TCE) MCL = 5 µg/L	LWDS-MW1	17.0 µg/L	November/December 2006
	LWDS-MW1	17.0 µg/L	November/December 2006
	LWDS-MW1	14.9 µg/L	May 2006
	LWDS-MW1	17.0 µg/L	November/December 2006
	LWDS-MW1	12.7 µg/L	June 2007
	TAV-MW6	7.38 µg/L	November/December 2006
	TAV-MW6 (dup)	6.68 µg/L	November/December 2006
	TAV-MW6	6.88 µg/L	February/March 2007
	TAV-MW6	7.39 µg/L	June 2007
	TAV-MW6	8.23 µg/L	August/September 2007
	TA2-W-19	5.63 µg/L	October/November 2006
	TA2-W-19	5.60 µg/L	January 2007
	TA2-W-19	5.15 µg/L	May/June 2007
	TA2-W-19	5.29 µg/L	July/August 2007
	TA2-W-19 (dup)	5.22 µg/L	July/August 2007
	WYO-4	6.45 µg/L	October/November 2005
	WYO-4	7.26 µg/L	January 2007
	WYO-4 (dup)	6.10 µg/L	January 2007
	WYO-4	8.56 µg/L	May/June2007
	WYO-4	6.55 µg/L	July/August 2007

NOTE: *See end of table for footnotes, next page.*

TABLE 7-4. Summary of Exceedances at Sampling Wells - FY 2007 (concluded)

Analyte	Wells	Exceedance	Date
NPN (AS NITROGEN) MCL = 10 mg/L	LWDS-MW1	13.8 mg/L	March 2007
	LWDS-MW1(dup)	12.7 mg/L	March 2007
	LWDS-MW1	11.4 mg/L	June 2007
	LWDS-MW1	13.1 mg/L	August 2007
	TA2-SW1-320	15.3 mg/L	October/November 2006
	TA2-SW1-320	27.8 mg/L	January2007
	TA2-SW1-320	17.9 mg/L	May/June 2007
	TA2-SW1-320	21.3 mg/L	July/August 2007
	TA2-W-19	10.1 mg/L	October/November 2006
	TA2-W-19	11.8 mg/L	January 2007
	TJA-2	11.2 mg/L	October/November 2006
	TJA-2	12.6 mg/L	January 2007
	TJA-2	10.4 mg/L	May/June 2007
	TJA-7	22.4 mg/L	October/November 2006
	TJA-7 (dup)	2.9.9 mg/L	October/November 2006
	TJA-7	24.1mg/L	January 2007
	TJA-7	25.6 mg/L	May/June 2007
	TJA-7	22.6 mg/L	July/August 2007
	TJA-4	20.8 mg/L	October/November 2006
	TJA-4	34.3 mg/L	January2007
	TJA-4	38.4 mg/L	May/June 2007
	TJA-4 (dup)	29.9 mg/L	May/June 2007
	TJA-4	28.7 mg/L	July/August 2006
	CYN-MW3	14.5 mg/L	March 2007
	CYN-MW3	14.7 mg/L	September 2007
	CYN-MW3	12.2 mg/L	September 2007
	CYN-MW6	22.9 mg/L	December 2006
	CYN-MW6 (dup)	26.8 mg/L	December 2006
	CYN-MW6	32.1 mg/L	March 2007
	CYN-MW6 (split)	23.9 mg/L	March 2007
	CYN-MW6 (Method 300)	22.2 mg/L	March 2007
	CYN-MW6	23.6 mg/L	June 2007
	CYN-MW6	23.1 mg/L	September 2007

NOTES: dup = duplicate
mg/L = milligrams per liter
µg/L = micrograms per liter
pCi/L = pcocuries per liter
MCL = maximum contaminant level MAC = maximum allowable concentration
* Uncorrected gross alpha results for samples from SFR-2S, and TRE-1 exceeded the MCL of 15.0 pCi/L.
When the results are corrected by subtracting the uranium activity, the results for SFR-2 and TRE-1 are below the MCL.



Legend

5200 Water Level Elevation Contour, 10 ft Intervals	KAFB Boundary	SNL Technical Areas
Surface Drainage	Monitor Well used to Construct Contours	
5200 Contour Interval 100ft.		

FIGURE 7-4. Regional Groundwater Elevation Map for SNL/KAFB - 2007

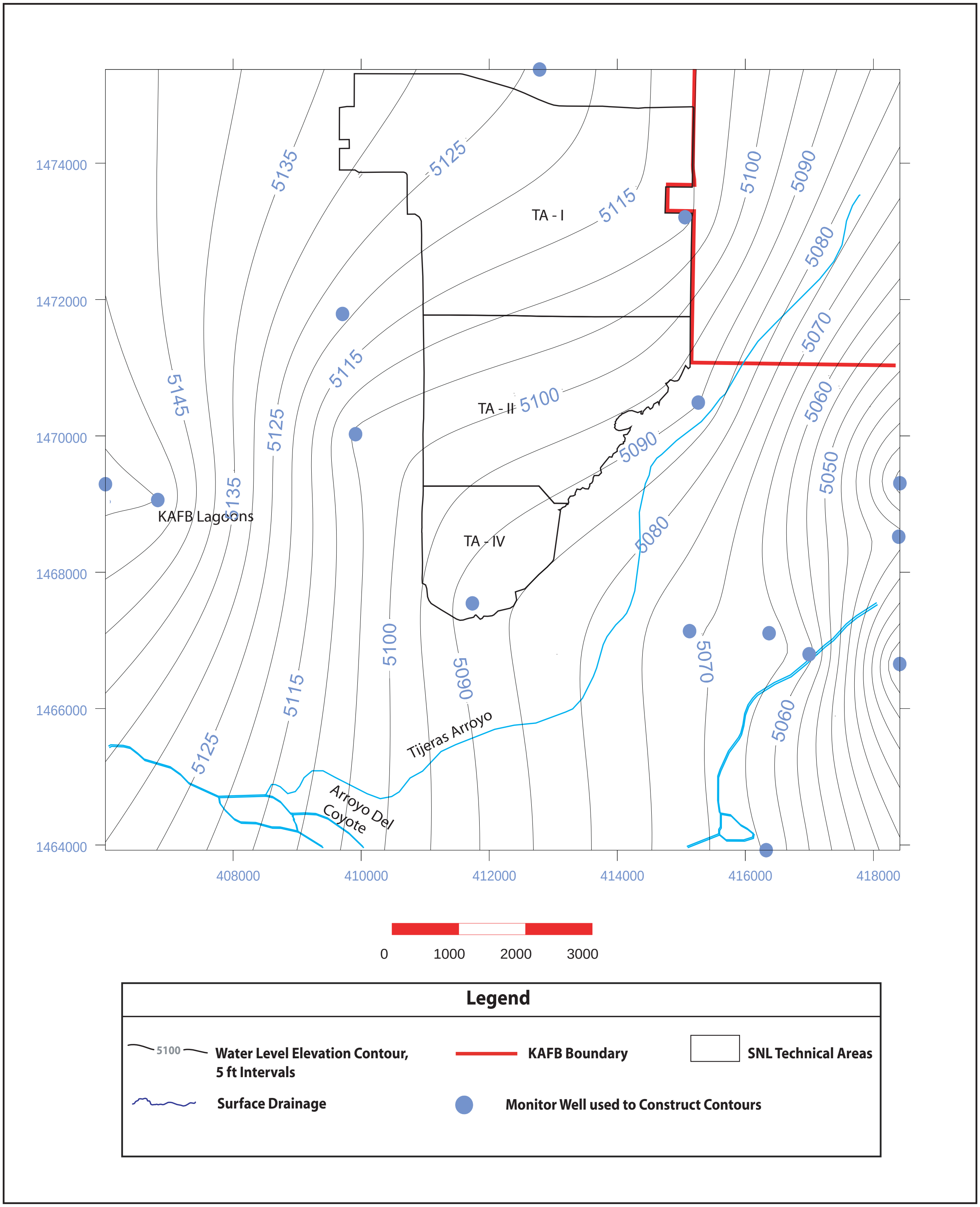


FIGURE 7-5. Perched Groundwater System Water Elevation Map - FY 2007

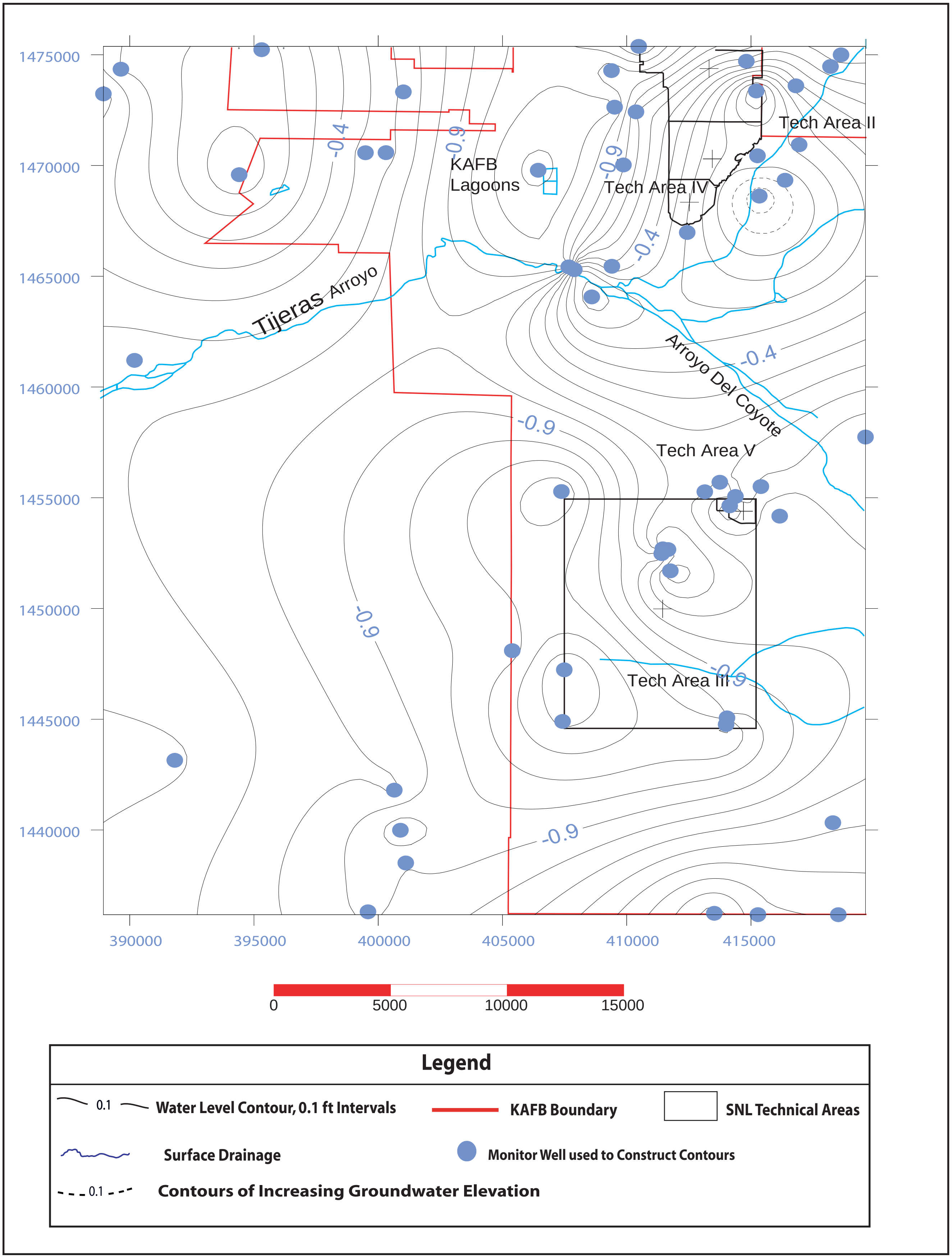


FIGURE 7-6 Annual Regional Groundwater Elevation Difference for SNL/KAFB FY 2006 - FY 2007

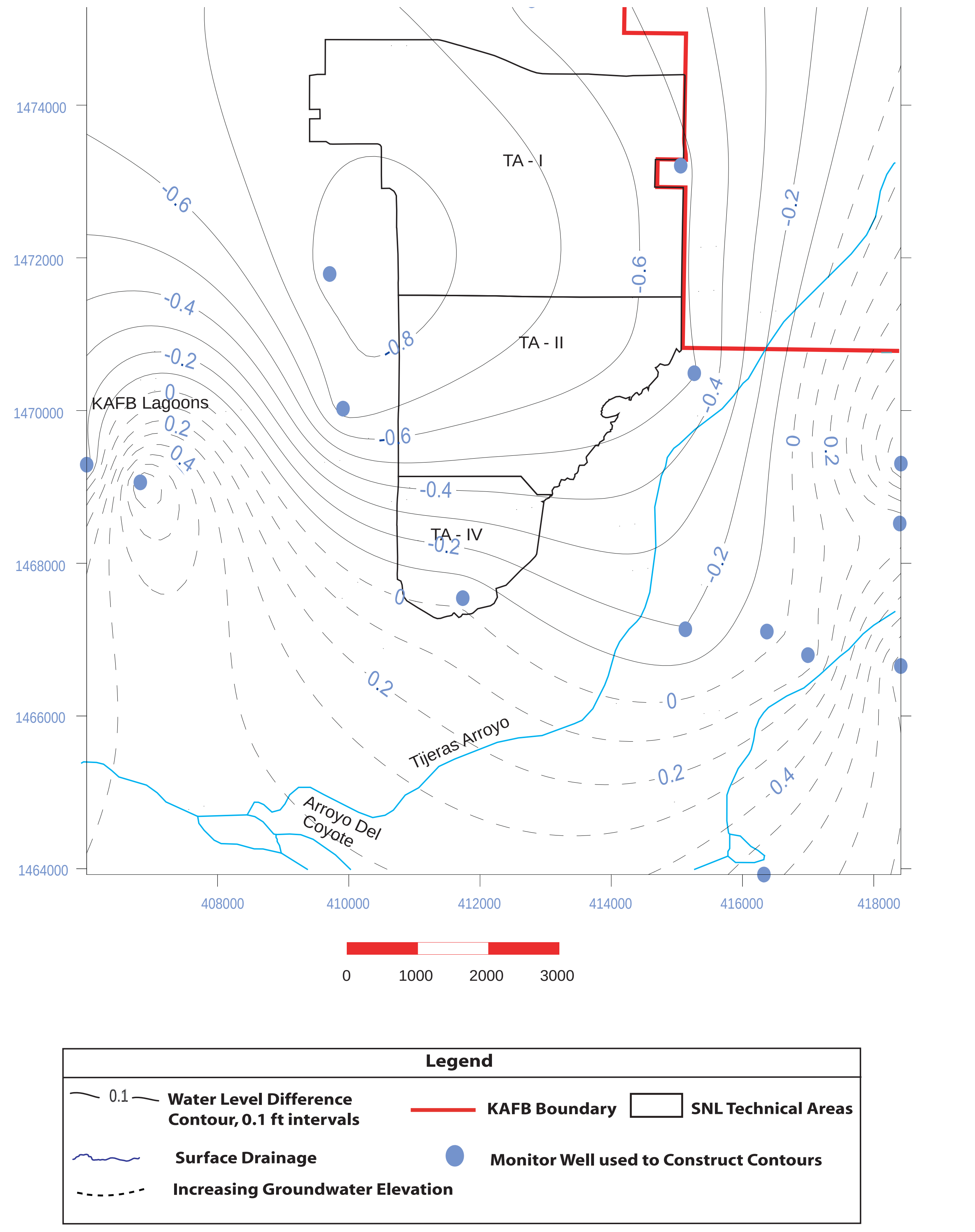


FIGURE 7-7. Perched Groundwater System Elevation Changes FY 2006 - FY 2007

This page intentionally left blank.

chapter eight

QUALITY ASSURANCE

"Wright's Fishhook Cactus" 2007 Photo Contest - Honorable Mention, photo by Jennifer Payne.

In This Chapter...

Corporate Level Quality Assurance (QA)
Environmental Program QA
Environmental Sampling and Analysis
2007 Sample Management Office (SMO) Activities

Environmental Snapshot

In 2007, the SMO processed a total of 3,233 samples in support of Sandia projects. Of these, 2,584 were for environmental monitoring and surveillance projects.

8.1 CORPORATE LEVEL QUALITY ASSURANCE (QA)

Sandia Corporation's (Sandia) Integrated Laboratories Management System (ILMS) is the framework for all management requirements at Sandia. It represents the complete set of policy, business rules, practices, and information that establishes Sandia's business expectations and intent. Sandia management is responsible for ensuring the quality of its products and assessing its operations, programs, projects, and business systems, and for identifying deficiencies and effecting continuous improvements. Through the ILMS, Sandia will insure consistent application of quality management principles to:

- enable Sandia's Vision and Strategy,
- achieve Mission Performance, Operational Excellence, and Stewardship consistent with Corporate Policy Statement CPS001, and,
- satisfy requirements for Contractor Assurance.

Corporate Quality Assurance (CQA) Program

Sandia's CQA program describes the Corporate Work Process (CWP) for managing and performing work that applies to all activities, facilities, organizations, and employees. All members of the workforce are required to utilize the CWP to manage and conduct all work at Sandia, which consists of five elements:

1. Plan Work,
2. Evaluate Risks,
3. Implement Controls,
4. Perform Work, and
5. Improve Processes.

Environment, Safety and Health (ES&H) Policy

Sandia's ES&H policy is to protect and preserve the environment and to ensure the safety and health of its employees, contractors, visitors, and the public while maintaining SNL's corporate vision and mission. As part of its mission, Sandia has adopted three key ES&H principles:

1. All Members of the Workforce take responsibility and are accountable for ES&H performance at Sandia.
2. All Members of the Workforce operate from an unwavering belief that job-related injuries, illnesses, and environmental incidents are preventable and unacceptable.
3. Working safely is a condition of employment.

Integrated Safety Management System (ISMS)

Sandia is committed to performing work safely and ensuring the protection of Members of the Workforce, the public, and the environment. ES&H performance at Sandia National Laboratories, New Mexico (SNL/NM) is based on the core functions and guiding principles of the ISMS. The Environmental Management System (EMS) is integrated into the ISMS; it is a continual cycle of planning, implementing, evaluating, and improving processes and actions for the achievement of environmental goals.

Sandia's corporate ES&H program mandates compliance with all applicable laws, regulations, DOE directives, internal corporate policy requirements, and permit requirements. Sandia's commitment to carry out the ES&H program includes the following:

- Plan work that incorporates safety awareness, protective health practices, environmental management, pollution prevention, and long-term stewardship of resources.
- Identify hazards and evaluate, monitor, and manage risks with effective ES&H systems.
- Implement controls to prevent injuries, exposure to hazardous materials, and the release of materials that could be hazardous to the environment.
- Perform quality work while protecting people, the environment, and our nation's security.
- Continually improve ES&H performance by establishing, assessing, and meeting measurable ES&H goals, objectives, targets, and milestones.
- Communicate ES&H issues to Members of the Workforce, the community, regulators, and stakeholders.

Sandia's corporate ES&H mission success requires leadership in ES&H to accomplish the following:

- Provide cost-effective, innovative, and integrated ES&H solutions that enable Sandia to accomplish its mission work through effectively managing risks and protecting both the Members of the Workforce and the environment.
- Pursue mission and operational excellence through diligent and mindful safety, health, and environmental stewardship behaviors and continuous improvement.
- Perform operations that are planned and conducted to avoid adverse impact while being in full compliance with all applicable ES&H laws, regulations, permit requirements, and corporate policy requirements, as well as DOE directives included in the Prime Contract between Sandia and DOE.

Sandia is committed to achieving performance excellence in all aspects of work through its ES&H Performance Excellence Objectives which include:

- **Worker and Public Safety**: We value our workforce and drive for worker and public safety; public and worker safety is a sacred trust.
- **Environmental Stewardship**: We will be good environmental stewards and leave our environment in as good a condition as it was when we started our operations.
- **Mission Fulfillment**: We serve our nation's critical needs by faithfully delivering our mission products and services and doing so in a safe and secure way.
- **Stakeholder and Customer Confidence**: We ensure that our customers and stakeholders have confidence in our ability to meet our commitments. We earn their complete trust in the way that we meet those commitments.

Sandia demonstrates its corporate values of:

- **Integrity** – ensuring we meet our obligation to report incidents and unsafe conditions,
- **Excellence** – striving for ES&H excellence in our work performance,
- **Service to the nation** – stewardship in ensuring that our operations protect the quality of the human and natural environment,
- **Concern for each other** – working to protect one another and our community, and
- **Teamwork** – understanding that ES&H is part of every job and enables mission success.

8.2 ENVIRONMENTAL PROGRAM QA

Environmental Sampling

Environmental samples are collected by personnel in various programs and analyzed for radiological and non-radiological contaminants. Some sampling is specifically mandated by regulations to meet compliance, while other sampling activities that are not regulatory-driven are carried out in accordance with DOE orders.

Samples are packaged, shipped, and tracked to off-site laboratories by the Sample Management Office (SMO) as discussed in Section 8.3. Some samples are processed and analyzed for radiological constituents by the SNL/NM Radiation Protection Sample Diagnostics (RPSD) laboratory, in accordance with RPSD procedures.

8.3 ENVIRONMENTAL SAMPLING AND ANALYSIS

Environmental Sampling

Environmental sampling is conducted in accordance with program-specific sampling and analysis plans (SAPs) or work plans – each contain applicable QA elements. These documents meet appropriate federal, state, and local regulatory guidelines for conducting sampling and analysis activities.

SMO Roles and Responsibilities

The SMO provides guidance and sample management support for field activities. However, each distinct program is responsible for its overall adherence and compliance regarding any sampling and analysis activity performed.

The SMO is responsible for QA and Quality Control (QC) once the samples are relinquished to the SMO by field team members.

Program-Specific SAPs

Each program involved in environmental monitoring and sampling develops and follows a relevant SAP. Most project SAPs include critical elements, such as procedures for sample collection, sample preservation and handling, sample control, references to analytical methods, laboratory QC and procedures, field QC, health and safety, and schedules and frequency of sampling and reporting.

Selection of a Contract Laboratory

All off-site contract laboratories are selected based on performance objectives and appraisal (pre-award assessment) as described in the *Quality Assurance Project Plan* (QAPP) *for the SMO* (SNL 2007f). All laboratories must employ U.S. Environmental Protection Agency (EPA) test procedures wherever possible — when these are not available, other suitable and validated test procedures are applied. Laboratory instruments must be calibrated in accordance with established procedures, methods, and the SMO Statement of Work (SOW). All calibrations and detection limits must be verified before sample analysis and data reporting. Once a laboratory has passed the initial appraisal and has been awarded a contract, the SMO is responsible for continuously monitoring laboratory performance to ensure that the laboratories are audited annually and meet their contractual requirements.

Contract laboratories are required to participate in applicable DOE and EPA programs for blind audit check sampling to monitor the overall accuracy of analyses routinely performed on SNL/NM samples.

Project QC

Project specified QC samples are submitted to contract laboratories in order to meet project Data Quality Objectives (DQOs) and SAP requirements. Various field QC samples are collected to assess the quality and final usability of the data. Errors that can be introduced into the sampling process include potential sample contamination in the field or during the transportation of samples, some of which are unavoidable. Additionally, the variability present at each sample location can also affect sample results.

Laboratory QC

With each SNL/NM sample batch, laboratory QC samples are concurrently prepared at defined frequencies and analyzed in accordance with established methods. Analytical accuracy, precision, contamination, and matrix effects associated with each analytical measurement are determined.

QC sample results are compared either to statistically established control criteria or prescribed acceptance control limits. Analytical results generated concurrently with QC sample results within established limits are considered acceptable. If QC analytical results exceed control limits, the results are qualified, and corrective action is initiated if warranted. Reanalysis is then performed for samples in the analytical batch as specified in the SOW and laboratory procedures.

QC sample summaries are included in analytical reports prepared by contract laboratories for SNL/NM.

SMO Sample Processing

The SMO processed the following types of samples in 2007 in support of SNL/NM projects:

- *Radioactive waste*
- *Mixed waste*
- *Hazardous waste*
- *Decontamination and Demolition (D&D)*
- *D&D swipes*
- *D&D materials*
- *Sludges and liquids*
- *Soil*
- *Groundwater*
- *Decon water*
- *Solid waste*
- *Air*
- *Wastewater effluent*
- *Surface water*
- *Storm water*
- *Soil gas*
- *Air filters*

8.4 2007 SMO ACTIVITIES

In 2007, the SMO processed a total of 3,233 samples in support of Sandia projects, including environmental monitoring (air and water), terrestrial surveillance, Long Term Stewardship (LTS), waste characterization, Decontamination and Demolition (D&D), and Environmental Restoration (ER). Of these, 2,584 were for environmental monitoring and surveillance projects. A total of 511 samples were submitted as field and analytical QC samples to assist with data validation and decision making. Approximately 497 QC samples were taken for environmental monitoring and surveillance projects.

SMO contract laboratories perform work in compliance with the Sandia SOW for analytical laboratories (Puissant 2007).

Inter-Laboratory Comparisons

SMO contract laboratories are required to participate in the DOE Mixed Analyte Performance Evaluation Program (MAPEP). They also participate in commercial vendor programs designed to meet the requirements given in the proficiency testing section (Chapter II) of the National Environmental Laboratory Accreditation Conference (NELAC) Standard. SMO contract laboratories have a history of achieving a 90 percent or greater success rate during these comparisons. Acceptable results are based either on established control limits (as stated in the applicable methods) or statistically applied acceptance windows as determined by the performance evaluation provider. Windows are typically two or three standard deviations around the true value.

Laboratory QA

In 2007, the SMO continued on-site data package assessments and validation at the NELAC approved laboratories used by Sandia. Data packages (including a wide array of analysis methods) are requested at the time of the on-site visit. The laboratories are not notified in advance and do not know which data packages will be assessed. The handling history of the data package is carefully reviewed from sample receipt to data completion by retracing each step through documentation files. Specific checks for documentation completeness, proper equipment calibration, and batch QC data are made. These assessments focus on data defensibility and regulatory compliance.

During 2007, Sandia employed the following contract laboratories to perform analysis of SNL/NM samples:

- General Engineering Laboratories (GEL) in Charleston, South Carolina.
- Test America (formerly Severn Trent) in St. Louis, Missouri; Santa Ana, California; Austin, Texas; and Arvada, Colorado.
- Hall Laboratory in Albuquerque, New Mexico.
- Paragon Analytics, a division of Datachem Laboratories, Inc. in Fort Collins, Colorado, was awarded a contract. No samples were processed by Paragon in 2007.

QA Audits

The DOE Consolidated Audit Program (DOECAP) conducted audits in 2007 at the primary SMO contract laboratories using DOECAP Quality Systems Analytical Services (QSAS) requirements. The audit reports, responses from the labs, and closure letters are all posted and tracked through the DOECAP website. The SMO works closely with the contract laboratories to expeditiously resolve audit findings. Decisions regarding sample distribution to contract laboratories are based on audit information, including outstanding corrective actions. In 2007, no Priority-1 findings that impacted SMO work were documented during laboratory audits. All corrective actions were expeditiously resolved.

Data Validation and Records Management

Sample collection, Analysis Request and Chain of Custody (ARCOC) documentation and measurement data were reviewed and validated for each sample collected. Analytical data reported by the laboratories were reviewed to assess laboratory and field precision, accuracy, completeness, representativeness, and comparability with respect to method compliance and the DQOs of the particular program. The following sources reviewed and validated data, at a minimum of three levels.

1. The analytical laboratory, where data was validated according to the laboratory's QA plan, standard operating procedures (SOPs), and client specific requirements,
2. A qualified member of Sandia's SMO staff, who reviews the analytical reports and corresponding sample collection and ARCOC documentation for completeness and laboratory contract compliance, and
3. A Sandia project leader responsible for program objectives, regulatory compliance, and project-specific data quality requirements. The project leader makes the final decision regarding the usability of the data.

In addition, a predetermined percentage of data are validated to detailed method-specified requirements and qualified in accordance with the *Data Validation Procedure for Chemical and Radiochemical Data* (SNL 2007b).

Two Sandia Employees sample a Four-Wing Saltbush at the Mixed Waste Landfill.

chapter nine

REFERENCES, DOCUMENTS, PERMITS, LAWS, REGULATIONS, AND STANDARDS FOR ENVIRONMENTAL PROGRAMS

"Fieldwork" 2007 Photo Contest - 3rd Place Field Work Category, photo by Phyllis Peterson.

In This Chapter...

References
Executive Orders
DOE Orders
Code of Federal Regulations
Acts and Statutes & Permits
Laws & Regulations for
    Environmental Programs

REFERENCES

ACGIH 2008	American Conference of Govornment Industrial Hygenists, *2007 TLVs and BELs*, Cincinnati, OH, 2008.
Anderson 2004	Anderson, E., *Results of Tritium Emission Flux Measurements for Sandia National Laboratories Mixed Waste Landfill.* Prepared by URS Corporation for Sandia National Laboratories Environmental Restoration Program, Austin, TX (February 2004).
Bearzi 2006	Bearzi, J.P., May 26, 2006, New Mexico Environment Department (NMED), Letter Notifying Patty Wagner (SSO/NNSA) and Les Shephard (SNL/NM) of Approval of Temporary Abandonment of Ground-Water Monitoring Well AVN-2, EPA ID# NM5890110518.
Bjorklund and Maxwell 1961	Bjorklund, L. J. and Maxwell, B. W., *Availability of Groundwater in the Albuquerque Area, Bernalillo and Sandoval Counties, New Mexico.* New Mexico State Engineer Technical Report 21 (1961).
Brookins 1992	Brookins, D., "Background Radiation in the Albuquerque, New Mexico, U.S.A., Area," in *Environmental Geology and Water Science,* Vol. 19, No. 1, pp. 11-15. (1992).
Dinwiddie 1997	Dinwiddie, R.S., Request for Supplemental Information: Background Concentrations Report, SNL/KAFB, Letter from S. Dinwiddie, State of New Mexico Environment Department, Hazardous & Radioactive Materials Bureau, September 24, 1997, to Michael J. Zamorski, U.S. Department of Energy, Kirtland Area Office.
DOC 2008	U.S. Department of Commerce, U.S. Census Bureau, website at <http://www.census.gov/> Washington, DC (2008).
DOE 2007	DOE Manual 231.1-1A (See DOE Orders Section)
DOE 2007a	DOE Order 450.1 (See DOE Orders Section)
DOE 2003	DOE Manual 231.1-2 (See DOE Orders Section)
DOE 2002	U.S. Department of Energy, Title V Operating Permit Application #515 (2002 update; Volume 1 for Sandia National Laboratories). DOE/Sandia Site Office, Albuquerque, NM (2002).
DOE 2001	DOE Order 435.1 (See DOE Orders Section)
DOE 1999	U.S. Department of Energy, *Sandia National Laboratories Final Site-Wide Environmental Impact Statement (SWEIS),* DOE/EIS-0281. DOE Albuquerque Operations Office, Albuquerque, NM (October 1999; ROD December 6, 1999).
DOE 1993	DOE Order 5400.5 (See DOE Orders Section)
DOE 1990	DOE Secretary of Energy Notice SEN-22-90 (See DOE Orders Section)
DOE 1987	U.S. Department of Energy/Albuquerque Operations Office (DOE/AL), *Comprehensive Environmental Assessment and Response Program (CEARP) Phase 1: Installation Assessment,* draft. DOE/Albuquerque Area Office, Environment, Safety and Health Division, Albuquerque, NM (September 1987).
DOE/SNL 2006	U.S. Department of Energy/Sandia National Laboratories, *Environmental Restoration Project Long-Term Environmental Stewardship (LTES) Implementation Plan*. DOE/Sandia Site Office and Sandia National Laboratories, Albuquerque, NM (September 2006).
Dragun and Chekiri 2005	Dragun, J. and K. Chekiri, *Elements in North American Soils.* The Association for Environmental Health and Sciences, Amherst, MA (2005).
EPA 2006	U.S. Environmental Protection Agency, *Radiation Risk Assessment Software (CAP88-PC)*, Version 3.0. Available on the EPA web site at < http://www.epa.gov/radiation/assessment/CAP88/index.html>.

EPA 2001	U.S. Environmental Protection Agency, *Multi-Sector General Storm Water Permit*, Permit Number NMR05A961. U.S. Environmental Protection Agency, Washington, DC (2001).
EPA 1997	U.S. Environmental Protection Agency (EPA) Region VI, September 1997, *Module IV, Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA, of the Resource Conservation and Recovery Act Permit for Sandia National Laboratories*, EPA ID Number NM5890110518, issued September 25, 1997.
EPA 1985	U.S. Environmental Protection Agency, "Hazardous Waste Management System; Final Codification Rule." *Federal Register*, 50 FR 28702, (p. 28712) (July 15, 1985).
Gore 1993	Gore, A., *From Red Tape to Results: Creating a Government that Works Better and Costs Less* (Report of the National Performance Review). U.S. Government Printing Office, Washington, DC (1993).
Grant 1982	Grant, P.R., Jr., "Geothermal Potential in the Albuquerque Area, New Mexico," in *Guidebook- New Mexico Geological Society*, Volume 33, pp. 325-331 (1982). New Mexico Geological Society, Albuquerque, NM (1982).
Kabata-Pendias 2000	Kabata-Pendias, A., *Trace Elements in Soils and Plants*, 3rd. Ed. CRC Press, Inc., Boca Raton, FL (2000).
Kelley 1977	Kelley, V. C., *Geology of Albuquerque Basin, New Mexico*, Memoir 33. New Mexico Bureau of Mines and Mineral Resources, Socorro, NM (1977).
Kieling, J.E. 2003	Kieling, J.E., Letter to K.L. Boardman (U.S. Department of Energy) and P.B. Davies (Sandia Corporation), "Chemical Waste Landfill, Corrective Measures Study, May 2003, Sandia National Laboratories NM5890110518, HWB-SNL-03-013." December 12, 2003.
Lozinsky et al. 1991	Lozinsky, R., and R.H. Tedford, *Geology and Paleontology of the Santa Fe Group, Southwestern Albuquerque Basin, Valencia County, New Mexico*. New Mexico Bureau of Mines and Mineral Resources, New Mexico Institute of Mining and Technology, Socorro, NM (1991).
Moats, W. 2003	Moats, W.P., December 16, 2003, New Mexico Environment Department (NMED) Letter to K.L. Boardman (U.S. Department of Energy) and P.B. Davies (Sandia Corporation) "Approval of the Chemical Waste Landfill, Landfill Excavation Voluntary Corrective Measure Final Report, April 2003, EPA ID# NM5890110518, HWB SNL-03-012" (2003).
NMDOA 2008	New Mexico Department of Agriculture website at <http://nmdaweb.nmsu.edu/> (2008).
NMED 2006	NMED, Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program, *Technical Background Document for Development of Soil Screening Levels*, Revision 4.0, June 2006
NMED 2004	New Mexico Environment Department (NMED), *Federal Facilities Compliance Order* (Sandia National Laboratories, New Mexico), as amended by NMED, Santa Fe, NM (Amendment No. 4 dated April 7, 2004).
Puissant 2007	Puissant, P., *Statement of Work for Analytical Laboratories, Sandia National Laboratories/New Mexico (SNL/NM)*. Sandia National Laboratories, Albuquerque, NM (March 2007).
Shyr, Herrera, Haaker 1998	Shyr, L., H. Herrera, R. Haaker, *The Role of Data Analysis in Sampling Design of Environmental Monitoring*, SAND98-0612. Sandia National Laboratories, Albuquerque, NM (March 1998).
SNL 2008	Sandia National Laboratories, *2007 Data Analysis in Support of the Annual Site Environmental Report*. Sandia National Laboratories, Albuquerque, NM (2008).
SNL 2008a	Sandia National Laboratories, *ES&H Manual*, (CPR 400.1.1) (2008)
SNL 2008b	Sandia National Laboratories, *NESHAP Annual Report for CY07, Sandia National Laboratories, New Mexico,* Sandia National Laboratories, Albuquerque, NM (2008).

SNL 2008c Sandia National Laboratories, *Radiological Dose Calculations and Supplemental Dose Assessment Data for NESHAP Compliance, Sandia National Laboratories, NM, 2007*. Sandia National Laboratories, Albuquerque, NM (June 2008).

SNL 2007 Sandia National Laboratories, *Chemical Analysis of Soil Samples Collected from the Vicinity of the Thermal Test Complex at Sandia National Laboratories, New Mexico Environs*, SAND2007-0110. Sandia National Laboratories, Albuquerque, NM (February 2007).

SNL 2007a Sandia National Laboratories, *Corrective Action Management Unit (CAMU) Vadose Zone Monitoring System (VZMS) Annual Monitoring Results Report*. Sandia National Laboratories, Albuquerque, NM (September 2007).

SNL 2007b Sandia National Laboratories, *Data Validation Procedure for Chemical and Radiochemical Data*, Environmental Restoration Project, Sandia National Laboratories, Albuquerque, NM (2007).

SNL 2007c Sandia National Laboratories, Section 10B "National Environmental Policy Act (NEPA), Cultural Resources, and Historic Properties," from Chapter 10, "Environmental Protection," of the ES&H Manual, MN471001. Sandia National Laboratories, Albuquerque, NM (April 11, 2008).

SNL 2007d Sandia National Laboratories, *Site Treatment Plan for Mixed Waste, Sandia National Laboratories/New Mexico, Revision 11* (This contains a Compliance Plan Volume [CPV] and a Background Volume [BV]). Sandia National Laboratories, Albuquerque, NM (Approved by the New Mexico Environment Department February 2007).

SNL 2007e Sandia National Laboratories, *Site Treatment Plan for Mixed Waste, FY06 Update.* Sandia National Laboratories, Albuquerque, NM (March 2007).

SNL 2007f Sandia National Laboratories, Quality Assurance Project Plan for the Sample Management Office, Sandia National Laboratories, Albuquerque, NM (2007).

SNL 2007g SAND-2008-0258. *Thunder Range, Range 1 2007 Field Report on Baseline Sampling.*

SNL 2007h SAND-2008-0156. *9930 Tungsten-in-Soil Study 12/2007 Field Report.*

SNL 2006 Sandia National Laboratories, *Chemical Analyses of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993-2005.* SAND2006-1468, Sandia National Laboratories, Albuquerque, NM (March 2006).

SNL 2003 Sandia National Laboratories/New Mexico (SNL/NM), April 2003. *Chemical Waste Landfill – Landfill Excavation Voluntary Corrective Measure – Final Report*, Sandia National Laboratories, Albuquerque, New Mexico.

SNL 2003a Sandia National Laboratories, *Resource Conservation and Recovery Act Closure for the Corrective Action Management Unit, Technical Area III, Sandia National Laboratories/New Mexico Environmental Restoration Project,* Sandia National Laboratories, Albuquerque, NM (December 2003).

SNL 2002 Sandia National Laboratories, *Closure Plan for the Corrective Action Management Unit, Technical Area III, Sandia National Laboratories/New Mexico, Environmental Restoration Project,* Sandia National Laboratories, Albuquerque, NM (October 2002).

SNL 2001 Sandia National Laboratories, *Storm Water Pollution Prevention Plan (SWP3)*, PLA97-06, Rev. 2. Sandia National Laboratories, Albuquerque, NM (November 2001).

SNL 1992 Sandia National Laboratories, *Chemical Waste Landfill Final Closure Plan and Postclosure Permit Application*. Sandia National Laboratories, Albuquerque, NM (December 1992).

SNL/ Outrider 2008 Sandia National Laboratories, *Chemical Inventory Report, CY 2007.* SNL Outrider (June 2008).

Thorn et al. 1993 Thorn, C.R., D. P. McAda, and J.M. Kernodle, *Geohydrologic Framework and Hydrologic Conditions in the Albuquerque Basin, Central New Mexico*, Water Resources Investigation Report 93-4149. U.S. Geological Survey, Albuquerque, NM (1993).

USACE 1979 U.S. Army Corps of Engineers, *Special Flood Hazard Information, Tijeras Arroyo and Arroyo del Coyote, Kirtland AFB, New Mexico.* U.S. Army Corps of Engineers Albuquerque District, Albuquerque, NM (1979).

USGS 2002 U.S. Geological Survey (USGS), 2002. *Preliminary Summary Statistics—All Groundwater Sites, Middle Rio Grande Basin*, prepared by Laura Bexfield, Water Resources Division, U.S. Geological Survey, Albuquerque, New Mexico.

Woodward 1982 Woodward, L. A., "Tectonic Framework of Albuquerque Country," in *Albuquerque Country II, Guidebook - 33rd New Mexico Geological Society Field Conference*. New Mexico Geological Society, Albuquerque, NM (1982).

EXECUTIVE ORDERS

EO 11988 *Floodplain Management,* as amended (May 24, 1977).

EO 11990 *Protection of Wetlands,* as amended (May 24, 1977).

EO 12898 *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations,* as amended (February 11, 1994).

EO 13423 *Strengthening Federal Environmental, Energy, and Transportation Management* (January 2007). *Note: EOs 13101, 13123, 13148, and 13149 were revoked by EO 13423 in January 2007.

EO 13432 *Cooperation Among Agencies in Protecting the Environment With Respect to Greenhouse Gas Emmissions From Motor Vehicles, Nonroad Vehicles, and Nonraod Engines.* (May 2007).

DOE DIRECTIVES

DOE 2007 U.S. Department of Energy, *Environment, Safety, and Health Reporting Manual*, DOE Manual 231.1-1A, Change 2. U.S. Department of Energy, Washington, DC (6/12/2007).

DOE 2007a U.S. Department of Energy, *Environmental Protection Program,* DOE Order 450.1, Administrative Change 1 dated 1/3/07, U.S. Department of Energy, Washington, DC (12/7/2007).

DOE 2003 U.S. Department of Energy, *Occurrence Reporting and Processing of Operations Information,* DOE Manual 231.1-2. U.S. Department of Energy, Washington, DC (8/19/2003).

DOE 2003a U.S. Department of Energy, *Connectivity to National Atmospheric Release Advisory Center (NARAC)*, DOE Notice 153.2. U.S. Department of Energy, Washington, D.C. (8/11/2003).

DOE 2001 U.S. Department of Energy, *Radioactive Waste Management*, DOE Order 435.1, Change 1. U.S. Department of Energy, Washington, DC (8/28/2001).

DOE 1993 U.S. Department of Energy, *Radiation Protection of the Public and the Environment*, DOE Order 5400.5, Change 2. U.S. Department of Energy, Washington, DC (1/7/1993).

DOE 1990 U.S. Department of Energy, "DOE Policy on Signatures of RCRA Permit Applications," SEN-22-90. U.S. Department of Energy, Washington, DC (5/8/1990).

CODE OF FEDERAL REGULATIONS

40 CFR 50 "National Primary and Secondary Ambeint Air Quality Standards."

40 CFR 60 "Standards of Performance for new stationary sources."

40 CFR 61 "National Emission Standards for Hazardous Air Pollutants (NESHAP)." Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities"

40 CFR 68 "Chemical Accident Prevention Provisions"

40 CFR 82 "Protection of Stratospheric Ozone"

40 CFR 112 "Oil Pollution Prevention"

40 CFR 122 "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System" (NPDES)

40 CFR 141	"National Primary Drinking Water Regulations"
40 CFR 265	"Interim Status Standards for Owners and Operators of Hazardoud Waste Treatment, Storage, and Disposal Facilities."
40 CFR 280	"Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks"
40 CFR 302	"Designation, Reportable Quantities, and Notification" (CERCLA Implementing Regulation)
40 CFR 355	"Emergency Planning and Notification"
40 CFR 372	"Toxic Chemical Release Reporting: Community Right-to-Know" (EPCRA Implementing Regulation)

ACTS AND STATUTES

- American Indian Religious Freedom Act (AIRFA) of 1978 (42 U.S.C. §1996)
- Archaeological Resources Protection Act (ARPA) of 1979 (16 U.S.C. §470aa)
- Atomic Energy Act (AEA) of 1954 (42 U.S.C. §2011 et seq.)
- Clean Air Act (CAA) and CAA Amendments (CAAA) of 1990 (42 U.S.C. §7401)
- Clean Water Act (CWA) of 1977 (the Federal Water Pollution Control Act) (33 U.S.C. §1251)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (42 U.S.C. §9601) Amended by the Superfund Amendments and Reauthorization Act (SARA)
- Emergency Planning and Community Right to Know Act (EPCRA) of 1986 (42 U.S.C. §11001 et seq.) (Also known as SARA Title III.)
- Endangered Species Act (ESA) (16 U.S.C.§1531 et seq.)
- Federal Facility Compliance Act (FFCA) of 1992 (42 U.S.C. §6961)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 U.S.C. §136)
- Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. §703 et seq.)
- National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. §4321)
- National Historic Preservation Act of 1966, as amended (16 U.S.C. §470 et seq.)
- Pollution Prevention Act of 1990 (42 U.S.C. §13101 et seq.)
- Quiet Communities Act of 1978 (42 U.S.C. §4901 et seq.)
- Resource Conservation and Recovery Act (RCRA) of 1976 (42 U.S.C. §6901 et seq.)
- Safe Drinking Water Act (SDWA) (42 U.S.C §300f)
- Superfund Amendments and Reauthorization Act (SARA) of 1986 (see CERCLA)
- Toxic Substances Control Act (TSCA) of 1976 (15 U.S.C. §2601 et seq.)

Note: U.S.C. = United States Code

APPLICABLE LOCAL AND STATE LAWS AND REGULATIONS FOR ENVIRONMENTAL PROGRAMS

Water Quality

20.6.2 NMAC, "Ground and Surface Water Protection"
20.6.4 NMAC, "Standards for Interstate and Intrastate Surface Waters"

20.7.10 NMAC, “Drinking Water”
Albuquerque/Bernalillo County Water Utility Authority, “Sewer Use and Wastewater Control Ordinance.”

Air Quality

20.2.3 NMAC, “New Mexico Ambient Air Quality Standards”
20.11.02 NMAC, “Permit Fees”
20.11.08 NMAC, “New Mexico Ambient Air Quality Standards”
20.11.20 NMAC, “Fugitive Dust Control”
20.11.21 NMAC, “Open Burning”
20.11.100 NMAC, “Motor Vehicle Inspection”

Miscellaneous

NMSA 76-4-1 et seq.,“New Mexico Pesticide Control Act”
21.17.50 NMAC, “Pesticides”

Oil Storage and Spill Containment

Oil Storage Programs
20.5 NMAC, “Petroleum Storage Tanks”

Waste Management

Hazardous Waste Management Program
20.4.1 NMAC, “Hazardous Waste Management”
20 NMAC 4.1, “Hazardous Waste Management”

Solid Waste Program
20.9 NMAC, “Solid Waste Management”

TABLE 9-1. Summary of Environmental Permits and Registrations in Effect During 2007

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
SEWER WASTEWATER					
General	WW001 Station Manhole, south of TA-IV at Tijeras Arroyo	2069 A-6	Submitted to ACWUA	Pending	ABCWU
General	WW006 Station Manhole, at Pennsylvania Ave.	2069 F-6	Submitted to ACWUA	Pending	ABCWU
Microelectronics Development Laboratory (MDL)	WW007 Station Manhole, TA-I	2069 G-6	10/12/05	8/31/09	ABCWU
General	WW008 Station Manhole, south of TA-II at Tijeras Arroyo	2069 I-5	2/1/004	7/31/08	ABCWU
General	WW011 Station Manhole, north of TA-III (includes TAs-III and V, and Coyote Test Field sewer lines)	2069 K-5	11/17/04	12/31/08	ABCWU
Center for Inteergrated Nano-Technologies (CINT)	CINT	2238A	1/5/07	4/30/011	ABCWUA
SURFACE DISCHARGE					
Pulsed Power Development Facilities (Discharge Plan)	TA-IV, Lagoons I and II	DP-530	9/21/07	9/21/12	NMED
UNDERGROUND STORAGE TANKS (UST)					
UST (20,000 gallons)	TA-I	1368	6/1/07	6/01/08	NMED
UST (20,000 gallons)	TA-I	1369	6/1/07	6/01/08	NMED
ABOVE GROUND STORAGE TANKS (AST)					
AST / 10,000	TA-I	1370	6/1/07	6/01/08	NMED
AST / 10,000	TA-I	1370	6/1/07	6/01/08	NMED
AST / 10,000	TA-I	1370	6/1/07	6/01/08	NMED
AST / 1,500	TA-I	1370	6/1/07	6/01/08	NMED
AST / 2,000	TA-I	1370	6/1/07	6/01/08	NMED
AST / 5,000	TA-III	1370	6/1/07	6/01/08	NMED
AST / 25,000	CTF	1370	6/1/07	6/01/08	NMED

See notes at end of table.

TABLE 9-1. Summary of Environmental Permits and Registrations in Effect During 2007 *(continued)*

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
STORM WATER					
National Pollution Discharge Elimination System (NPDES) "Multi-sector General" Permit	Storm water discharges from Points (MP) 01 through MP 10	NMR05A961	2/01	9/30/05 EPA has indefinitely extended this Permit	EPA
NPDES Construction Permits					
Center for Integrated Nanotechnology (CINT) CORE Facility Construction Project	Eubank	NMR15DC23	10/21/03	6/30/06	EPA
Microsystems and Engineering Science Applications (MESA) Facility	TA-I	NM0002376	N/A	7/31/09	EPA
Exterior Communication Infrastructure Modernization (ECIM) Project	TA-I	NMR15DC79	3/1/04	6/30/06	EPA
Photovoltaics Parking Lot	Photovoltaics Parking Lot	NMR15DV49 NMR15E422 @	11/05/04	6/30/05	EPA
Building 956 - Lot A	Building 956	NMR15DW01	11/12/04	5/30/05	EPA
Building 1090	TA-I	NMR15E170	2/8/2005	9/30/2005	EPA
20th Street Stockpile Area	TA-I	NMR15E764 NMR15EB81 @	04/29/05	3/30/2007	EPA
46kV Line Partial Circuit #2 Replacement	TA-III-IV	NMR15ED84 NMR15ED83 @	07/14/05	1/30/2006	EPA
National Infrastructure Simulation and Analysis Center (NISAC) Building 1008	TA-II	NMR15EL42	11/1/2005	11/30/2006	EPA
Mixed Waste Landfill Cover	TA-III	NMR15EZ15 NMR15EZ62 @	05/18/06	Active until terminated	EPA
Technical Area III Borrow Pit	TA-III	NMR15F015 NMR15F012 @	6/07/206	Active until terminated	EPA
16 inch Chilled Water Line Installation	TA-I	NMR15F083	06/18/06	Active until terminated	EPA
Technical Area I Fence Removal	TA-II	NMR15F099	8/10/07	7/13/08	EPA
DS&A Modular Office Installation	TA-I	NMR15FQ78	9/17/07	5/31/08	EPA
Technical Area I Limited Area Fence Expansion	TA-I	NMR15F452	7/31/06	Active until terminated	EPA
Heating System Modernization Construction Project	TA-I	NMR15FK02	5/11/07	12/14/09	EPA
Communication Trunk Line in H Avenue	TA-I	NMR15FM85	7/06/07	Active until terminated	EPA
Building 1090 Parking Lot	TA-II	NMLEW0297	12/14/2005	7/1/2006	EPA
9990 Com Trench	TA-III	NMLEW0303	12/27/2005	6/30/2006	EPA
COMPLETED PROJECTS					
Aerial Cable Facilities Renovation	Sol se Mete Canyon	NMR15DD44	3/12/04	5/30/05	EPA
Building 755	Building 755	NMR15DK40	8/9/04	4/15/05	EPA
TA-I Waterline Rehabilitation Project	TA-I	NMR15DR15	9/9/04	10/30/05	EPA
Building 702 Construction	Building 702	NMLEW108	8/9/2004	4/15/05	EPA
Building 758 Construction	Building 758	NA	12/21/04	7/8/05	EPA
TA-II & TA-IV Improvements	TA-II and TA-IV	NMR15DY00	12/8/04	6/30/05	EPA
Building 729	Building 729	NMR15DY97	1/4/05	7/31/05	EPA

See notes at end of table.

TABLE 9-1. Summary of Environmental Permits and Registrations in Effect During 2007 *(continued)*

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
ECOLOGICAL					
U.S. Fish and Wildlife Service Special Purpose Salvage Permit	Site-Wide Ecological Monitoring	MB040780-0	5/30/01	12/31/05	U.S. Fish and Wildlife Service
U.S. Fish and Wildlife Service Special Purpose Relocate Permit	Site-Wide Ecological Monitoring Activity	MB105852-0	5/26/05	6/30/05	U.S Fish and Wildlife Service
RCRA					
Hazardous Waste Facility Permit Module I - General Permit Conditions Module II - General Facility Conditions Module III - Containers	Hazardous Waste management Facility (HWMF), TA-II (storage)	NM5890110518-1	8/6/92	08/06/02, modified 2006 a ** (request for renewal submitted 2/6/02, most recent revision submitted 3/22/2007)	NMED
Hazardous Waste Facility Permit Module IV - Hazardous and Solid Waste Amendments (HSWA) Portion for Solid Waste Management Units (SWMUs)	Environmental Restoration (ER) Sites	NM5890110518-1	8/26/93	9/20/02, modified 2006 a** (request for renewal submitted 2/6/02, most recent revision submitted 3/22/2007)	EPA/NMED
Hazardous Waste Treatment Facility Permit Module I - General Permit Conditions Module II - General Facility Conditions Module III - Containers	Thermal Treatment Facility (TTF), TA-III (Treatment of explosive waste)	NM5890110518-2	12/4/94	12/4/04, modified 2005 *** (request for renewal submitted 2/6/02, most recent revision submitted 3/22/2007)	NMED
Class III Permit Modification for the Management of Hazardous Remediation Waste in the Corrective Action Management Unit (CAMU), Tech Area III Modification to Part B Operating Permit	CAMU, TA-III	NM5890110518	9/25/97	9/20/02 [a]** (request for renewal submitted 2/6/02, most recent revision submitted 3/22/2007)	NMED
RCRA Part A Permit Application for Hazardous Waste Management Units for the hazardous component in mixed waste stored and/or treated at ten waste management areas.	RMWMF (storage and treatment); 7 Manzano Bunkers (storage only); Auxiliary Hot Cell Facility (storage and treatment)	NM5890110518	Application for interim status first submitted 8/90; most recent revision 3/22/2007	Under Review[a] (No expiration date)	NMED
TSCA					
Risk-Based Approval Request under 40 CFR 761.61(c); Risk-Based Method for Management of PCB Materials; Chemical Waste Landfill and Corrective Action Management Unit (CAMU)	Chemical Waste Landfill and CAMU, co-located in TA-III	N/A	6/26/02	CAMU Closure Report submitted 4/19/04. CWL permit continues until closure. CWL closure delayed pending NMED remedy selection process; closure expected late 2007.	EPA, Region 6

See notes at end of table.

TABLE 9-1. Summary of Environmental Permits and Registrations in Effect During 2007 *(continued)*

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
Open Burn Permits*					
Explosive Firing Site—Panel Box Tests	TA-III	06-0084	1/1/2007	12/31/2007	COA
Thermal Treatment Facility	TA-III	07-0001	1/1/2007	12/31/2007	COA
Lurance Burn Site—Lare 250-gal Pool Fire	Remote	07-0003	1/1/2007	12/31/2007	COA
Lurance Burn Site—Igloo Building 9830	Remote	7-0007	1/1/2007	12/31/2007	COA
Lurance Burn Site—Wood Crib Fire Tests	Remote	07-0012	1/1/2007	12/31/2007	COA
Impact Test Facility—Explosive	TA-III	06-0080	1/1/2007	12/31/2007	COA
Impact Test Facility—Propellant	TA-III	06-0081	1/1/2007	12/31/2007	COA
Impact Test Facility—Termite	TA-III	06-0082	1/1/2007	12/31/2007	COA
9940 Area	Remote	07-0010	1/1/2007	12/31/2007	COA
Thunder Range—Explosive Tests	Remote	07-0011	1/1/2007	12/31/2007	COA
Lurance Burn Site—Large 2,500-gal Pool Fire (1)	Remote	07-0051	6/25/2007	8/30/2007	COA
Lurance Burn Site—Large 2,500-gal Pool Fire (2)	Remote	07-0052	6/25/2007	8/30/2007	COA
Lurance Burn Site—Large 2,500-gal Pool Fire (3)	Remote	07-0053	6/25/2007	8/30/2007	COA
9920 Area—Explosive Tests	Remote	07-0050	7/9/2007	7/30/2007	COA
Aerial Cable Site—410-lb Penetration Test (1)	Remote	07-0080	10/1/2007	11/30/2007	COA
Aerial Cable Site—410-lb Penetration Test (2)	Remote	07-0081	10/1/2007	11/30/2007	COA
9920 Area—30-lb Explosive Tests	Remote	07-0093	10/1/2007	11/30/2007	COA
9920 Area—55-lb Explosive Tests	Remote	07-0103	11/1/2007	12/31/2007	COA
Thunder Range—205-lb Explosive Test (1)	Remote	07-0106	11/7/2007	12/7/2007	COA
Thunder Range—205-lb Explosive Test (2)	Remote	07-0107	11/7/2007	12/7/2007	COA
AIR (Permits & Registrations)					
Hammermill Facility	TA-III	144-M1	09/28/06	Biennial update	COA
Fire Laboratory used for the Authentication of Modeling and Experiments (FLAME)	Burn Site	196	5/19/88	Annual Review	COA
Neutron Generator Facility (NGF)	TA-I	374- M1	7/17/98	Annual Review	COA
Standby diesel generators at Bldg 862	TA-I	402	5/07/96	Annual Review	COA
Radioactive and Mixed Waste Management Facility (RMWMF)	TA-III	415- M1	5/10/97	Biennial update	COA
Title V Operating Permit	Site-Wide	515 (pending)	Submitted[a] 3/1/96	Pending (5 yr renewal)	COA

See notes at end of table.

TABLE 9-1. Summary of Environmental Permits and Registrations in Effect During 2007 *(continued)*

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
AIR (Permits & Registrations) (concluded)					
Emergency Generator at Building 702	TA-I	924	5/5/98	Annual Review	COA
Processing and Environmental Technology Laboratory (PETL) Emergency Generator	TA-I	925-M1	3/5/01	Annual Review	COA
PETL Boilers and HAP Chemicals	TA-I	936	5/5/04	Annual Review	COA
Advanced Manufacturing Prototype Facility (AMPF)	TA-I	1406	11/6/00	Annual Review	COA
Microelectronics Development Laboratory (MDL)	TA-I	1678-M1	12/14/04	Annual Review	COA
Steam Plant	TA-I	1705	11/10/04	Annual Review	COA
Thermal Test Complex	TA-III	1712	4/9/04	Annual Review	COA
Center for Integrated Nanotechnology (CINT)	Sandia Science & Technology Park	1725	10/11/04	Annual Review	COA
MESA Facility Central Utility Building 858J	TA-I	1820	9/28/2006	Biennial update	COA
South East Tech Area I	TA-I	1828	9/28/2006	Biennial update	COA
Heating System Modernization Boilers	TA-I	1830	3/23/2007	Biennial update	COA
Strategic Defense Facility, Building 963	TA-4	1900	1/11/2008	Biennial update	COA
FUGITIVE DUST CONTROL AND DEMOLITION PERMIT FILE* (Permits & Registrations)**					
SWMU 91	Thunder Range	10-411-2903	07/30/2004	07/30/2009	COA
Soil Stockpile	TA-I	10-348-3106	3/16/2005	10/30/2007	COA
Building 9940 Programmatic	Outside TA-III	P05-0057	11/10/2005	11/10/2010	COA
TA-I Water Project	TA-I	10-1449-3380	1/24/2006	1/24/2007	COA
Building 770	TA-I	10-344-3390	2/2/2006	2/2/2007	COA
Building 9990 Communication Systems	TA-I	10-430-3426	3/26/2006	3/23/2007	COA
MWL's Cover	TA-III	10-411-3440	4/5/2006	9/30/2007	COA
Building 806	TA-I	10-210-3442	4/7/2006	6/7/2007	COA
46 KV Feeder	TA-III & TA-V	10-555-3450	4/20/2006	4/20/2007	COA
Thunder Range Programmatic	TA-III	P-06-0004	5/2/2006	5/2/2011	COA
Building 880 Parking Lot	TA-I	10-564-3477	5/25/2006	5/25/2007	COA
Tech Area I Infrastructure—16" Chilled Water	TA-I	10-10-3538	8/2/2006	8/2/2007	COA
Tech Area II Infrastructure—20th St. Extension	TA-II	10-10-3537	8/2/2006	8/2/2007	COA

TABLE 9-1. Summary of Environmental Permits and Registrations in Effect During 2007 *(concluded)*

Permit Type and/or Facility Name	Location	Permit Number	Issue Date	Expiration Date	Regulatory Agency
FUGITIVE DUST CONTROL AND DEMOLITION PERMIT FILE* (Permits & Registrations)**					
Waterline Replacement	TA-I	10-149-3610	11/1/2006	11/1/2007	COA
MESA Loop Road	TA-I	10-348-3751	6/25/2007	6/25/2008	COA
Tech Area I Infrastructure	TA-I	10-344-3663	2/6/2007	12/31/2008	COA
South End Long Sled Track	TA-III	10-624-3730	5/14/2007	5/14/2008	COA
HSM Project	TA-I	10-10-3726	5/14/2007	5/14/2008	COA
Large Scale LNG Test Site	TA-III	1009-626-3732	5/5/2007	12/31/2008	COA
Building 956 Parking Lot	TA-II	10-564-3773	7/25/2007	7/24/2008	COA
Tech Area II Fence Removal	TA-II	10-210-3779	7/26/2007	7/26/2008	COA
Tech Area II East Escarpment Repair	TA-II	10-626-3813	9/14/2007	9/14/2008	COA
Tech Area I Utility Improvements	TA-I	10-204-3817	9/19/2007	9/18/2008	COA
WIF/MESA Storm Water Ponds	14th & Hardin	10-308-3839	10/18/2007	10/18/2008	COA
Borrow Site Programmatic—Cell No. 1	TA-III	P08-0005	12/10/2007	12/10/2012	COA
Building 9940 Programmatic—DETS	TA-III	P08-0006	12/10/2007	12/10/2012	COA
Moving Vehicle Test Track Programmatic	TA-3	P08-0004	12/11/2007	12/11/2012	COA

NOTES: †Registration = Certificate - no permit required
Approval = EPA did not issue a permit to NMED on 02/06/2002
[a]Combined with application for permit renewal submitted to NMED on 02/06/2002
PCB = polychlorinated biphenyl
*Open Burn Permits are issued by the City of Albuquerque
for no more than a year at any one time.
**Sandia submitted a timely application for permit renewal
(RCRA Part A and Part B permit applications) to NMED on 02/06/2002. The old permit remains in force until the new one is issued.
***Permits are obtained by general contractors directly from City of Albuquerque
COA= City of Albuquerque
TA= technical area
EPA = U.S. Environmental Protection Agency
N/A = not applicable
NMED = New Mexico Environment Department
RCRA = Resource Conservation and Recovery Act
@ =DOE/SSO Permits

TABLE 9-2. Federal and State Air Regulations Applicable to SNL/NM

CAA Title	CAA Section	Federal Regulation	Local Regulation	Subject
I	176(c)	40 CFR 51 40 CFR 93	20 NMAC 11.04 20 NMAC 11.03	Conformity of Federal Actions (State and Federal Plans) General and Transportation
	110	40 CFR 58	N/A	Ambient Air Quality Surveillance
	109	40 CFR 50	20 NMAC 11.08	National Primary and Secondary Ambient Air Quality Standards (NAAQS)
	165-166	40 CFR 52	20 NMAC 11.02	Permit Fees
		40 CFR 52	20 NMAC 11.05	Visible Air Contaminants
		40 CFR 52	20 NMAC 11.06	Emergency Action Plan
		40 CFR 52	20 NMAC 11.07	Variance Procedure
		40 CFR 52	20 NMAC 11.20	Fugitive Dust Control
		40 CFR 52	20 NMAC 11.21	Open Burning
		40 CFR 51–52	20 NMAC 11.40	Source Registration
		40 CFR 51–52	20 NMAC 11.41	Authority-to-Construct
		40 CFR 51.100	20 NMAC 11.43	Stack Height Requirements
		40 CFR 51	20 NMAC 11.44	Emissions Trading
	171-193	40 CFR 51–52	20 NMAC 11.60	Permitting in Nonattainment Areas
	160-169	40 CFR 52	20 NMAC 11.61	Prevention of Significant Deterioration
	165-166	40 CFR 60 40 CFR 63	20 NMAC 11.65	Volatile Organic Compounds (VOC)
		40 CFR 60	20 NMAC 11.66	Process Equipment
		40 CFR 60	20 NMAC 11.22	Wood Burning
		40 CFR 60	20 NMAC 11.63	New Source Performance Standards (NSPS)
		40 CFR 60	20 NMAC 11.67	Equipment, Emissions and Limitations (stationary combustion sources)
		40 CFR 60	20 NMAC 11.68	Incinerators
		40 CFR 60	20 NMAC 11.69	Pathological Waste Destructors
II	202-210 213-219 211	40 CFR 85-86	20 NMAC 11.100	Motor Vehicle Inspection: Decentralized
			20 NMAC 11.101	Motor Vehicle Inspection: Centralized
		40 CFR 80	20 NMAC 11.102	Oxygenated Fuels
			20 NMAC 11.103	Motor Vehicle Visible Emissions
III	112	40 CFR 61 40 CFR 63	20 NMAC 11.64	National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart H – Radionuclides Subpart M – Asbestos
IV	401-416	40 CFR 72-78	20 NMAC 11.62	Acid Rain
V	501-507	40 CFR 70-71	20 NMAC 11.42	Operating Permits
VI	601-618	40 CFR 82	20 NMAC 11.23	Stratospheric Ozone Protection
VII	113-114	40 CFR 64	20 NMAC 11.90	Administration, Enforcement, Inspection

NOTES: CAA = Clean Air Act
NMAC = New Mexico Administrative Code
CFR = Code of Federal Regulations

TABLE 9-3. Summary of Compliance History with Regard to Mixed Waste (MW) at SNL/NM

Date	Milestone	Comment
1984	Amendments to Resource Conservation and Recovery Act (RCRA) and Hazardous and Solid Waste Amendments (HSWA) in 1984	MW became an issue after amendments to RCRA and HSWA enforced Land Disposal Restrictions (LDRs), including prohibition on storage of wastes for more than one year.
Aug 1990	RCRA Part A Interim Status Permit Application	Submitted RCRA Part A Interim Status Permit application for MW storage. Later revisions to the interim status permit added proposed MW treatment processes.
Oct 1992	Federal Facilities Compliance Act (FFCA) Passed	The FFCA allows storage of MW over one-year RCRA time limit. Requires U.S. Department of Energy (DOE) to submit a site treatment plan for MW.
Dec 1992	Notice of Noncompliance (NON) Issued	U.S. Environmental Protection Agency (EPA) issued a NON for storage of RCRA-regulated MW over the one-year maximum period.
Oct 1993	Conceptual Site Treatment Plan Submitted	DOE submitted *Conceptual Site Treatment Plan for Mixed Waste* to NMED; other drafts followed.
Mar 1995	Final Site Treatment Plan submitted	DOE submitted final *Site Treatment Plan for Mixed Waste* to NMED
Jun 1995	Historical Disposal Requests Validation (HDRV) Project Initiated	The HDRV Project was initiated to characterize and sort legacy MW. Project continued into 1997, when it was replaced with new sorting procedures
Oct 1995	Federal Facility Compliance Order (FFCO) Signed	The FFCO, an agreement between State, DOE, and Sandia Corporation, details specific actions required with regard to MW management, including the requirement to develop of a Site Treatment Plan (STP), to be updated annually
Oct 1995	Compliance Order Issued	NMED issued a Compliance Order enforcing the STP
Sep 1996	First MW Shipment	First MW shipment made to Perma-Fix/DSSI
Oct 1996	FFCO Amendment No. 1	FFCO amended
Dec 1996	Revisions to Proposed Treatment Methods	DOE and Sandia re-submitted Part A and B permit application, to reflect revisions to proposed on-site treatment methods
May 1997	FFCO Amendment No. 2	FFCO amended
Dec 1997	On-site MW Treatment	Onsite treatment of MW began at the RMWMF in Bldg. 6920. Additionally, Bldg. 6921 was converted to a laboratory for the treatment of certain types of MW
1997	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 1996 activities, and changes to proposed treatment technologies. NMED approved Revision 1 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
1998	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 1997 activities, and changes to proposed treatment technologies. NMED approved Revision 2 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
1999	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 1998 activities, and changes to proposed treatment technologies. NMED approved Revision 3 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.

See notes at end of table.

TABLE 9-3. Summary of Compliance History with Regard to Mixed Waste (MW) at SNL/NM

Date	Milestone	Comment
2000	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 1999 activities, and changes to proposed treatment technologies. NMED approved Revision 4 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
2001	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2000 activities, and changes to proposed treatment technologies. NMED approved Revision 5 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
2001	FFCO Amendment No. 3	FFCO amended
2002	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2001 activities, and changes to proposed treatment technologies. NMED approved Revision 6 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
Feb 2002	Revisions to Permit Application	DOE and Sandia submitted updated Part A and B permit application to NMED, to reflect revisions to on-site waste management operations. Permit application for mixed waste management units is combined with permit renewal request for hazardous waste management units at SNL/NM.
2003	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2002 activities, and changes to proposed treatment technologies. NMED approved Revision 7 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
2003	Revisions to Permit Application	DOE and Sandia revised Part A and Part B permit application in response to NMED comments. Revisions submitted in April and November.
2004	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2003 activities, and changes to proposed treatment technologies. NMED approved Revision 8 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
2004	FFCO Amendment No. 4	FFCO amended
2004	Revisions to Permit Application	DOE and Sandia revised Part A and Part B permit application in response to NMED comments. Revisions submitted in November.
2005	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2004 activities, and changes to proposed treatment technologies. NMED approved Revision 9 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.

TABLE 9-3. Summary of Compliance History with Regard to Mixed Waste (MW) at SNL/NM (concluded)

Date	Milestone	Comment
2005	Revisions to Permit Application	DOE and Sandia revised Part A and Part B permit application to reflect changes in waste management operations. Revisions submitted in June and October.
2006	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2005 activities, and changes to proposed treatment technologies. NMED approved Revision 10 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.
2007	STP Milestones Met	Treated wastes on site and shipped mixed wastes to off-site treatment and disposal facilities, meeting all treatment and disposal milestones. Updated STP to reflect FY 2006 activities, and changes to proposed treatment technologies. NMED approved Revision 11 to STP, revising waste volumes and treatment/disposal technologies, and establishing new deadlines.

NOTES: NON = Notification of Non-compliance
RCRA = Resource Conservation and Recovery Act
HSWA = Hazardous and Solid Waste Amendments
FFCA = Federal Facility Compliance Act
NMED = New Mexico Environment Department
DSSI = Diversified Scientific Services, Inc.
FY = fiscal year
DOE = Department of Energy
HDRV = Historical Disposal Requests Validation
STP = Site Treatment Plan
FFCO = Federal Facility Compliance Order
MW = Mixed Waste

TABLE 9-4. Mixed Waste Treatment and Disposal Status (End of FY 2007)

Waste Category	Volume (m^3)	Description	Status and Plans
TG 1	0	Inorganic Debris with Explosive Component	No waste currently in inventory
TG 2	0	Inorganic Debris with a Water Reactive Component	No waste currently in inventory.
TG 3	0	Reactive Metals	No waste currently in inventory.
TG 4	0	Elemental Lead	No waste currently in inventory.[a]
TG 5	0	Aqueous Liquids (Corrosive)	No waste currently in inventory.
TG 6	0	Elemental Mercury	No waste currently in inventory.
TG 7	0	Organic Liquids I	No waste currently in inventory.
TG 8	0	Organic Debris with Organic Contaminants	No waste currently in inventory.*
TG 9	0.32	Inorganic Debris with TCLP Metals	Utilizing on-site treatment or shipping to off-site treatment and disposal facilities.[a]
TG 10	0.1	Heterogeneous Debris	Sort waste as needed to determine more suitable treatability groups.
TG 11	0	Organic Liquids II	No waste currently in inventory.
TG 12	0.4	Organic Debris with TCLP Metals	Utilizing off-site treatment and disposal options.[a]
TG 13	0	Oxidizers	No waste currently in inventory.
TG 14	0	Aqueous Liquids with Organic Contaminants	No waste currently in inventory.
TG 15	0.35	Soils <50 percent Debris & Particulates with TCLP Metals	Utilizing on-site treatment and off-site treatment and disposal options.[a]
TG 16	0	Cyanide Waste	No waste currently in inventory.
TG 17	0	Liquid/Solid with Organic and/or Metal Contaminants	No waste currently in inventory.*
TG 18	0	Particulates with Organic Contaminants	No waste currently in inventory.
TG 19	0	Liquids with Metals	No waste currently in inventory.
TG 20	0	Propellant with TCLP Metals	No waste currently in inventory.*
TG 21	0	Sealed Sources with TCLP Metals	No waste currently in inventory.*
TG 22	0	Reserved	Not Applicable
TG 23	0	Thermal Batteries	No waste currently in inventory.
TG 24	0.03	Spark Gap Tubes with TCLP Metals	Utilizing on-site treatment and off-site treatment options, and investigating off-site disposal options.[a]
TG 25	1.4	Classified Items with TCLP Metals	Sort waste as needed to determine more suitable treatability groups.
TG 26	0.05	Debris Items with Reactive Compounds & TCLP Metals	Utilizing on-site treatment and off-site treatment options, and investigating off-site disposal options.[a]
TG 27	0	High Mercury Solids & Liquids	No waste currently in inventory
TRU/MW	1.33	TRU/MW	Investigating off-site treatment and disposal options.

NOTES: [a] Treatment and/or disposal at one or more permitted off-site mixed waste management facilities.
Treatments are detailed in the *Site Treatment Plan for Mixed Waste, Sandia National Laboratories, New Mexico* (SNL 2007d) and the *Site Treatment Plan for MW, FY07 Update* (SNL 2007e).
TCLP = toxicity characteristic leaching procedure m^3 = cubic meters
TRU/MW = transuranic/mixed waste

RADIOLOGICAL DOSE

Radiation Protection

The U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) has established radiation protection standards for the public to control and limit radiation doses resulting from activities at DOE facilities. Sandia National Laboratories, New Mexico (SNL/NM) is the DOE facility specific to this discussion. Public areas are defined as any location that is accessible to non-DOE facility employees (e.g., excluding Sandia Corporation employees and contractors), such as Kirtland Air Force Base (KAFB) personnel and the surrounding community. Radiation protection standards are provided in DOE Order 5400.5, *Radiation Protection of the Public and the Environment* (DOE 1993). Environmental monitoring requirements for DOE operations are given in DOE Order 450.1, *Environmental Protection Program* (DOE 2005). In addition to these quantitative standards, the overriding DOE policy is that exposures to the public shall be maintained "as low as reasonably achievable" (ALARA).

DOE Order 5400.5 limits the total annual effective dose equivalent (EDE) of all potential exposure pathways to the public (including air, water, and the food chain) to 100 millirem per year (mrem/yr). The Order lists the Derived Concentration Guides (DCGs) for radionuclides in water and air that could be continuously consumed or inhaled (365 days/year). This is a conservative approach that assumes that a member of the public resides at the location continuously. Table 9-5 lists the DCGs pertinent to activities at SNL/NM and to this report.

TABLE 9-5. Derived Concentration Guides (DCGs) for Selected Radionuclides*

	Ingested Water		Inhaled Air†	
Radionuclide	**DCG (µCi/ml)**	**f_1 Value****	**DCG (µCi/ml)**	**Solubility Class**
Tritium (water)	2×10^{-3}	--	1×10^{-7}	W
Cesium-137	3×10^{-6}	1	4×10^{-10}	D
Uranium, total (U_{tot})	6×10^{-6}	--	1×10^{-13}	Y

NOTES: µCi/ml = microcuries per milliliter
*From Figure III-1, DOE Order 5400.5, Change 2, January 7, 1993 (DOE 1993).
† DCG for tritium in air is adjusted for skin absorption.
** F_1 value is the gastrointestinal absorption factor.
Listed DCG's for U_{tot} are based on U_{nat} listing in 5400.5 (DOE 1993).

- *Water Pathways* - DOE drinking water guidelines are based on an annual EDE not to exceed 4 mrem/yr. Guideline values for drinking water are calculated at 4 percent of ingested water using DCG values for specific nuclides.

- *Air Pathways* - DOE facilities are required to comply with U.S. Environmental Protection Agency (EPA) standards for radiation protection as given in National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart H, specific to radionuclides emitted from DOE facilities (with the exception of radon). This rule mandates that air emissions from DOE facilities shall not cause any individual of the public to receive an EDE of greater than 10 mrem/yr from air pathways. Table 9-6 summarizes the public radiation protection standards that are applicable to DOE facilities.

WATER QUALITY MONITORING PARAMETERS

Resource Conservation and Recovery Act (RCRA)

Table 9-7 lists the 40 CFR 265, Subpart F, parameters required for groundwater monitoring analysis, implemented under RCRA. Table 9-8 gives the EPA interim primary drinking water standards (40 CFR 265, Appendix III) for the groundwater monitoring parameters. Table 9-9 gives EPA secondary drinking water standards. At SNL/NM, this regulation applies to Environmental Restoration (ER) sites. Table 9-10 gives New Mexico Water Quality Control Commission (NMWQCC) Standards for groundwater.

TABLE 9-6. General Dose Limits to the Public from DOE Facilities

Pathway	Effective Dose Equivalent (EDE) Limit	Comments
All Pathways*	100 mrem/yr 1 mSv/yr	The EDE for any member of the public from all routine DOE operations (normal planned activities including remedial actions). Radiation dose occurring from natural background and medical exposures are not included in the total allowed dose from all pathways.
Air Pathway **	10 mrem/yr 0.10 mSv/yr	Sandia calculates doses resulting from all potential air depositions and direct inhalation (e.g., emissions, ground shine, food crops)

NOTES: *DOE Order 5400.5, Chapters I and II (DOE 1993)
**40 CFR 61, Subpart H for radionuclides, National Emission Standards for Hazardous Air Pollutants (NESHAP).
mrem/yr = millirem per year mSv/yr = millisievert per year DOE = Department of Energy

TABLE 9-7. Groundwater Monitoring Parameters Required by 40 CFR 265, Subpart F*

Contamination Indicator	Groundwater Quality	Appendix III† Drinking Water Supply
pH	Chloride	Arsenic
Specific Conductivity	Iron	Barium
Total Organic Halogen (TOX)	Manganese	Cadmium
Total Organic Carbon (TOC)	Phenol	Chromium
	Sodium	Fluoride
	Sulfate	Lead
		Mercury
		Nitrate (as N)
		Selenium
		Silver
		Endrin
		Lindane
		Methoxychlor
		Toxaphene
		2,4-D
		2,4,5-TP Silvex
		Radium
		Gross Alpha
		Gross Beta
		Coliform Bacteria
		Turbidity

NOTES: *Resource Conservation and Recovery Act (RCRA)
†40 CFR 265, Appendix III.
pH = potential of hydrogen (acidity)

TABLE 9-8. EPA Primary Drinking Water Supply Standards/New Mexico Drinking Water Standards

Inorganic Chemicals	MCL	Units
Antimony	0.006	mg/L
Arsenic	0.010	mg/L
Asbestos	7	MFL
Barium	2.0	mg/L
Beryllium	0.004	mg/L
Cadmium	0.005	mg/L
Chromium	0.1	mg/L
Copper	1.3*	mg/L
Cyanide (free cyanide)	0.2	mg/L
Fluoride	4.0	mg/L
Lead	0.015	mg/L
Mercury (inorganic)	0.002	mg/L
Nickel (New Mexico only) [5]	0.2	mg/L
Nitrate (measured as N)	10	mg/L
Nitrite (measured as N)	1	mg/L
Selenium	0.05	mg/L
Thallium	0.002	mg/L
Organic Chemicals	**MCL**	**Units**
Alachlor	0.002	mg/L
Atrazine	0.003	mg/L
Benzene	0.005	mg/L
Benzo(a)pyrene	0.0002	mg/L
Carbofuran	0.04	mg/L
Carbon tetrachloride	0.005	mg/L
Chlordane	0.002	mg/L
Chlorobenzene	0.1	mg/L
2,4-D	0.07	mg/L
Dalapon	0.2	mg/L
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	mg/L
o-Dichlorobenzene	0.6	mg/L
p-Dichlorobenzene	0.075	mg/L
1,2-Dichloroethane	0.005	mg/L
1,1-Dichloroethylene	0.007	mg/L
cis-1,2-Dichloroethylene	0.07	mg/L
trans-1,2-Dichloroethylene	0.1	mg/L
Dichloromethane	0.005	mg/L
1,2-Dichloropropane	0.005	mg/L
Di(2-ethylhexyl)adipate	0.4	mg/L
Di(2ethylhexyl)phthalate	0.006	mg/L
Dinoseb	0.007	mg/L
Dioxin (2,3,7,8-TCDD)	0.00000003	mg/L
Diquat	0.02	mg/L
Endothall	0.1	mg/L
Endrin	0.002	mg/L

See notes at end of table.

TABLE 9-8. EPA Primary Drinking Water Supply Standards/New Mexico Drinking Water Standards *(concluded)*

Organic Parameter (continued)	MCL	Units
Ethylbenzene	0.7	mg/L
Ethylene Dibromide	0.00005	mg/L
Glyphosate	0.7	mg/L
Heptachlor	0.0004	mg/L
Heptachlor epoxide	0.0002	mg/L
Hexachlorobenzene	0.001	mg/L
Hexachlorocyclopentadiene	0.05	mg/L
Lindane	0.0002	mg/L
Methoxychlor	0.04	mg/L
Oxamyl (Vydate)	0.2	mg/L
Polychlorinated biphenyls (PCBs)	0.0005	mg/L
Pentachlorophenol	0.001	mg/L
Picloram	0.5	mg/L
Simazine	0.004	mg/L
Styrene	0.1	mg/L
Tetrachloroethylene	0.005	mg/L
Toluene	1	mg/L
Total Trihalomethanes (TTHMs)	0.1	mg/L
Toxaphene	0.003	mg/L
2,4,5-TP (Silvex)	0.05	mg/L
1,2,4-Trichlorobenzene	0.07	mg/L
1,1,1-Trichloroethane	0.2	mg/L
1,1,2-Trichloroethane	0.005	mg/L
Trichloroethylene	0.005	mg/L
Vinyl chloride	0.002	mg/L
Xylenes (total)	10	mg/L
Radionuclides	**MCL**	**Units**
Beta particles and photon emitters	4	mrem/yr
Gross alpha particle activity	15	pCi/L
Radium 226 and Radium 228 (combined)	5	pCi/L
Uranium	0.030	mg/L

NOTES: EPA = Enviromental Protection Agency
*action level concentrations which trigger systems into taking treatment steps if 10 percent of tap water samples exceed the value
**New Mexico Drinking Water Standard only, EPA removed nickel in 1995
MCL = Maximum Contaminant Level
mg/L = milligram per liter; ml = milliliter
MFL= Micro-fibers per liter
mrem/yr = millirem per year
pCi/L = picocurie per liter

TABLE 9-9. EPA Secondary Drinking Water Supply Standards

Contaminant	Level
Aluminum	0.05 to 0.2 mg/L
Chloride	250 mg/L
Color	15 color units
Copper	1.0 mg/L
Corrosivity	Non-corrosive
Fluoride	2.0 mg/L
Foaming agents	0.5 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Odor	3 threshold odor number
pH	6.5-8.5
Silver	0.1 mg/L
Sulfate	250 mg/L
Total dissolved solids (TDS)	500 mg/L
Zinc	5 mg/L

NOTES: EPA = Environmental Protection Agency
mg/L = milligram per liter
pH = potential of hydrogen (acidity)

TABLE 9-10. New Mexico Water Quality Control Commission (NMWQCC) Standards for Groundwater of 10,000 mg/L total dissolved solid (TDS) Concentration or Less

Contaminant	NMWQCC Standard	Units
A. Human Health Standards		
Arsenic	0.1	mg/L
Barium	1.0	mg/L
Cadmium	0.01	mg/L
Chromium	0.05	mg/L
Cyanide	0.2	mg/L
Fluoride	1.6	mg/L
Lead	0.05	mg/L
Total Mercury	0.002	mg/L
Nitrate (as N)	10.0	mg/L
Selenium	0.05	mg/L
Silver	0.05	mg/L
Uranium	5.0	mg/L
Radioactivity: Radium-226 & Radium 228	30.0	pCi/L
Benzene	0.01	mg/L
Polychlorinated biphenyls (PCB's)	0.001	mg/L
Toluene	0.75	mg/L
Carbon Tetrachloride	0.01	mg/L
1,2-dichloroethane (EDC)	0.01	mg/L
1,1-dichloroethylene (1,1-DCE)	0.005	mg/L
1,1,2,2-tetrachloroethylene (PCE)	0.02	mg/L
1,1,2- trichloroethylene (TCE)	0.1	mg/L
Ethylbenzene	0.75	mg/L
Total Xylene	0.62	mg/L
Methylene Chloride	0.1	mg/L
Chloroform	0.1	mg/L
1,1 –dichloroethane	0.025	mg/L
Ethylene dibromide (EDB)	0.0001	mg/L
1,1,1 –trichloroethane	0.06	mg/L
1,1,2 –trichloroethane	0.01	mg/L
1,2,2,2 –tetrachloroethane	0.01	mg/L
Vinyl Chloride	0.001	mg/L
PAHs: total naphtalene + monomethylnapthalenes	0.03	mg/L
Benzo(a)pyrene	0.0007	mg/L
B. Other Standards for Domestic Water Supply		
Chloride	250.0	mg/L
Copper	1.0	mg/L
Iron	1.0	mg/L
Manganese	0.2	mg/L
Phenols	0.005	mg/L
Sulfate	600.0	mg/L
Total Disolved Solids	1000.0	mg/L
Zinc	10.0	mg/L
pH	Between 6 and 9	

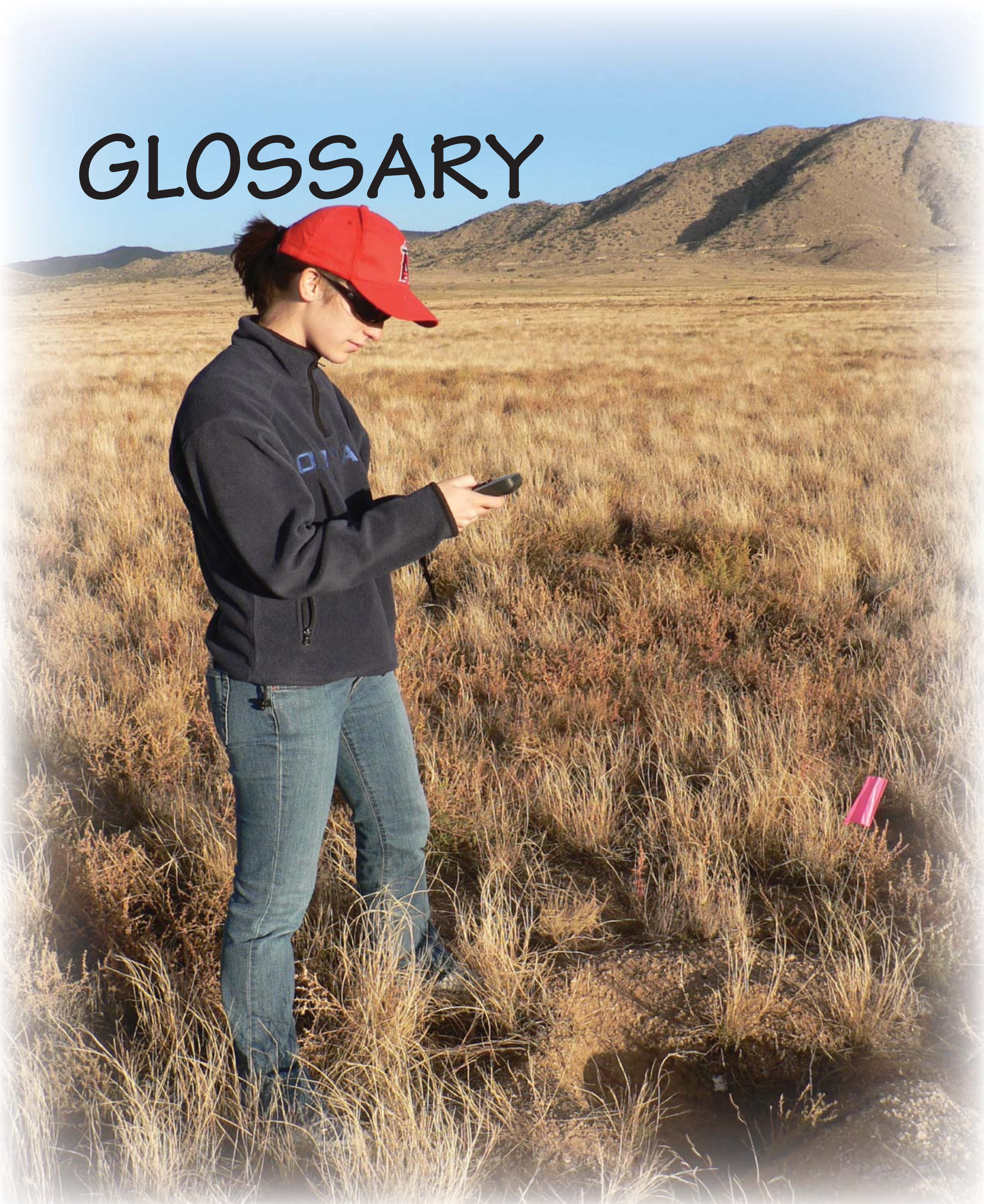
NOTES: mg/L = milligram per liter
MAC = maximum allowable concentration
pH = potential of hydrogen (acidity)
pCi/L = picocurie per liter

TABLE 9-10. New Mexico Water Quality Control Commission (NMWQCC) Standards for Groundwater of 10,000 mg/L total dissolved solid (TDS) Concentration or Less *(concluded)*

Contaminant	NMWQCC Standard	Units
C. Standards for Irrigation Use – Groundwater shall meet the standards of Subsection A,B, and C unless other wise provided		
Aluminum	5.0	mg/L
Boron	0.75	mg/L
Cobalt	0.05	mg/L
Molybdenum	1.0	mg/L
Nickel	0.2	mg/L

NOTES: mg/L = milligram per liter
MAC = maximum allowable concentration
pCi/L = picocurie per liter

GLOSSARY



"Tess Goering taking GPS Coordinates at SNL/NM"   Photo by Jennifer Payne.

This page intentionally left blank.

A

Abatement – Reducing the degree or intensity of, or eliminating, pollution.

Absorbent material – a material having capacity or tendency to absorb another substance.

Absorption – The uptake of water, other fluids, or dissolved chemicals by a cell or an organism (as tree roots absorb dissolved nutrients in soil.)

Alluvial – Relating to and/or sand deposited by flowing water.

Ambient air – Any unconfined portion of the atmosphere: open air, surrounding air.

Analyte – A substance or chemical constituent that is undergoing analysis.

Antimony – A metallic element having four allotropic forms, the most common of which is a hard, extremely brittle, lustrous, silver-white, crystalline material. It is used in a wide variety of alloys, especially with lead in battery plates, and in the manufacture of flame-proofing compounds, paint, semiconductor devices, and ceramic products.

Appraisal – A documented activity performed according to written procedures and specified criteria to evaluate the compliance and conformance of an organization with programs, standards, and other requirements contained in orders, laws, and regulations, or other requirements invoked by SNL.

Aquifer – An underground geological formation, or group of formations, containing water. A source of groundwater for wells and springs.

Arroyo – A deep gully cut by an intermittent stream; a dry gulch.

Asbestos – A mineral fiber that can pollute air or water and cause cancer or asbestosis when inhaled. Uses for asbestos-containing material include, but are not limited to, electrical and heat insulation, paint filler, reinforcing agents in rubber and plastics (e.g., tile mastic), and cement reinforcement.

Attenuation – The process by which a compound is reduced in concentration over time, through absorption, adsorption, degradation, dilution, and/or transformation. Can also be the decrease with distance of sight caused by attenuation of light by particulate pollution.

Audit – 1. An examination of records or financial accounts to check their accuracy. 2. An adjustment or correction of accounts. 3. An examined and verified account.

B

Background radiation – Relatively constant low-level radiation from environmental sources such as building materials, cosmic rays, and ingested radionuclides in the body.

Basin – 1. A low-lying area, wholly or largely surrounded by higher land, that varies from a small, nearly enclosed valley to an extensive, mountain-rimmed depression. 2. An entire area drained by a given stream and its tributaries. 3. An area in which the rock strata are inclined downward from all sides toward the center. 4. An area in which sediments accumulate.

Best Management Practice (BMP) – The preferred methods and practices for managing operations.

Biological niche – A role played by a species in the environment.

Biota – The animal and plant life of a given region.

Borehole – A hole created or enlarged by a drill or auger. Also known as drill hole.

C

Catchment basin – The geographical area draining into a river or reservoir.

Cesium-137 – A radioactive isotope of cesium used in radiation therapy and found in atmospheric fallout.

Commercial solid waste –Includes all types of solid waste generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential, household and industrial wastes. At SNL, such waste includes office trash, packaging material, empty containers, cardboard, newspaper, broken glass, and food debris.

Coniferous forest – A type of forest characterized by cone-bearing, needle-leaved trees.

Containment – An enclosed space or facility to contain and prevent the escape of hazardous material.

Containment cell – An engineered structure designed to contain and prevent the migration of hazardous waste.

Contamination – Introduction into water, air, and soil of microorganisms, chemicals, toxic substances, wastes, or wastewater in a concentration that makes the medium unfit for its next intended use. Also applies to surfaces of objects, buildings, and various household and agricultural use products.

Corporate Work Process (CWP) – A five-element process for managing and performing work that applies to all activities, facilities, organizations, and employees.

Corrective action – 1. EPA can require treatment, storage and disposal (TSDF) facilities handling hazardous waste to undertake corrective actions to clean up spills resulting from failure to follow hazardous waste management procedures or other mistakes. The process includes cleanup procedures designed to guide TSDFs toward in spills. 2. An action identified to correct a finding that, when completed, fixes the problem or prevents recurrence.

CSU-enabled Energy Star Operations - means the equipment (monitors) go into "sleep" (low energy) mode when inactive for a set period of time.

D

Data Quality Objectives (DQO) – Following a strategic, systematic process for planning scientific data collection efforts.

Decontamination – Removal of harmful substances such as noxious chemicals, harmful bacteria or other organisms, or radioactive material from exposed individuals, rooms and furnishings in buildings, or the exterior environment.

Demolition – The act or process of wrecking or destroying, especially destruction by explosives.

Discharge – Any liquid or solid that flows or is placed on or onto any land or into any water. This includes precipitation discharges to the storm drains, accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of any material or substance on or into any land or water.

Discharge limits – The maximum concentration of a specified pollutant allowed to be discharged in a volume of water or wastewater.

Discharge point – The site or location of a release, flow or runoff of any waste governed by regulation.

Diurnal – 1. Relating to or occurring in a 24-hour period; daily. 2. Occurring or active during the daytime rather than at night: diurnal animals.

Dosimeter – A device used to measure the dose of ionizing radiation received by an individual.

Drawdown – 1. The drop in the water table or level of water in the ground when water is being pumped from a well. 2. The amount of water used from a tank or reservoir. 3. The drop in the water level of a tank or reservoir.

E

Ecology – The relationship of living things to one another and their environment, or the study of such relationships.

Ecosystem – The interacting system of a biological community and its non-living environmental surroundings.

Effective Dose Equivalent (EDE) – The weighted average of dose equivalents in certain organs or tissues of the body; this can be used to estimate the health-effects risk of the exposed individual.

Effluent – Wastewater (treated or untreated) that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

Electroplating – To coat or cover with a thin layer of metal by electrodeposition.

Energy Star Operations - means the equipment (monitors) go into "sleep" (low energy) mode when inactive for a set period of time. (CSU enabled)

Environment – The sum of all external conditions affecting the life, development and survival of an organism.

Environment, Safety and Health (ES&H) – A program designed to protect and preserve the environment and to ensure the safety and health of its employees, contractors, visitors, and the public.

Environmental Assessment (EA) – An environmental analysis prepared pursuant to the National Environmental Policy Act (NEPA) to determine whether a federal action would significantly affect the environment and thus require a more detailed environmental impact statement.

Environmental Impact Statement (EIS) – A document required of federal agencies by the National Environmental Policy Act for major projects or legislative proposals significantly affecting the environment. A tool for decision making, it describes the positive and negative effects of the undertaking and cites alternative actions.

Environmental Management – A program designed to maintain compliance with EPA, state, local and DOE requirements.

Environmental Management System (EMS) – A continuing cycle of planning, evaluating, implementing, and improving processes and actions undertaken to achieve environmental goals.

Environmental Monitoring – The collection and analysis of samples or direct measurements of environmental media such as air, water, and soil.

Environmental Restoration (ER) – A project chartered with the assessment and, if necessary, the remediation of inactive waste sites.

ER site – Any location listed on the environmental restoration ER site list that has been identified as an area that is (or may be) contaminated-either on or beneath the land surface-as a result of SNL operations. Contaminants may be chemicals, radioactive material, or both.

Environmental surveillance – A program including surveys of soil and vegetation, water sampling and analysis, in an attempt to identify and quantify long-term effects of pollutants resulting from SNL operations.

Electronic Product Environmental Assessment Tool (EPEAT) - Is a set of criteria in eight different electronic to determine the environmental attributes of a particular electronic office product. At this point, EPEAT is only targeting computer desktops/towers, notebook computers (laptops) and monitors.

Ephemeral stream – A stream channel which carries water only during and immediately after periods of rainfall or snowmelt.

Exceedance – Violation of the pollutant levels permitted by environmental protection standards.

Explosive waste – Any explosive substance, article, or explosive-contaminated item that cannot be used for its intended purpose and does not have a legitimate investigative or research use.
Examples include:

- unstable explosive substances or articles
- wipes, filters, or debris contaminated with explosives
- scraps, cuttings, chips, fines, etc. from plastic, composite, or sheet explosives
- explosives dissolved in solvents
- damaged or misfired explosive articles
- small quantities of bulk explosives, pyrotechnics, and propellants for which there are no known reapplication uses

Any of the above examples that have an investigative or research use are not waste until the owner determines that there is no further legitimate need or use for them.

F

Fault – A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth’s crust, in which adjacent surfaces are displaced relative to one another and parallel to the plane of fracture.

Fauna – 1. Animals, especially the animals of a particular region or period, considered as a group. 2. A catalog of the animals of a specific region or period.
Flora – 1. Plants. 2. The plant life characterizing a specific geographic region or environment.

Flow channel – the part of a stream bed that is occupied by water under normal flow conditions

G

Gamma Radiation – very high-energy/high-frequency electromagnetic radiation that is emitted by the nuclei of radioactive substances during decay, or by the interactions of high-energy electrons with matter. They are similar to, but have a shorter wavelength, than X-rays.

Geology – The scientific study of the origin, history, and structure of the earth.

Groundwater – The supply of fresh water found beneath the Earth's surface, usually in aquifers, which supply wells and springs. Because ground water is a major source of drinking water, there is growing concern over contamination from leaching agricultural or industrial pollutants or leaking underground storage tanks.

H

Hazardous substance – 1. Any material that poses a threat to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive. 2. Any substance designated by EPA to be reported if a designated quantity of the substance is spilled in the waters of the United States or is otherwise released into the environment.

Hazardous waste – Waste that meets any of the following conditions:

- on analysis, exhibits any characteristicsof a hazardous waste as defined in 40 CFR 261Subpart C
- has been named as a hazardous waste and is listed as such in 40 CFR 261 Subpart D
- a mixture containing a listed hazardous waste and a nonhazardous solid waste
- a waste derived from the treatment, storage, or disposal of a listed hazardous waste
- not excluded from regulation as hazardous waste
- defined as hazardous waste by specific state regulations

Hazardous waste landfill – An excavated or engineered site where hazardous waste is deposited and covered.

Hazardous waste site – Any facility or location at which hazardous waste operations take place.

Herbicides – A chemical pesticide designed to control or destroy plants, weeds, or grasses.

High-Level Radioactive Waste (HLW) – Waste generated in core fuel of a nuclear reactor, found at nuclear reactors or by nuclear fuel reprocessing; is a serious threat to anyone who comes near the waste without shielding.

Hydrology – The science dealing with the properties, distribution, and circulation of water.

I

Illicit discharges – The absolute prohibitions against the release of certain substances.

Implementation Plan (IP) – The plan developed by the Operational Readiness Review (ORR) or Readiness Assessment (RA) team that describes the specifics of approach, schedule, methodology, team members and their qualifications, and reporting requirements of the ORR or RA. The Implementation Plan (IP) is used by the team leader to execute the ORR or RA.

Industrial discharges – The absolute prohibitions against the release of certain substances.

Inertial-confinement fusion – A method of controlled fusion in which the rapid implosion of a fuel pellet, produced by laser, electron, or ion beams, raises the temperature and density of the pellet core to levels at which nuclear fusion can take place before the pellet flies apart.

Infiltration – 1. The penetration of water through the ground surface into sub-surface soil or the penetration of water from the soil into sewer or other pipes through defective joints, connections, or manhole walls. 2. The technique of applying large volumes of waste water to land to penetrate the surface and percolate through the underlying soil.

Inhalation hazard – Risk from materials or chemicals that present a hazard if respired (inhaled) into the lungs.

Insecticides – A pesticide compound specifically used to kill or prevent the growth of insects.

Integrated Laboratories Management System (ILMS) – Framework for all management requirements at Sandia. It represents the complete set of policy, business rules, practices, and information that establishes Sandia's business expectations and intent.

Integrated Safety Management System (ISMS) Systematically integrates safety into management and work practices at all levels so that missions are accomplished while protecting the worker, the public, and the environment.

L

Lagoons – 1. A shallow pond where sunlight, bacterial action, and oxygen work to purify wastewater; also used for storage of wastewater. 2. Shallow body of water, often separated from the sea by coral reefs or sandbars.

Landfill – 1. Sanitary landfills are disposal sites for non-hazardous solid wastes spread in layers, compacted to the smallest practical volume, and covered by material applied at the end of each operating day. 2. Secure chemical landfills are disposal sites for hazardous waste, selected and designed to minimize the chance of release of hazardous substances into the environment.

Leachate – Water that collects contaminants as it trickles through wastes, pesticides or fertilizers. Leaching may occur in farming areas, feedlots, and landfills, and may result in hazardous substances entering surface water, ground water, or soil.

Leached – The process by which soluble constituents are dissolved and filtered through the soil by a percolating fluid.

Legacy contamination – Contamination that remains after facilities, operations, or activities that created it have gone out of existence or ceased, often resulting in an orphan site in need of remediation or institutional control.

Line management – The process of managing workers through individual Integrated Job Structure assignments (i.e., work titles) and contractor positions that support SNL's mission core processes and enabling processes.

Long-Term Environmental Stewardship (LTS)– Activities necessary to maintain long-term protection of human health and the environment from hazards posed by residual radioactivity and chemically hazardous materials.

Low-Level Radioactive Waste (LLW) – Wastes less hazardous than most of those associated with a nuclear reactor; generated by hospitals, research laboratories, and certain industries. The Department of Energy, Nuclear Regulatory Commission, and EPA share responsibilities for managing them.

Low-Temperature Thermal Desorption (LTTD) – A process of removing organic compounds from soil by heating it and causing the organics to volatilize and/or decompose. The volatilized compounds may be further degraded by after burning or catalysis.

M

Maximally Exposed Individual (MEI) – The location of a member of the public which receives or has the potential to receive the maximum radiological dose from air emissions of a National Emissions Standards for Hazardous Air Pollutants (NESHAP) radionuclide source.

Migratory birds – All birds listed within the Migratory Bird Treaty Act, 50 CFR 10.13, or which are a mutation or hybrid of any such species, including any part, nest, or egg.

Mixed Analyte Performance Evaluation Program (MAPEP) – The MAPEP is used by the DOE as a quality assurance tool for environmental analytical services across the DOE Complex. It includes radiological, stable inorganic, and organic constituents (i.e., mixed analytes) in the same single-blind sample for analytical performance evaluation. The samples use various matrices including soils, water, vegetation, and air filters. MAPEP samples are not a mixed waste.

Mixed Low-Level Waste (MLLW) – Waste containing both hazardous and low-level radioactive components. Mixed waste – Radioactive waste that contains both source material, special nuclear material, or by-product material subject to the Atomic Energy Act of 1954, as amended; and a hazardous component subject to the Resource Conservation and Recovery Act (RCRA), as amended.

Mixed waste generator – Any person or organization generating mixed waste or causing a material to be subject to mixed waste regulations. Generators are responsible for the generation and subsequent management of mixed waste as part of their occupation or position. Generators may include managers, their employees, and contractors.

N

National Emissions Standards for Hazardous Air Pollutants (NESHAP) – Emissions standards set by EPA for an air pollutant not covered by NAAQS that may cause an increase in fatalities or in serious, irreversible, or incapacitating illness. Primary standards are designed to protect human health, secondary standards to protect public welfare (e.g. building facades, visibility, crops, and domestic animals).

National Environmental Policy Act (NEPA) – The basic national charter for protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy.

National Pollutant Discharge Elimination System (NPDES) – A provision of the Clean Water Act which prohibits discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state, or, where delegated, a tribal government on an Indian reservation.

Natural resources – Resources (actual and potential) supplied by nature.

Nitrates – A compound containing nitrogen that can exist in the atmosphere or as a dissolved gas in water and which can have harmful effects on humans and animals. Nitrates in water can cause severe illness in infants and domestic animals. A plant nutrient and inorganic fertilizer, nitrate is found in septic systems, animal feed lots, agricultural fertilizers, manure, industrial waste waters, sanitary landfills, and garbage dumps.

Nitrites – 1. An intermediate in the process of nitrification. 2. Nitrous oxide salts used in food preservation.

Nitrogen Dioxide – A poisonous brown gas, NO2, often found in smog and automobile exhaust fumes and synthesized for use as a nitrating agent, a catalyst, and an oxidizing agent.

Non-Methane Hydrocarbon (NMHC) – The sum of all hydrocarbon air pollutants except methane; significant precursors to ozone formation.

Non-radiological contaminants – A source of contamination that has no radiological components.

Nuclear energy – The energy released by a nuclear reaction.

Nuclear particle acceleration – Imparting large kinetic energy to electrically charged sub-atomic nuclear particles (e.g., protons, deuterons, electrons) by applying electrical potential differences for the purpose of physics experiments.

O

Outfalls – The place where effluent is discharged into receiving waters.

Overland surface flow – A land application technique that cleanses waste water by allowing it to flow over a sloped surface. As the water flows over the surface, contaminants are absorbed and the water is collected at the bottom of the slope for reuse.

Ozone – A colorless gas (O3) soluble in alkalis and cold water; a strong oxidizing agent; can be produced by electric discharge in oxygen or by the action of ultraviolet radiation on oxygen in the stratosphere (where it acts as a screen for ultraviolet radiation).

P

PM10 – Particulate matter (diameter equal to or less than 10 microns).

PM2.5 – Respirable particulate matter (diameter equal to or less than 2.5 microns)

Passive soil vapor – Used in the context of soil gas sampling by placing a porous material into contact with the soil. Gases present in the soil will adsorb to the material. The porous material is removed from the soil after a sufficient time of exposure and sent to a laboratory for analysis of the adsorbed gases.

Perched groundwater – Groundwater that is unconfined and separated from an underlying main body of groundwater by an unsaturated zone (also known as perched water).

Perennial spring – A spring that flows continuously, as opposed to an intermittent spring or periodic spring.

Physiography – The study of the natural features of the earth's surface, especially in its current aspects, including land formation, climate, currents, and distribution of flora and fauna (also called physical geography).

Piezometer – An instrument for measuring pressure, especially high pressure.

Point source – A stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g. a pipe, ditch, ship, ore pit, factory smokestack.

Point source discharges – Any discernible, confined, and discrete conveyance from which pollutants are or may be discharged.

Pollutant – Generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.

Pollutant, water – Defined by the Environmental Protection Agency (EPA) as any physical, chemical, biological, or radiological substance that has an adverse affect on water.

Pollution Prevention (P2) – The use of materials, processes, and practices that reduce or eliminate the generation and release of pollutants, contaminants, hazardous substances, and waste into land, water, and air. For DOE, this includes recycling.

Polychlorinated biphenyls – PCB" and "PCBs" are chemical terms limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances that contains such substance. Because of their persistence, toxicity, and ecological damage via water pollution, their manufacture was discontinued in the U.S. in 1976.

Potable Water – Water free from impurities present in quantities sufficient to cause disease or harmful physiological effects.

Practical Quantitation Limit (PQL) – The lowest level of analytical determination that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

Pulsed power – Technology is used to generate and apply energetic beams and high-power energy pulses.

Q

Quality Assurance (QA) – A system of procedures, checks, audits, and corrective actions to ensure that all EPA research design and performance, environmental monitoring and sampling, and other technical and reporting activities are of the highest achievable quality.

Quality Control (QC) – Used in determining analytical accuracy, precision, and contamination when samples are collected , and to assess the quality and usability of the data.

R

Radiation-generating device (RGD) – Collective term for devices which produce ionizing radiation, sealed sources which emit ionizing radiation, small particle accelerators used for single-purpose applications which produce ionizing radiation (e.g., radiography), and electron-generating devices that produce x-rays incidentally.

Radioactive waste – Any waste that emits energy as rays, waves, streams or energetic particles. Radioactive materials are often mixed with hazardous waste, from nuclear reactors, research institutions, or hospitals.

Radiological Contaminants – Radioactive material deposited in any place where it is not desired, particularly where its presence may be harmful.

Radionuclide – Radioactive particle, man-made (anthropogenic) or natural, with a distinct atomic weight number. Can have a long life as soil or water pollutant.

Radon – A colorless naturally occurring, radioactive, inert gas formed by radioactive decay of radium atoms in soil or rocks.

Reportable quantity (RQ) – Quantity of material or product compound or contaminant which when released to the environment is reportable to a regulatory agency.

Rodenticides – A chemical or agent used to destroy rats or other rodent pests, or to prevent them from damaging food, crops, etc.

S

Sample Management Office (SMO) – An SNL office that manages environmental analytical laboratory contracts and assists with the processing and tracking of samples undergoing chemical and radiochemical analyses performed at these laboratories.

Sampling and Analysis Plan (SAP) – A plan containing various criteria required for conducting sampling activities.

Sanitary discharges – The portion of liquid effluent exclusive of industrial wastewater and storm water. The liquid discharges from rest rooms and food preparation activities.

Screened intervals – The section of water well piping below ground that is perforated or in some manner made porous to allow water to enter the interior of the casing and prohibit the entry of sand and rocks.

Seasonal recharge – Recharge of groundwater during and after a wet season, with a rise in the level of the water table.

Secondary containment – Any structure or device that has been installed to prevent leaks, spills, or other discharges of stored chemicals, waste, oil, or fuel from storage, transfer, or end-use equipment from being released to the environment. Examples of secondary containment include pans, basins, sumps, dikes, berms, or curbs.

Semi-confined aquifer – An aquifer partially confined by soil layers of low permeability through which recharge and discharge can still occur.

Semi-volatile organic compounds – Organic compounds that volatilize slowly at standard temperature (20 degrees C and 1 atm pressure).

Solid waste – 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.

Sieve – A utensil of wire mesh or closely perforated metal, used for straining, sifting, ricing, or puréeing.

Statement Of Work (SOW) – A comprehensive description of the goods, services, or combination of goods and services for which SNL contracts.

Storm water – Water runoff from rainfall or snowmelt, including that discharged to the sanitary sewer system.

Sulfur Dioxide – A colorless, extremely irritating gas or liquid, SO2, used in many industrial processes, especially the manufacture of sulfuric acid.

Surface discharge – Spilling, leaking, pumping, pouring, emitting, emptying, or dumping into water or in a location and manner where there is a reasonable probability that the discharged substance will reach surface or subsurface water.

Site-Wide Environmental Impact Statement (SWEIS) – A detailed public document, for which a federal agency is responsible, that provides analysis of the expected impacts on the human environment of a proposed action and alternatives to the proposed action.

T

Thermoluminescent Dosimeters – A device that monitors both the whole body and skin radiation dose to which a person has been exposed during the course of work. These same devices can also be used to measure environmental exposure rates.

Threatened and endangered species – A species present in such small numbers that it is at risk of extinction.

Time-weighted composites – A sample consisting of several portions of the user's discharge collected during a 24-hour period in which each portion of the sample is collected with a specific time frame that is irrespective of flow.

Topography – The physical features of a surface area including relative elevations and the position of natural and man-made (anthropogenic) features.

Transuranic waste (TRU) – Radioactive waste containing alpha-emitting radionuclides having an atomic number greater than 92, and a half-life greater than 20 years, in concentrations greater than 100 nCi/g.

Trihalomethanes – A chemical compound containing three halogen atoms substituted for the three hydrogen atoms normally present in a methane molecule. It can occur in chlorinated water as a result of reaction between organic materials in the water and chlorine added as a disinfectant.

Tritium – A radioactive hydrogen isotope with atomic mass 3 and half-life 12.5 years, prepared artificially for use as a tracer and as a constituent of hydrogen bombs.

Toxic (chemicals) – Any chemical listed in EPA rules as "Toxic Chemicals Subject to Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986."

Turbidity – 1. Haziness in air caused by the presence of particles and pollutants. 2. A cloudy condition in water due to suspended silt or organic matter.

U

USFS (U.S. Forest Service) Withdrawn Area – A portion of Kirtland Air Force Base consisting of land within the Cibola National Forest, which has been withdrawn from public access for use by the US Air Force and the US Department of Energy.

Unconsolidated basin sediment – 1. A sediment that is loosely arranged or unstratified, or whose particles are not cemented together, occurring either at the surface or at depth. 2. Soil material that is in a loosely aggregated form.

Underground Storage Tank (UST) – A single tank or a combination of tanks, including underground pipes connected thereto, which are used to contain an accumulation of regulated substances, such as petroleum products, mineral oil, and chemicals, and the volume of which, including the volume of underground pipes connected thereto, is 10% or more beneath the surface of the ground.

Up-gradient – In the direction of higher water levels.

Upstream – In, at, or toward the source of a stream.

Uranium – A heavy silvery-white metallic element, radioactive and toxic, easily oxidized, and having 14 known isotopes of which U 238 is the most abundant in nature. The element occurs in several minerals, including uraninite and carnotite, from which it is extracted and processed for use in research, nuclear fuels, and nuclear weapons.

V

Vadose zone – The zone between land surface and the water table within which the moisture content is less than saturation (except in the capillary fringe) and pressure is less than atmospheric. Soil pore space also typically contains air or other gases. The capillary fringe is included in the vadose zone.

Vanadium – A bright white, soft, ductile metallic element found in several minerals, notably vanadinite and carnotite, having good structural strength and used in rust-resistant high-speed tools, as a carbon stabilizer in some steels, as a titanium-steel bonding agent, and as a catalyst.

Volatile Organic Compound (VOC) – Any organic compound that participates in atmospheric photochemical reactions except those designated by EPA as having negligible photochemical reactivity.

W

Waste characterization – Identification of chemical and microbiological constituents of a waste material.

Waste management – The processes involved in dealing with the waste of humans and organisms, including minimization, handling, processing, storage, recycling, transport, and final disposal.

Wastewater – The spent or used water from a home, community, farm, or industry that contains dissolved or suspended matter. Water Pollution: The presence in water of enough harmful or objectionable material to damage the water's quality.

Water-bearing strata – Ground layers below the standing water level.

Watershed – The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point.

Water table – The level of groundwater.

Wetland – An area that is saturated by surface or ground water with vegetation adapted for life under those soil conditions, as swamps, bogs, fens, marshes, and estuaries.

Wind rose – A wind rose is a graphical presentation of wind speed and direction frequency distribution.
ground water with vegetation adapted for life under.

Playa lake - A nearly level area at the bottom of an undrained desert basin, sometimes temporarily covered with water.

UNLIMITED RELEASE DISTRIBUTION

U.S Department of Energy

U.S. Department of Energy/NNSA (15)
Sandia Site Operations (SSO)
Office of Environment, Safety and Health
Attn: Karen Agogino
P.O. Box 5400
Albuquerque, NM 87185-5400

U.S. Department of Energy/HQ (1)
Immediate Office of the Chief Health, Safety and Security Officer
HS-1/Forrestal Building
Attn: Glenn S. Podonsky
19901 Germantown Road
Germantown, MD 20874

U.S. Department of Energy/HQ (1)
Director, Office of Nuclear Safety and Environment
HS-30/Forrestal Building
Attn: Andrew C. Lawrence
1000 Independence Ave.
Washington, DC 20585

U.S. Department of Energy/HQ (1)
Director, Office of Independent Oversight
HS-60/Forrestal Building
Attn: Bradley A. Peterson
19901 Germantown Road
Germantown, MD 20874

U.S. Department of Energy/HQ (1)
Immediate Office of the Administrator, Senior Advisor for Environment, Safety and Health
NA-1/Forrestal Building
Attn: Frank B. Russo
1000 Independence Ave., S.W.
Washington, DC 20585

U.S. Department of Energy/HQ (1)
Director, Office of Operations Oversight (EM-62)
Attn: Robert Goldsmith
19901 Germantown Road
Germantown, MD 20874

U.S. Department of Energy/HQ (3)
Office of Analysis (HS-32)
Attn: Ross Natoli
1000 Independence Ave. SW
Washington, DC 20585

U.S. Department of Energy/HQ (1)
Director, Scientific and Technical Information (SC-44)
Attn: Walter Warnick
19901 Germantown Road
Germantown, MD 20874

U.S. Department of Energy/HQ (2)
Director, Office of Management Analysis and Process Management (EM-6)
Attn: James Fiore
19901 Germantown Road
Germantown, MD 20874

U.S. Department of Energy/HQ (1)
Associate Administrator for Infrastructure and Environment
NA-50/Forrestal Building
Attn: Alice Williams
1000 Independence Ave.
Washington, DC 20585

U.S. Department of Energy/HQ (1)
Director, Office of Corporate Safety Programs
HS-31/270CC
Attn: Charles B. Lewis
19901 Germantown Road
Germantown, MD 20874

U.S. Department of Energy/HQ (1)
Director Office of Scientific and Technical Information (SC-44)
Attn: Walter Warnick
19901 Germantown Road
Germantown, MD 20874

UNLIMITED RELEASE DISTRIBUTION *(continued)*

U.S. Department of Energy/NNSA (2)
NNSA Service Center (NNSA/SC)
Environmental Safety and Health Department
Attn: Deborah Griswold
P.O. Box 5400
Albuquerque, NM 87185-5400

U.S. Department of Energy/NNSA (CD only)
Nevada Site Office (NSO)
Attn: Bruce Hurley
P.O. Box 98518
Las Vegas, NV 89193-8518

State and Other Federal Agencies

Environmental Protection Agency (1)
Region VI Office
Fountain Place 12th Floor
1445 Ross Ave., Suite 1200
Dallas, TX 75202-2733

Albuquerque City Environmental
Health Department (1)
1 Civic Plaza NW
Albuquerque, NM 87102

New Mexico Environment Department/DOE (2)
Attn: Tom Skibitski
DOE Oversight Bureau
Mail Stop 1396
P.O. Box 5400
Albuquerque, NM 87185-5400

New Mexico Environment Department (2)
Hazardous Waste Bureau
Attn: John Kieling
2905 Rodeo Park Rd. E Bldg. 1
Santa Fe, New Mexico 87505

Brent A. Pulsipher (1)
Pacific Northwest National Laboratory
902 Battelle Blvd.
P.O. Box 999 / MS K5-12
Richland, WA 99352

N.W. Golchert (1)
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

Jim Piatt, Director (1)
Isleta Environment Department
P.O. Box 1270
Isleta, NM 87022

Environmental Protection Agency (1)
Headquarters Office
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Other Individuals and Organizations

John Pike (1)
2050 Wyoming Blvd. SE
377 SPTG/CEVQ
Kirtland AFB, NM 87117-5270

John Dietrich (1)
Lockheed-Martin Corporation
6801 Rockledge Drive
Mail Stop DM315
Bethesda, MD 20817

Priscilla McIntosh (1)
Congressional Information Service, Inc.
4520 East West Highway
Suite 800
Bethesda, MD 20814-3389

UNM – Valencia Campus (1)
280 La Entrada
Los Lunas, NM 87031

UNM – LANL Campus (1)
4000 University Drive
Los Alamos, NM 87544

Anderson School of Management (1)
1 University of New Mexico, MSC05 3090
Albuquerque, NM 87131-0001

College of Santa Fe (1)
1600 St. Michael's Drive
Santa Fe, NM 87505

Steve Rohrer (1)
Lovelace Respiratory Research Institute
2425 Ridgecrest Drive SE
Albuquerque, NM 87108-5127

Margaret Lindeman (1)
Lockheed-Martin Corporation
6801 Rockledge Drive
Mail Point CLE610
Bethesda, MD 20817

Dan Barkley (1 CD)
Government Information Department
Zimmerman Library-UNM
1 University of New Mexico MSC05 3020
Albuquerque, NM 87131-0001

CNM – Montoya Campus (1)
4700 Morris NE
Albuquerque, NM 87111

CNM – Main Campus (1)
525 Buena Vista SE
Albuquerque, NM 87106-4096

CNM – South Valley Campus (1)
5816 Isleta Boulevard SW
Albuquerque, NM 87105

UNLIMITED RELEASE DISTRIBUTION *(concluded)*

Sandia National Laboratories Distribution

1	(MS 0124)	P. Newman, 4100
1	(MS 0140)	S. J. Ward, 4020
2	(MS 0141)	A. Blumberg, 11100*
3	(MS 0165)	T.A. Wolff, 3600
1	(MS 0434)	J. Harris, 12334
1	(MS 0612)	M. L. O'Canna, 9532
1	(MS 0651)	ES&H Customer-Funded Record Center, 4532
1	(MS 0724)	L. Shephard, 6000
1	(MS 0756)	P. Puissant, 4133
1	(MS 0777)	A. Villareal, 4113
1	(MS 0781)	M. Irwin, 6411*
1	(MS 0890)	A. Bendure, 4124
1	(MS 0890)	K. Armstrong, 4112*
2	(MS 0899)	Technical Library, 4536
2	(MS 0899)	Central Technical Files, 8944
1	(MS 1042)	B. Bailey-White, 4131*
1	(MS 1042)	L. Bayliss, 4133
1	(MS 1042)	J. M. Bonaguidi, 4133
1	(MS 1042)	T. Cooper, 4133
1	(MS 1042)	R. Deola, 4133
1	(MS 1042)	M. L. du Mond, 4133*
1	(MS 1042)	J. L. Eckstein, 4133*
1	(MS 1042)	T. Fitzgerald, 4131*
1	(MS 1042)	S. Hwang, 4131
1	(MS 1042)	A. K. Jones, 4133
10	(MS 1042)	S. Koss, 4131
1	(MS 1042)	F. C. Lauffer, 4133**
1	(MS 1042)	M. L. Miller, 4133**
1	(MS 1042)	J. Mizner, 4131
1	(MS 1042)	E. Otto, 4131*
1	(MS 1042)	J. Payne, 4133
1	(MS 1042)	A. Reiser, 4133*
1	(MS 1042)	C. Roma, 4133
1	(MS 1042)	R. V. Sanchez, 4131
1	(MS 1042)	K. Wagner, 4131
5	(MS 1043)	ES&H Library, 10313
1	(MS 1089)	T. Jackson, 4133*
1	(MS 1089)	D. Schofield, 4133
1	(MS 1089)	M. Skelly, 6765*
1	(MS 1103)	W. J. Suderman, 4139
1	(MS 1112)	D. Castillo, 4139
1	(MS 1122)	G. King, 10264
1	(MS 1151)	L. Gonzales, 4139*
1	(MS 1172)	J. Jarry, 5419
1	(MS 1172)	A. Lopez, 5419**
1	(MS 1172)	N. Nitta, 54191
1	(MS 1231)	S. Yesner, 5210
1	(MS 1392)	W. Forston, 2915
1	(MS 1392)	V. Hermansen, 2915
1	(MS 1454)	M. L. Jones, 2712
1	(MS 1491)	F. March, 9751
1	(MS 9221)	J. Irwin, 10010
1	(MS 0651)	D. Castellano, 9532*

NOTE: *Require CD copies of this report
**Require CD and published copies of this report.

APPENDIX A

2007 WASTEWATER MONITORING RESULTS

"Keeping Records" Photo by Staff.

This page intentionally left blank.

CONTENTS

TABLES

This page intentionally left blank.

TABLE A-1. Permitted Sanitary Outfalls, March 2007
(All results in milligrams per liter [mg/L] unless otherwise noted.)

Permit Number:	2069-A		2069F-4		2069I-3		2069-K		Regulatory
Station:	**WW001**		**WW006**		**WW008**		**WW011**		**Limit**
Date Collected:	**3/20/2007**		**3/20/2007**		**3/20/2007**		**3/20/2007**		**COA**
Sample ID:	**084020-001**		**084021-001**		**084023-001**		**084024-001**		**(mg/L)**
Analyte									
Aluminum	0.293		0.19	J	0.447		0.0842	J	900
Arsenic	0.006	U	0.006	U	0.006	U	0.006	U	0.051
Boron	0.0818		0.143		0.0705		0.101		
Cadmium	0.001	U	0.001	U	0.001	U	0.001	U	0.5
Chromium	0.00243	J	0.00281	J	0.00271	J	0.00336	J	4.1
Copper	0.0214		0.028		0.0162		0.0294		5.3
Fluoride	1.41		0.56		1.82		0.699		36
Lead	0.0025	U	0.00372	J	0.00307	J	0.0025	U	1
Molybdenum	0.169		0.0942		0.143		0.0266		2
Nickel	0.0033	BJ	0.00341	BJ	0.00375	BJ	0.0046	BJ	2
Selenium	0.006	U	0.006	U	0.006	U	0.006	U	0.46
Silver	0.001	U	0.001	U	0.001	U	0.001	U	5
Zinc	0.0492	B	0.084	B	0.0338	B	0.0791	B	2.2

Permit Number:	2069-A		2069F-4		2069G-2		2069I-3		2069-K		Regulatory
Station:	**WW001**		**WW006**		**WW007**		**WW008**		**WW011**		**Limit**
Date Collected:	**3/21/2007**		**3/21/2007**		**3/21/2007**		**3/21/2007**		**3/21/2007**		**COA**
Sample ID:	**084025-001**		**084026-001**		**084022-001**		**084028-001**		**084029-001**		**(mg/L)**
Analyte											
Aluminum	1.21		0.081	J	0.081		0.495		0.176	J	900
Arsenic	0.006	U	0.0061	J	0.0061		0.00895	J	0.006	U	0.051
Boron	0.095		0.163		0.163		0.0901		0.103		
Cadmium	0.001	U	0.001	U	0.001		0.001	U	0.001	U	0.5
Chromium	0.00422	J	0.001	U	0.001		0.00383	J	0.00414	J	4.1
Copper	0.147		0.0148		0.0148		0.0355		0.0449		5.3
Fluoride	1.24		0.896		0.896		1.41		0.58		36
Lead	0.00344	J	0.0025	U	0.0025		0.00684	J	0.0025	U	1
Molybdenum	0.188		0.0935		0.0935		0.18		0.029		2
Nickel	0.00395	J	0.00144	J	0.00144		0.00357	J	0.00342	J	2
Selenium	0.006	U	0.006	U	0.006		0.006	U	0.006	U	0.46
Silver	0.001	U	0.001	U	0.001		0.001	U	0.001	U	5
Zinc	0.235	B	0.0424	B	0.0424		0.0805	B	0.156	B	

See notes at end of table.

TABLE A-1. Permitted Sanitary Outfalls, March 2007 *(concluded)*
(All results in milligrams per liter [mg/L] unless otherwise noted)

Permit Number:	**2069G-2**		**2238A**		**2238A**		**Regulatory**
Station:	**WW007**		**CINT**		**CINT**		**Limit**
Date Collected:	**3/22/2007**		**6/14/2007**		**6/18/0207**		**COA**
Sample ID:	**084027-001**		**084212-001**		**084799-001**		**(mg/L)**
Analyte							
Aluminum	0.544		ND	U	ND	U	900
Arsenic	0.006	U	0.0201		0.0221	U	0.051
Boron	0.0278	J	0.103		0.112		
Cadmium	0.001	U	ND	U	0.00124	J	0.5
Chromium	0.001	U	0.00134	J	ND	U	4.1
Copper	0.003	U	0.00586	J	0.0163		5.3
Fluoride	1.35		0.793		0.891		36
Lead	0.0025	U	ND	U	ND	U	1
Molybdenum	0.011		0.138		0.125		2
Nickel	0.001	U	ND	U	ND	U	2
Selenium	0.006	U	ND	U	0.0212		0.46
Silver	0.001	U	ND		ND	U	5
Zinc	0.00579	BJ	0.0103		0.00931	J	2.2

Permit Number:	**2069F-4**		**2069G-2**		**2069I-3**		**2238A**		**2238A**		**Regulatory**
Station:	**WW006**		**WW007**		**WW008**		**CINT**		**CINT**		**Limit**
Date Collected:	**3/19/2007**		**3/19/2007**		**3/19/2007**		**6/14/2007**		**6/18/2007**		**COA**
Sample ID:	**084030-001**		**084031-001**		**084032-001**		**084212-001**		**084799-001**		**(mg/L)**
Analyte											
Cyanide, Total	0.0103		0.0015	U	0.0029	J	Not Sampled		ND		0.45

NOTES: COA = City of Albuquerque
J = Estimated value, the analyte concentration fell above the effective (MDL) minimum detection limit and below the effective (PQL) practical quantitation limit.
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.
B = The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).
NE = Not established.

TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, March 2007

(All Results in picocuries per liter [pCi/L] unless otherwise noted.)

Permit Number:	**2069-A**			**2069F-4**			**2069I-3**			**2069-K**			**Regulatory**
Station:	**WW001**			**WW006**			**WW008**			**WW011**			**Sewer Release**
Date Collected:	**3/20/2007**			**3/20/2007**			**3/20/2007**			**3/20/2007**			**Limits***
Sample ID:	**084020-004**			**084021-004**			**084023-004**			**084024-004**			**(Monthly Avg)**
Analyte	**Activity**		**MDA**	**Activity**		**MDA**	**Activity**		**MDA**	**Activity**		**MDA**	
Actinium-228	1.51 ± 14.3	U	7.77	-9.15 ± 11.3	U	5.52	-11.8 ± 16.5	U	10	13.5 ± 7.42	U	5.39	300000
Americium-241	0.625 ± 3.99	U	3.03	-1.48 ± 8.58	U	5.42	-0.246 ± 3.25	U	2.83	9.65 ± 8.03	U	6.25	200
Antimony-124	2.09 ± 7.42	U	5.61	-1.26 ± 4.56	U	3.77	-2.06 ± 6.91	U	5.6	1.08 ± 5.16	U	4.36	NE
Antimony-125	-3.27 ± 5.97	U	4.93	2.67 ± 4.52	U	3.9	2.48 ± 6.32	U	5.44	3.64 ± 4.43	U	3.89	NE
Barium-133	-0.718 ± 3.16	U	2.31	-0.201 ± 2.44	U	1.8	-8.52 ± 4.1	U	2.27	0.168 ± 2.32	U	1.74	NE
Beryllium-7	-7.81 ± 22.9	U	18.9	-0.169 ± 17.1	U	14.4	-6.76 ± 25	U	20.7	-2.6 ± 16	U	13.5	NE
Bismuth-211	10.5 ± 24	U	10.1	4.26 ± 17.2	U	7.87	4.28 ± 21.7	U	13.3	8.76 ± 12.8	U	8.06	NE
Bismuth-212	10.3 ± 17.9	U	15.2	29.7 ± 16.9	U	12.7	-27.1 ± 38.3	U	19.7	-15.7 ± 23.7	U	11.3	NE
Bismuth-214	1.11 ± 9.32	U	4.32	2.28 ± 7.32	U	2.83	7.72 ± 10.1	U	5.31	-3.11 ± 6.98	U	3.02	NE
Cadmium-109	11.1 ± 47.8	U	30.2	25.7 ± 56.3	U	31.4	-19 ± 36.1	U	27.3	-36.1 ± 35.1	U	28.8	NE
Cerium-139	-0.653 ± 1.95	U	1.6	-2.01 ± 2.25	U	1.24	-3.08 ± 3.03	U	1.42	-0.975 ± 1.68	U	1.2	NE
Cerium-141	-4.67 ± 5.97	U	3.79	1.33 ± 6.38	U	2.99	-5.32 ± 6.11	U	3.52	-3.98 ± 5.7	U	2.91	NE
Cerium-144	-2.85 ± 12.4	U	10.3	-1.06 ± 10.3	U	8.57	-6.84 ± 11.4	U	9.32	10.7 ± 11.2	U	8.47	30000
Cesium-134	0.548 ± 2.5	U	2.17	-0.472 ± 1.81	U	1.53	0.896 ± 3.26	U	2.75	0.573 ± 1.94	U	1.49	9000
Cesium-137	-0.344 ± 2.45	U	2.01	-0.467 ± 1.66	U	1.35	1.4 ± 2.93	U	2.46	0.893 ± 1.72	U	1.4	10000
Chromium-51	-3.44 ± 28.9	U	24.7	-7.01 ± 21.6	U	18.3	-11.3 ± 29.1	U	24.6	19.2 ± 23.4	U	19.6	5000000
Cobalt-57	-1.07 ± 1.52	U	1.25	-0.591 ± 1.28	U	1.06	-0.321 ± 1.4	U	1.18	-1.05 ± 1.19	U	0.97	NE
Cobalt-60	1.09 ± 2.51	U	2.16	-0.121 ± 1.79	U	1.48	1.58 ± 3.16	U	2.69	-0.308 ± 1.78	U	1.48	30000
Europium-152	-1.57 ± 6.05	U	5.11	-2.97 ± 4.63	U	3.86	4.58 ± 6.14	U	5.41	-2.81 ± 4.73	U	3.88	NE
Europium-154	-1.93 ± 6.81	U	5.53	0.382 ± 4.48	U	3.75	5.53 ± 8.38	U	7.26	-1.58 ± 5.41	U	4.48	NE
Iron-59	0.732 ± 6.12	U	5.19	-3.5 ± 5.5	U	3.61	3.62 ± 7.04	U	6.09	0.903 ± 4.11	U	3.56	100000
Lead-211	23.6 ± 58.3	U	48.7	11.3 ± 44	U	37.1	133 ± 110	U	51.4	26.3 ± 45.4	U	37.1	NE
Lead-212	-1.55 ± 5.15	U	3.3	5 ± 6.93	U	3.5	1.33 ± 6.02	U	3.63	0.737 ± 5.85	U	2.77	20000
Lead-214	3.67 ± 8.35	U	4.05	1.48 ± 5.99	U	3.23	-1.02 ± 7.65	U	4.66	3.05 ± 4.45	U	2.88	1000000
Manganese-54	0.0234 ± 2.22	U	1.9	-1.96 ± 1.76	U	1.41	-0.346 ± 2.8	U	2.37	0.139 ± 1.68	U	1.4	NE
Mercury-203	1.41 ± 2.83	U	2.47	-3.24 ± 3.91	U	1.89	3.66 ± 2.9	U	2.46	1.14 ± 2.38	U	1.84	NE
Neptunium-237	3.17 ± 13.7	U	8.14	7.34 ± 16.1	U	8.59	-21.5 ± 15.8	U	7.86	-3.36 ± 9.92	U	8.32	NE
Neptunium-239	-1.65 ± 11.1	U	9.32	-7.85 ± 9.39	U	7.71	-2.72 ± 10.4	U	8.72	-9.43 ± 10.1	U	7.16	NE
Niobium-95	2.92 ± 4.22	U	3.15	4.62 ± 4.07	X	1.97	1.39 ± 4.06	U	3.54	-1.46 ± 3.74	U	2.11	NE
Nitrogen, Ammonia	10.9		0.1	17.9		0.5	3.31		0.02	16.5		0.1	NE

See notes at end of table.

TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, March 2007 (continued)
(All Results in picocuries per liter [pCi/L] unless otherwise noted.)

Permit Number:	**2069-A**			**2069F-4**			**2069I-3**			**2069-K**			**Regulatory**
Station:	**WW001**			**WW006**			**WW008**			**WW011**			**Sewer Release**
Date Collected:	**3/20/2007**			**3/20/2007**			**3/20/2007**			**3/20/2007**			**Limits***
Sample ID:	**084020-004**			**084021-004**			**084023-004**			**084024-004**			**(Monthly Avg)**
Analyte	**Activity**		**MDA**	**Activity**		**MDA**	**Activity**		**MDA**	**Activity**		**MDA**	
Potassium-40	39.1 ± 51.3	X	19.3	87.5 ± 41.2		14.6	56.6 ± 39.4	X	22	31.2 ± 44.1	U	16.4	40000
Protactinium-231	-101 ± 95.7	U	78.5	4.96 ± 73.4	U	63.3	-66.7 ± 94	U	72.8	48.1 ± 82.1	U	59.6	NE
Protactinium-233	4.66 ± 4	U	3.55	0.798 ± 3.1	U	2.68	1.6 ± 4.08	U	3.57	1.71 ± 3.18	U	2.65	NE
Protactinium-234	2.97 ± 19.4	U	16.6	2.01 ± 13.5	U	11.5	6.2 ± 22.7	U	19.5	6.76 ± 15.7	U	11.5	NE
Radium-223	-17.9 ± 41.3	U	34.7	-77.7 ± 83.1	U	26.7	-20.9 ± 40.1	U	33.6	-33.8 ± 34.3	U	26.6	NE
Radium-224	29.6 ± 42.9	U	35.8	267 ± 45	U	35.6	82.2 ± 44.4	U	34.8	24.4 ± 35	U	24.7	NE
Radium-226	-59.3 ± 85.6	U	46	24.6 ± 71.3	U	27.3	50 ± 93.8	U	30.9	-48.2 ± 72.9	U	35.1	600
Radium-228	1.51 ± 14.3	U	7.77	-9.15 ± 11.3	U	5.52	-11.8 ± 16.5	U	10	13.5 ± 7.42	U	5.39	600
Radon-219	-12.4 ± 25.8	U	21.4	-4.36 ± 19.4	U	16.3	59.2 ± 34.4	U	23.2	6.42 ± 21.5	U	16.2	NE
Rhodium-106	-8.18 ± 25.4	U	17.7	-2.05 ± 16.7	U	13.8	-19.1 ± 25.3	U	19.8	16.7 ± 15.2	U	13.3	NE
Ruthenium-103	-0.157 ± 3.13	U	2.62	0.959 ± 2.33	U	1.98	0.449 ± 3.31	U	2.79	0.565 ± 2.31	U	1.98	300000
Ruthenium-106	-8.18 ± 25.4	U	17.7	-2.05 ± 16.7	U	13.8	-19.1 ± 25.3	U	19.8	16.7 ± 15.1	U	13.3	30000
Selenium-75	2.25 ± 3.09	U	2.58	-0.967 ± 2.28	U	1.83	-1.27 ± 2.84	U	2.25	0.287 ± 2.28	U	1.88	NE
Sodium-22	-0.598 ± 2.46	U	2	0.186 ± 1.61	U	1.36	1.7 ± 3.01	U	2.59	-0.569 ± 1.94	U	1.61	NE
Strontium-85	1.92 ± 4.02	U	3.41	25.5 ± 3.25	U	2.75	14.1 ± 3.79	U	3.2	-21.2 ± 3.38	U	2.06	NE
Thallium-208	0.378 ± 3.96	U	2.26	2.89 ± 4.16	X	1.4	6.23 ± 6.63	X	2.21	1.33 ± 3.98	U	1.63	NE
Thorium-227	-10.8 ± 25.1	U	20.1	-3.1 ± 18.8	U	15.3	-10.7 ± 26.2	U	18.4	-2.11 ± 21.8	U	15.6	NE
Thorium-231	1.92 ± 27.7	U	16	-14.2 ± 32.4	U	17.9	3.89 ± 35.8	U	15.8	-5.28 ± 28.8	U	17.1	300
Thorium-232	-97.9 ± 1260	U	570	150 ± 2460	U	1050	161 ± 1770	U	539	2040 ± 21100	U	1210	500000
Thorium-234	25.3 ± 61	U	39.5	95.6 ± 98.4	X	45.8	-4.62 ± 65.7	U	45.2	237 ± 160	X	60.7	50000
Tin-113	-1.84 ± 4.36	U	2.43	0.493 ± 2.3	U	1.97	3.29 ± 3.19	U	2.82	0.67 ± 2.4	U	1.81	NE
Tritium	114 ± 140	U	114	-33.5 ± 134	U	114	-11.2 ± 136	U	114	-98.5 ± 132	U	114	10000000
Uranium-235	-13 ± 17.4	U	10.7	3.71 ± 17.8	U	7.99	-10.2 ± 17.6	U	10	-4.63 ± 16.1	U	8.2	3000
Uranium-238	25.3 ± 61	U	29.2	95.6 ± 98.4	X	45.8	-4.62 ± 65.7	U	45.2	237 ± 160	X	48.6	3000
Yttrium-88	2.35 ± 5.85	U	2.26	1.12 ± 2.63	U	1.99	-3.33 ± 3	U	2.12	1.31 ± 2.31	U	2	100000
Zinc-65	-2.17 ± 5.28	U	4.3	-1.54 ± 4.35	U	3.02	3.49 ± 6.93	U	5.25	-0.0488 ± 3.81	U	3.25	NE
Zirconium-95	-3.11 ± 4.87	U	3.81	-0.702 ± 5.44	U	2.9	-9.16 ± 7.61	U	4.55	4.03 ± 3.58	U	3.14	200000

See notes at end of table.

TABLE A-2. Summary of Sanitary Outfalls of Radiological Analyses, March 2007 (concluded)

(All Results in picocuries per liter [pCi/L] unless otherwise noted.)

Permit Number:	**2069-A**			**2069F-4**			**2069I-3**			**2069-K**			**Regulatory**
Station:	**WW001**			**WW006**			**WW008**			**WW011**			**Sewer Release**
Date Collected:	**3/21/2007**			**3/21/2007**			**3/21/2007**			**3/21/2007**			**Limits***
Sample ID:	**084025-003**			**084026-003**			**084028-003**			**084029-003**			**(Monthly Avg)**
Analyte	**Activity**		**MDA**	**Activity**		**MDA**	**Activity**		**MDA**	**Activity**		**MDA**	
Nitrogen, Ammonia	11.8	B	0.1	23.4	B	0.2	3.81	B	0.04	16.1	B	0.2	NE

NOTES: U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

X = Presumptive evidence analyte is not present.

B = The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).

NE = Not established.

MDA = minimum detectable activity.

* = The monthly average concentration values for release of sanitary sewage were derived by taking the most restrictive occupational stochastic oral ingestion annual limits on intake (ALT) for a reference mean.

This page intentionally left blank.

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volatile Organic Compounds, March 2007
(All Results in micrograms per liter [µg/L] unless otherwise noted.)

Permit Number:	**2069-A**		**2069F-4**		**2069I-3**		**2069-K**	
Station:	**WW001**		**WW006**		**WW008**		**WW011**	
Date Collected:	**3/20/2007**		**3/20/2007**		**3/20/2007**		**3/20/2007**	
Sample ID:	**084020-007**		**084021-007**		**084023-007**		**084024-007**	
Analyte								
1,2,4-Trichlorobenzene	2	U	2.04	U	1.98	U	2.02	U
2,4,6-Trichlorophenol	2	U	2.04	U	1.98	U	2.02	U
2,4-Dichlorophenol	2	U	2.04	U	1.98	U	2.02	U
2,4-Dimethylphenol	2	U	2.04	U	1.98	U	3.74	J
2,4-Dinitrophenol	10	U	10.2	U	9.9	U	10.1	U
2,4-Dinitrotoluene	2	U	2.04	U	1.98	U	2.02	U
2,6-Dinitrotoluene	2	U	2.04	U	1.98	U	2.02	U
2-Chloronaphthalene	0.35	U	0.357	U	0.347	U	0.354	U
2-Chlorophenol	2	U	2.04	U	1.98	U	2.02	U
2-Methyl-4,6-dinitrophenol	3	U	3.06	U	2.97	U	3.03	U
2-Nitrophenol	2	U	2.04	U	1.98	U	2.02	U
4-Chloro-3-methylphenol	2	U	2.04	U	1.98	U	2.02	U
4-Nitrophenol	2	U	2.04	U	1.98	U	2.02	U
Acenaphthene	0.31	U	0.316	U	0.307	U	0.313	U
Acenaphthylene	0.2	U	0.204	U	0.198	U	0.202	U
Anthracene	0.2	U	0.204	U	0.198	U	0.202	U
Benzo(a)anthracene	0.2	U	0.204	U	0.198	U	0.202	U
Benzo(a)pyrene	0.2	U	0.204	U	0.198	U	0.202	U
Benzo(b)fluoranthene	0.2	U	0.204	U	0.198	U	0.202	U
Benzo(ghi)perylene	0.2	U	0.204	U	0.198	U	0.202	U
Benzo(k)fluoranthene	0.2	U	0.204	U	0.198	U	0.202	U
bis(2-Chloroethoxy)methane	3	U	3.06	U	2.97	U	3.03	U
bis(2-Chloroethyl) ether	2	U	2.04	U	1.98	U	2.02	U
bis(2-Chloroisopropyl)ether	2	U	2.04	U	1.98	U	2.02	U
bis(2-Ethylhexyl)phthalate	2	U	60.5		1.98	U	2.02	U
Chrysene	0.2	U	0.204	U	0.198	U	0.202	U
Dibenzo(a,h)anthracene	0.2	U	0.204	U	0.198	U	0.202	U
Dibenzofuran	2	U	2.04	U	1.98	U	2.02	U
Diethylphthalate	2	U	2.04	U	1.98	U	2.02	U
Di-n-butylphthalate	2	U	2.04	U	1.98	U	2.02	U
Di-n-octylphthalate	3	U	3.06	U	2.97	U	3.03	U
Fluoranthene	0.2	U	0.204	U	0.198	U	0.202	U
Fluorene	0.2	U	0.204	U	0.198	U	0.202	U
Hexachlorobenzene	2	U	2.04	U	1.98	U	2.02	U
Hexachlorobutadiene	2	U	2.04	U	1.98	U	2.02	U
Hexachlorocyclopentadiene	2	U	2.04	U	1.98	U	2.02	U
Hexachloroethane	2	U	2.04	U	1.98	U	2.02	U
Indeno(1,2,3-cd)pyrene	0.2	U	0.204	U	0.198	U	0.202	U
Isophorone	2	U	2.04	U	1.98	U	2.02	U
Naphthalene	0.3	U	0.306	U	0.297	U	0.303	U
Nitrobenzene	3	U	3.06	U	2.97	U	3.03	U
N-Nitrosodipropylamine	2	U	2.04	U	1.98	U	2.02	U
Pentachlorophenol	4.72	J	2.04	U	1.98	U	2.02	U
Phenanthrene	0.2	U	0.204	U	0.198	U	0.202	U
Phenol	1	U	1.02	U	0.99	U	1.01	U
Pyrene	0.3	U	0.306	U	0.297	U	0.303	U

See notes at end of table.

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volatile Organic Compounds, March 2007 (continued)
(All Results in micrograms per liter [µg/L] unless otherwise noted.)

Permit Number:	**2069G-2**	
Station:	**WW007**	
Date Collected:	**3/21/2007**	
Sample ID:	**084022-007**	
Analyte		
1,2,4-Trichlorobenzene	1.98	U
2,4,6-Trichlorophenol	1.98	U
2,4-Dichlorophenol	1.98	U
2,4-Dimethylphenol	1.98	U
2,4-Dinitrophenol	9.9	U
2,4-Dinitrotoluene	1.98	U
2,6-Dinitrotoluene	1.98	U
2-Chloronaphthalene	0.347	U
2-Chlorophenol	1.98	U
2-Methyl-4,6-dinitrophenol	2.97	U
2-Nitrophenol	1.98	U
4-Chloro-3-methylphenol	1.98	U
4-Nitrophenol	1.98	U
Acenaphthene	0.307	U
Acenaphthylene	0.198	U
Anthracene	0.198	U
Benzo(a)anthracene	0.198	U
Benzo(a)pyrene	0.198	U
Benzo(b)fluoranthene	0.198	U
Benzo(ghi)perylene	0.198	U
Benzo(k)fluoranthene	0.198	U
bis(2-Chloroethoxy)methane	2.97	U
bis(2-Chloroethyl) ether	1.98	U
bis(2-Chloroisopropyl)ether	1.98	U
bis(2-Ethylhexyl)phthalate	1.98	U
Chrysene	0.198	U
Dibenzo(a,h)anthracene	0.198	U
Dibenzofuran	1.98	U
Diethylphthalate	1.98	U
Di-n-butylphthalate	1.98	U
Di-n-octylphthalate	2.97	U
Fluoranthene	0.198	U
Fluorene	0.198	U
Hexachlorobenzene	1.98	U
Hexachlorobutadiene	1.98	U
Hexachlorocyclopentadiene	1.98	U
Hexachloroethane	1.98	U
Indeno(1,2,3-cd)pyrene	0.198	U
Isophorone	1.98	U
Naphthalene	0.297	U
Nitrobenzene	2.97	U
N-Nitrosodipropylamine	1.98	U

See notes at end of table.

TABLE A-3. Summary of Sanitary Outfalls of Semi-Volatile Organic Compounds, March 2007 (concluded)
(All Results in micrograms per liter [µg/L] unless otherwise noted.)

Permit Number:	**2069G-2**	
Station:	**WW007**	
Date Collected:	**3/21/2007**	
Sample ID:	**084022-007**	
Analyte		
Pentachlorophenol	1.98	U
Phenanthrene	0.198	U
Phenol	0.99	U
Pyrene	0.297	U

NOTES: U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.
J = Estimated value, the analyte concentration fell above the effective (MDL) minimum detection limit and below the effective (PQL) practical quantitation limit.

This page intentionally left blank.

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, March 2007
(All Results in micrograms per liter [µg/L] unless otherwise noted.)

Permit Number:	**2069-A**		**2069F-4**		**2069I-3**		**2069-K**	
Station:	**WW001**		**WW006**		**WW008**		**WW011**	
Date Collected:	**3/20/2007**		**3/20/2007**		**3/20/2007**		**3/20/2007**	
Sample ID:	**084020-006**		**084021-006**		**084023-006**		**084024-006**	
Analyte								
1,1,1-Trichloroethane	0.3	U	0.3	U	0.3	U	0.3	U
1,1,2,2-Tetrachloroethane	0.25	U	0.25	U	0.25	U	0.25	U
1,1,2-Trichloroethane	0.25	U	0.25	U	0.25	U	0.25	U
1,1-Dichloroethane	0.3	U	0.3	U	0.3	U	0.3	U
1,1-Dichloroethylene	0.3	U	0.3	U	0.3	U	0.3	U
1,2-Dichlorobenzene	2	U	2.04	U	1.98	U	2.02	U
1,2-Dichloroethane	0.25	U	0.25	U	0.25	U	0.25	U
1,2-Dichloropropane	0.25	U	0.25	U	0.25	U	0.25	U
1,3-Dichlorobenzene	2	U	2.04	U	1.98	U	2.02	U
1,4-Dichlorobenzene	2	U	2.04	U	1.98	U	2.02	U
2,4,5-Trichlorophenol	1	U	1.02	U	0.99	U	1.01	U
2-Butanone	2.05	J	5.48		2.27	J	2.87	J
2-Hexanone	1.25	U	1.25	U	1.25	U	1.25	U
2-Methylnaphthalene	0.3	U	0.306	U	0.297	U	0.303	U
3,3’-Dichlorobenzidine	1	U	1.02	U	0.99	U	1.01	U
4-Bromophenylphenylether	2	U	2.04	U	1.98	U	2.02	U
4-Chloroaniline	2	U	2.04	U	1.98	U	2.02	U
4-Chlorophenylphenylether	2	U	2.04	U	1.98	U	2.02	U
4-Methyl-2-pentanone	1.25	U	1.25	U	1.25	U	1.25	U
Acetone	141		20.7		117		130	
Benzene	0.3	U	0.3	U	0.3	U	0.3	U
Bromodichloromethane	0.25	U	0.25	U	0.25	U	0.25	U
Bromoform	1.25		0.53	J	0.488	J	0.25	U
Bromomethane	0.5	U	0.5	U	0.5	U	0.5	U
Butylbenzylphthalate	2	U	2.04	U	1.98	U	2.02	U
Carbazole	0.2	U	0.204	U	0.198	U	0.202	U
Carbon disulfide	1.25	U	1.25	U	1.25	U	1.25	U
Carbon tetrachloride	0.25	U	0.25	U	0.25	U	0.25	U
Chlorobenzene	0.25	U	0.25	U	0.25	U	0.25	U
Chloroethane	0.5	U	0.5	U	0.5	U	0.5	U
Chloroform	0.25	U	0.347	J	0.25	U	1.03	
Chloromethane	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethylene	0.3	U	0.3	U	0.3	U	0.3	U
cis-1,3-Dichloropropylene	0.25	U	0.25	U	0.25	U	0.25	U
Dibromochloromethane	0.258	J	0.25	U	0.299	J	0.25	U
Dimethylphthalate	2	U	2.04	U	1.98	U	2.02	U
Diphenylamine	3	U	3.06	U	2.97	U	3.03	U
Ethylbenzene	0.25	U	0.25	U	0.25	U	0.25	U
m,p-Cresol	3	U	3.06	U	2.97	U	26.9	
Methylene chloride	2	U	2	U	2	U	2	U
m-Nitroaniline	2	U	2.04	U	1.98	U	2.02	U
o-Cresol	2	U	2.04	U	1.98	U	2.02	U
o-Nitroaniline	2	U	2.04	U	1.98	U	2.02	U
p-Nitroaniline	3	U	3.06	U	2.97	U	3.03	U
Styrene	0.25	U	0.25	U	0.25	U	0.25	U

See notes at end of table.

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, March 2007 (continued)
(All Results in micrograms per liter [µg/L] unless otherwise noted.)

Permit Number:	**2069-A**		**2069F-4**		**2069I-3**		**2069-K**	
Station:	**WW001**		**WW006**		**WW008**		**WW011**	
Date Collected:	**3/20/2007**		**3/20/2007**		**3/20/2007**		**3/20/2007**	
Sample ID:	**084020-006**		**084021-006**		**084023-006**		**084024-006**	
Analyte								
Tetrachloroethylene	0.25	U	0.25	U	0.25	U	0.25	U
Toluene	0.25	U	0.25	U	0.25	U	2.64	
trans-1,2-Dichloroethylene	0.3	U	0.3	U	0.3	U	0.3	U
trans-1,3-Dichloropropylene	0.25	U	0.25	U	0.25	U	0.25	U
Trichloroethylene	0.25	U	0.25	U	0.25	U	0.25	U
Vinyl acetate	1.5	U	1.5	U	1.5	U	1.5	U
Vinyl chloride	0.5	U	0.5	U	0.5	U	0.5	U
Xylenes (total)	0.25	U	0.25	U	0.25	U	0.25	U

Permit Number:	**2069G-2**	
Station:	**WW007**	
Date Collected:	**3/21/2007**	
Sample ID:	**084022-006**	
Analyte		
1,1,1-Trichloroethane	0.3	U
1,1,2,2-Tetrachloroethane	0.25	U
1,1,2-Trichloroethane	0.25	U
1,1-Dichloroethane	0.3	U
1,1-Dichloroethylene	0.3	U
1,2-Dichlorobenzene	1.98	U
1,2-Dichloroethane	0.25	U
1,2-Dichloropropane	0.25	U
1,3-Dichlorobenzene	1.98	U
1,4-Dichlorobenzene	1.98	U
2,4,5-Trichlorophenol	0.99	U
2-Butanone	3.09	J
2-Hexanone	1.25	U
2-Methylnaphthalene	0.297	U
3,3’-Dichlorobenzidine	0.99	U
4-Bromophenylphenylether	1.98	U
4-Chloroaniline	1.98	U
4-Chlorophenylphenylether	1.98	U
4-Methyl-2-pentanone	1.25	U
Acetone	13.4	
Benzene	0.3	U
Bromodichloromethane	0.25	U
Bromoform	0.25	U
Bromomethane	0.5	U
Butylbenzylphthalate	1.98	U
Carbazole	0.198	U
Carbon disulfide	1.25	U
Carbon tetrachloride	0.25	U
Chlorobenzene	0.25	U
Chloroethane	0.5	U
Chloroform	0.25	U

See notes at end of table.

TABLE A-4. Summary of Sanitary Outfalls of Volatile Organic Compounds, March 2007 (concluded)
(All Results in micrograms per liter [µg/L] unless otherwise noted.)

Permit Number:	**2069G-2**	
Station:	**WW007**	
Date Collected:	**3/21/2007**	
Sample ID:	**084022-006**	
Analyte		
Chloromethane	0.5	U
cis-1,2-Dichloroethylene	0.3	U
cis-1,3-Dichloropropylene	0.25	U
Dibromochloromethane	0.25	U
Dimethylphthalate	1.98	U
Diphenylamine	2.97	U
Ethylbenzene	0.25	U
m,p-Cresol	2.97	U
Methylene chloride	2	U
m-Nitroaniline	1.98	U
o-Cresol	1.98	U
o-Nitroaniline	1.98	U
p-Nitroaniline	2.97	U
Styrene	0.25	U
Tetrachloroethylene	0.25	U
Toluene	0.25	U
trans-1,2-Dichloroethylene	0.3	U
trans-1,3-Dichloropropylene	0.25	U
Trichloroethylene	0.25	U
Vinyl acetate	1.5	U
Vinyl chloride	0.5	U
Xylenes (total)	0.25	U

NOTES: U =The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL. SNL/NM uses the City of Albuquerque's value of 3.2 mg/L as the standard (that value has not been exceeded). This value is derived from the summation of all values greater than 0.01 mg/L for the list of toxic organics as developed by the EPA for each National Categorical Pretreatment Standard. For non-categorical users, the summation of all values above 0.01 mg/L of those listed in 40 CFR 122, Appendix D, Table II, or as directed by the Industrial Waste Engineer. Based on the Sewer Use and Wastewater Control Table, this value should never exceed 3.2 mg/L.

.

This page intentionally left blank.

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Metals) Analyses, CY 2007

(All Results in milligrams per liter [mg/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA
2069-A	WW001	Aluminum	1	0.239		0.239	0.239	900
		Antimony	1	0.010		0.0103	0.0103	NE
		Arsenic	1	0.017		0.0166	0.0166	0.051
		Barium	1	0.181		0.181	0.181	NE
		Beryllium	1	0.001		0.001	0.001	NE
		Cadmium	1	0.001		0.00101	0.00101	0.5
		Calcium	1	70.100		70.1	70.1	NE
		Chromium	1	0.004		0.00442	0.00442	4.1
		Cobalt	1	0.001		0.001	0.001	NE
		Copper	1	0.038		0.0383	0.0383	5.3
		Iron	1	0.412		0.412	0.412	NE
		Lead	1	0.003		0.0025	0.0025	1
		Magnesium	1	12.500		12.5	12.5	NE
		Manganese	1	0.041		0.041	0.041	NE
		Mercury	1	0.000		0.000081	0.000081	NE
		Nickel	1	0.002		0.00192	0.00192	2
		Potassium	1	14.700		14.7	14.7	NE
		Selenium	1	0.005		0.005	0.005	0.46
		Silver	1	0.001		0.001	0.001	5
		Sodium	1	112.00		112	112	NE
		Thallium	1	0.010		0.00965	0.00965	NE
		Vanadium	1	0.011		0.0105	0.0105	NE
		Zinc	1	0.171		0.171	0.171	2.2
2069F-4	WW006	Aluminum	1	0.113		0.113	0.113	900
		Antimony	1	0.007		0.00708	0.00708	NE
		Arsenic	1	0.018		0.0176	0.0176	0.051
		Barium	1	0.182		0.182	0.182	NE
		Beryllium	1	0.001		0.001	0.001	NE
		Cadmium	1	0.001		0.001	0.001	0.5
		Calcium	1	65.900		65.9	65.9	NE
		Chromium	1	0.002		0.00171	0.00171	4.1
		Cobalt	1	0.001		0.001	0.001	NE
		Copper	1	0.020		0.0202	0.0202	5.3
		Iron	1	0.290		0.29	0.29	NE
		Lead	1	0.003		0.0025	0.0025	1
		Magnesium	1	10.800		10.8	10.8	NE
		Manganese	1	0.015		0.0153	0.0153	NE
		Mercury	1	0.000		0.000038	0.000038	NE
		Nickel	1	0.001		0.001	0.001	2
		Potassium	1	48.000		48	48	NE

See notes at end of table.

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Metals) Analyses, CY 2007 (continued)
(All Results in milligrams per liter [mg/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA
2069F-4 (cont'd)	WW006	Selenium	1	0.005		0.005	0.005	0.46
		Silver	1	0.004		0.00369	0.00369	5
		Sodium	1	110.000		110	110	NE
		Thallium	1	0.010		0.00957	0.00957	NE
		Vanadium	1	0.009		0.00853	0.00853	NE
		Zinc	1	0.052		0.0523	0.0523	2.2
2069G-2	WW007	Aluminum	1	0.068		0.068	0.068	900
		Antimony	1	0.005		0.00546	0.00546	NE
		Arsenic	1	0.007		0.00735	0.00735	0.051
		Barium	1	0.046		0.0457	0.0457	NE
		Beryllium	1	0.001		0.001	0.001	NE
		Cadmium	1	0.001		0.001	0.001	0.5
		Calcium	1	43.500		43.5	43.5	NE
		Chromium	1	0.001		0.001	0.001	4.1
		Cobalt	1	0.001		0.001	0.001	NE
		Copper	1	0.003		0.003	0.003	5.3
		Iron	1	0.027		0.0271	0.0271	NE
		Lead	1	0.003		0.0025	0.0025	1
		Magnesium	1	6.840		6.84	6.84	NE
		Manganese	1	0.003		0.00256	0.00256	NE
		Mercury	1	0.000		0.00003	0.00003	NE
		Nickel	1	0.001		0.001	0.001	2
		Potassium	1	1.950		1.95	1.95	NE
		Selenium	1	0.005		0.005	0.005	0.46
		Silver	1	0.001		0.001	0.001	5
		Sodium	1	108.000		108	108	NE
		Thallium	1	0.008		0.00755	0.00755	NE
		Vanadium	1	0.003		0.00255	0.00255	NE
		Zinc	1	0.002		0.002	0.002	2.2
2069I-3	WW008	Aluminum	1	0.114		0.114	0.114	900
		Antimony	1	0.007		0.00698	0.00698	NE
		Arsenic	1	0.015		0.0153	0.0153	0.051
		Barium	1	0.108		0.108	0.108	NE
		Beryllium	1	0.001		0.001	0.001	NE
		Cadmium	1	0.001		0.001	0.001	0.5
		Calcium	1	51.700		51.7	51.7	NE
		Chromium	1	0.002		0.00184	0.00184	4.1
		Cobalt	1	0.001		0.001	0.001	NE
		Copper	1	0.016		0.0155	0.0155	5.3

See notes at end of table.

TABLE A-5. Permitted Sanitary Outfalls of Non-radiological (Metals) Analyses, CY 2007 (concluded)

(All Results in milligrams per liter [mg/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA
2069I-3 (cont'd)	WW008	Iron	1	0.079		0.0794	0.0794	NE
		Lead	1	0.003		0.0025	0.0025	1
		Magnesium	1	8.550		8.55	8.55	NE
		Manganese	1	0.007		0.00674	0.00674	NE
		Mercury	1	0.000		0.00003	0.00003	NE
		Nickel	1	0.001		0.001	0.001	2
		Potassium	1	9.330		9.33	9.33	NE
		Selenium	1	0.005		0.005	0.005	0.46
		Silver	1	0.001		0.001	0.001	5
		Sodium	1	138.000		138	138	NE
		Thallium	1	0.008		0.00849	0.00849	NE
		Vanadium	1	0.008		0.00753	0.00753	NE
		Zinc	1	0.030		0.03	0.03	2.2
2069-K	WW011	Aluminum	1	0.192		0.192	0.192	900
		Antimony	1	0.007		0.00687	0.00687	NE
		Arsenic	1	0.015		0.015	0.015	0.051
		Barium	1	0.140		0.14	0.14	NE
		Beryllium	1	0.001		0.001	0.001	NE
		Cadmium	1	0.001		0.001	0.001	0.5
		Calcium	1	57.000		57	57	NE
		Chromium	1	0.003		0.00339	0.00339	4.1
		Cobalt	1	0.001		0.001	0.001	NE
		Copper	1	0.034		0.0342	0.0342	5.3
		Iron	1	0.421		0.421	0.421	NE
		Lead	1	0.003		0.0025	0.0025	1
		Magnesium	1	9.670		9.67	9.67	NE
		Manganese	1	0.047		0.0468	0.0468	NE
		Mercury	1	0.000		0.00003	0.00003	NE
		Nickel	1	0.001		0.00113	0.00113	2
		Potassium	1	23.800		23.8	23.8	NE
		Selenium	1	0.005		0.005	0.005	0.46
		Silver	1	0.026		0.0258	0.0258	5
		Sodium	1	63.400		63.4	63.4	NE
		Thallium	1	0.007		0.00721	0.00721	NE
		Vanadium	1	0.007		0.00671	0.00671	NE
		Zinc	1	0.118		0.118	0.118	2.2

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA
2069F-4	WW006	Cyanide, Total	4	0.009	0.00	0.00685	0.0108	0.45
2069G-2	WW007	Cyanide, Total	4	0.002	0.00	0.0015	0.00292	0.45
2069I-3	WW008	Cyanide, Total	4	0.002	0.00	0.0015	0.00287	0.45

NOTES: COA = City of Albuquerque
NE = Not established
Std Dev = Standard Deviation

This page intentionally left blank.

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2007
(All Results in picocuries per liter [pci/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA
2069-A	WW001	Actinium-228	1	-7.530		-7.53	-7.53	300000
		Americium-241	1	-1.010		-1.01	-1.01	200
		Antimony-124	1	4.600		4.6	4.6	NE
		Antimony-125	1	-3.670		-3.67	-3.67	NE
		Barium-133	1	1.120		1.12	1.12	NE
		Beryllium-7	1	25.400		25.4	25.4	NE
		Bismuth-211	1	11.300		11.3	11.3	NE
		Bismuth-212	1	10.900		10.9	10.9	NE
		Bismuth-214	1	4.700		4.7	4.7	NE
		Cadmium-109	1	19.400		19.4	19.4	NE
		Cerium-139	1	0.224		0.224	0.224	NE
		Cerium-141	1	-6.820		-6.82	-6.82	NE
		Cerium-144	1	5.710		5.71	5.71	30000
		Cesium-134	1	0.840		0.84	0.84	9000
		Cesium-137	1	-0.818		-0.818	-0.818	10000
		Chromium-51	1	40.600		40.6	40.6	5000000
		Cobalt-57	1	0.691		0.691	0.691	NE
		Cobalt-60	1	0.609		0.609	0.609	30000
		Europium-152	1	-2.480		-2.48	-2.48	NE
		Europium-154	1	-5.670		-5.67	-5.67	NE
		Gross Alpha	1	-0.998		-0.998	-0.998	NE
		Gross Beta	1	19.400		19.4	19.4	NE
		Iron-59	1	1.940		1.94	1.94	100000
		Lead-211	1	-19.000		-19	-19	NE
		Lead-212	1	5.860		5.86	5.86	20000
		Lead-214	1	3.930		3.93	3.93	1000000
		Manganese-54	1	-1.080		-1.08	-1.08	NE
		Mercury-203	1	2.390		2.39	2.39	NE
		Neptunium-237	1	4.160		4.16	4.16	NE
		Neptunium-239	1	-6.000		-6	-6	NE
		Niobium-95	1	2.230		2.23	2.23	NE
		Potassium-40	1	30.200		30.2	30.2	40000
		Protactinium-231	1	-33.700		-33.7	-33.7	NE
		Protactinium-233	1	2.590		2.59	2.59	NE
		Protactinium-234	1	-10.000		-10	-10	NE
		Radium-223	1	7.740		7.74	7.74	NE
		Radium-224	1	35.800		35.8	35.8	NE
		Radium-226	1	44.800		44.8	44.8	600
		Radium-228	1	-7.530		-7.53	-7.53	600

See notes at end of table.

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2007 (continued)
(All Results in picocuries per liter [pci/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA
2069-A (cont'd)	WW001	Radium-224	1	35.800		35.8	35.8	NE
		Radium-226	1	44.800		44.8	44.8	600
		Radium-228	1	-7.530		-7.53	-7.53	600
		Radon-219	1	-0.005		-0.00492	-0.00492	NE
		Rhodium-106	1	-4.920		-4.92	-4.92	NE
		Ruthenium-103	1	0.334		0.334	0.334	300000
		Ruthenium-106	1	-4.920		-4.92	-4.92	30000
		Selenium-75	1	0.713		0.713	0.713	NE
		Sodium-22	1	-1.960		-1.96	-1.96	NE
		Strontium-85	1	-16.800		-16.8	-16.8	NE
		Thallium-208	1	4.590		4.59	4.59	NE
		Thorium-227	1	5.680		5.68	5.68	NE
		Thorium-231	1	5.440		5.44	5.44	300
		Thorium-232	1	369.000		369	369	500000
		Thorium-234	1	-38.000		-38	-38	50000
		Tin-113	1	-0.895		-0.895	-0.895	NE
		Tritium	1	130.000		130	130	10000000
		Uranium-235	1	-7.950		-7.95	-7.95	3000
		Uranium-238	1	-38.000		-38	-38	3000
		Yttrium-88	1	2.290		2.29	2.29	100000
		Zinc-65	1	-3.320		-3.32	-3.32	NE
		Zirconium-95	1	-2.190		-2.19	-2.19	200000
2069F-4	WW006	Actinium-228	1	0.877		0.877	0.877	300000
		Americium-241	1	0.438		0.438	0.438	200
		Antimony-124	1	-2.870		-2.87	-2.87	NE
		Antimony-125	1	3.760		3.76	3.76	NE
		Barium-133	1	-4.700		-4.7	-4.7	NE
		Beryllium-7	1	7.970		7.97	7.97	NE
		Bismuth-211	1	-11.500		-11.5	-11.5	NE
		Bismuth-212	1	-7.360		-7.36	-7.36	NE
		Bismuth-214	1	12.900		12.9	12.9	NE
		Cadmium-109	1	13.200		13.2	13.2	NE
		Cerium-139	1	-1.060		-1.06	-1.06	NE
		Cerium-141	1	1.080		1.08	1.08	NE
		Cerium-144	1	4.130		4.13	4.13	30000
		Cesium-134	1	-0.019		-0.0188	-0.0188	9000
		Cesium-137	1	-4.780		-4.78	-4.78	10000
		Chromium-51	1	-5.540		-5.54	-5.54	5000000
		Cobalt-57	1	1.540		1.54	1.54	NE
		Cobalt-60	1	-0.495		-0.495	-0.495	30000
		Europium-152	1	-3.290		-3.29	-3.29	NE

See notes at end of table.

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2007 (continued)
(All Results in picocuries per liter [pci/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA
2069F-4 (cont'd)	WW006	Europium-154	1	7.000		7	7	NE
		Gross Alpha	1	0.702		0.702	0.702	NE
		Gross Beta	1	50.900		50.9	50.9	NE
		Iron-59	1	2.800		2.8	2.8	100000
		Lead-211	1	35.200		35.2	35.2	NE
		Lead-212	1	0.940		0.94	0.94	20000
		Lead-214	1	0.070		0.0703	0.0703	1000000
		Manganese-54	1	2.530		2.53	2.53	NE
		Mercury-203	1	-2.520		-2.52	-2.52	NE
		Neptunium-237	1	3.740		3.74	3.74	NE
		Neptunium-239	1	0.980		0.98	0.98	NE
		Niobium-95	1	0.457		0.457	0.457	NE
		Potassium-40	1	42.400		42.4	42.4	40000
		Protactinium-231	1	11.400		11.4	11.4	NE
		Protactinium-233	1	1.900		1.9	1.9	NE
		Protactinium-234	1	-18.800		-18.8	-18.8	NE
		Radium-223	1	-2.480		-2.48	-2.48	NE
		Radium-224	1	50.600		50.6	50.6	NE
		Radium-226	1	11.100		11.1	11.1	600
		Radium-228	1	0.877		0.877	0.877	600
		Radon-219	1	-10.300		-10.3	-10.3	NE
		Rhodium-106	1	-13.100		-13.1	-13.1	NE
		Ruthenium-103	1	-1.150		-1.15	-1.15	300000
		Ruthenium-106	1	-13.100		-13.1	-13.1	30000
		Selenium-75	1	-0.930		-0.93	-0.93	NE
		Sodium-22	1	2.730		2.73	2.73	NE
		Strontium-85	1	-16.400		-16.4	-16.4	NE
		Thallium-208	1	0.824		0.824	0.824	NE
		Thorium-227	1	-25.400		-25.4	-25.4	NE
		Thorium-231	1	0.254		0.254	0.254	300
		Thorium-232	1	16.100		16.1	16.1	500000
		Thorium-234	1	-15.200		-15.2	-15.2	50000
		Tin-113	1	0.959		0.959	0.959	NE
		Tritium	1	181.000		181	181	10000000
		Uranium-235	1	2.890		2.89	2.89	3000
		Uranium-238	1	-15.200		-15.2	-15.2	3000
		Yttrium-88	1	0.956		0.956	0.956	100000
		Zinc-65	1	0.471		0.471	0.471	NE
		Zirconium-95	1	-3.970		-3.97	-3.97	200000
2069I-3	WW008	Actinium-228	1	-5.430		-5.43	-5.43	300000
		Americium-241	1	-6.070		-6.07	-6.07	200

See notes at end of table.

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2007 (continued)
(All Results in picocuries per liter [pci/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA
2069I-3 (cont'd)	WW008	Antimony-124	1	-1.390		-1.39	-1.39	NE
		Antimony-125	1	0.765		0.765	0.765	NE
		Barium-133	1	-6.040		-6.04	-6.04	NE
		Beryllium-7	1	1.340		1.34	1.34	NE
		Bismuth-211	1	-5.710		-5.71	-5.71	NE
		Bismuth-212	1	2.340		2.34	2.34	NE
		Bismuth-214	1	2.790		2.79	2.79	NE
		Cadmium-109	1	-127.00		-127	-127	NE
		Cerium-139	1	1.450		1.45	1.45	NE
		Cerium-141	1	1.350		1.35	1.35	NE
		Cerium-144	1	2.580		2.58	2.58	30000
		Cesium-134	1	0.226		0.226	0.226	9000
		Cesium-137	1	-1.210		-1.21	-1.21	10000
		Chromium-51	1	-17.800		-17.8	-17.8	5000000
		Cobalt-57	1	0.680		0.68	0.68	NE
		Cobalt-60	1	1.480		1.48	1.48	30000
		Europium-152	1	-2.870		-2.87	-2.87	NE
		Europium-154	1	-0.929		-0.929	-0.929	NE
		Gross Alpha	1	2.500		2.5	2.5	NE
		Gross Beta	1	13.500		13.5	13.5	NE
		Iron-59	1	4.890		4.89	4.89	100000
		Lead-211	1	0.520		0.52	0.52	NE
		Lead-212	1	0.282		0.282	0.282	20000
		Lead-214	1	-1.790		-1.79	-1.79	1000000
		Manganese-54	1	-0.429		-0.429	-0.429	NE
		Mercury-203	1	3.500		3.5	3.5	NE
		Neptunium-237	1	0.715		0.715	0.715	NE
		Neptunium-239	1	-3.700		-3.7	-3.7	NE
		Niobium-95	1	1.420		1.42	1.42	NE
		Potassium-40	1	-15.900		-15.9	-15.9	40000
		Protactinium-231	1	-100.00		-100	-100	NE
		Protactinium-233	1	-0.478		-0.478	-0.478	NE
		Protactinium-234	1	0.685		0.685	0.685	NE
		Radium-223	1	-2.930		-2.93	-2.93	NE
		Radium-224	1	3.190		3.19	3.19	NE
		Radium-226	1	34.800		34.8	34.8	600
		Radium-228	1	-5.430		-5.43	-5.43	600
		Radon-219	1	9.050		9.05	9.05	NE
		Rhodium-106	1	1.290		1.29	1.29	NE
		Ruthenium-103	1	-0.575		-0.575	-0.575	300000
		Ruthenium-106	1	1.290		1.29	1.29	30000

See notes at end of table.

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2007 (continued)
(All Results in picocuries per liter [pci/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA
2069I-3 (cont'd)	WW008	Selenium-75	1	1.960		1.96	1.96	NE
		Sodium-22	1	-0.349		-0.349	-0.349	NE
		Strontium-85	1	-4.070		-4.07	-4.07	NE
		Thallium-208	1	3.470		3.47	3.47	NE
		Thorium-227	1	13.800		13.8	13.8	NE
		Thorium-231	1	28.300		28.3	28.3	300
		Thorium-232	1	448.000		448	448	500000
		Thorium-234	1	34.900		34.9	34.9	50000
		Tin-113	1	2.140		2.14	2.14	NE
		Tritium	1	56.400		56.4	56.4	10000000
		Uranium-235	1	5.700		5.7	5.7	3000
		Uranium-238	1	34.900		34.9	34.9	3000
		Yttrium-88	1	-1.100		-1.1	-1.1	100000
		Zinc-65	1	-5.120		-5.12	-5.12	NE
		Zirconium-95	1	0.748		0.748	0.748	200000
2069-K	WW011	Actinium-228	1	-14.300		-14.3	-14.3	300000
		Americium-241	1	-7.490		-7.49	-7.49	200
		Antimony-124	1	1.500		1.5	1.5	NE
		Antimony-125	1	1.020		1.02	1.02	NE
		Barium-133	1	0.507		0.507	0.507	NE
		Beryllium-7	1	11.700		11.7	11.7	NE
		Bismuth-211	1	13.700		13.7	13.7	NE
		Bismuth-212	1	16.400		16.4	16.4	NE
		Bismuth-214	1	1.740		1.74	1.74	NE
		Cadmium-109	1	-6.500		-6.5	-6.5	NE
		Cerium-139	1	-2.900		-2.9	-2.9	NE
		Cerium-141	1	0.432		0.432	0.432	NE
		Cerium-144	1	-2.380		-2.38	-2.38	30000
		Cesium-134	1	-0.176		-0.176	-0.176	9000
		Cesium-137	1	-0.592		-0.592	-0.592	10000
		Chromium-51	1	-45.800		-45.8	-45.8	5000000
		Cobalt-57	1	-1.400		-1.4	-1.4	NE
		Cobalt-60	1	-0.152		-0.152	-0.152	30000
		Europium-152	1	-9.000		-9	-9	NE
		Europium-154	1	-0.328		-0.328	-0.328	NE
		Gross Alpha	1	3.060		3.06	3.06	NE
		Gross Beta	1	20.300		20.3	20.3	NE
		Iron-59	1	1.750		1.75	1.75	100000
		Lead-211	1	-10.200		-10.2	-10.2	NE
		Lead-212	1	2.070		2.07	2.07	20000
		Lead-214	1	4.780		4.78	4.78	1000000

See notes at end of table..

TABLE A-6. Permitted Sanitary Outfalls of Radiological Analyses, CY 2007 (concluded)

(All Results in picocuries per liter [pci/L] unless otherwise noted.)

Permit Number	Station	Analyte	Sample Size	Mean	Std Dev	Minimum	Maximum	Regulatory Limit COA
2069-K (cont'd)	WW011	Manganese-54	1	-3.830		-3.83	-3.83	NE
		Mercury-203	1	0.265		0.265	0.265	NE
		Neptunium-237	1	-0.271		-0.271	-0.271	NE
		Neptunium-239	1	0.590		0.59	0.59	NE
		Niobium-95	1	-1.450		-1.45	-1.45	NE
		Potassium-40	1	57.800		57.8	57.8	40000
		Protactinium-231	1	-50.800		-50.8	-50.8	NE
		Protactinium-233	1	2.030		2.03	2.03	NE
		Protactinium-234	1	6.710		6.71	6.71	NE
		Radium-223	1	34.600		34.6	34.6	NE
		Radium-224	1	35.500		35.5	35.5	NE
		Radium-226	1	44.400		44.4	44.4	600
		Radium-228	1	-14.300		-14.3	-14.3	600
		Radon-219	1	21.000		21	21	NE
		Rhodium-106	1	9.490		9.49	9.49	NE
		Ruthenium-103	1	-1.390		-1.39	-1.39	300000
		Ruthenium-106	1	9.490		9.49	9.49	30000
		Selenium-75	1	0.122		0.122	0.122	NE
		Sodium-22	1	-0.145		-0.145	-0.145	NE
		Strontium-85	1	-27.100		-27.1	-27.1	NE
		Thallium-208	1	0.428		0.428	0.428	NE
		Thorium-227	1	-14.200		-14.2	-14.2	NE
		Thorium-231	1	2.180		2.18	2.18	300
		Thorium-232	1	-253.00		-253	-253	500000
		Thorium-234	1	-65.000		-65	-65	50000
		Tin-113	1	0.952		0.952	0.952	NE
		Tritium	1	152.000		152	152	10000000
		Uranium-235	1	1.150		1.15	1.15	3000
		Uranium-238	1	-65.000		-65	-65	3000
		Yttrium-88	1	1.800		1.8	1.8	100000
		Zinc-65	1	-1.820		-1.82	-1.82	NE
		Zirconium-95	1	-2.610		-2.61	-2.61	200000

NOTES: COA = City of Albuquerque
NE = Not established
Std Dev = Standard Deviation

TABLE A-7. Permitted Sanitary Outfalls, August 2007
(All results in milligrams per liter [mg/L] unless otherwise noted.)

Permit Number:	**2069-A**		**2069F-4**		**2069G-2**		**2069I-3**		**2069-K**		**Regulatory**
Station:	**WW001**		**WW006**		**WW007**		**WW008**		**WW011**		**Limit**
Date Collected:	**8/28/2007**		**8/28/2007**		**8/28/2007**		**8/28/2007**		**8/28/2007**		**COA**
Sample ID:	**085141-001**		**085142-001**		**085143-001**		**085144-001**		**085145-001**		**(mg/L)**
Analyte											
Aluminum	0.239		0.113	J	0.113	U	0.114	J	0.192	J	900
Antimony	0.0103		0.00708	J	0.00708	J	0.00698	J	0.00687	J	NE
Arsenic	0.0166		0.0176		0.0176	J	0.0153		0.015		0.051
Barium	0.181		0.182		0.182		0.108		0.14		NE
Beryllium	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	NE
Cadmium	0.00101	J	0.001	U	0.001	U	0.001	U	0.001	U	0.5
Calcium	70.1		65.9		65.9		51.7		57		NE
Chromium	0.00442	J	0.00171	J	0.00171	U	0.00184	J	0.00339	J	4.1
Cobalt	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	NE
Copper	0.0383		0.0202		0.0202	U	0.0155		0.0342		5.3
Iron	0.412		0.29		0.29	J	0.0794	J	0.421		NE
Lead	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	1
Magnesium	12.5		10.8		10.8		8.55		9.67		NE
Manganese	0.041		0.0153		0.0153	J	0.00674	J	0.0468		NE
Mercury	0.00008	J	0.00004	J	0.00004	U	0.00003	U	0.00003	U	NE
Nickel	0.00192	J	0.001	U	0.001	U	0.001	U	0.00113	J	2
Potassium	14.7		48		48		9.33		23.8		NE
Selenium	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.46
Silver	0.001	U	0.00369	J	0.00369	U	0.001	U	0.0258		5
Sodium	112		110		110		138		63.4		NE
Thallium	0.00965	J	0.00957	J	0.00957	J	0.00849	J	0.00721	J	NE
Vanadium	0.0105		0.00853		0.00853	J	0.00753		0.00671		NE
Zinc	0.171		0.0523		0.0523	U	0.03		0.118		2.2

NOTES: COA = City of Albuquerque

J = Estimated value, the analyte concentration fell above the effective (MDL) minimum detection limit and below the effective (PQL) practical quantitation limit.

U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

NE = Not established.

This page intentionally left blank.

TABLE A-8. Summary of Sanitary Outfalls of Radiological Analyses, August 2007

(All Results in picocuries per liter [pCi/L] unless otherwise noted.)

Permit Number:	2069-A			2069F-4			2069I-3			2069-K			Regulatory
Station:	**WW001**			**WW006**			**WW008**			**WW011**			**Sewer Release**
Date Collected:	**8/28/2007**			**8/28/2007**			**8/28/2007**			**8/28/2007**			**Limits***
Sample ID:	**085141-004**			**085142-004**			**085144-004**			**085145-004**			**(Monthly Avg)**
Analyte	**Activity**		**MDA**	**Activity**		**MDA**	**Activity**		**MDA**	**Activity**		**MDA**	
Actinium-228	-7.53 ± 13.7	U	7.92	0.877 ± 21.5	U	8.26	-5.43 ± 12.2	U	7.02	-14.3 ± 11.6	U	5.27	300000
Americium-241	-1.01 ± 3.06	U	2.61	0.438 ± 3.27	U	2.86	-6.07 ± 12.1	U	8.45	-7.49 ± 9.86	U	8.33	200
Antimony-124	4.6 ± 7.6	U	5.9	-2.87 ± 7.06	U	5.65	-1.39 ± 5.48	U	4.5	1.5 ± 5.48	U	4.77	NE
Antimony-125	-3.67 ± 6.33	U	5.02	3.76 ± 5.93	U	5.16	0.765 ± 5.74	U	4.76	1.02 ± 4.67	U	3.91	NE
Barium-133	1.12 ± 3.1	U	2.29	-4.7 ± 2.99	U	2.35	-6.04 ± 2.85	U	2.11	0.507 ± 2.43	U	1.81	NE
Beryllium-7	25.4 ± 23.3	U	20.8	7.97 ± 27.1	U	23	1.34 ± 22.3	U	18.3	11.7 ± 18.5	U	15.6	NE
Bismuth-211	11.3 ± 22.8	U	10.8	-11.5 ± 20.6	U	12	-5.71 ± 19.7	U	10.8	13.7 ± 21.8	U	8.55	NE
Bismuth-212	10.9 ± 19.4	U	16.5	-7.36 ± 31.9	U	19.6	2.34 ± 16.1	U	13.7	16.4 ± 20.4	U	12.9	NE
Bismuth-214	4.7 ± 8.74	U	4.82	12.9 ± 9.91	U	5.67	2.79 ± 9.16	U	4.05	1.74 ± 6.38	U	2.96	NE
Cadmium-109	19.4 ± 42.1	U	26	13.2 ± 53.3	U	29	-127 ± 50.6	U	37.2	-6.5 ± 46.3	U	35.1	NE
Cerium-139	0.224 ± 1.93	U	1.4	-1.06 ± 1.78	U	1.45	1.45 ± 2.11	U	1.59	-2.9 ± 1.64	U	1.27	NE
Cerium-141	-6.82 ± 6.13	U	3.54	1.08 ± 6.29	U	3.46	1.35 ± 4.69	U	4.02	0.432 ± 8.65	U	3.22	NE
Cerium-144	5.71 ± 11	U	9.24	4.13 ± 11.4	U	9.73	2.58 ± 12.4	U	10.6	-2.38 ± 11	U	9.11	30000
Cesium-134	0.84 ± 3.11	U	2.25	-0.0188 ±	U	2.62	0.226 ± 2.3	U	1.95	-0.176 ± 2.22	U	1.59	9000
Cesium-137	-0.818 ± 2.37	U	1.94	-4.78 ± 4.57	U	2.47	-1.21 ± 3.93	U	2.01	-0.592 ± 1.71	U	1.42	10000
Chromium-51	40.6 ± 34.3	U	25.8	-5.54 ± 30.5	U	26.1	-17.8 ± 28.5	U	23.2	-45.8 ± 40.4	U	20.3	5000000
Cobalt-57	0.691 ± 1.37	U	1.15	1.54 ± 2.01	U	1.18	0.68 ± 1.59	U	1.37	-1.4 ± 1.55	U	1.12	NE
Cobalt-60	0.609 ± 2.34	U	2.04	-0.495 ± 3.27	U	2.64	1.48 ± 2.01	U	1.81	-0.152 ± 2.22	U	1.58	30000
Europium-152	-2.48 ± 6.04	U	4.93	-3.29 ± 6.07	U	5.08	-2.87 ± 5.79	U	4.72	-9 ± 7.48	U	3.87	NE
Europium-154	-5.67 ± 6.84	U	5.17	7 ± 7.55	U	6.71	-0.929 ± 5.63	U	4.75	-0.328 ± 5.4	U	4.51	NE
Iron-59	1.94 ± 6.16	U	5.27	2.8 ± 7.21	U	6.18	4.89 ± 5.56	U	4.86	1.75 ± 4.99	U	4.34	100000
Lead-211	-19 ± 60.6	U	48.1	35.2 ± 62	U	50.7	0.52 ± 55.3	U	45.7	-10.2 ± 47	U	38.4	NE
Lead-212	5.86 ± 6.13	X	2.73	0.94 ± 6.73	U	2.65	0.282 ± 6.05	U	2.87	2.07 ± 6.32	U	2.84	20000
Lead-214	3.93 ± 7.94	U	4.11	0.0703 ± 7.17	U	4.32	-1.79 ± 6.87	U	3.77	4.78 ± 7.59	U	3.36	1000000
Manganese-54	-1.08 ± 2.66	U	1.89	2.53 ± 2.72	U	2.43	-0.429 ± 2.31	U	1.64	-3.83 ± 3.82	U	1.55	NE
Mercury-203	2.39 ± 2.75	U	2.39	-2.52 ± 2.94	U	2.28	3.5 ± 2.85	U	2.45	0.265 ± 2.29	U	1.97	NE
Neptunium-237	4.16 ± 9.71	U	7.45	3.74 ± 15.2	U	7.66	0.715 ± 13.3	U	10.9	-0.271 ± 13.3	U	10.1	NE
Neptunium-239	-6 ± 9.66	U	7.85	0.98 ± 14.6	U	8.81	-3.7 ± 11.5	U	9.81	0.59 ± 14	U	8.31	NE
Niobium-95	2.23 ± 3.88	U	3.3	0.457 ± 4.06	U	3.5	1.42 ± 3.11	U	2.68	-1.45 ± 5.09	U	2.59	NE
Potassium-40	30.2 ± 51.7	U	19	42.4 ± 60.8	X	19.9	-15.9 ± 51.7	U	25.9	57.8 ± 49.5	X	16.5	40000
Protactinium-231	-33.7 ± 95.2	U	76.3	11.4 ± 95.3	U	77.2	-100 ± 96.1	U	76.8	-50.8 ± 75.5	U	62.7	NE
Protactinium-233	2.59 ± 3.92	U	3.37	1.9 ± 4	U	3.51	-0.478 ± 3.81	U	3.16	2.03 ± 3.22	U	2.79	NE
Protactinium-234	-10 ± 18.9	U	15.3	-18.8 ± 31.4	U	19	0.685 ± 15.7	U	13.1	6.71 ± 14.3	U	12.1	NE
Radium-223	7.74 ± 44.6	U	33	-2.48 ± 41	U	35.2	-2.93 ± 39.9	U	33.1	34.6 ± 43.5	U	28	NE
Radium-224	35.8 ± 41.5	U	32.3	50.6 ± 44.7	U	30.3	3.19 ± 68.3	U	30.4	35.5 ± 34.7	U	27.4	NE
Radium-226	44.8 ± 91.3	U	32.8	11.1 ± 95.9	U	32.8	34.8 ± 98.3	U	34.7	44.4 ± 85.9	U	28.7	600
Radium-228	-7.53 ± 13.7	U	7.92	0.877 ± 21.5	U	8.26	-5.43 ± 12.2	U	7.02	-14.3 ± 11.6	U	5.27	600
Radon-219	-0.0049±26.6	U	21.8	-10.3 ± 26.4	U	22	9.05 ± 24.6	U	20.6	21 ± 20.2	U	17.4	NE

See notes at end of table.

TABLE A-8. Summary of Sanitary Outfalls of Radiological Analyses, August 2007 (concluded)

(All Results in picocuries per liter [pCi/L] unless otherwise noted.)

Permit Number:	**2069-A**			**2069F-4**			**2069I-3**			**2069-K**			**Regulatory**
Station:	**WW001**			**WW006**			**WW008**			**WW011**			**Sewer Release**
Date Collected:	**8/28/2007**			**8/28/2007**			**8/28/2007**			**8/28/2007**			**Limits***
Sample ID:	**085141-004**			**085142-004**			**085144-004**			**085145-004**			**(Monthly Avg)**
Analyte	**Activity**		**MDA**	**Activity**		**MDA**	**Activity**		**MDA**	**Activity**		**MDA**	
Rhodium-106	-4.92 ± 21.4	U	17.7	-13.1 ± 25.5	U	20.3	1.29 ± 18.3	U	15.6	9.49 ± 18.6	U	14.2	NE
Ruthenium-103	0.334 ± 3.26	U	2.79	-1.15 ± 4.63	U	2.92	-0.575 ± 3.39	U	2.37	-1.39 ± 2.47	U	1.96	300000
Ruthenium-106	-4.92 ± 21.4	U	17.7	-13.1 ± 25.5	U	20.3	1.29 ± 18.3	U	15.6	9.49 ± 18.6	U	14.2	30000
Selenium-75	0.713 ± 3.04	U	2.29	-0.93 ± 2.92	U	2.34	1.96 ± 2.81	U	2.4	0.122 ± 2.28	U	1.95	NE
Sodium-22	-1.96 ± 2.46	U	1.87	2.73 ± 2.71	U	2.43	-0.349 ± 2.03	U	1.71	-0.145 ± 1.94	U	1.62	NE
Strontium-85	-16.8 ± 4.34	U	3.15	-16.4 ± 4.79	U	3.41	-4.07 ± 3.64	U	3.03	-27.1 ± 3.93	U	2.27	NE
Thallium-208	4.59 ± 3.95	U	2.26	0.824 ± 5.71	U	2.21	3.47 ± 4.54	U	2.08	0.428 ± 3.06	U	1.79	NE
Thorium-227	5.68 ± 25.3	U	19.1	-25.4 ± 24.2	U	18.4	13.8 ± 32.1	U	19.9	-14.2 ± 18.8	U	15.6	NE
Thorium-231	5.44 ± 30.9	U	14.3	0.254 ± 32.9	U	16.1	28.3 ± 27.2	U	22.4	2.18 ± 47.3	U	20.3	300
Thorium-232	369 ± 3850	U	491	16.1 ± 640	U	539	448 ± 5170	U	1670	-253 ± 3240	U	1660	500000
Thorium-234	-38 ± 52	U	35.6	-15.2 ± 58.8	U	45.5	34.9 ± 180	U	77.6	-65 ± 170	U	92.5	50000
Tin-113	-0.895 ± 3	U	2.43	0.959 ± 3.05	U	2.63	2.14 ± 2.75	U	2.34	0.952 ± 2.35	U	1.99	NE
Tritium	130 ± 145	U	112	181 ± 149	U	110	56.4 ± 137	U	111	152 ± 148	U	112	10000000
Uranium-235	-7.95 ± 16.4	U	9.8	2.89 ± 16.9	U	9.19	5.7 ± 12.8	U	11	1.15 ± 23.1	U	8.89	3000
Uranium-238	-38 ± 52	U	35.6	-15.2 ± 58.8	U	45.5	34.9 ± 180	U	76	-65 ± 170	U	92.5	3000
Yttrium-88	2.29 ± 3.11	U	2.77	0.956 ± 2.86	U	2.49	-1.1 ± 2.71	U	1.8	1.8 ± 2.46	U	2.2	100000
Zinc-65	-3.32 ± 5.72	U	4.56	0.471 ± 6.1	U	5.1	-5.12 ± 4.69	U	3.58	-1.82 ± 4.85	U	3.43	NE
Zirconium-95	-2.19 ± 4.99	U	3.99	-3.97 ± 5.81	U	4.77	0.748 ± 4.25	U	3.61	-2.61 ± 3.81	U	3.06	200000

NOTES: U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

X = Presumptive evidence analyte is not present.

NE = Not established.

MDA = minimum detectable activity.

* = The monthly average concentration values for release of sanitary sewage were derived by taking the most restrictive occupational stochastic oral ingestion annual limits on intake (ALT) for a reference mean.

TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, August 2007

(All Results in micrograms per liter [µg/L] unless otherwise noted.)

Permit Number:	2069-A		2069F-4		2069G-2		2069I-3		2069-K	
Station:	**WW001**		**WW006**		**WW007**		**WW008**		**WW011**	
Date Collected:	**8/28/2007**		**8/28/2007**		**8/28/2007**		**8/28/2007**		**8/28/2007**	
Sample ID:	**085141-006**		**085142-006**		**085143-003**		**085144-006**		**085145-006**	
Analyte										
1,1,1- Trichloroethane	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
1,1,2,2- Tetrachloroethane	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,1,2- Trichloroethane	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,1- Dichloroethane	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
1,1- Dichloroethylene	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
1,2- Dichlorobenzene	1.96	U	7.92	U	7.92	U	1.94	U	2	U
1,2- Dichloroethane	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,2- Dichloropropane	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3- Dichlorobenzene	1.96	U	7.92	U	7.92	U	1.94	U	2	U
1,4- Dichlorobenzene	1.96	U	7.92	U	7.92	U	1.94	U	2	U
2,4,5- Trichlorophenol	0.98	U	3.96	U	3.96	U	0.971	U	1	U
2-Butanone	1.25	U	1.25	U	1.25	U	1.25	U	1.34	J
2-Hexanone	1.25	U	1.25	U	1.25	U	1.25	U	1.25	U
2- Methylnaphthalene	0.294	U	1.19	U	1.19	U	0.291	U	0.3	U
3,3'- Dichlorobenzidine	0.98	U	3.96	U	3.96	U	0.971	U	1	U
4- Bromophenylphenylether	1.96	U	7.92	U	7.92	U	1.94	U	2	U
4-Chloroaniline	1.96	U	7.92	U	7.92	U	1.94	U	2	U
4- Chlorophenylphenylether	1.96	U	7.92	U	7.92	U	1.94	U	2	U
4-Methyl-2-pentanone	1.25	U	1.25	U	1.25	U	1.25	U	1.25	U
Acetone	25.7		13.6		13.6		57.5		78	
Benzene	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Bromodichloromethane	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Bromoform	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Bromomethane	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Butylbenzylphthalate	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Carbazole	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Carbon disulfide	1.25	U	1.25	U	1.25	U	1.25	U	1.25	U
Carbon tetrachloride	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Chlorobenzene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Chloroethane	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chloroform	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Chloromethane	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2- Dichloroethylene	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
cis-1,3- Dichloropropylene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Dibromochloromethane	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Dimethylphthalate	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Diphenylamine	2.94	U	11.9	U	11.9	U	2.91	U	3	U
Ethylbenzene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
m,p-Cresol	2.94	U	11.9	U	11.9	U	2.91	U	6.88	J
Methylene chloride	2	U	2	U	2	U	2	U	2	U
m-Nitroaniline	1.96	U	7.92	U	7.92	U	1.94	U	2	U
o-Cresol	1.96	U	7.92	U	7.92	U	1.94	U	2	U
o-Nitroaniline	1.96	U	7.92	U	7.92	U	1.94	U	2	U

See notes at end of table.

TABLE A-9. Summary of Sanitary Outfalls of Volatile Organic Compounds, August 2007 (concluded)
(All Results in micrograms per liter [µg/L] unless otherwise noted.)

Permit Number:	**2069-A**		**2069F-4**		**2069G-2**		**2069I-3**		**2069-K**	
Station:	**WW001**		**WW006**		**WW007**		**WW008**		**WW011**	
Date Collected:	**8/28/2007**		**8/28/2007**		**8/28/2007**		**8/28/2007**		**8/28/2007**	
Sample ID:	**085141-006**		**085142-006**		**085143-003**		**085144-006**		**085145-006**	
Analyte										
p-Nitroaniline	2.94	U	11.9	U	11.9	U	2.91	U	3	U
Styrene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Tetrachloroethylene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Toluene	0.25	U	0.25	U	0.25	U	0.25	U	0.568	J
trans-1,2-Dichloroethylene	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
trans-1,3-Dichloropropylene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Trichloroethylene	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Vinyl acetate	1.5	U	1.5	U	1.5	U	1.5	U	1.5	U
Vinyl chloride	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Xylenes (total)	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U

NOTES: U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.

SNL/NM uses the City of Albuquerque's value of 3.2 mg/L as the standard (that value has not been exceeded). This value is derived from the summation of all values greater than 0.01 mg/L for the list of toxic organics as developed by the EPA for each National Categorical Pretreatment Standard. For non-categorical users, the summation of all values above 0.01 mg/L of those listed in 40 CFR 122, Appendix D, Table II, or as directed by the Industrial Waste Engineer. Based on the Sewer Use and Wastewater Control Table, this value should never exceed 3.2 mg/L.

TABLE A-10. Summary of Sanitary Outfalls of Semi-Volatile Organic Compounds, August 2007
(All Results in micrograms per liter [µg/L] unless otherwise noted.)

Permit Number:	**2069-A**		**2069F-4**		**2069G-2**		**2069I-3**		**2069-K**	
Station:	**WW001**		**WW006**		**WW007**		**WW008**		**WW011**	
Date Collected:	**8/28/2007**		**8/28/2007**		**8/28/2007**		**8/28/2007**		**8/28/2007**	
Sample ID:	**085141-007**		**085142-007**		**085143-004**		**085144-007**		**085145-007**	
Analyte										
1,2,4-Trichlorobenzene	1.96	U	7.92	U	7.92	U	1.94	U	2	U
2,4,6-Trichlorophenol	1.96	U	7.92	U	7.92	U	1.94	U	2	U
2,4-Dichlorophenol	1.96	U	7.92	U	7.92	U	1.94	U	2	U
2,4-Dimethylphenol	1.96	U	7.92	U	7.92	U	1.94	U	2	U
2,4-Dinitrophenol	9.8	U	39.6	U	39.6	U	9.71	U	10	U
2,4-Dinitrotoluene	1.96	U	7.92	U	7.92	U	1.94	U	2	U
2,6-Dinitrotoluene	1.96	U	7.92	U	7.92	U	1.94	U	2	U
2-Chloronaphthalene	0.343	U	1.39	U	1.39	U	0.34	U	0.35	U
2-Chlorophenol	1.96	U	7.92	U	7.92	U	1.94	U	2	U
2-Methyl-4,6-dinitrophenol	2.94	U	11.9	U	11.9	U	2.91	U	3	U
2-Nitrophenol	1.96	U	7.92	U	7.92	U	1.94	U	2	U
4-Chloro-3-methylphenol	1.96	U	7.92	U	7.92	U	1.94	U	2	U
4-Nitrophenol	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Acenaphthene	0.304	U	1.23	U	1.23	U	0.301	U	0.31	U
Acenaphthylene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Anthracene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Benzo(a)anthracene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Benzo(a)pyrene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Benzo(b)fluoranthene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Benzo(ghi)perylene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Benzo(k)fluoranthene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
bis(2-Chloroethoxy) methane	2.94	U	11.9	U	11.9	U	2.91	U	3	U
bis(2-Chloroethyl) ether	1.96	U	7.92	U	7.92	U	1.94	U	2	U
bis(2-Chloroisopropyl)ether	1.96	U	7.92	U	7.92	U	1.94	U	2	U
bis(2-Ethylhexyl)phthalate	1.96	U	235		235	U	2.1	J	2.94	J
Chrysene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Dibenzo(a,h)anthracene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Dibenzofuran	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Diethylphthalate	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Di-n-butylphthalate	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Di-n-octylphthalate	2.94	U	11.9	U	11.9	U	2.91	U	3	U
Fluoranthene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Fluorene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Hexachlorobenzene	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Hexachlorobutadiene	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Hexachlorocyclopentadiene	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Hexachloroethane	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Indeno(1,2,3-cd)pyrene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Isophorone	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Naphthalene	0.294	U	1.19	U	1.19	U	0.291	U	0.3	U
Nitrobenzene	2.94	U	11.9	U	11.9	U	2.91	U	3	U
N-Nitrosodipropylamine	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Pentachlorophenol	1.96	U	7.92	U	7.92	U	1.94	U	2	U
Phenanthrene	0.196	U	0.792	U	0.792	U	0.194	U	0.2	U
Phenol	0.98	U	3.96	U	3.96	U	0.971	U	4.18	J
Pyrene	0.294	U	1.19	U	1.19	U	0.291	U	0.3	U

NOTES: U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

J = Estimated value, the analyte concentration fell above the effective (MDL) minimum detection limit and below the effective (PQL) practical quantitation limit.

This page intentionally left blank.

APPENDIX B
2007 GROUNDWATER CONTAMINANT CONCENTRATION TRENDS

"Collecting Samples"   Photo by Staff.

This page intentionally left blank.

CONTENTS

FIGURES

Groundwater Protection Program Wells

Mixed Waste Landfill Well

Technical Area V Wells

Tijeras Arroyo Groundwater Wells

Burn Site Groundwater Wells

This page intentionally left blank.

Groundwater Protection Program Wells

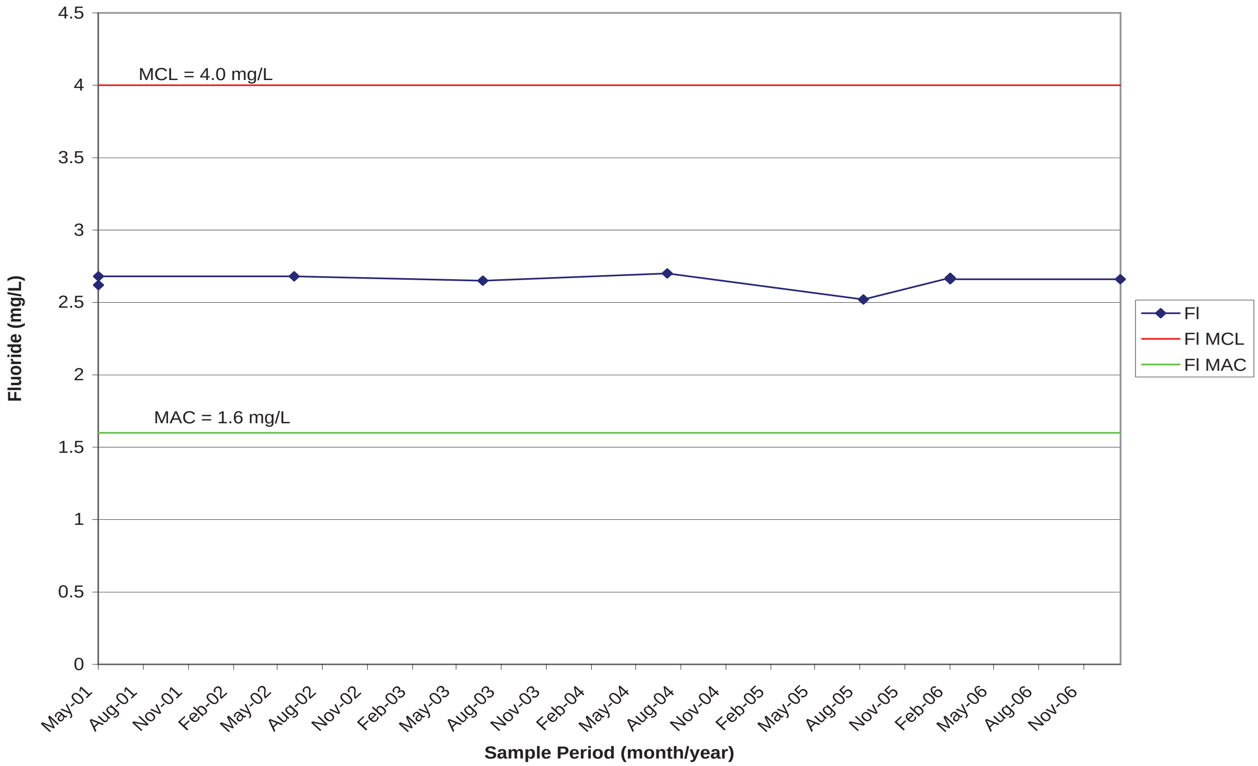


FIGURE B-1. Fluoride Concentrations, SFR-4T

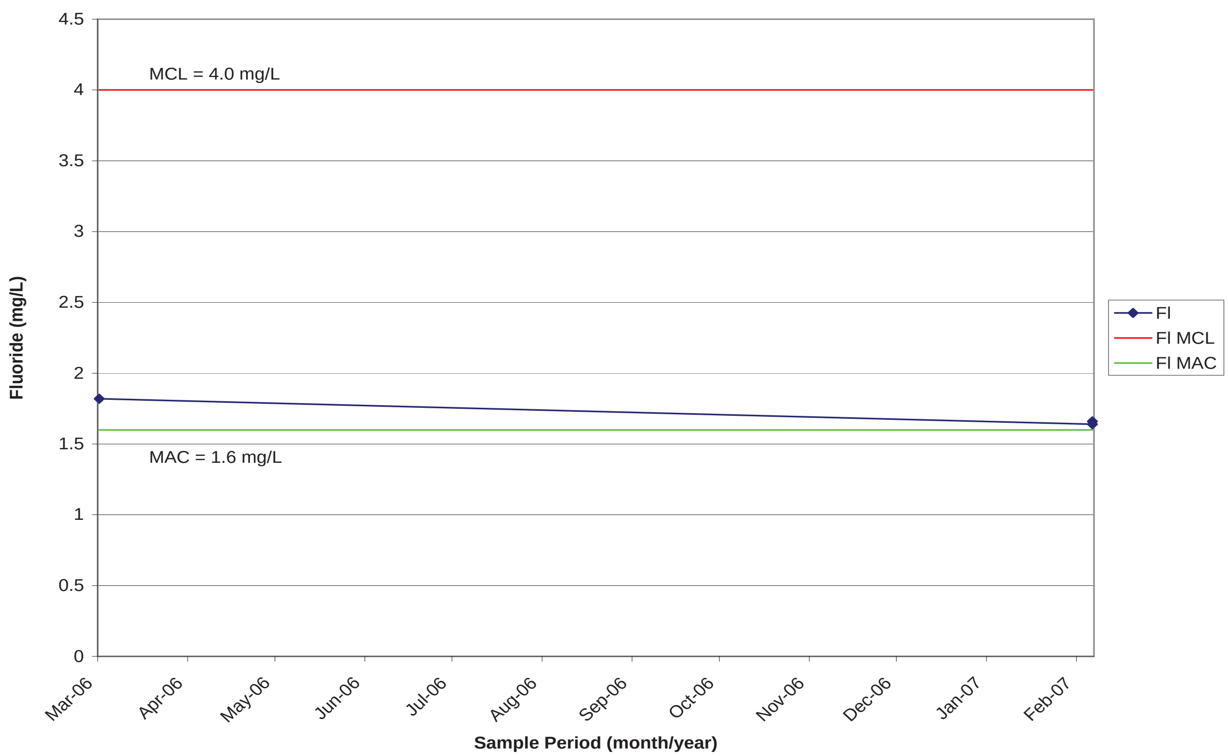


FIGURE B-2. Fluoride Concentrations, SWTA3-MW4

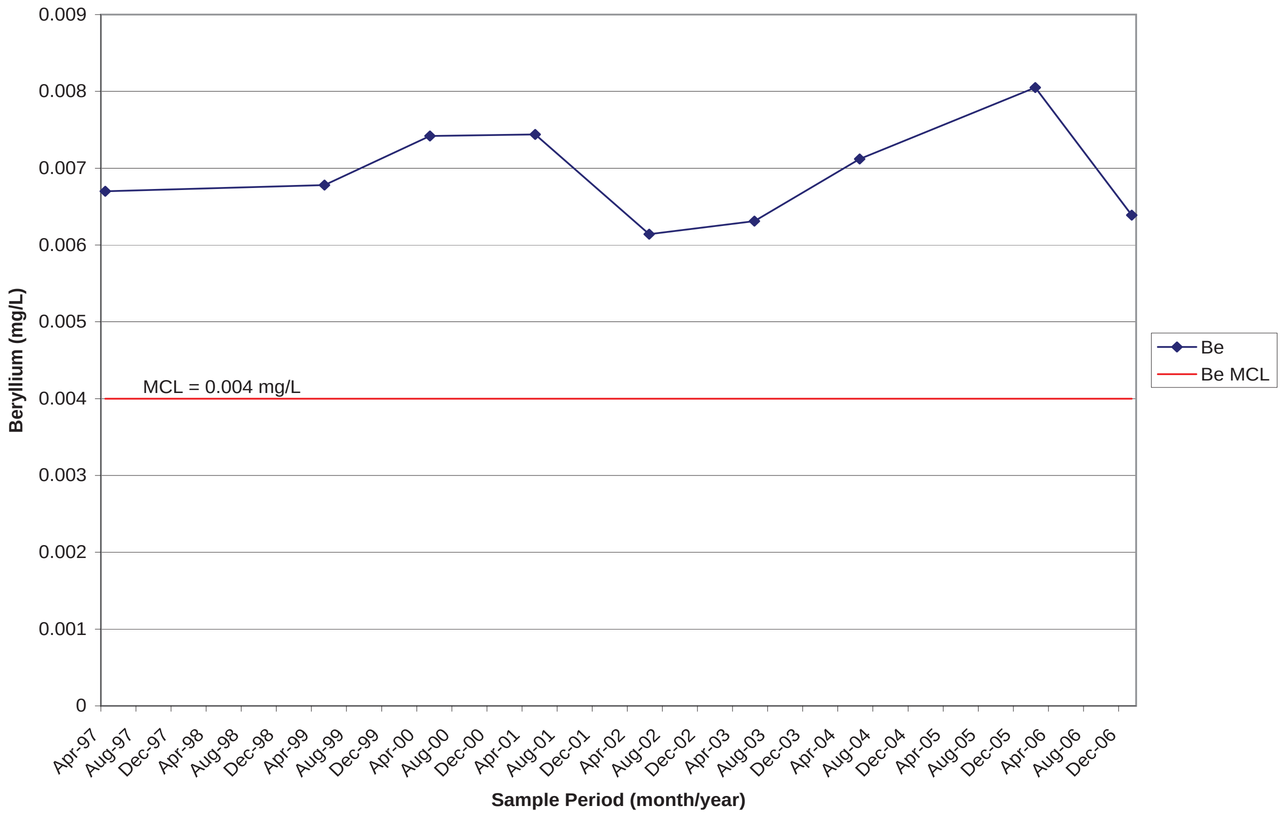


FIGURE B-3. Fluoride Concentrations, Coyote Springs

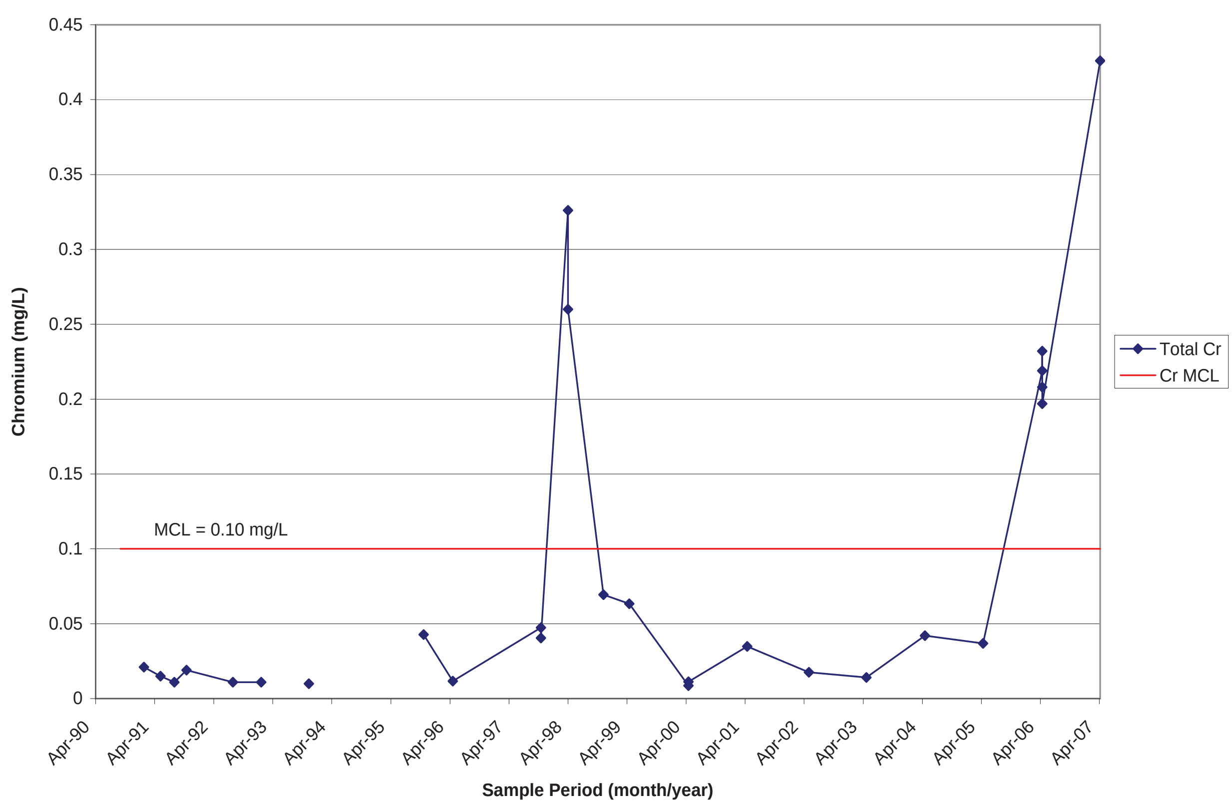


FIGURE B-4. Total Chromium Concentrations, MWL-MW1

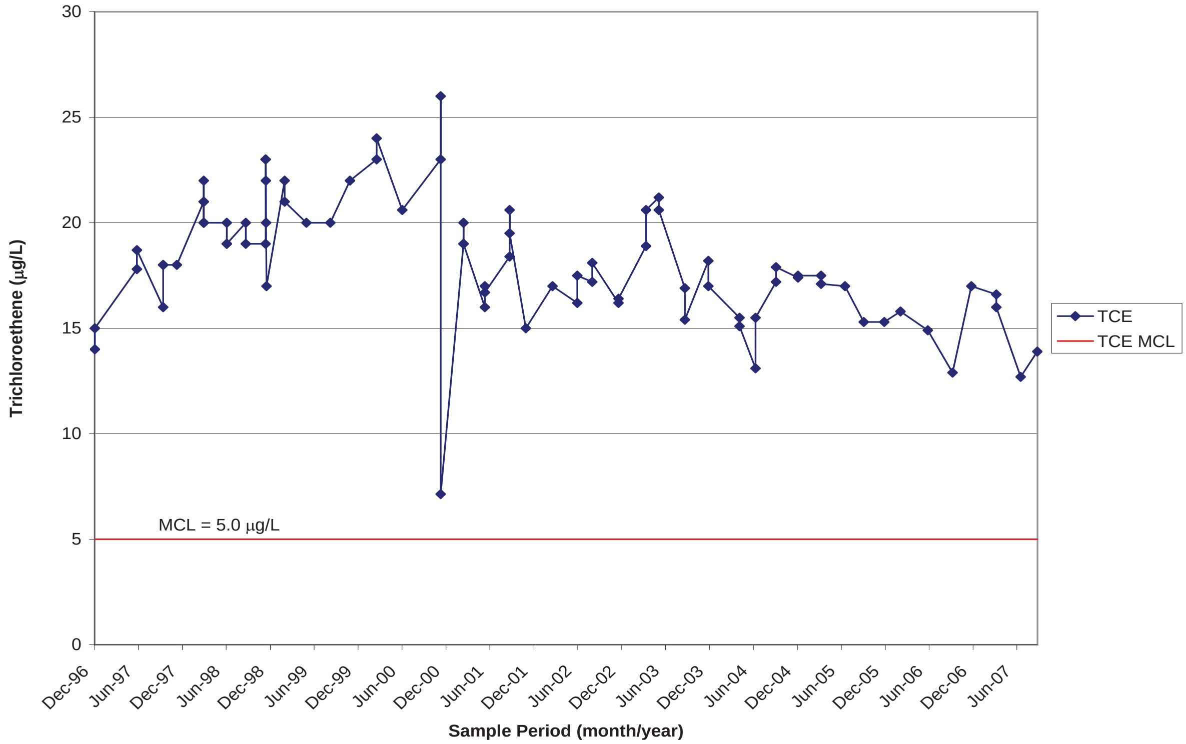


FIGURE B-5. TCE Concentrations, LWDS-MW1

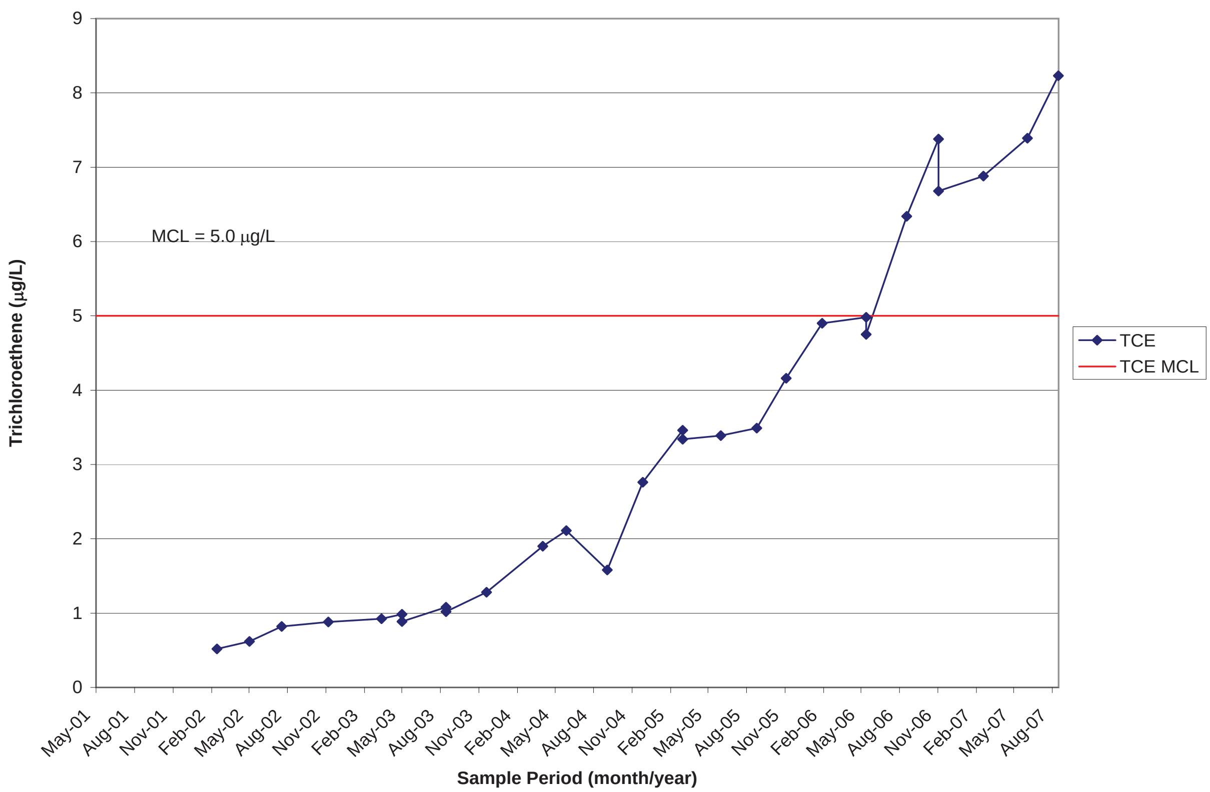


FIGURE B-6. TCE Concentrations, TAV-MW6

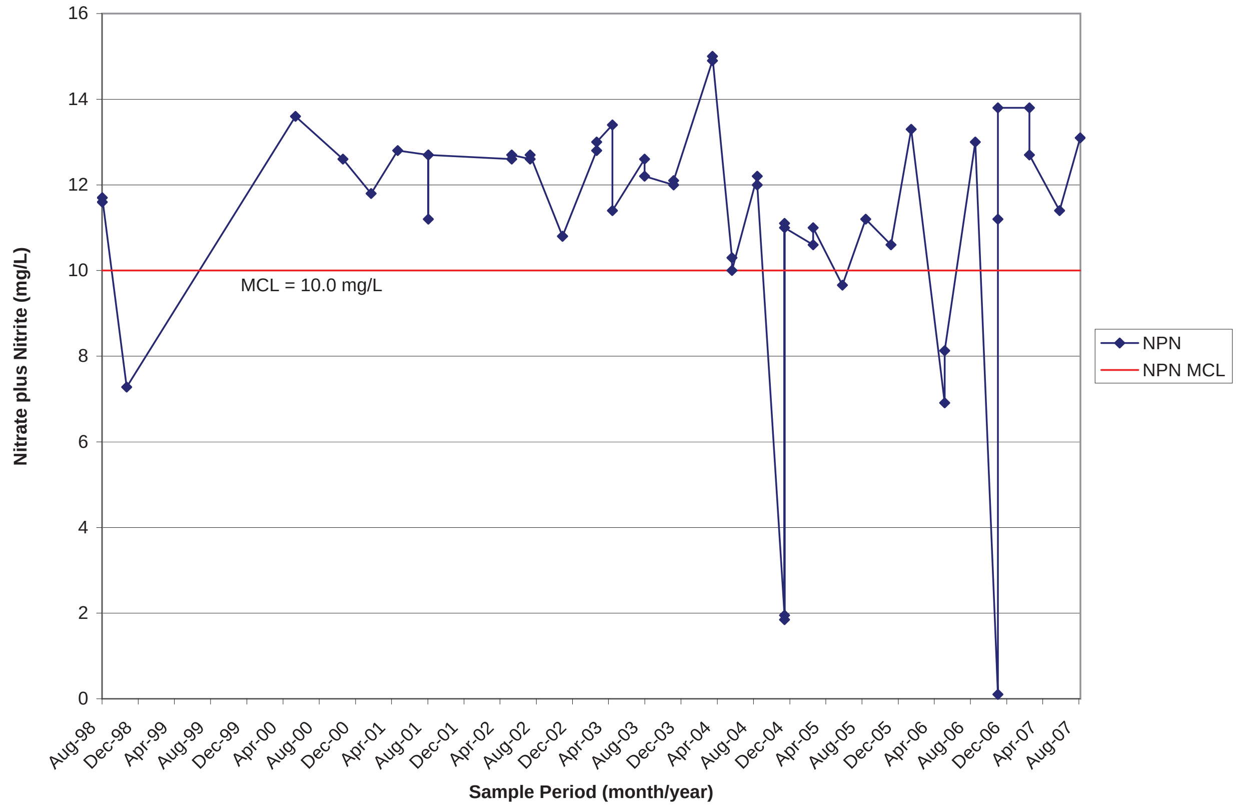


FIGURE B-7. Nitrate plus Nitrite Concentrations, LWDS-MW1

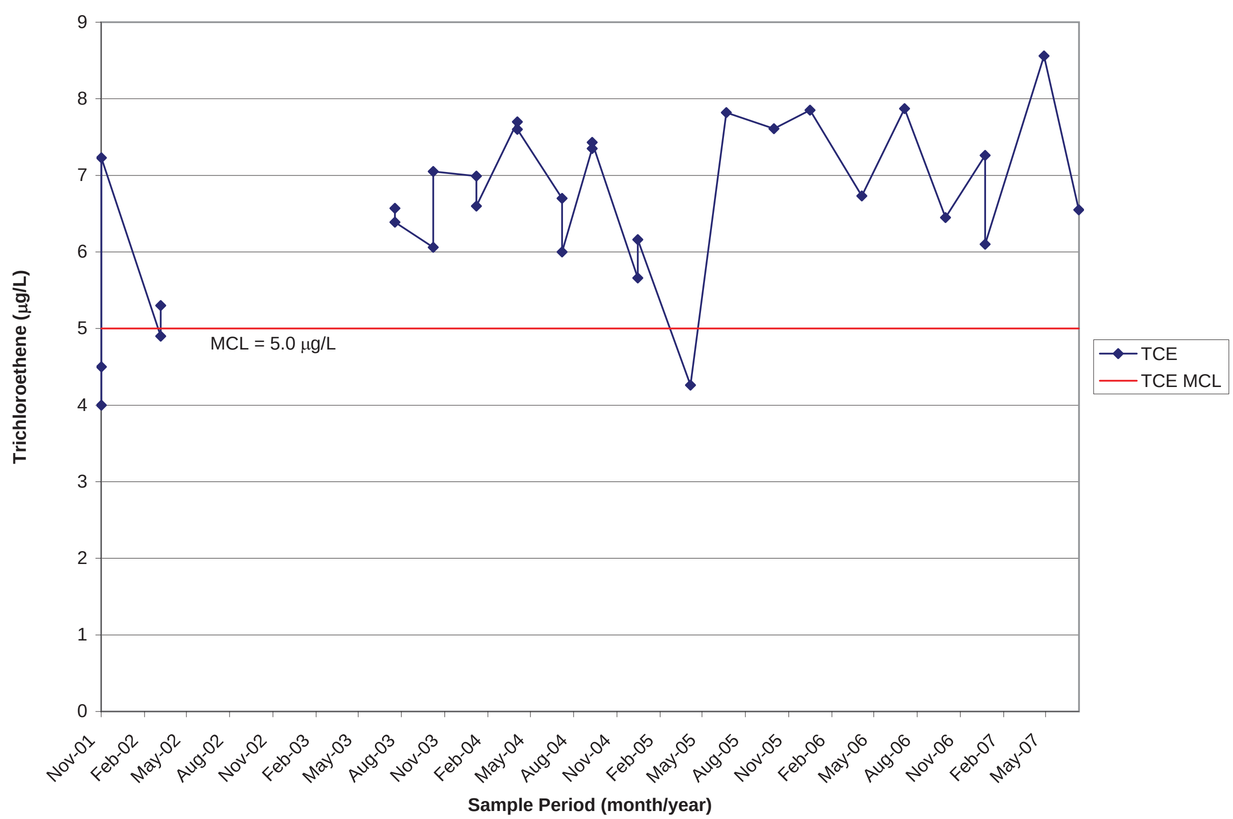


FIGURE B-8. TCE Concentrations, WYO-4

Mixed Waste Landfill Wells

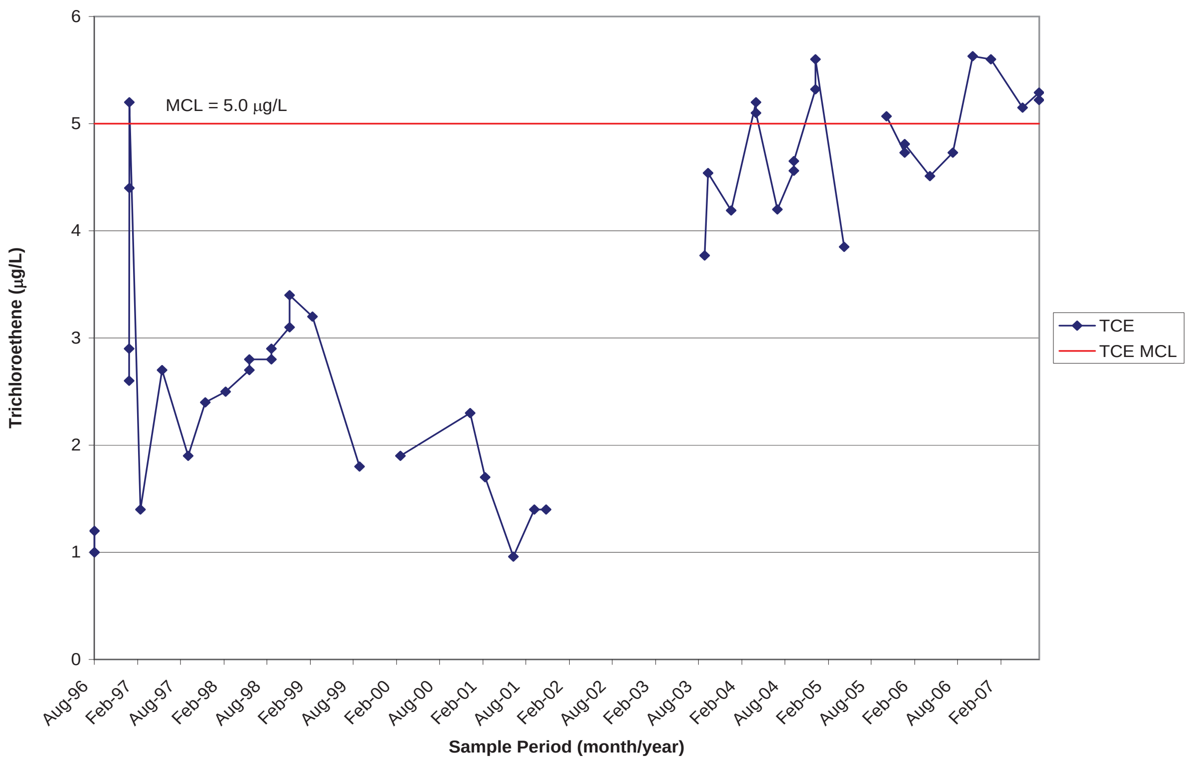


FIGURE B-9. TCE Concentrations, TA2-W-19

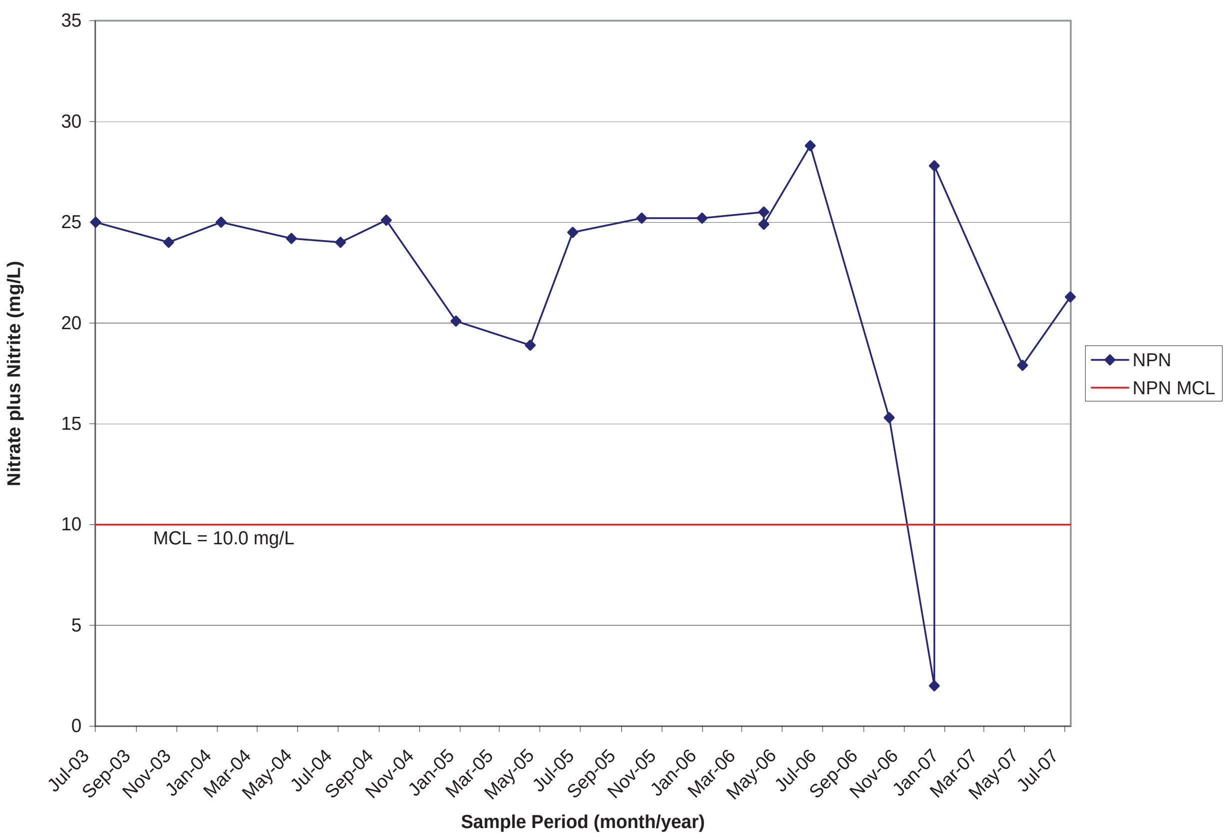


FIGURE B-10. Nitrate plus Nitrite Concentrations, TA2-SW1-320

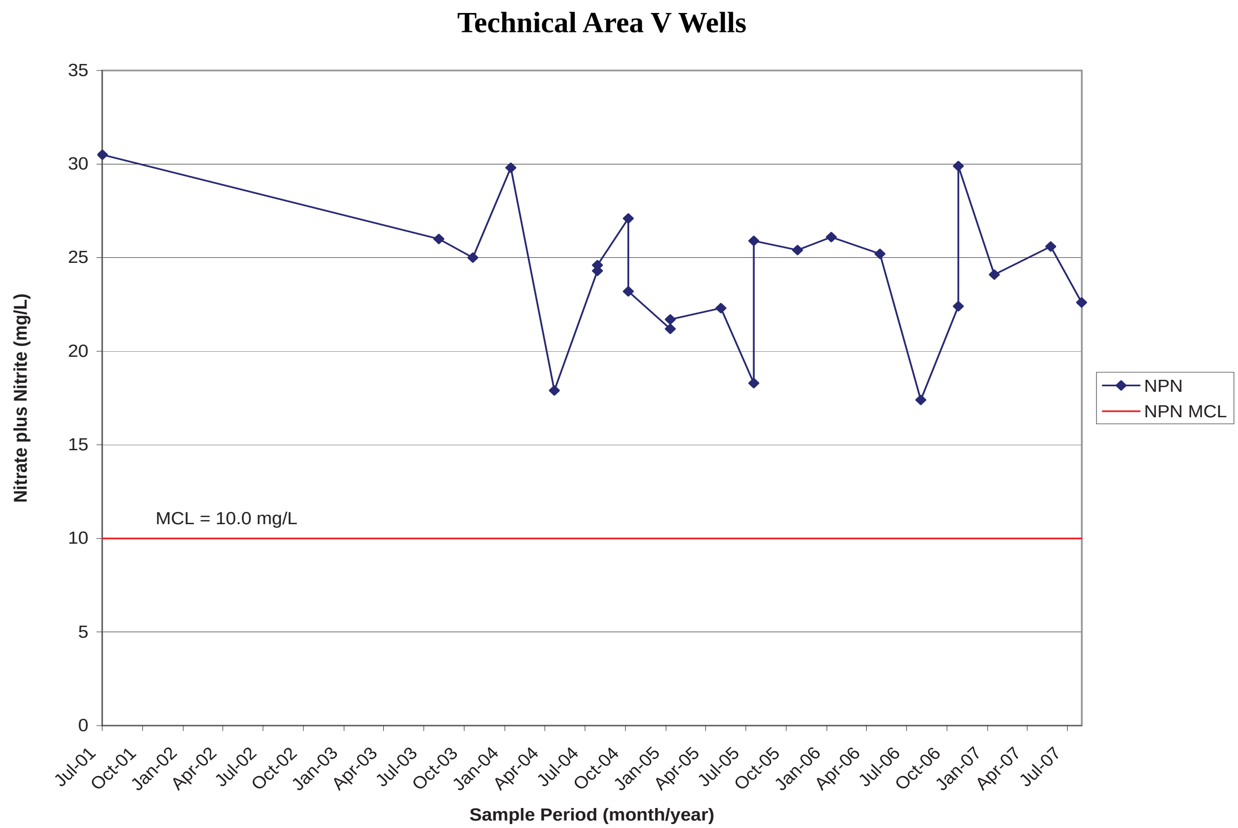


FIGURE B-11. Nitrate Plus Nitrite Concentrations, TJA-7

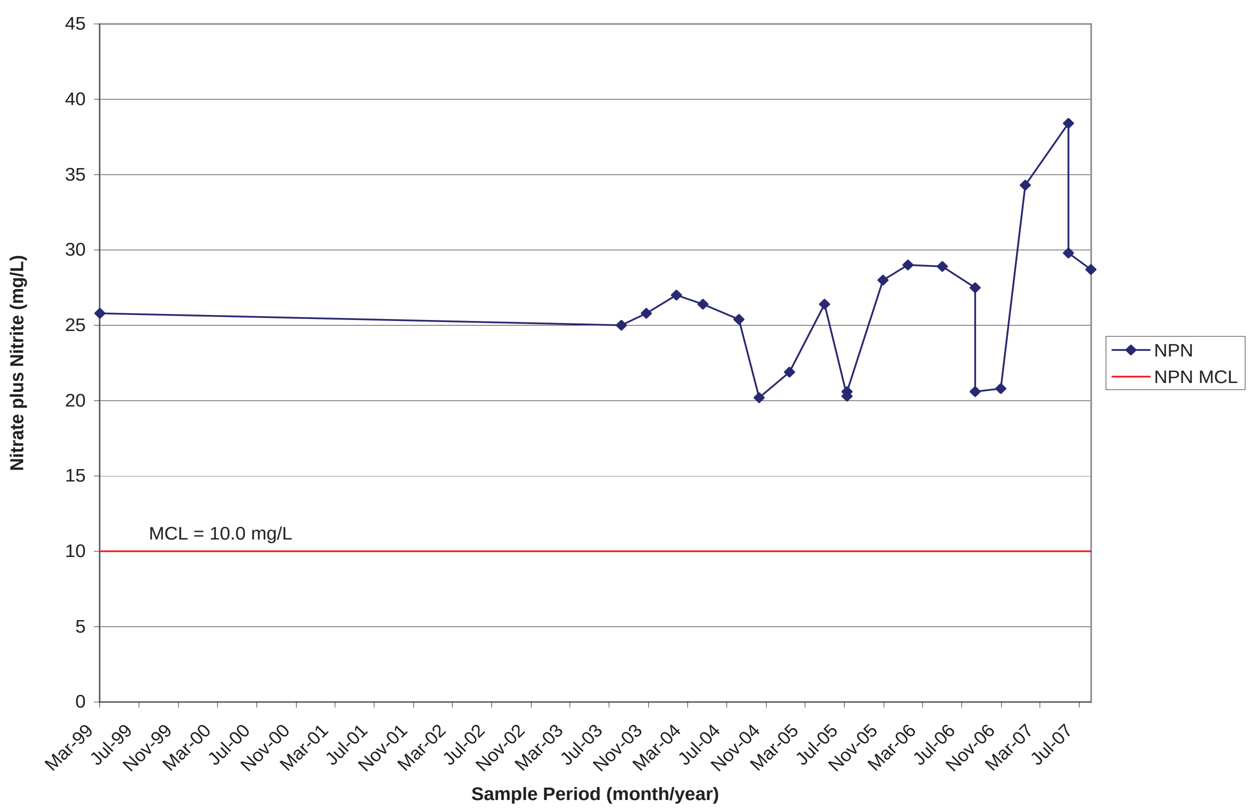


FIGURE B-12. Nitrate plus Nitrite Concentrations, TJA-4

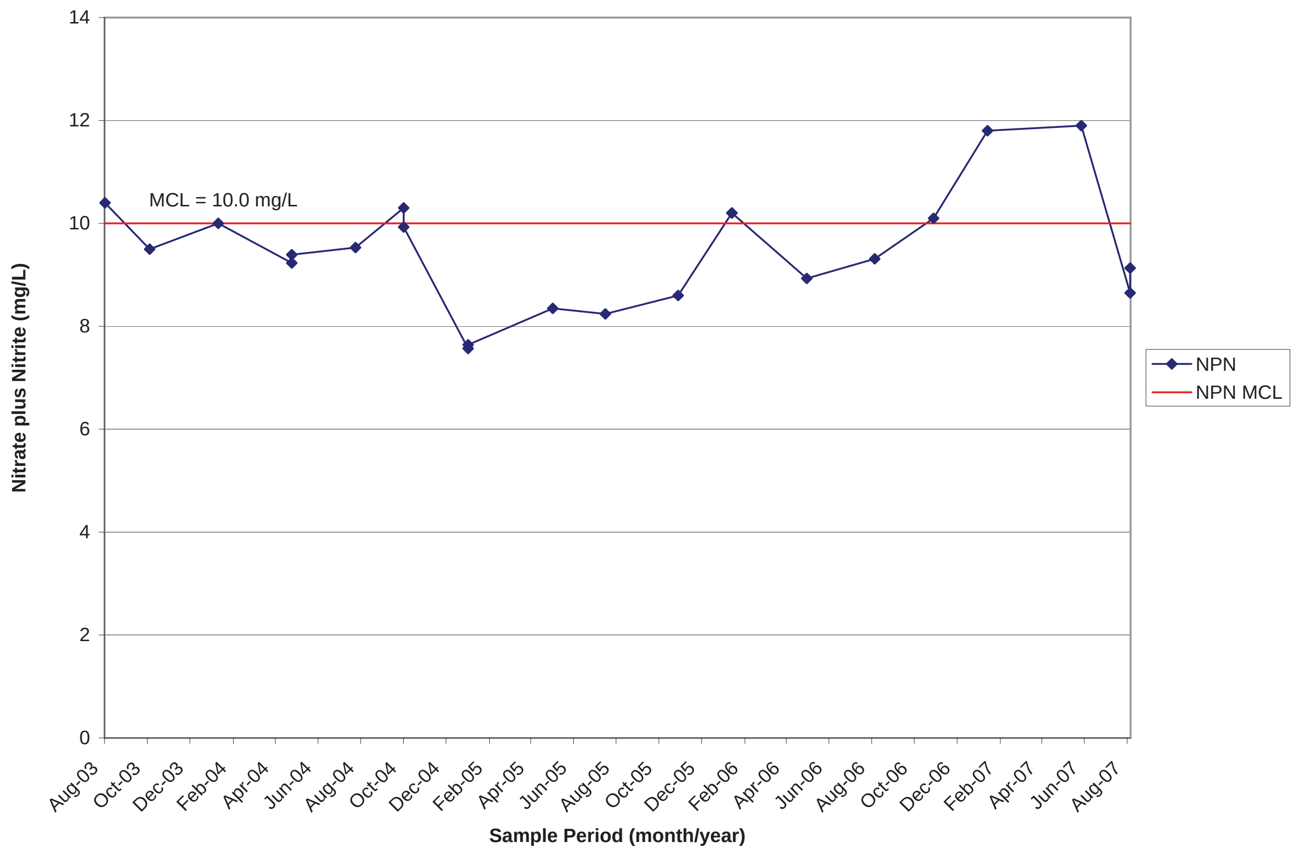


FIGURE B-13. Nitrate plus Nitrite Concentrations, TA2-W-19

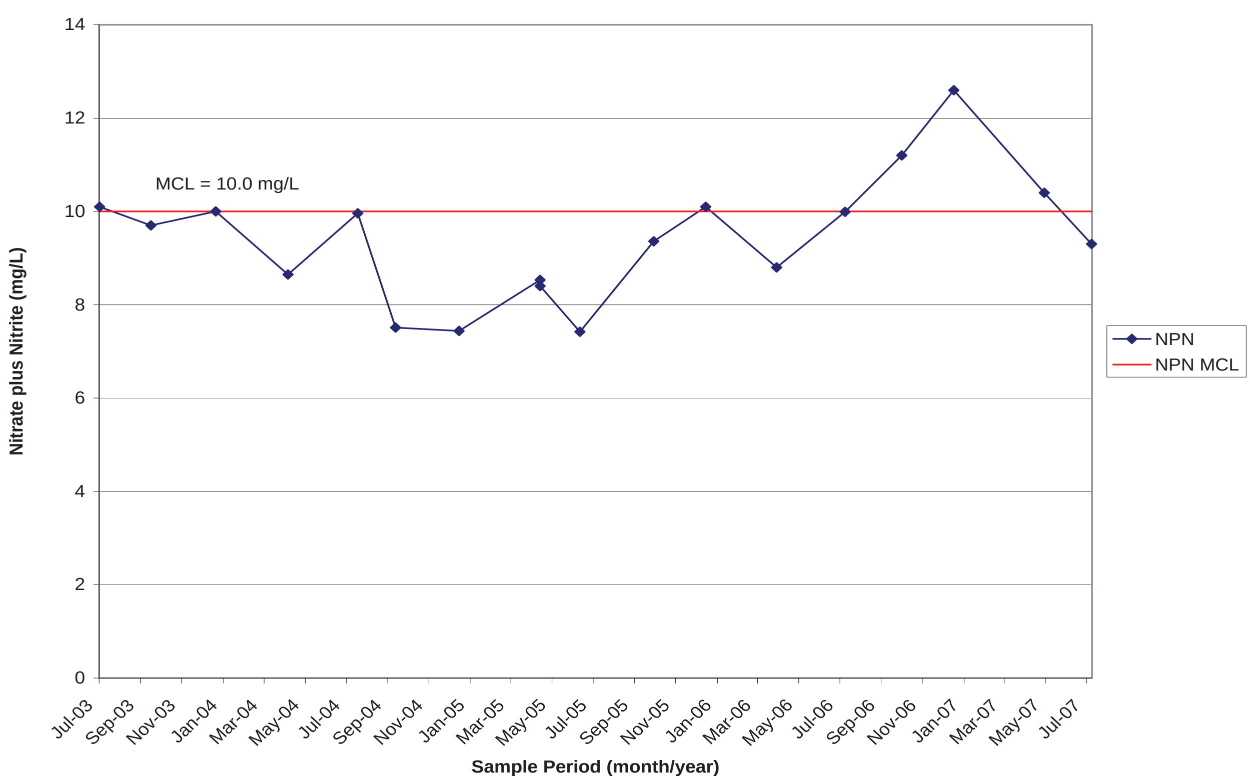


FIGURE B-14. Nitrate Plus Nitrite Concentrations, TJA-2

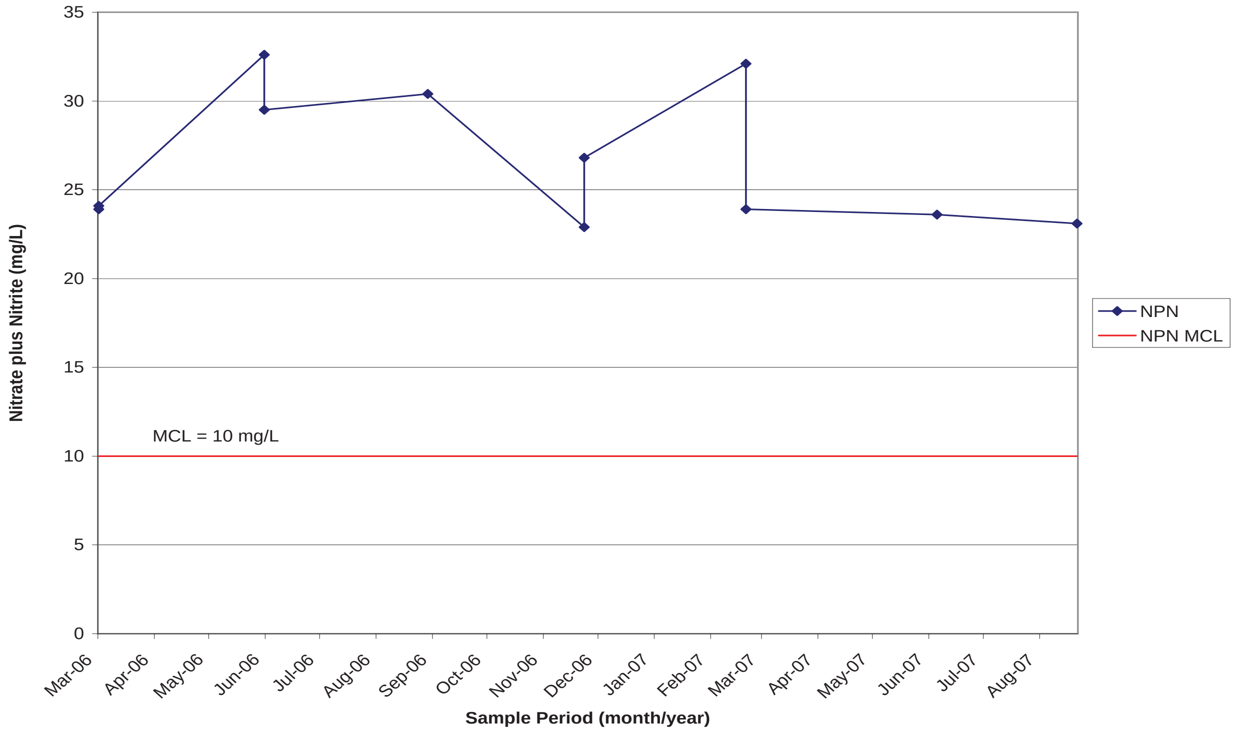


FIGURE B-15. Nitrate plus Nitrite Concentrations, CYN-MW6

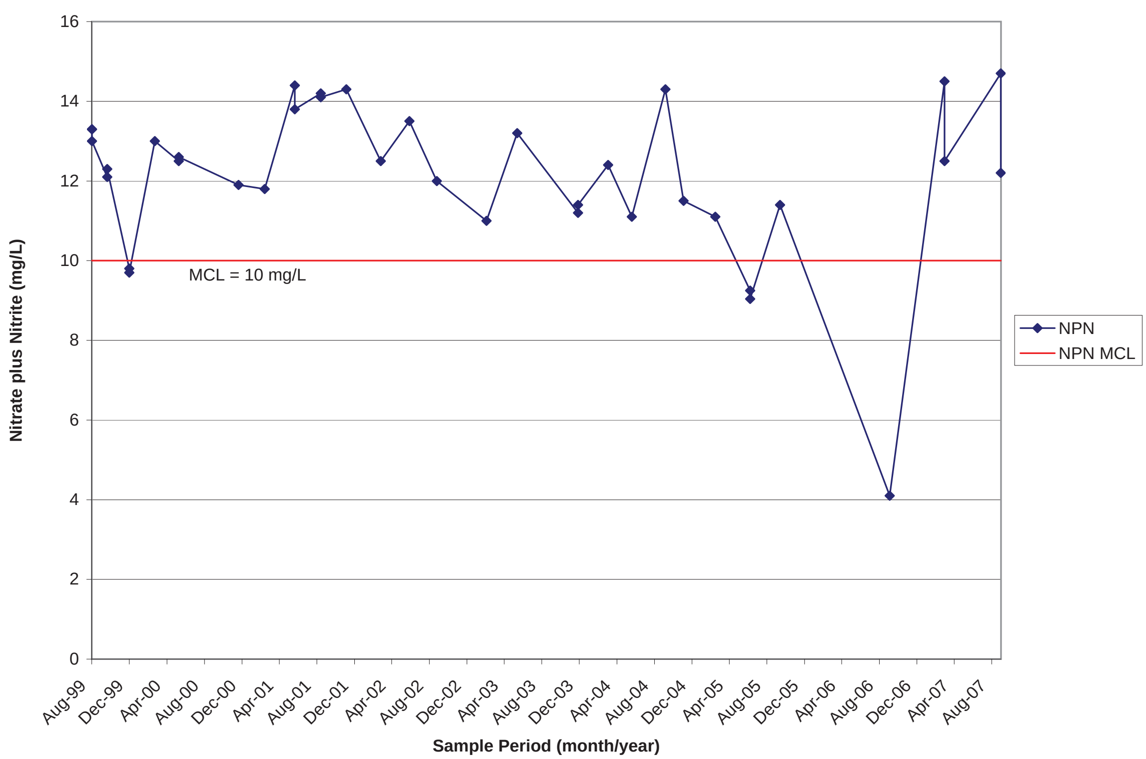


FIGURE B-16. Nitrate plus Nitrite Concentrations, CYN-MW3

Tijeras Arroyo Groundwater Wells

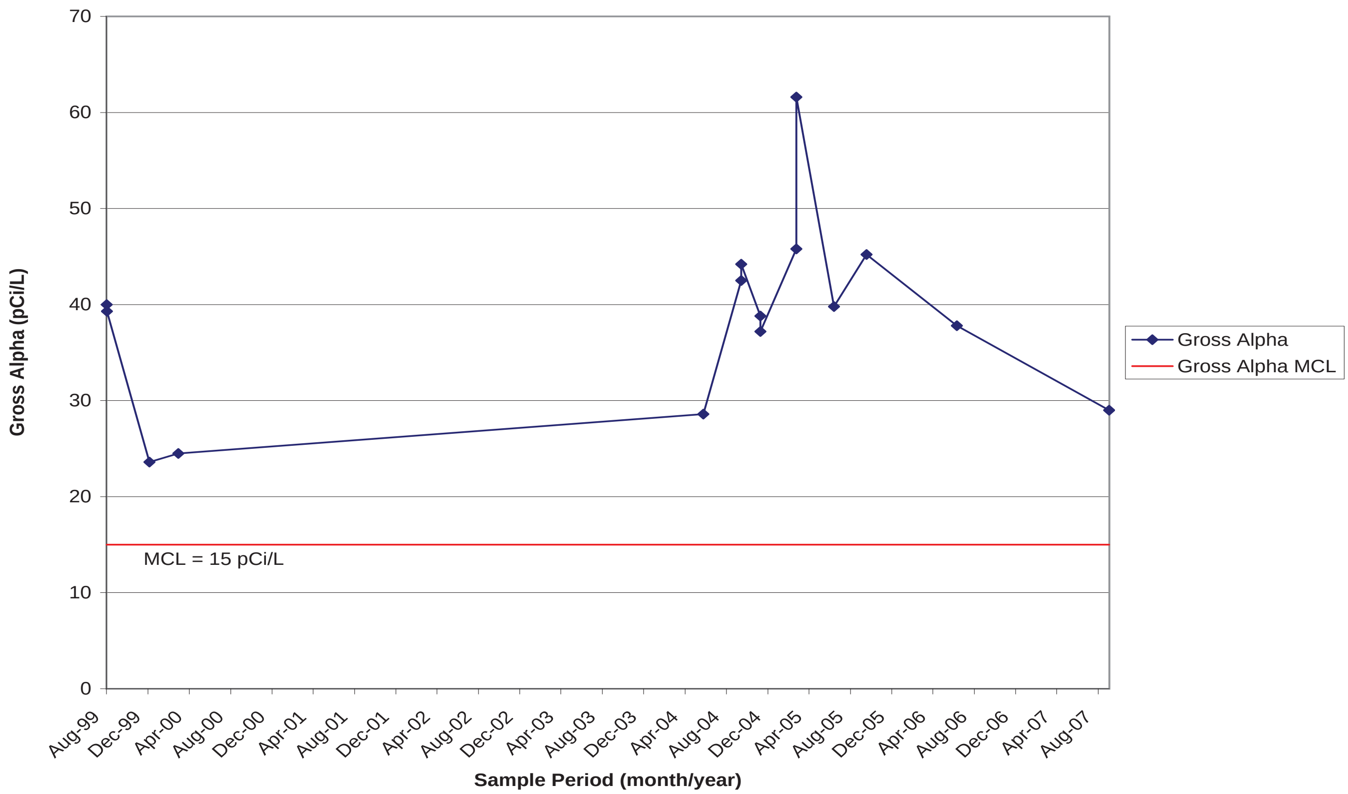


FIGURE B-17. Gross Alpha Activities, CYN-MW4

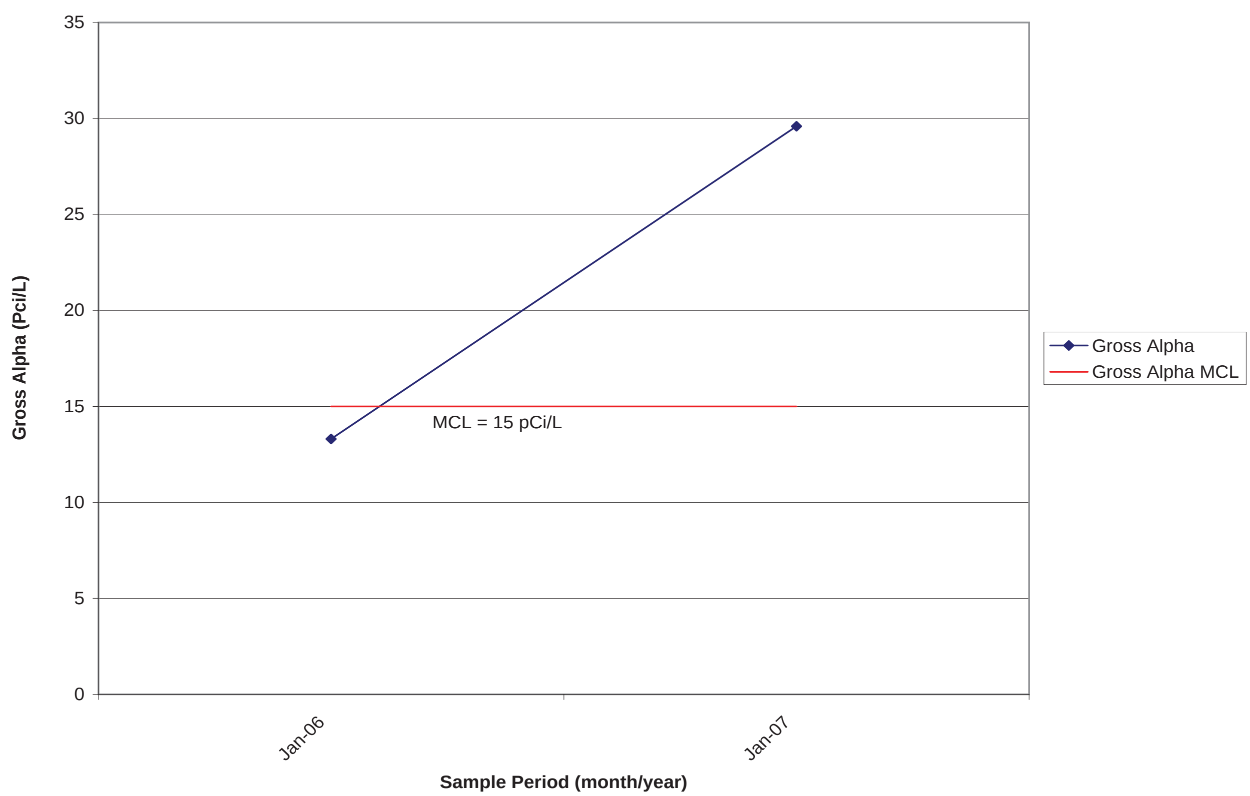


FIGURE B-18. Gross Alpha Activities, CYN-MW7

This page intentionally left blank.

APPENDIX C

2007 TERRESTRIAL SURVEILLANCE

This page intentionally left blank.

CONTENTS

TABLES

This page intentionally left blank.

C.1 Radiological Parameters:

Gamma-emitting radionuclides – Gamma spectroscopy is used to detect the emission of gamma radiation from radioactive materials. Radionuclide identification is possible by measuring the spectrum of gamma energies associated with a sample, since each radionuclide has a unique and consistent series of gamma emissions. Cesium–137 (Cs-137) is an example of a long-lived gamma emitter that is prevalent in the environment (as fallout from historical nuclear weapons testing) and is used as a possible indicator of environmental contamination from reactor facilities.

Tritium (H^3) radioisotope - H^3 is a radioactive isotope of hydrogen with a half-life of 12.5 years. Unlike the most common element of hydrogen (${}_1H^1$), which has a single proton in its nucleus, H^3 contains one proton and two neutrons. Tritium occurs naturally at low levels in the environment, and as a result of fallout from past atmospheric nuclear weapons testing. It is also a possible contaminant associated with research and development (R&D).

Uranium – Uranium occurs naturally in soils, and may also be present as a pollutant in the environment, due to past testing conducted at SNL/NM. Total uranium (U_{tot}) analysis is used to measure all uranium isotopes present in a sample. A high U_{tot} measurement may trigger an isotope-specific analysis to determine the possible source of uranium (natural or man-made, enriched or depleted).

External gamma radiation exposure rates - Thermoluminescent dosimeters (TLDs) are used to measure ambient gamma exposure rates. Several natural gamma radiation sources exist, including cosmic radiation and radioactive materials that exist in geologic materials at SNL/NM. Many sources of man-made gamma radiation also exist at SNL/NM, such as reactor and accelerator facilities. The TLD network was established to determine the regional gamma exposure rate due to natural sources and to determine the impact, if any, of SNL/NM's operations on these levels. The dosimeters are placed on aluminum poles at a height of approximately one meter, and are exchanged and measured quarterly.

Non-Radiological parameters:

All metals, except for mercury, are determined using the Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS) method. Mercury is determined by the Cold Vapor Atomic Absorption method.

Definitions:
The following terminology is utilized in the tables in this appendix:

Definitions for Radiological Analysis Tables
Decision Level (or Critical Level): The activity concentration above which a sample is considered to have activity above the instrument background at a prescribed level of confidence. The decision level is calculated such that there is a five percent probability of reporting a false positive result for a sample containing no activity.

Detection Limit (or Minimum DetecTable Activity): The true activity concentration in a sample that, if present, can be detected (i.e., above the decision level) at a prescribed level of confidence. The detection limit is calculated such that there is a five percent probability of reporting a false negative result for a sample containing activity at the detection limit.

Definitions for Metals Tables
Decision Level (or Method Detection Limit): The lowest concentration at which a substance can be detected in a sample at a prescribed level of confidence.

Detection Limit (or Practical Quantification Limit): The lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

This page intentionally left blank.

TABLE C-1. Radiological Results by Location for Calendar Year 2007, Soil

Location Type	Analyte	Location	Units	Activity (±2σ) And/or Concentration		Decision Level	Detection Limit
On-Site	Americium-241	2NE	pCi/g	0.0372 ± 0.0452	U	0.037	0.074
		2NW	pCi/g	0.027 ± 0.0382	U	0.0262	0.0524
		2SE	pCi/g	0.0253 ± 0.0478	U	0.0395	0.079
		2SW	pCi/g	0.0194 ± 0.0143	U	0.0119	0.0238
		6	pCi/g	0.011 ± 0.0465	U	0.0368	0.0736
		7	pCi/g	0.0597 ± 0.0344	U	0.0285	0.0598
		33	pCi/g	0.059 ± 0.0263	U	0.0211	0.059
		35	pCi/g	0.0406 ± 0.0158	U	0.0133	0.0406
		41	pCi/g	0.0107 ± 0.0376	U	0.026	0.0519
		42	pCi/g	-0.0249 ± 0.047	U	0.037	0.074
		43	pCi/g	0.0473 ± 0.0192	U	0.016	0.0474
		45	pCi/g	0.0498 ± 0.0771	U	0.0589	0.118
		51	pCi/g	-0.0879 ± 0.0386	U	0.0274	0.0549
		52	pCi/g	0.0561 ± 0.0217	U	0.0179	0.0562
		76	pCi/g	-0.00689 ± 0.048	U	0.0396	0.0792
		77	pCi/g	0.0518 ± 0.0196	U	0.0164	0.0518
		86	pCi/g	0.0614 ± 0.022	U	0.0183	0.0614
	Cesium-137	2NE	pCi/g	0.134 ± 0.0187		0.0069	0.0138
		2NW	pCi/g	0.0942 ± 0.0172		0.00786	0.0157
		2SE	pCi/g	0.235 ± 0.0255		0.00685	0.0137
		2SW	pCi/g	0.0904 ± 0.0145		0.00792	0.0158
		6	pCi/g	0.145 ± 0.0191		0.00822	0.0164
		7	pCi/g	0.392 ± 0.0393		0.00815	0.0163
		33	pCi/g	0.159 ± 0.0296		0.0142	0.0284
		35	pCi/g	0.176 ± 0.0237		0.0089	0.0178
		41	pCi/g	0.128 ± 0.0165		0.00633	0.0127
		42	pCi/g	0.0752 ± 0.0182		0.0094	0.0188
		43	pCi/g	0.0473 ± 0.0203		0.011	0.0221
		45	pCi/g	0.0305 ± 0.0153	X	0.00937	0.0187
		51	pCi/g	0.067 ± 0.0145		0.0087	0.0174
		52	pCi/g	0.0221 ± 0.0168	U	0.0121	0.0243
		76	pCi/g	0.171 ± 0.0202		0.00856	0.0171
		77	pCi/g	0.416 ± 0.0399		0.0105	0.021
		86	pCi/g	0.037 ± 0.0193		0.0116	0.0232

See notes at end of table.

TABLE C-1. Radiological Results by Location for Calendar Year 2007, Soil (continued)

Location Type	Analyte	Location	Units	Activity (±2σ) And/or Concentration		Decision Level	Detection Limit
On-Site (cont'd)	Tritium	2NE	pCi/L	298 ± 127		83.8	179
		2NW	pCi/L	218 ± 118		82.9	177
		2SE	pCi/L	182 ± 98		69.2	148
		2SW	pCi/L	223 ± 118		83.2	178
		6	pCi/L	31.2 ± 133	U	109	241
		7	pCi/L	-31.7 ± 50.4	U	44.8	97.2
		33	pCi/L	168 ± 113	U	83	177
		35	pCi/L	312 ± 131		84.3	182
		41	pCi/L	190 ± 155	U	110	245
		42	pCi/L	109 ± 93.3	U	70.9	152
		43	pCi/L	190 ± 114		82.5	176
		45	pCi/L	24.9 ± 106	U	86.7	193
		51	pCi/L	-35.4 ± 61.7	U	54.6	118
		52	pCi/L	177 ± 98.9		70.3	150
		76	pCi/L	-14.9 ± 161	U	136	290
		77	pCi/L	118 ± 70.4		50	108
		86	pCi/L	107 ± 110	U	84.9	181
	Uranium	2NE	mg/kg	0.488	B	0.00965	0.0386
		2NW	mg/kg	0.287	B	0.00958	0.0383
		2SE	mg/kg	0.333	B	0.00975	0.039
		2SW	mg/kg	0.327	B	0.00988	0.0395
		6	mg/kg	0.414	B	0.00963	0.0385
		7	mg/kg	0.431		0.00965	0.0386
		33	mg/kg	1.33		0.00967	0.0387
		35	mg/kg	0.378		0.00994	0.0398
		41	mg/kg	0.396		0.00996	0.0398
		42	mg/kg	0.402		0.00977	0.0391
		43	mg/kg	0.653		0.00984	0.0394
		45	mg/kg	0.498	B	0.00956	0.0382
		51	mg/kg	0.57	B	0.00977	0.0391
		52	mg/kg	0.415	B	0.00954	0.0382
		76	mg/kg	0.427		0.00967	0.0387
		77	mg/kg	0.398		0.0098	0.0392
		86	mg/kg	0.15		0.01	0.04

See notes at end of table.

TABLE C-1. Radiological Results by Location for Calendar Year 2007, Soil (continued)

Location Type	Analyte	Location	Units	Activity (±2σ) And/or Concentration		Decision Level	Detection Limit
Perimeter	Americium-241	4	pCi/g	0.0394 ± 0.0691	U	0.0552	0.11
		12	pCi/g	0.0355 ± 0.0238	X	0.0171	0.0342
		16	pCi/g	0.0379 ± 0.0539	U	0.047	0.0939
		19	pCi/g	0.0805 ± 0.0537	U	0.0431	0.0862
		58	pCi/g	0.0128 ± 0.0507	U	0.0414	0.0828
		59	pCi/g	0.0195 ± 0.0259	U	0.0214	0.0428
		60	pCi/g	0.0332 ± 0.0313	U	0.0255	0.0509
		61	pCi/g	0.016 ± 0.0229	U	0.0191	0.0383
		63	pCi/g	0.056 ± 0.0261	X	0.014	0.028
		64	pCi/g	0.047 ± 0.0319	U	0.0266	0.0532
		80	pCi/g	0.0431 ± 0.0599	U	0.0453	0.0905
		81	pCi/g	0.0254 ± 0.0303	U	0.0245	0.0489
		82	pCi/g	0.0648 ± 0.042	U	0.0356	0.0711
		87	pCi/g	0.0394 ± 0.0417	U	0.0349	0.0698
		88	pCi/g	0.0348 ± 0.0548	U	0.0448	0.0896
		89	pCi/g	0.0292 ± 0.0189	U	0.0157	0.0313
	Cesium-137	4	pCi/g	0.651 ± 0.0456		0.00846	0.0169
		12	pCi/g	1.82 ± 0.152		0.012	0.024
		16	pCi/g	0.0974 ± 0.0171		0.00874	0.0175
		19	pCi/g	0.384 ± 0.0354		0.00908	0.0182
		58	pCi/g	0.0986 ± 0.0197		0.0101	0.0202
		59	pCi/g	0.283 ± 0.0255		0.00606	0.0121
		60	pCi/g	0.0389 ± 0.00978		0.00622	0.0124
		61	pCi/g	0.0213 ± 0.0152		0.00755	0.0151
		63	pCi/g	0.853 ± 0.0735		0.0116	0.0232
		64	pCi/g	0.895 ± 0.0703		0.00971	0.0194
		80	pCi/g	0.107 ± 0.0248		0.0104	0.0208
		81	pCi/g	0.448 ± 0.0359		0.00691	0.0138
		82	pCi/g	0.0168 ± 0.0167	U	0.0108	0.0215
		87	pCi/g	0.171 ± 0.0176		0.00729	0.0146
		88	pCi/g	0.125 ± 0.016		0.00702	0.014
		89	pCi/g	0.268 ± 0.0346		0.0121	0.0242

See notes at end of table.

TABLE C-1. Radiological Results by Location for Calendar Year 2007, Soil (continued)

Location Type	Analyte	Location	Units	Activity (±2σ) And/or Concentration		Decision Level	Detection Limit
Perimeter (con'td)	Tritium	4	pCi/L	272 ± 131		88	190
		12	pCi/L	266 ± 106		77.8	159
		16	pCi/L	-0.601 ± 2.27	U	1.96	4.28
		19	pCi/L	103 ± 108	U	83	179
		58	pCi/L	-1.03 ± 2.09	U	1.84	4.03
		59	pCi/L	0.849 ± 2.41	U	1.94	4.25
		60	pCi/L	-1.44 ± 2.16	U	1.93	4.23
		61	pCi/L	1.15 ± 2.33	U	1.85	4.04
		63	pCi/L	383 ± 113		75.3	154
		64	pCi/L	2.66 ± 2.64	U	1.95	4.25
		80	pCi/L	388 ± 111		73.6	151
		81	pCi/L	0.235 ± 2.34	U	1.94	4.24
		82	pCi/L	0.927 ± 2.34	U	1.88	4.11
	Uranium	4	mg/kg	0.361		0.00984	0.0394
		19	mg/kg	0.408		0.00977	0.0391
		60	mg/kg	0.638		0.00952	0.0381
Community	Americium-241	8	pCi/g	0.0159 ± 0.0415	U	0.0333	0.0666
		9	pCi/g	0.0402 ± 0.0208	U	0.0171	0.0402
		10	pCi/g	0.0594 ± 0.0565	U	0.0449	0.0897
		11	pCi/g	0.0152 ± 0.0332	U	0.0229	0.0457
		25	pCi/g	0.0197 ± 0.027	U	0.0231	0.0462
		62	pCi/g	0.00543 ± 0.051	U	0.043	0.086
	Cesium-137	8	pCi/g	0.0188 ± 0.0175	X	0.00807	0.0161
		9	pCi/g	0.402 ± 0.041		0.0117	0.0235
		10	pCi/g	0.199 ± 0.0259		0.0095	0.019
		11	pCi/g	0.04 ± 0.0119		0.007	0.014
		25	pCi/g	0.0205 ± 0.0147	X	0.00614	0.0123
		62	pCi/g	0.0736 ± 0.0153		0.00865	0.0173
	Tritium	8	pCi/L	187 ± 108		83.7	172

See notes at end of table.

TABLE C-1. Radiological Results by Location for Calendar Year 2007, Soil (concluded)

Location Type	Analyte	Location	Units	Activity (±2σ) And/or Concentration		Decision Level	Detection Limit
Community (cont'd)	Tritium	9	pCi/L	254 ± 114		83.9	173
		10	pCi/L	374 ± 110		74	152
		11	pCi/L	0.128 ± 2.35	U	1.96	4.29
		25	pCi/L	0.806 ± 2.28	U	1.84	4.03
		62	pCi/L	225 ± 100		75.2	154
	Uranium	11	mg/kg	0.525		0.00954	0.0382

NOTES: pCi/g = picocurie per gram
pCi/L = picocurie per liter
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level. Some tritium results reported in pCi/g due to inadequate soil moisture to run standard analytical method (results are included for qualitative, not quantitative purposes).
X = Presumptive evidence that analyte is not present.
B = The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).

This page intentionally left blank.

TABLE C-2. Radiological Results by Location for Calendar Year 2007, Sediment

Location Type	Analyte	Location	Units	Activity (±2σ) And/or Concentration		Decision Level	Detection Limit
On-Site	Americium-241	56	pCi/g	0.0163 ± 0.0209	U	0.0172	0.0344
		72	pCi/g	0.0361 ± 0.0576	U	0.0481	0.0962
		74N	pCi/g	0.0162 ± 0.047	U	0.0401	0.0802
		75	pCi/g	0.0397 ± 0.017	U	0.0146	0.0397
		79	pCi/g	-0.00956 ± 0.0534	U	0.0433	0.0865
		83	pCi/g	0.0453 ± 0.0674	U	0.0536	0.107
		84	pCi/g	0.0891 ± 0.0867	U	0.0653	0.131
		85	pCi/g	-0.0059 ± 0.0407	U	0.0353	0.0706
	Cesium-137	56	pCi/g	0.0356 ± 0.0189	X	0.0112	0.0224
		72	pCi/g	0.0342 ± 0.0122		0.00819	0.0164
		74N	pCi/g	-0.000806 ± 0.0107	U	0.00789	0.0158
		75	pCi/g	0.00181 ± 0.0118	U	0.0104	0.0208
		79	pCi/g	0.18 ± 0.0246		0.00967	0.0193
		83	pCi/g	0.243 ± 0.0275		0.0107	0.0213
		84	pCi/g	0.177 ± 0.0228		0.0101	0.0202
		85	pCi/g	0.0185 ± 0.0103		0.00695	0.0139
	Tritium	56	pCi/L	-57.4 ± 47.2	U	44.2	96
		72	pCi/L	1460 ± 262		74.2	160
		74N	pCi/L	-23.6 ± 42.8	U	37.8	82
		75	pCi/L	17 ± 58.3	U	47.5	103
		79	pCi/L	119 ± 77.7	U	56	121
		83	pCi/L	180 ± 86.3		58.1	125
		84	pCi/L	-3.39 ± 29.6	U	25.1	53.5
		85	pCi/L	586 ± 217		134	288
	Uranium	56	mg/kg	0.513	B	0.00994	0.0398
		72	mg/kg	0.545		0.00977	0.0391
		74N	mg/kg	0.883		0.00978	0.0391
		75	mg/kg	0.841		0.00954	0.0382
		79	mg/kg	1.16		0.0098	0.0392
		83	mg/kg	0.625		0.0099	0.0396
		84	mg/kg	0.847	B	0.00971	0.0388
		85	mg/kg	1.03		0.00986	0.0394

See notes at end of table.

TABLE C-2. Radiological Results by Location for Calendar Year 2007, Sediment (concluded)

Location Type	Analyte	Location	Units	Activity (±2σ) And/or Concentration		Decision Level	Detection Limit
Perimeter	Americium-241	73	pCi/g	0.0199 ± 0.049	U	0.0385	0.0769
	Cesium-137	73	pCi/g	0.013 ± 0.0149	U	0.0101	0.0201
	Tritium	73	pCi/L	-53.8 ± 44.2	U	41.5	90
	Uranium	73	mg/kg	1.07		0.00969	0.0388
Community	Americium-241	8	pCi/g	0.0281 ± 0.0384	U	0.0273	0.0546
		11	pCi/g	0.0437 ± 0.0393	U	0.032	0.064
		68	pCi/g	0.0548 ± 0.0317	U	0.0277	0.0553
	Cesium-137	8	pCi/g	0.0493 ± 0.0136		0.0075	0.015
		11	pCi/g	0.073 ± 0.0157		0.00846	0.0169
		68	pCi/g	0.0288 ± 0.0109		0.00619	0.0124
	Tritium	8	pCi/L	101 ± 93.4	U	75.2	154
		11	pCi/L	-40.7 ± 98.2	U	83.7	173
		68	pCi/L	2.23 ± 2.51	U	1.88	4.12
	Uranium	11	mg/kg	0.867		0.00984	0.0394

NOTES: pCi/g = picocurie per gram
pCi/L = picocurie per liter
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level. Some tritium results reported in pCi/g due to inadequate soil moisture to run standard analytical method (results are included for qualitative, not quantitative purposes).
X = Presumptive evidence that analyte is not present.
B = The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).

TABLE C-3. Radiological Replicate Results by Location for Calendar Year 2007, Soil

Location Type	Analyte	Location	Sample ID	Units	Activity (±2σ) And/or Concentration		Decision Level	Detection Limit	Average	Std Dev	CV
On-Site	Americium-241	2NE	084362-001	pCi/g	0.0372 ± 0.0452	U	0.037	0.074	0.03	0.04	143.99%
			084362-002	pCi/g	-0.0164 ± 0.0459	U	0.0377	0.0754			
			084362-003	pCi/g	0.0716 ± 0.0501	U	0.0419	0.0838			
		33	084394-001	pCi/g	0.059 ± 0.0263	U	0.0211	0.059	0.05	0.01	21.58%
			084394-002	pCi/g	0.0471 ± 0.0577	U	0.0462	0.0923			
			084394-003	pCi/g	0.0383 ± 0.0217	U	0.0178	0.0384			
	Cesium-137	2NE	084362-001	pCi/g	0.134 ± 0.0187		0.0069	0.0138	0.15	0.02	13.07%
			084362-002	pCi/g	0.174 ± 0.0223		0.00927	0.0185			
			084362-003	pCi/g	0.152 ± 0.0227		0.00866	0.0173			
		33	084394-001	pCi/g	0.159 ± 0.0296		0.0142	0.0284	0.14	0.01	9.52%
			084394-002	pCi/g	0.134 ± 0.0207		0.00759	0.0152			
			084394-003	pCi/g	0.137 ± 0.0226		0.0118	0.0235			
	Tritium	2NE	084362-001	pCi/L	298 ± 127		83.8	179	308.67	48.88	15.84%
			084362-002	pCi/L	266 ± 138		87.9	196			
			084362-003	pCi/L	362 ± 175		109	243			
		33	084394-001	pCi/L	168 ± 113	U	83	177	166.00	2.83	1.70%
			084394-003	pCi/L	164 ± 116	U	85.8	183			
	Uranium	2NE	084362-001	mg/kg	0.488	B	0.00965	0.0386	0.39	0.09	22.22%
			084362-002	mg/kg	0.37	B	0.00954	0.0382			
			084362-003	mg/kg	0.318	B	0.00992	0.0397			
		33	084394-001	mg/kg	1.33		0.00967	0.0387	1.41	0.08	5.35%
			084394-002	mg/kg	1.42		0.00992	0.0397			
			084394-003	mg/kg	1.48		0.00975	0.039			
Perimeter	Americium-241	64	084405-001	pCi/g	0.047 ± 0.0319	U	0.0266	0.0532	0.03	0.03	74.46%
			084405-002	pCi/g	0.00498 ± 0.0349	U	0.0275	0.0549			
			084405-003	pCi/g	0.0518 ± 0.039	U	0.0313	0.0626			

See notes at end of table.

TABLE C-3. Radiological Replicate Results by Location for Calendar Year 2007, Soil (concluded)

Location Type	Analyte	Location	Sample ID	Units	Activity (±2σ) And/or Concentration		Decision Level	Detection Limit	Average	Std Dev	CV
Perimeter (cont'd)	Cesium-137	64	084405-001	pCi/g	0.895 ± 0.0703		0.00971	0.0194	0.73	0.16	22.50%
			084405-002	pCi/g	0.714 ± 0.0582		0.00823	0.0165			
			084405-003	pCi/g	0.569 ± 0.0523		0.00738	0.0148			
	Tritium	64	084405-001	pCi/L	2.66 ± 2.64	U	1.95	4.25	1.17	1.40	120.10%
			084405-002	pCi/L	0.968 ± 2.44	U	1.96	4.29			
			084405-003	pCi/L	-0.124 ± 2.26	U	1.91	4.17			
Community	Americium-241	11	084436-001	pCi/g	0.0152 ± 0.0332	U	0.0229	0.0457	0.02	0.02	96.37%
			084436-002	pCi/g	0.0446 ± 0.0344	U	0.0297	0.0595			
			084436-003	pCi/g	0.00465 ± 0.0139	U	0.0122	0.0243			
	Cesium-137	11	084436-001	pCi/g	0.04 ± 0.0119		0.007	0.014	0.04	0.01	12.55%
			084436-002	pCi/g	0.0472 ± 0.0125		0.00646	0.0129			
			084436-003	pCi/g	0.0371 ± 0.0183		0.00881	0.0176			
	Tritium	11	084436-001	pCi/L	0.128 ± 2.35	U	1.96	4.29	0.34	1.30	380.98%
			084436-002	pCi/L	-0.837 ± 2.19	U	1.91	4.18			
			084436-003	pCi/L	1.73 ± 2.74	U	2.14	4.67			
	Uranium	11	084436-001	mg/kg	0.525		0.00954	0.0382	0.47	0.06	13.25%
			084436-002	mg/kg	0.478		0.00967	0.0387			
			084436-003	mg/kg	0.402		0.00975	0.039			

NOTES: pCi/g = picocurie per gram
pCi/L = picocurie per liter
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level. Some tritium results reported in pCi/g due to inadequate soil moisture to run standard analytical method (results are included for qualitative, not quantitative purposes).
B = The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).
CV = coefficient of variation
Std Dev = standard deviation

TABLE C-4. Radiological Results by Location for Calendar Year 2007, Vegetation

Location Type	Analyte	Location	Units	Activity (±2σ) And/or Concentration		Decision Level	Detection Limit
On-Site	Americium-241	2NE	pCi/g	-0.0468 ± 0.095	U	0.0463	0.0926
		6	pCi/g	-0.075 ± 0.0714	U	0.0515	0.103
		33	pCi/g	-0.0118 ± 0.238	U	0.16	0.32
		35	pCi/g	-0.0291 ± 0.0922	U	0.0696	0.139
		45	pCi/g	0.0536 ± 0.0729	U	0.0499	0.0998
		51	pCi/g	0.0117 ± 0.0825	U	0.0578	0.116
		52	pCi/g	-0.00396 ± 0.067	U	0.0523	0.105
	Cesium-137	2NE	pCi/g	0.00429 ± 0.0187	U	0.015	0.0301
		6	pCi/g	-0.0108 ± 0.0212	U	0.0163	0.0326
		33	pCi/g	0.0552 ± 0.0653	U	0.0537	0.107
		35	pCi/g	0.0127 ± 0.0202	U	0.0143	0.0286
		45	pCi/g	0.00201 ± 0.018	U	0.0144	0.0289
		51	pCi/g	0.00209 ± 0.0141	U	0.0113	0.0226
		52	pCi/g	0.000387 ± 0.0195	U	0.0159	0.0318
	Uranium	2NE	mg/kg	0.00996	U	0.00996	0.0398
		6	mg/kg	0.00954	U	0.00954	0.0382
		33	mg/kg	0.00994	U	0.00994	0.0398
		35	mg/kg	0.00986	U	0.00986	0.0394
		45	mg/kg	0.00996	U	0.00996	0.0398
		51	mg/kg	0.0122	J	0.01	0.04
		52	mg/kg	0.01	U	0.01	0.04
Perimeter	Americium-241	4	pCi/g	-0.0373 ± 0.0698	U	0.0453	0.0906
		19	pCi/g	0.0115 ± 0.0638	U	0.0458	0.0915
	Cesium-137	4	pCi/g	0.0055 ± 0.0429	U	0.0136	0.0271
		19	pCi/g	-0.00448 ± 0.0174	U	0.0141	0.0281
	Uranium	4	mg/kg	0.00978	U	0.00978	0.0391
		19	mg/kg	0.00973	U	0.00973	0.0389

NOTES: pCi/g = picocurie per gram
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.

This page intentionally left blank.

TABLE C-5. Radiological Replicate Results by Location for Calendar Year 2007, Vegetation

Location Type	Analyte	Location	Sample ID	Units	Activity (±2σ) And/or Concentration		Decision Level	Detection Limit	Average	Std Dev	CV
On-Site	Americium-241	33	084395-001	pCi/g	-0.0118 ± 0.238	U	0.16	0.32	-0.02	0.06	-273.57%
			084395-002	pCi/g	0.0344 ± 0.21	U	0.153	0.307			
			084395-003	pCi/g	-0.0938 ± 0.141	U	0.0998	0.199			
	Cesium-137	33	084395-001	pCi/g	0.0552 ± 0.0653	U	0.0537	0.107	0.02	0.04	215.31%
			084395-002	pCi/g	0.0229 ± 0.0437	U	0.0356	0.0712			
			084395-003	pCi/g	-0.0232 ± 0.0493	U	0.0323	0.0645			
	Tritium	33	084395-001	pCi/L	121 ± 141	U	110	236	129.30	43.15	33.37%
			084395-002	pCi/L	176 ± 144	U	108	232			
			084395-003	pCi/L	90.9 ± 135	U	106	229			
	Uranium	33	084395-001	mg/kg	0.00994	U	0.00994	0.0398	0.01	0.00	0.14%
			084395-002	mg/kg	0.0116	J	0.00969	0.0388			
			084395-003	mg/kg	0.00996	U	0.00996	0.0398			

NOTES: pCi/g = picocurie per gram
pCi/L = picocurie per liter
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level.
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
CV = coefficient of variation
Std Dev = standard deviation

This page intentionally left blank.

TABLE C-6. Radiological Replicate Results by Location for Calendar Year 2007, Sediment

Location Type	Analyte	Location	Sample ID	Units	Activity (±2σ) And/or Concentration		Decision Level	Detection Limit	Average	Std Dev	CV
On-Site	Americium-241	74N	084409-001	pCi/g	0.0162 ± 0.047	U	0.0401	0.0802	0.03	0.03	88.69%
			084409-002	pCi/g	0.0136 ± 0.0462	U	0.0774	0.0774			
			084409-003	pCi/g	0.0617 ± 0.0323	U	0.0277	0.0617			
	Cesium-137	74N	084409-001	pCi/g	-0.000806 ± 0.0107	U	0.00789	0.0158	0.01	0.01	158.44%
			084409-002	pCi/g	0.0232 ± 0.00924		0.0155	0.0155			
			084409-003	pCi/g	0.0142 ± 0.00974	U	0.00784	0.0157			
	Tritium	74N	084409-001	pCi/L	-23.6 ± 42.8	U	37.8	82	-13.93	15.81	-113.54%
			084409-002	pCi/L	-22.5 ± 50.2	U	43.9	95.3			
			084409-003	pCi/L	4.32 ± 46.8	U	38.9	84.5			
	Uranium	74N	084409-001	mg/kg	0.883		0.00978	0.0391	0.94	0.06	6.36%
			084409-002	mg/kg	1		0.00988	0.0395			
			084409-003	mg/kg	0.923		0.00978	0.0391			
Community	Americium-241	11	084438-001	pCi/g	0.0437 ± 0.0393	U	0.032	0.064	0.02	0.02	66.42%
			084438-002	pCi/g	0.0172 ± 0.0607	U	0.0484	0.0968			
			084438-003	pCi/g	0.0135 ± 0.0221	U	0.0171	0.0341			
	Cesium-137	11	084438-001	pCi/g	0.073 ± 0.0157		0.00846	0.0169	0.10	0.03	25.61%
			084438-002	pCi/g	0.124 ± 0.0197		0.0108	0.0215			
			084438-003	pCi/g	0.106 ± 0.0275		0.0146	0.0292			
	Tritium	11	084438-001	pCi/L	-40.7 ± 98.2	U	83.7	173	51.00	80.85	158.52%
			084438-002	pCi/L	112 ± 102	U	81.7	169			
			084438-003	pCi/L	81.7 ± 102	U	82.6	171			
	Uranium	11	084438-001	mg/kg	0.867		0.00984	0.0394	0.95	0.07	7.71%
			084438-002	mg/kg	0.987		0.00994	0.0398			
			084438-003	mg/kg	1		0.0096	0.0384			

NOTES: pCi/g = picocurie per gram
pCi/L = picocurie per liter
mg/kg = milligram per kilogram
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level. . Some tritium results reported in pCi/g due to inadequate soil moisture to run standard analytical method (results are included for qualitative, not quantitative purposes).
CV = coefficient of variation
Std Dev = standard deviation

This page intentionally left blank.

TABLE C-7. TLD Measurements by Quarter and Location Class for Calendar Year, 2007

Location Class	Location Number	1st Quarter (92 Days)		2nd Quarter (92 Days)		3rd Quarter (92 Days)		4th Quarter (95 Days)		Exposure Rate	
		Exposure (mR)	Error	Exposure (mR)	Error	Exposure (mR)	Error	Exposure (mR)	Error	uR per hour	Error
Off-Site	10	29.9	1.4	23.5	1.6	25.6	0.8	31.3	3.7	12.4	0.5
	11	24	1.8	18.3	1.1	17.6	0.8	20.3	1.1	9.0	0.3
	21	25.4	1.1	21.3	0.7	21.2	0.8	23.4	1.1	10.3	0.2
	22	30.8	1.4	20.6	1	22	0.9	24.9	1	11.0	0.3
	23	25.9	1	23	1.7	19.6	0.8	21.4	1.2	10.1	0.3
	24	24	1.7	17.3	1	17.6	1.4	18.1	1.3	8.6	0.3
	25	25.7	1.4	19.1	1.3	18.9	0.8	20.8	1.4	9.5	0.3
	26	31.2	1.7	24.2	1.4	25.6	0.8	24.7	1.1	11.9	0.3
	27	26.7	1.1	20	0.6	21.8	1.5	23.1	2.1	10.3	0.3
	28	23.9	1.2	18.3	1.3	18.8	0.8	19.8	1.8	9.1	0.3
	29	22.6	2	17.2	2.6	17.8	1.6	18.8	1.8	8.6	0.5
	30	31.4	3.6	22.4	0.7	24.8	2	23.9	1.1	11.5	0.5
Perimeter	4	25	1.1	21.7	1.9	21.1	0.7	20.1	0.8	9.9	0.3
	5	25.3	1.6	21.2	1.2	21.4	0.9	17.3	1.3	9.6	0.3
	16	30.4	0.7	24.9	1.1	25.8	0.9	22.9	1.1	11.7	0.2
	18	25.7	0.8	19.5	1.1	20.6	1.1	19.2	0.9	9.5	0.2
	19	28.8	1.8	22.7	1.7	23.3	0.7	22.3	0.8	10.9	0.3
	39	24.6	2.2	17.1	1	19.7	1.5	19.7	0.9	9.1	0.3
	40	26.4	2.5	20.6	1.6	19.4	0.7	19.8	0.8	9.7	0.6
	81	26.1	2.9	20.7	1.1	22.3	0.6	22.3	2.3	10.3	0.4
On-Site	1	25.4	0.7	20.3	1.1	22.2	1	21.6	1.3	10.1	0.2
	2NW	23.8	2.2	18.6	1	20.3	1.3	20	1.3	9.3	0.3
	3	25.9	1.6	20.6	1.6	20.6	0.9	21.5	2.3	10.0	0.4
	6	24.5	2.2	20.5	1.1	20.6	0.8	20.3	1.7	9.6	0.4
	7	26.3	2.7	20	1	20.6	0.8	21.1	3.6	9.9	0.5
	20	26.5	1.6	21.4	1.1	0	0	22.3	1.2	10.5	0.3
	31	25.5	1	19.6	1.9	20.7	1.7	21.6	1	9.8	0.3
	41	24.9	0.6	19.9	1.3	21.7	0.6	20.4	0.9	9.8	0.2
	42	24.2	1.5	19	1	21	0.7	19.3	0.9	9.4	0.2
	43	23.2	1.2	20.7	1.3	20.3	0.6	18.3	0.9	9.3	0.2
	46	28.8	3.2	21.8	1.2	23.5	1.9	21	1.3	10.7	0.5
	47	26.8	3.4	20.8	1.3	20.8	0.8	20.9	1	10.0	0.4
	48	26.8	1.5	23.1	1.2	21.8	0.8	19.6	1.6	10.3	0.3
	66	26.1	1.7	20.2	1.5	22.2	0.7	20.4	1	10.0	0.3
Operational	45	25.3	2	19	1.1	23.8	1.7	20.4	1	9.9	0.3
	45E	24.5	1.9	21.4	1.4	23.5	1.7	21.3	1.3	10.2	0.4

NOTES: mR = Milliroentgen (10^{-3} roentgen); uR = microroentgen (10^{-6} roentgen)
"Operational" refers to TLD locations that are near ongoing operations that may influence readings, such that they may not truly reflect "environmental" conditions.

This page intentionally left blank.

TABLE C-8. Summary TLD Results for Calendar Year 2007, SNL/NM

Location Class	Number of Locations	Mean Exposure Rate (uR/hour)	Std Dev.	Minimum	Maximum
Off-Site	12	10.2	1.3	8.6	12.4
Perimeter	8	10.1	0.8	9.1	11.7
On-Site	16	9.9	0.4	9.3	10.7
Operational	2	10.1	0.2	9.9	10.2

NOTES: uR = microroentgen (10^{-6} roentgen)
"Operational" refers to TLD locations that are near ongoing operations that may influence readings, such that they may not truly reflect "environmental" conditions.

This page intentionally left blank.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site	2NE	Aluminum	8960	B	4.83	14.5
		Antimony	0.0965	BU	0.0965	0.386
		Arsenic	1.99		0.29	0.965
		Barium	73.1		0.0965	0.386
		Beryllium	0.448		0.0193	0.0965
		Cadmium	0.324		0.0193	0.193
		Calcium	6210		7.72	19.3
		Chromium	8.59		0.193	0.579
		Cobalt	3.34		0.0193	0.193
		Copper	6.51		0.0386	0.193
		Iron	9500		1.93	4.83
		Lead	10.7		0.0965	0.386
		Magnesium	2550		4.83	14.5
		Manganese	158		0.193	0.965
		Mercury	0.00643	J	0.00218	0.00871
		Nickel	6.77		0.0965	0.386
		Potassium	2350		77.2	290
		Selenium	0.483	U	0.483	0.965
		Silver	0.135	J	0.0386	0.193
		Sodium	40.7	BJ	15.4	48.3
		Thallium	0.129	J	0.0772	0.193
		Vanadium	15.3		0.386	1.93
		Zinc	26.6		0.386	1.93
	2NW	Aluminum	8290	B	4.79	14.4
		Antimony	0.0958	BU	0.0958	0.383
		Arsenic	1.49		0.287	0.958
		Barium	61.3		0.0958	0.383
		Beryllium	0.327		0.0192	0.0958
		Cadmium	0.138	J	0.0192	0.192
		Calcium	4280		7.66	19.2
		Chromium	7.12		0.192	0.575
		Cobalt	2.61		0.0192	0.192
		Copper	5.04		0.0383	0.192
		Iron	6920		1.92	4.79
		Lead	6.94		0.0958	0.383
		Magnesium	1960		4.79	14.4
		Manganese	122		0.192	0.958
		Mercury	0.00447	J	0.00238	0.00951
		Nickel	5.36		0.0958	0.383
		Potassium	2290		76.6	287

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	2NW	Selenium	0.479	U	0.479	0.958
		Silver	0.06	J	0.0383	0.192
		Sodium	32.5	BJ	15.3	47.9
		Thallium	0.0872	J	0.0766	0.192
		Vanadium	10.7		0.383	1.92
		Zinc	28.5		0.383	1.92
	2SE	Aluminum	10000	B	4.87	14.6
		Antimony	0.0975	BU	0.0975	0.39
		Arsenic	1.88		0.292	0.975
		Barium	75.4		0.0975	0.39
		Beryllium	0.418		0.0195	0.0975
		Cadmium	0.664		0.0195	0.195
		Calcium	10400		39	97.5
		Chromium	7.9		0.195	0.585
		Cobalt	3.09		0.0195	0.195
		Copper	6.51		0.039	0.195
		Iron	8800		1.95	4.87
		Lead	9.21		0.0975	0.39
		Magnesium	2460		4.87	14.6
		Manganese	137		0.195	0.975
		Mercury	0.011		0.00224	0.00896
		Nickel	8.63		0.0975	0.39
		Potassium	2520		78	292
		Selenium	0.487	U	0.487	0.975
		Silver	0.188	J	0.039	0.195
		Sodium	33	BJ	15.6	48.7
		Thallium	0.105	J	0.078	0.195
		Vanadium	14.2		0.39	1.95
		Zinc	23		0.39	1.95
	2SW	Aluminum	6190	B	4.94	14.8
		Antimony	0.0988	BU	0.0988	0.395
		Arsenic	1.6		0.296	0.988
		Barium	54.9		0.0988	0.395
		Beryllium	0.32		0.0198	0.0988
		Cadmium	0.137	J	0.0198	0.198
		Calcium	4600		7.91	19.8
		Chromium	7.59		0.198	0.593
		Cobalt	2.59		0.0198	0.198
		Copper	5.21		0.0395	0.198

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	2SW	Iron	6460		1.98	4.94
		Lead	6.09		0.0988	0.395
		Magnesium	1710		4.94	14.8
		Manganese	125		0.198	0.988
		Mercury	0.00508	J	0.00229	0.00917
		Nickel	4.96		0.0988	0.395
		Potassium	1690		15.8	59.3
		Selenium	0.494	U	0.494	0.988
		Silver	0.0595	J	0.0395	0.198
		Sodium	33.9	BJ	15.8	49.4
		Thallium	0.0868	J	0.0791	0.198
		Vanadium	10.5		0.395	1.98
		Zinc	26.7		0.395	1.98
	6	Aluminum	15600	B	4.82	14.5
		Antimony	0.0963	BU	0.0963	0.385
		Arsenic	2.68		0.289	0.963
		Barium	117		0.0963	0.385
		Beryllium	0.648		0.0193	0.0963
		Cadmium	0.276		0.0193	0.193
		Calcium	3350		38.5	96.3
		Chromium	13		0.193	0.578
		Cobalt	5.15		0.0193	0.193
		Copper	55.8		0.0385	0.193
		Iron	11700		9.63	24.1
		Lead	13.5		0.0963	0.385
		Magnesium	3190		4.82	14.5
		Manganese	217		0.963	4.82
		Mercury	0.0122		0.00233	0.00932
		Nickel	14.4		0.0963	0.385
		Potassium	3520		77.1	289
		Selenium	0.482	U	0.482	0.963
		Silver	0.68		0.0385	0.193
		Sodium	42	BJ	15.4	48.2
		Thallium	0.163	J	0.0771	0.193
		Vanadium	18		1.93	9.63
		Zinc	62.9		0.385	1.93

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	7	Aluminum	7350	B	4.83	14.5
		Antimony	0.0965	U	0.0965	0.386
		Arsenic	1.46		0.29	0.965
		Barium	62.8		0.0965	0.386
		Beryllium	0.377		0.0193	0.0965
		Cadmium	0.225		0.0193	0.193
		Calcium	3660	B	7.72	19.3
		Chromium	7.09		0.193	0.579
		Cobalt	2.91		0.0193	0.193
		Copper	6.38		0.0386	0.193
		Iron	7370		1.93	4.83
		Lead	11.2		0.0965	0.386
		Magnesium	2060		0.965	2.9
		Manganese	153		0.193	0.965
		Mercury	0.00841	J	0.00226	0.00902
		Nickel	5.74		0.0965	0.386
		Potassium	1970		15.4	57.9
		Selenium	0.483	U	0.483	0.965
		Silver	0.0683	J	0.0386	0.193
		Sodium	43.4	J	15.4	48.3
		Thallium	0.143	J	0.0772	0.193
		Vanadium	10.8		0.386	1.93
		Zinc	30.2		0.386	1.93
	33	Aluminum	11200	B	4.84	14.5
		Antimony	0.0967	U	0.0967	0.387
		Arsenic	11.4		0.29	0.967
		Barium	127		0.0967	0.387
		Beryllium	1.19		0.0193	0.0967
		Cadmium	0.36		0.0193	0.193
		Calcium	41700	B	38.7	96.7
		Chromium	11.7		0.193	0.58
		Cobalt	6.23		0.0193	0.193
		Copper	8.75		0.0387	0.193
		Iron	13100		9.67	24.2
		Lead	13.1		0.0967	0.387
		Magnesium	4770		0.967	2.9
		Manganese	345		0.967	4.84
		Mercury	0.0145		0.0024	0.0096
		Nickel	13.4		0.0967	0.387

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	33	Potassium	3070		15.5	58
		Selenium	0.484	U	0.484	0.967
		Silver	0.0472	J	0.0387	0.193
		Sodium	1020		15.5	48.4
		Thallium	0.19	J	0.0774	0.193
		Vanadium	22.5		1.93	9.67
		Zinc	51.5		0.387	1.93
	35	Aluminum	10700	B	4.97	14.9
		Antimony	0.0994	U	0.0994	0.398
		Arsenic	1.61		0.298	0.994
		Barium	74.6		0.0994	0.398
		Beryllium	0.411	J	0.0994	0.497
		Cadmium	0.224		0.0199	0.199
		Calcium	2420		39.8	99.4
		Chromium	9.26		0.994	2.98
		Cobalt	3.45		0.0994	0.994
		Copper	7.85		0.199	0.994
		Iron	8710		9.94	24.9
		Lead	9.75		0.0994	0.398
		Magnesium	2590		4.97	14.9
		Manganese	201		0.994	4.97
		Mercury	0.0106		0.00235	0.0094
		Nickel	7.12		0.497	1.99
		Potassium	2430		79.5	298
		Selenium	0.497	U	0.497	0.994
		Silver	0.0583	J	0.0398	0.199
		Sodium	79.5	U	79.5	249
		Thallium	0.125	J	0.0795	0.199
		Vanadium	12.2		1.99	9.94
		Zinc	29.3		0.398	1.99
	41	Aluminum	12100	B	4.98	14.9
		Antimony	0.0996	U	0.0996	0.398
		Arsenic	2.06		0.299	0.996
		Barium	74.5		0.0996	0.398
		Beryllium	0.468		0.0199	0.0996
		Cadmium	0.224		0.0199	0.199
		Calcium	9750	B	7.97	19.9
		Chromium	9.65		0.199	0.598
		Cobalt	3.51		0.0199	0.199

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	41	Copper	7.3		0.0398	0.199
		Iron	9740		1.99	4.98
		Lead	11.7		0.0996	0.398
		Magnesium	2680		0.996	2.99
		Manganese	146		0.199	0.996
		Mercury	0.01		0.00242	0.00968
		Nickel	7.32		0.0996	0.398
		Potassium	2990		15.9	59.8
		Selenium	0.498	U	0.498	0.996
		Silver	0.0544	J	0.0398	0.199
		Sodium	46.1	J	15.9	49.8
		Thallium	0.119	J	0.0797	0.199
		Vanadium	15.8		0.398	1.99
		Zinc	37.9		0.398	1.99
	42	Aluminum	8670	B	0.977	2.93
		Antimony	0.0977	U	0.0977	0.391
		Arsenic	2.59		0.293	0.977
		Barium	82.8		0.0977	0.391
		Beryllium	0.502		0.0195	0.0977
		Cadmium	0.201		0.0195	0.195
		Calcium	40200	B	39.1	97.7
		Chromium	8.19		0.195	0.586
		Cobalt	3.66		0.0195	0.195
		Copper	7.34		0.0391	0.195
		Iron	8660		1.95	4.88
		Lead	6.49		0.0977	0.391
		Magnesium	3140		0.977	2.93
		Manganese	140		0.195	0.977
		Mercury	0.00968		0.00237	0.00949
		Nickel	7.83		0.0977	0.391
		Potassium	2790		15.6	58.6
		Selenium	0.488	U	0.488	0.977
		Silver	0.0391	U	0.0391	0.195
		Sodium	42.4	J	15.6	48.8
		Thallium	0.107	J	0.0781	0.195
		Vanadium	13.7		0.391	1.95
		Zinc	26		0.391	1.95

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	43	Aluminum	9140	B	0.984	2.95
		Antimony	0.0984	U	0.0984	0.394
		Arsenic	2.91		0.295	0.984
		Barium	90.8		0.0984	0.394
		Beryllium	0.494		0.0197	0.0984
		Cadmium	0.224		0.0197	0.197
		Calcium	40100	B	39.4	98.4
		Chromium	8.18		0.197	0.591
		Cobalt	3.88		0.0197	0.197
		Copper	8.07		0.0394	0.197
		Iron	8850		1.97	4.92
		Lead	6.99		0.0984	0.394
		Magnesium	3070		0.984	2.95
		Manganese	145		0.197	0.984
		Mercury	0.00636	J	0.00243	0.00971
		Nickel	8.27		0.0984	0.394
		Potassium	2860		15.7	59.1
		Selenium	0.492	U	0.492	0.984
		Silver	0.0407	J	0.0394	0.197
		Sodium	52.4		15.7	49.2
		Thallium	0.113	J	0.0787	0.197
		Vanadium	14.2		0.394	1.97
		Zinc	27.9		0.394	1.97
	45	Aluminum	13000	B	4.78	14.3
		Antimony	0.0956	BU	0.0956	0.382
		Arsenic	3.5		0.287	0.956
		Barium	110		0.0956	0.382
		Beryllium	0.554		0.0191	0.0956
		Cadmium	0.194		0.0191	0.191
		Calcium	18500		38.2	95.6
		Chromium	12.3		0.191	0.574
		Cobalt	4.44		0.0191	0.191
		Copper	9.08		0.0382	0.191
		Iron	10800		9.56	23.9
		Lead	10.6		0.0956	0.382
		Magnesium	4000		4.78	14.3
		Manganese	158		0.956	4.78
		Mercury	0.0272		0.00237	0.00949
		Nickel	9.99		0.0956	0.382

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	45	Potassium	3630		76.5	287
		Selenium	0.478	U	0.478	0.956
		Silver	0.096	J	0.0382	0.191
		Sodium	47.4	BJ	15.3	47.8
		Thallium	0.166	J	0.0765	0.191
		Vanadium	18.6		1.91	9.56
		Zinc	32		0.382	1.91
	51	Aluminum	12400	B	4.88	14.6
		Antimony	0.0977	BU	0.0977	0.391
		Arsenic	3.48		0.293	0.977
		Barium	253		0.0977	0.391
		Beryllium	0.678		0.0195	0.0977
		Cadmium	0.177	J	0.0195	0.195
		Calcium	48200		39.1	97.7
		Chromium	26.4		0.195	0.586
		Cobalt	4.48		0.0195	0.195
		Copper	11.2		0.0391	0.195
		Iron	10100		9.77	24.4
		Lead	10.8		0.0977	0.391
		Magnesium	4030		4.88	14.6
		Manganese	138		0.195	0.977
		Mercury	0.0127		0.0023	0.0092
		Nickel	11.6		0.0977	0.391
		Potassium	2810		78.1	293
		Selenium	0.488	U	0.488	0.977
		Silver	0.0887	J	0.0391	0.195
		Sodium	59.3	B	15.6	48.8
		Thallium	0.144	J	0.0781	0.195
		Vanadium	18		1.95	9.77
		Zinc	52.7		0.391	1.95
	52	Aluminum	8450	B	4.77	14.3
		Antimony	0.0954	BU	0.0954	0.382
		Arsenic	2.23		0.286	0.954
		Barium	87.8		0.0954	0.382
		Beryllium	0.383		0.0191	0.0954
		Cadmium	0.121	J	0.0191	0.191
		Calcium	17700		38.2	95.4
		Chromium	7.61		0.191	0.573
		Cobalt	3.12		0.0191	0.191

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	52	Copper	5.79		0.0382	0.191
		Iron	7440		1.91	4.77
		Lead	6.66		0.0954	0.382
		Magnesium	2610		4.77	14.3
		Manganese	124		0.191	0.954
		Mercury	0.0049	J	0.00218	0.00873
		Nickel	6.7		0.0954	0.382
		Potassium	1840		15.3	57.3
		Selenium	0.477	U	0.477	0.954
		Silver	0.233		0.0382	0.191
		Sodium	44.5	BJ	15.3	47.7
		Thallium	0.107	J	0.0763	0.191
		Vanadium	14.1		0.382	1.91
		Zinc	25		0.382	1.91
	76	Aluminum	11400	B	4.84	14.5
		Antimony	0.0967	U	0.0967	0.387
		Arsenic	2.01		0.29	0.967
		Barium	70.9		0.0967	0.387
		Beryllium	0.462		0.0193	0.0967
		Cadmium	0.236		0.0193	0.193
		Calcium	4740	B	7.74	19.3
		Chromium	9.53		0.193	0.58
		Cobalt	3.53		0.0193	0.193
		Copper	6.82		0.0387	0.193
		Iron	9830		9.67	24.2
		Lead	8.97		0.0967	0.387
		Magnesium	2550		0.967	2.9
		Manganese	146		0.193	0.967
		Mercury	0.0116		0.00234	0.00936
		Nickel	7.12		0.0967	0.387
		Potassium	2650		15.5	58
		Selenium	0.484	U	0.484	0.967
		Silver	0.0538	J	0.0387	0.193
		Sodium	44.5	J	15.5	48.4
		Thallium	0.112	J	0.0774	0.193
		Vanadium	16.1		0.387	1.93
		Zinc	29.4		0.387	1.93

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	77	Aluminum	13500	B	4.9	14.7
		Antimony	0.098	U	0.098	0.392
		Arsenic	2.17		0.294	0.98
		Barium	124		0.098	0.392
		Beryllium	0.498		0.098	0.49
		Cadmium	0.261		0.0196	0.196
		Calcium	23500		39.2	98
		Chromium	10.3		0.98	2.94
		Cobalt	3.8		0.098	0.98
		Copper	8.62		0.196	0.98
		Iron	9730		9.8	24.5
		Lead	11.2		0.098	0.392
		Magnesium	3880		4.9	14.7
		Manganese	186		0.98	4.9
		Mercury	0.0118		0.00227	0.00909
		Nickel	8.58		0.49	1.96
		Potassium	3060		78.4	294
		Selenium	0.49	U	0.49	0.98
		Silver	0.0622	J	0.0392	0.196
		Sodium	78.4	U	78.4	245
		Thallium	0.164	J	0.0784	0.196
		Vanadium	15.6		1.96	9.8
		Zinc	32.2		0.392	1.96
	86	Aluminum	1750	B	1	3
		Antimony	0.1	U	0.1	0.4
		Arsenic	0.3	U	0.3	1
		Barium	104		0.1	0.4
		Beryllium	0.276		0.02	0.1
		Cadmium	0.198	J	0.02	0.2
		Calcium	38700	B	40	100
		Chromium	0.667		0.2	0.6
		Cobalt	3.34		0.02	0.2
		Copper	2.8		0.04	0.2
		Iron	271		2	5
		Lead	4.09		0.1	0.4
		Magnesium	3470		1	3
		Manganese	176		0.2	1
		Mercury	0.0143		0.00221	0.00884
		Nickel	6.65		0.1	0.4

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	86	Potassium	2040		16	60
		Selenium	0.5	U	0.5	1
		Silver	0.04	U	0.04	0.2
		Sodium	56.9		16	50
		Thallium	0.08	U	0.08	0.2
		Vanadium	0.4	U	0.4	2
		Zinc	24.7		0.4	2
Perimeter	4	Aluminum	10400	B	4.92	14.8
		Antimony	0.0984	U	0.0984	0.394
		Arsenic	2.48		0.295	0.984
		Barium	86.9		0.0984	0.394
		Beryllium	0.372	J	0.0984	0.492
		Cadmium	0.199		0.0197	0.197
		Calcium	10100		39.4	98.4
		Chromium	8.57		0.984	2.95
		Cobalt	3.16		0.0984	0.984
		Copper	6.6		0.197	0.984
		Iron	8060		9.84	24.6
		Lead	11.2		0.0984	0.394
		Magnesium	2990		4.92	14.8
		Manganese	158		0.984	4.92
		Mercury	0.00828	J	0.00243	0.00971
		Nickel	6.74		0.492	1.97
		Potassium	2520		78.7	295
		Selenium	0.492	U	0.492	0.984
		Silver	0.0402	J	0.0394	0.197
		Sodium	78.7	U	78.7	246
		Thallium	0.101	J	0.0787	0.197
		Vanadium	12.5		1.97	9.84
		Zinc	28		0.394	1.97
	19	Aluminum	12400	B	4.88	14.6
		Antimony	0.0977	U	0.0977	0.391
		Arsenic	1.98		0.293	0.977
		Barium	99.2		0.0977	0.391
		Beryllium	0.376	J	0.0977	0.488
		Cadmium	0.291		0.0195	0.195
		Calcium	4960		39.1	97.7
		Chromium	13.8		0.977	2.93
		Cobalt	5.31		0.0977	0.977
		Copper	12.3		0.195	0.977

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
Perimeter (cont'd)	19	Iron	11100		9.77	24.4
		Lead	20		0.0977	0.391
		Magnesium	3970		4.88	14.6
		Manganese	272		0.977	4.88
		Mercury	0.0111		0.00242	0.00968
		Nickel	11.4		0.488	1.95
		Potassium	2680		78.1	293
		Selenium	0.488	U	0.488	0.977
		Silver	0.0539	J	0.0391	0.195
		Sodium	78.1	U	78.1	244
		Thallium	0.143	J	0.0781	0.195
		Vanadium	16.1		1.95	9.77
		Zinc	47		0.391	1.95
	60	Aluminum	11700	B	4.95	14.9
		Antimony	0.299	U	0.299	0.965
		Arsenic	2.72		0.297	0.99
		Barium	142		0.099	0.396
		Beryllium	0.528		0.0198	0.099
		Cadmium	0.27		0.0198	0.198
		Calcium	29100		29.7	99
		Chromium	10.9		0.198	0.594
		Cobalt	5	B	0.0198	0.198
		Copper	9.58	B	0.0396	0.198
		Iron	12100		9.9	24.8
		Lead	9.41		0.099	0.396
		Magnesium	4360		0.99	2.97
		Manganese	274		0.99	4.95
		Mercury	0.00482	J	0.00144	0.0096
		Nickel	10.1		0.099	0.396
		Potassium	3380		15.8	59.4
		Selenium	0.495	U	0.495	0.99
		Silver	0.0965	U	0.0965	0.483
		Sodium	57.7		15.2	47.6
		Thallium	0.258		0.0396	0.198
		Vanadium	22.2		1.98	9.9
		Zinc	39.4		0.396	1.98
	87	Aluminum	9180		9.71	29.1
		Antimony	0.0971	BU	0.0971	0.388
		Arsenic	1.54		0.291	0.971
		Barium	80.1		0.0971	0.388

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
Perimeter (cont'd)	87	Beryllium	0.387		0.0194	0.0971
		Cadmium	0.229		0.0194	0.194
		Calcium	3720		7.77	19.4
		Chromium	8.73		0.194	0.583
		Cobalt	3.35		0.0194	0.194
		Copper	6.14		0.0388	0.194
		Iron	8920		1.94	4.85
		Lead	8.02		0.0971	0.388
		Magnesium	2990		0.971	2.91
		Manganese	185		0.194	0.971
		Mercury	0.00682	J	0.00245	0.0098
		Nickel	6.07		0.0971	0.388
		Potassium	2570		15.5	58.3
		Selenium	0.485	U	0.485	0.971
		Silver	0.0598	J	0.0388	0.194
		Sodium	92.3		15.5	48.5
		Thallium	0.107	J	0.0777	0.194
		Vanadium	18.5		0.388	1.94
		Zinc	27		0.388	1.94
	88	Aluminum	5780		0.971	2.91
		Antimony	0.0971	BU	0.0971	0.388
		Arsenic	1.18		0.291	0.971
		Barium	42		0.0971	0.388
		Beryllium	0.232		0.0194	0.0971
		Cadmium	0.138	J	0.0194	0.194
		Calcium	875		7.77	19.4
		Chromium	5.31		0.194	0.583
		Cobalt	1.9		0.0194	0.194
		Copper	3.34		0.0388	0.194
		Iron	5560		1.94	4.85
		Lead	4.83		0.0971	0.388
		Magnesium	1220		0.971	2.91
		Manganese	94.1		0.194	0.971
		Mercury	0.00227	U	0.00227	0.00908
		Nickel	3.46		0.0971	0.388
		Potassium	1290		15.5	58.3
		Selenium	0.485	U	0.485	0.971
		Silver	0.0388	U	0.0388	0.194
		Sodium	28.1	J	15.5	48.5
		Thallium	0.0777	U	0.0777	0.194

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (continued)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
Perimeter (cont'd)	88	Vanadium	10.8		0.388	1.94
		Zinc	15.6		0.388	1.94
	89	Aluminum	8780		0.982	2.95
		Antimony	0.0982	BU	0.0982	0.393
		Arsenic	1.26		0.295	0.982
		Barium	60.6		0.0982	0.393
		Beryllium	0.345		0.0196	0.0982
		Cadmium	0.214		0.0196	0.196
		Calcium	1830		7.86	19.6
		Chromium	8.58		0.196	0.589
		Cobalt	2.82		0.0196	0.196
		Copper	5.16		0.0393	0.196
		Iron	8200		1.96	4.91
		Lead	7.17		0.0982	0.393
		Magnesium	2530		0.982	2.95
		Manganese	138		0.196	0.982
		Mercury	0.00618	J	0.00241	0.00963
		Nickel	5.6		0.0982	0.393
		Potassium	2830		15.7	58.9
		Selenium	0.491	U	0.491	0.982
		Silver	0.0464	J	0.0393	0.196
		Sodium	89.9		15.7	49.1
		Thallium	0.102	J	0.0786	0.196
		Vanadium	15.9		0.393	1.96
		Zinc	23.6		0.393	1.96
Community	11	Aluminum	4230	B	0.952	2.86
		Antimony	0.306	U	0.306	0.988
		Arsenic	1.72		0.286	0.952
		Barium	140		0.0952	0.381
		Beryllium	0.234		0.019	0.0952
		Cadmium	0.126	J	0.019	0.19
		Calcium	9060		28.6	95.2
		Chromium	5.1		0.19	0.571
		Cobalt	2.82	B	0.019	0.19
		Copper	4.01	B	0.0381	0.19
		Iron	6260		1.9	4.76
		Lead	5.77		0.0952	0.381
		Magnesium	2120		0.952	2.86
		Manganese	253		0.952	4.76
		Mercury	0.00225	J	0.00145	0.00969

See notes at end of table.

TABLE C-9. Non-radiological Results for Onsite by Location for Calendar Year 2007, Soil (concluded)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
Community (cont'd)	11	Nickel	4.68		0.0952	0.381
		Potassium	1310		15.2	57.1
		Selenium	0.476	U	0.476	0.952
		Silver	0.0988	U	0.0988	0.494
		Sodium	259		15.3	47.7
		Thallium	0.0855	J	0.0381	0.19
		Vanadium	14.2		0.381	1.9
		Zinc	19		0.381	1.9

NOTES: B = The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

This page intentionally left blank.

TABLE C-10 . Non-radiological Results by Location for Calendar Year 2007, Vegetation

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site	2NE	Aluminum	75.3		0.996	2.99
		Antimony	0.0996	BU	0.0996	0.398
		Arsenic	0.299	U	0.299	0.996
		Barium	5.29		0.0996	0.398
		Beryllium	0.0199	U	0.0199	0.0996
		Cadmium	0.0791	J	0.0199	0.199
		Calcium	2610		7.97	19.9
		Chromium	0.582	J	0.199	0.598
		Cobalt	0.0339	J	0.0199	0.199
		Copper	3.57		0.0398	0.199
		Iron	81.1		1.99	4.98
		Lead	0.115	J	0.0996	0.398
		Magnesium	745		0.996	2.99
		Manganese	12.1		0.199	0.996
		Mercury	0.0025	U	0.0025	0.00998
		Nickel	0.235	J	0.0996	0.398
		Potassium	7940		79.7	299
		Selenium	0.498	U	0.498	0.996
		Silver	0.0398	U	0.0398	0.199
		Sodium	15.9	U	15.9	49.8
		Thallium	0.0797	U	0.0797	0.199
		Vanadium	0.398	U	0.398	1.99
		Zinc	7.16		0.398	1.99
	6	Aluminum	55.8	B	0.954	2.86
		Antimony	0.0954	U	0.0954	0.382
		Arsenic	0.286	U	0.286	0.954
		Barium	7.59		0.0954	0.382
		Beryllium	0.0191	U	0.0191	0.0954
		Cadmium	0.0536	J	0.0191	0.191
		Calcium	3520		5.73	19.1
		Chromium	0.616		0.191	0.573
		Cobalt	0.0427	J	0.0191	0.191
		Copper	4.72		0.0382	0.191
		Iron	69.1		1.91	4.77
		Lead	0.0954	U	0.0954	0.382
		Magnesium	1410	B	0.954	2.86
		Manganese	7.2		0.191	0.954

See notes at end of table.

TABLE C-10. Non-radiological Results by Location for Calendar Year 2007, Vegetation (continued)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	6	Mercury	0.00132	U	0.00132	0.0088
		Nickel	0.725		0.0954	0.382
		Potassium	9750		153	573
		Selenium	0.488	J	0.477	0.954
		Silver	0.0382	U	0.0382	0.191
		Sodium	15.3	U	15.3	47.7
		Thallium	0.0382	U	0.0382	0.191
		Vanadium	0.382	U	0.382	1.91
		Zinc	17.8		0.382	1.91
	33	Aluminum	15.3		0.994	2.98
		Antimony	0.0994	BU	0.0994	0.398
		Arsenic	0.298	U	0.298	0.994
		Barium	3.27		0.0994	0.398
		Beryllium	0.0199	U	0.0199	0.0994
		Cadmium	0.0199	U	0.0199	0.199
		Calcium	1080		7.95	19.9
		Chromium	0.349	J	0.199	0.596
		Cobalt	0.033	J	0.0199	0.199
		Copper	1.08		0.0398	0.199
		Iron	29.6		1.99	4.97
		Lead	0.0994	U	0.0994	0.398
		Magnesium	583		0.994	2.98
		Manganese	15.9		0.199	0.994
		Mercury	0.00258	J	0.00238	0.00951
		Nickel	0.238	J	0.0994	0.398
		Potassium	5000		15.9	59.6
		Selenium	0.497	U	0.497	0.994
		Silver	0.0398	U	0.0398	0.199
		Sodium	178		15.9	49.7
		Thallium	0.0795	U	0.0795	0.199
		Vanadium	0.398	U	0.398	1.99
		Zinc	6.28		0.398	1.99
	35	Aluminum	142	B	0.986	2.96
		Antimony	0.0986	U	0.0986	0.394
		Arsenic	0.296	U	0.296	0.986
		Barium	7.93		0.0986	0.394
		Beryllium	0.0197	U	0.0197	0.0986
		Cadmium	0.0377	J	0.0197	0.197

See notes at end of table.

TABLE C-10. Non-radiological Results by Location for Calendar Year 2007, Vegetation (continued)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	35	Calcium	4290		5.92	19.7
		Chromium	0.894		0.197	0.592
		Cobalt	0.0836	J	0.0197	0.197
		Copper	7.58		0.0394	0.197
		Iron	139		1.97	4.93
		Lead	0.148	J	0.0986	0.394
		Magnesium	1230	B	0.986	2.96
		Manganese	32.3		0.197	0.986
		Mercury	0.00148	U	0.00148	0.00987
		Nickel	0.92		0.0986	0.394
		Potassium	7620		15.8	59.2
		Selenium	0.493	U	0.493	0.986
		Silver	0.0394	U	0.0394	0.197
		Sodium	15.8	U	15.8	49.3
		Thallium	0.0394	U	0.0394	0.197
		Vanadium	0.394	U	0.394	1.97
		Zinc	13.4		0.394	1.97
	45	Aluminum	72.7	B	0.996	2.99
		Antimony	0.0996	U	0.0996	0.398
		Arsenic	0.299	U	0.299	0.996
		Barium	6.41		0.0996	0.398
		Beryllium	0.0199	U	0.0199	0.0996
		Cadmium	0.0865	J	0.0199	0.199
		Calcium	3130		5.98	19.9
		Chromium	0.65		0.199	0.598
		Cobalt	0.0388	J	0.0199	0.199
		Copper	7.77		0.0398	0.199
		Iron	78.7		1.99	4.98
		Lead	0.0996	U	0.0996	0.398
		Magnesium	659	B	0.996	2.99
		Manganese	9.67		0.199	0.996
		Mercury	0.0015	U	0.0015	0.01
		Nickel	0.579		0.0996	0.398
		Potassium	8770		15.9	59.8
		Selenium	0.498	U	0.498	0.996
		Silver	0.0398	U	0.0398	0.199
		Sodium	15.9	U	15.9	49.8

See notes at end of table.

TABLE C-10. Non-radiological Results by Location for Calendar Year 2007, Vegetation (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	45	Thallium	0.0398	U	0.0398	0.199
		Vanadium	0.398	U	0.398	1.99
		Zinc	70.5		0.398	1.99
	51	Aluminum	111	B	1	3
		Antimony	0.1	U	0.1	0.4
		Arsenic	0.3	U	0.3	1
		Barium	11.5		0.1	0.4
		Beryllium	0.02	U	0.02	0.1
		Cadmium	0.0236	J	0.02	0.2
		Calcium	3790		6	20
		Chromium	1.24		0.2	0.6
		Cobalt	0.078	J	0.02	0.2
		Copper	9.28		0.04	0.2
		Iron	109		2	5
		Lead	0.157	J	0.1	0.4
		Magnesium	1320	B	1	3
		Manganese	11.3		0.2	1
		Mercury	0.0014	U	0.0014	0.00935
		Nickel	0.767		0.1	0.4
		Potassium	6870		16	60
		Selenium	0.5	U	0.5	1
		Silver	0.04	U	0.04	0.2
		Sodium	16	U	16	50
		Thallium	0.04	U	0.04	0.2
		Vanadium	0.4	U	0.4	2
		Zinc	43.5		0.4	2
	52	Aluminum	37	B	1	3
		Antimony	0.1	U	0.1	0.4
		Arsenic	0.3	U	0.3	1
		Barium	7.46		0.1	0.4
		Beryllium	0.02	U	0.02	0.1
		Cadmium	0.02	U	0.02	0.2
		Calcium	3120		6	20
		Chromium	0.633		0.2	0.6
		Cobalt	0.0318	J	0.02	0.2
		Copper	5.14		0.04	0.2
		Iron	47.7		2	5
		Lead	0.1	U	0.1	0.4
		Magnesium	1390	B	1	3

See notes at end of table.

TABLE C-10. Non-radiological Results by Location for Calendar Year 2007, Vegetation (continued)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	52	Manganese	14.2		0.2	1
		Mercury	0.0015	U	0.0015	0.00998
		Nickel	0.58		0.1	0.4
		Potassium	8170		16	60
		Selenium	0.5	U	0.5	1
		Silver	0.04	U	0.04	0.2
		Sodium	16	U	16	50
		Thallium	0.124	J	0.04	0.2
		Vanadium	0.4	U	0.4	2
		Zinc	14.7		0.4	2
Perimeter	4	Aluminum	207	B	0.978	2.94
		Antimony	0.0978	U	0.0978	0.391
		Arsenic	0.294	U	0.294	0.978
		Barium	15.9		0.0978	0.391
		Beryllium	0.0196	U	0.0196	0.0978
		Cadmium	0.0499	J	0.0198	0.198
		Calcium	3640		5.87	19.6
		Chromium	0.803		0.196	0.587
		Cobalt	0.0718	J	0.0196	0.196
		Copper	4.63		0.0391	0.196
		Iron	189	B	1.96	4.89
		Lead	0.151	J	0.0978	0.391
		Magnesium	1080		0.978	2.94
		Manganese	16.6		0.196	0.978
		Mercury	0.0014	U	0.0014	0.0093
		Nickel	0.489		0.0978	0.391
		Potassium	9750		15.7	58.7
		Selenium	0.489	U	0.489	0.978
		Silver	0.0391	U	0.0391	0.196
		Sodium	15.7	U	15.7	48.9
		Thallium	0.338	B	0.0391	0.196
		Vanadium	0.625	J	0.391	1.96
		Zinc	16.1		0.391	1.96

See notes at end of table.

TABLE C-10. Non-radiological Results for Perimeter by Location for Calendar Year 2007, Vegetation (concluded)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
Perimeter (cont'd)	19	Aluminum	46.6	B	0.973	2.92
		Antimony	0.0973	U	0.0973	0.389
		Arsenic	0.292	U	0.292	0.973
		Barium	10.4		0.0973	0.389
		Beryllium	0.0195	U	0.0195	0.0973
		Cadmium	0.0771	J	0.0192	0.192
		Calcium	4260		5.84	19.5
		Chromium	0.589		0.195	0.584
		Cobalt	0.0403	J	0.0195	0.195
		Copper	6.9		0.0389	0.195
		Iron	72	B	1.95	4.86
		Lead	0.176	J	0.0973	0.389
		Magnesium	567		0.973	2.92
		Manganese	16.8		0.195	0.973
		Mercury	0.00147	U	0.00147	0.00977
		Nickel	0.304	J	0.0973	0.389
		Potassium	8350		15.6	58.4
		Selenium	0.486	U	0.486	0.973
		Silver	0.0389	U	0.0389	0.195
		Sodium	15.6	U	15.6	48.6
		Thallium	0.0473	BJ	0.0389	0.195
		Vanadium	0.389	U	0.389	1.95
		Zinc	28.2		0.389	1.95

NOTES: B = The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

TABLE C-11. Non-radiological Results by Location for Calendar Year 2007, Sediment

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site	56	Aluminum	6840	B	4.97	14.9
		Antimony	0.0994	BU	0.0994	0.398
		Arsenic	2.21		0.298	0.994
		Barium	98		0.0994	0.398
		Beryllium	0.389		0.0199	0.0994
		Cadmium	0.203		0.0199	0.199
		Calcium	41300		39.8	99.4
		Chromium	10.6		0.199	0.596
		Cobalt	3.74		0.0199	0.199
		Copper	8.03		0.0398	0.199
		Iron	7820		9.94	24.9
		Lead	7.92		0.0994	0.398
		Magnesium	2970		4.97	14.9
		Manganese	152		0.994	4.97
		Mercury	0.00404	J	0.00224	0.00896
		Nickel	8.97		0.0994	0.398
		Potassium	1610		79.5	298
		Selenium	0.497	U	0.497	0.994
		Silver	0.0598	J	0.0398	0.199
		Sodium	58.1	B	15.9	49.7
		Thallium	0.0911	J	0.0795	0.199
		Vanadium	12.7		1.99	9.94
		Zinc	51.6		0.398	1.99
	72	Aluminum	5110	B	0.977	2.93
		Antimony	0.0977	U	0.0977	0.391
		Arsenic	1.64		0.293	0.977
		Barium	68.7		0.0977	0.391
		Beryllium	0.373	J	0.0977	0.488
		Cadmium	0.208		0.0195	0.195
		Calcium	53900		78.1	195
		Chromium	6.99		0.195	0.586
		Cobalt	2.89		0.0195	0.195
		Copper	6.28		0.0391	0.195
		Iron	6560		1.95	4.88
		Lead	5.63		0.0977	0.391
		Magnesium	3850		9.77	29.3
		Manganese	167		0.195	0.977

See notes at end of table.

TABLE C-11. Non-radiological Results by Location for Calendar Year 2007, Sediment (continued)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	72	Mercury	0.00223	U	0.00223	0.00893
		Nickel	5.93		0.0977	0.391
		Potassium	970		15.6	58.6
		Selenium	0.488	U	0.488	0.977
		Silver	0.0391	U	0.0391	0.195
		Sodium	129	J	78.1	244
		Thallium	0.0781	U	0.0781	0.195
		Vanadium	10.6		0.391	1.95
		Zinc	22.9		0.391	1.95
	74N	Aluminum	3440	B	0.978	2.94
		Antimony	0.0978	U	0.0978	0.391
		Arsenic	0.428	J	0.294	0.978
		Barium	93.2		0.0978	0.391
		Beryllium	0.228	J	0.0978	0.489
		Cadmium	0.173	J	0.0196	0.196
		Calcium	39600		39.1	97.8
		Chromium	2.25		0.196	0.587
		Cobalt	2.49		0.0196	0.196
		Copper	4.48		0.0391	0.196
		Iron	6260		1.96	4.89
		Lead	3.08		0.0978	0.391
		Magnesium	2970		4.89	14.7
		Manganese	195		0.196	0.978
		Mercury	0.00237	U	0.00237	0.00948
		Nickel	3.53		0.0978	0.391
		Potassium	1280		15.7	58.7
		Selenium	0.489	U	0.489	0.978
		Silver	0.0391	U	0.0391	0.196
		Sodium	78.3	U	78.3	245
		Thallium	0.0816	J	0.0783	0.196
		Vanadium	10.4		0.391	1.96
		Zinc	26.6		0.391	1.96
	75	Aluminum	3720	B	0.954	2.86
		Antimony	0.0954	U	0.0954	0.382
		Arsenic	1.31		0.286	0.954
		Barium	30.9		0.0954	0.382
		Beryllium	0.263		0.0191	0.0954
		Cadmium	0.164	J	0.0191	0.191

See notes at end of table.

TABLE C-11. Non-radiological Results by Location for Calendar Year 2007, Sediment (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	75	Calcium	32800	B	38.2	95.4
		Chromium	5.12		0.191	0.573
		Cobalt	3.17		0.0191	0.191
		Copper	7		0.0382	0.191
		Iron	7600		1.91	4.77
		Lead	3.77		0.0954	0.382
		Magnesium	2430		0.954	2.86
		Manganese	171		0.191	0.954
		Mercury	0.00238	U	0.00238	0.00954
		Nickel	5.76		0.0954	0.382
		Potassium	673		15.3	57.3
		Selenium	0.477	U	0.477	0.954
		Silver	0.0382	U	0.0382	0.191
		Sodium	61.7		15.3	47.7
		Thallium	0.0763	U	0.0763	0.191
		Vanadium	12.4		0.382	1.91
		Zinc	19.9		0.382	1.91
	79	Aluminum	16700	B	4.9	14.7
		Antimony	0.226	J	0.098	0.392
		Arsenic	2.84		0.294	0.98
		Barium	191		0.098	0.392
		Beryllium	0.666		0.098	0.49
		Cadmium	0.363		0.0196	0.196
		Calcium	73200		78.4	196
		Chromium	16.1		0.98	2.94
		Cobalt	6.33		0.098	0.98
		Copper	12.4		0.196	0.98
		Iron	13800		9.8	24.5
		Lead	12.9		0.098	0.392
		Magnesium	5060		4.9	14.7
		Manganese	338		0.98	4.9
		Mercury	0.0138		0.0024	0.00962
		Nickel	14.8		0.49	1.96
		Potassium	3360		78.4	294
		Selenium	0.49	U	0.49	0.98
		Silver	0.0635	J	0.0392	0.196
		Sodium	89.9	J	78.4	245
		Thallium	0.156	J	0.0784	0.196

See notes at end of table.

TABLE C-11. Non-radiological Results by Location for Calendar Year 2007, Sediment (continued)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	79	Vanadium	21.9		1.96	9.8
		Zinc	44.7		0.392	1.96
	83	Aluminum	13600	B	4.95	14.9
		Antimony	0.099	U	0.099	0.396
		Arsenic	2.23		0.297	0.99
		Barium	154		0.099	0.396
		Beryllium	0.463	J	0.099	0.495
		Cadmium	0.314		0.0198	0.198
		Calcium	33700		39.6	99
		Chromium	10.6		0.99	2.97
		Cobalt	5.9		0.099	0.99
		Copper	12.6		0.198	0.99
		Iron	13200		9.9	24.8
		Lead	11.8		0.099	0.396
		Magnesium	5400		4.95	14.9
		Manganese	307		0.99	4.95
		Mercury	0.0119		0.00246	0.00985
		Nickel	10.3		0.495	1.98
		Potassium	4470		79.2	297
		Selenium	0.495	U	0.495	0.99
		Silver	0.117	J	0.0396	0.198
		Sodium	79.2	U	79.2	248
		Thallium	0.171	J	0.0792	0.198
		Vanadium	21.7		1.98	9.9
		Zinc	48.6		0.396	1.98
	84	Aluminum	15900	B	4.85	14.6
		Antimony	0.111	BJ	0.0971	0.388
		Arsenic	3.78		0.291	0.971
		Barium	209		0.0971	0.388
		Beryllium	0.76		0.0194	0.0971
		Cadmium	0.331		0.0194	0.194
		Calcium	46000		38.8	97.1
		Chromium	17.4		0.194	0.583
		Cobalt	8.35		0.0194	0.194
		Copper	17.6		0.0388	0.194
		Iron	15900		9.71	24.3
		Lead	19.3		0.0971	0.388
		Magnesium	6300		4.85	14.6
		Manganese	356		0.971	4.85

See notes at end of table.

TABLE C-11. Non-radiological Results by Location for Calendar Year 2007, Sediment (continued)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site (cont'd)	84	Mercury	0.0106		0.00217	0.0087
		Nickel	16.7		0.0971	0.388
		Potassium	3820		77.7	291
		Selenium	0.485	U	0.485	0.971
		Silver	0.0903	J	0.0388	0.194
		Sodium	103	B	15.5	48.5
		Thallium	0.26		0.0777	0.194
		Vanadium	27.5		1.94	9.71
		Zinc	51.4		0.388	1.94
	85	Aluminum	3420	B	0.986	2.96
		Antimony	0.0986	U	0.0986	0.394
		Arsenic	2.18		0.296	0.986
		Barium	85.4		0.0986	0.394
		Beryllium	0.242	J	0.0986	0.493
		Cadmium	0.342		0.0197	0.197
		Calcium	166000		197	493
		Chromium	7.4		0.197	0.592
		Cobalt	2.33		0.0197	0.197
		Copper	3.17		0.0394	0.197
		Iron	7680		1.97	4.93
		Lead	8.26		0.0986	0.394
		Magnesium	3140		4.93	14.8
		Manganese	260		0.986	4.93
		Mercury	0.00242	U	0.00242	0.00969
		Nickel	8.15		0.0986	0.394
		Potassium	529		15.8	59.2
		Selenium	0.493	U	0.493	0.986
		Silver	0.0394	U	0.0394	0.197
		Sodium	86.9	J	78.9	247
		Thallium	0.0789	U	0.0789	0.197
		Vanadium	11.8		0.394	1.97
		Zinc	24.9		0.394	1.97
Perimeter	73	Aluminum	9070	B	0.969	2.91
		Antimony	0.0969	U	0.0969	0.388
		Arsenic	2.04		0.291	0.969
		Barium	132		0.0969	0.388

See notes at end of table.

TABLE C-11. Non-radiological Results by Location for Calendar Year 2007, Sediment (continued)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
Perimeter (cont'd)	73	Beryllium	0.411		0.0194	0.0969
		Cadmium	0.215		0.0194	0.194
		Calcium	21700	B	38.8	96.9
		Chromium	9.06		0.194	0.581
		Cobalt	6.07		0.0194	0.194
		Copper	9.37		0.0388	0.194
		Iron	15900		9.69	24.2
		Lead	7.71		0.0969	0.388
		Magnesium	5500		0.969	2.91
		Manganese	329		0.969	4.84
		Mercury	0.00242	U	0.00242	0.00968
		Nickel	8.25		0.0969	0.388
		Potassium	3190		15.5	58.1
		Selenium	0.484	U	0.484	0.969
		Silver	0.0388	U	0.0388	0.194
		Sodium	111		15.5	48.4
		Thallium	0.211		0.0775	0.194
		Vanadium	25.9		1.94	9.69
		Zinc	51.5		0.388	1.94
Community	11	Aluminum	10900	B	4.91	14.7
		Antimony	0.295	U	0.295	0.952
		Arsenic	2.46		0.295	0.982
		Barium	206		0.0982	0.393
		Beryllium	0.492		0.0196	0.0982
		Cadmium	0.863		0.0196	0.196
		Calcium	22300		29.5	98.2
		Chromium	9.47		0.196	0.589
		Cobalt	4.17	B	0.0196	0.196
		Copper	7.12	B	0.0393	0.196
		Iron	9570		9.82	24.6
		Lead	8.13		0.0982	0.393
		Magnesium	4450		0.982	2.95
		Manganese	228		0.982	4.91
		Mercury	0.00896		0.00134	0.00896
		Nickel	8.52		0.0982	0.393

See notes at end of table.

TABLE C-11. Non-radiological Results by Location for Calendar Year 2007, Sediment (concluded)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
Community (cont'd)	11	Potassium	2200		15.7	58.9
		Selenium	0.491	U	0.491	0.982
		Silver	0.145	J	0.0952	0.476
		Sodium	174		15.7	49.2
		Thallium	0.141	J	0.0393	0.196
		Vanadium	18.3		1.96	9.82
		Zinc	31		0.393	1.96

NOTES: B = The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

This page intentionally left blank.

TABLE C-12. Non-Radiological Replicate Results for Calendar Year 2007, Soil

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result		Decision Level	Detection Limit	Average	Std Dev	CV
On-Site	2NE	084362-001	Aluminum	8960	B	4.83	14.5	9220.00	494.27	5.36%
		084362-002	Aluminum	9790	B	4.77	14.3			
		084362-003	Aluminum	8910	B	4.96	14.9			
		084362-001	Antimony	0.0965	BU	0.0965	0.386	0.10	0.00	2.02%
		084362-002	Antimony	0.0954	BU	0.0954	0.382			
		084362-003	Antimony	0.0992	BU	0.0992	0.397			
		084362-001	Arsenic	1.99		0.29	0.965	1.82	0.17	9.12%
		084362-002	Arsenic	1.66		0.286	0.954			
		084362-003	Arsenic	1.8		0.298	0.992			
		084362-001	Barium	73.1		0.0965	0.386	72.27	0.97	1.34%
		084362-002	Barium	71.2		0.0954	0.382			
		084362-003	Barium	72.5		0.0992	0.397			
		084362-001	Beryllium	0.448		0.0193	0.0965	0.43	0.02	4.92%
		084362-002	Beryllium	0.428		0.0191	0.0954			
		084362-003	Beryllium	0.406		0.0198	0.0992			
		084362-001	Cadmium	0.324		0.0193	0.193	0.29	0.03	10.07%
		084362-002	Cadmium	0.268		0.0191	0.191			
		084362-003	Cadmium	0.281		0.0198	0.198			
		084362-001	Calcium	6210		7.72	19.3	5523.33	594.67	10.77%
		084362-002	Calcium	5180		38.2	95.4			
		084362-003	Calcium	5180		39.7	99.2			
		084362-001	Chromium	8.59		0.193	0.579	8.53	0.10	1.15%
		084362-002	Chromium	8.59		0.191	0.573			
		084362-003	Chromium	8.42		0.198	0.595			
		084362-001	Cobalt	3.34		0.0193	0.193	3.24	0.12	3.85%
		084362-002	Cobalt	3.28		0.0191	0.191			
		084362-003	Cobalt	3.1		0.0198	0.198			
		084362-001	Copper	6.51		0.0386	0.193	6.50	0.16	2.39%
		084362-002	Copper	6.65		0.0382	0.191			
		084362-003	Copper	6.34		0.0397	0.198			
		084362-001	Iron	9500		1.93	4.83	8443.33	940.02	11.13%
		084362-002	Iron	8130		9.54	23.9			
		084362-003	Iron	7700		9.92	24.8			
		084362-001	Lead	10.7		0.0965	0.386	9.84	0.74	7.57%
		084362-002	Lead	9.48		0.0954	0.382			
		084362-003	Lead	9.35		0.0992	0.397			
		084362-001	Magnesium	2550		4.83	14.5	2383.33	230.72	9.68%

See notes at end of table.

TABLE C-12. Non-Radiological Replicate Results for Calendar Year 2007, Soil (Cont'd)
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result		Decision Level	Detection Limit	Average	Std Dev	CV
On-Site (cont'd)	2NE	084362-002	Magnesium	2480		4.77	14.3	2383.33	230.72	9.68%
		084362-003	Magnesium	2120		4.96	14.9			
		084362-001	Manganese	158		0.193	0.965	147.67	8.96	6.07%
		084362-002	Manganese	142		0.954	4.77			
		084362-003	Manganese	143		0.992	4.96			
		084362-001	Mercury	0.0063	J	0.00218	0.00871	0.01	0.00	2.91%
		084362-002	Mercury	0.0067	J	0.0025	0.00998			
		084362-003	Mercury	0.0478		0.00221	0.00884			
		084362-001	Nickel	6.77		0.0965	0.386	6.66	0.14	2.10%
		084362-002	Nickel	6.7		0.0954	0.382			
		084362-003	Nickel	6.5		0.0992	0.397			
		084362-001	Potassium	2350		77.2	290	2416.67	83.27	3.45%
		084362-002	Potassium	2390		76.3	286			
		084362-003	Potassium	2510		79.4	298			
		084362-001	Selenium	0.483	U	0.483	0.965	0.49	0.01	2.00%
		084362-002	Selenium	0.477	U	0.477	0.954			
		084362-003	Selenium	0.496	U	0.496	0.992			
		084362-001	Silver	0.135	J	0.0386	0.193	0.13	0.02	13.28%
		084362-002	Silver	0.107	J	0.0382	0.191			
		084362-003	Silver	0.137	J	0.0397	0.198			
		084362-001	Sodium	40.7	BJ	15.4	48.3	40.27	1.31	3.24%
		084362-002	Sodium	41.3	BJ	15.3	47.7			
		084362-003	Sodium	38.8	BJ	15.9	49.6			
		084362-001	Thallium	0.129	J	0.0772	0.193	0.11	0.01	11.94%
		084362-002	Thallium	0.112	J	0.0763	0.191			
		084362-003	Thallium	0.102	J	0.0794	0.198			
		084362-001	Vanadium	15.3		0.386	1.93	12.43	2.51	20.22%
		084362-002	Vanadium	11.4		1.91	9.54			
		084362-003	Vanadium	10.6		1.98	9.92			
		084362-001	Zinc	26.6		0.386	1.93	25.57	1.00	3.92%
		084362-002	Zinc	24.6		0.382	1.91			
		084362-003	Zinc	25.5		0.397	1.98			
	33	084394-001	Aluminum	11200	B	4.84	14.5	10966.67	776.75	7.08%
		084394-002	Aluminum	11600	B	4.96	14.9			
		084394-003	Aluminum	10100	B	4.87	14.6			
		084394-001	Antimony	0.0967	U	0.0967	0.387	0.10	0.00	1.31%
		084394-002	Antimony	0.0992	U	0.0992	0.397			
		084394-003	Antimony	0.0975	U	0.0975	0.39			

See notes at end of table.

TABLE C-12. Non-Radiological Replicate Results for Calendar Year 2007, Soil (continued)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result		Decision Level	Detection Limit	Average	Std Dev	CV
On-site (cont'd)	33	084394-001	Arsenic	11.4		0.29	0.967	12.10	0.62	5.16%
		084394-002	Arsenic	12.3		0.298	0.992			
		084394-003	Arsenic	12.6		0.292	0.975			
		084394-001	Barium	127		0.0967	0.387	130.00	8.89	6.84%
		084394-002	Barium	140		0.0992	0.397			
		084394-003	Barium	123		0.0975	0.39			
		084394-001	Beryllium	1.19		0.0193	0.0967	1.26	0.07	5.27%
		084394-002	Beryllium	1.28		0.0198	0.0992			
		084394-003	Beryllium	1.32		0.0195	0.0975			
		084394-001	Cadmium	0.36		0.0193	0.193	0.37	0.01	3.49%
		084394-002	Cadmium	0.375		0.0198	0.198			
		084394-003	Cadmium	0.386		0.0195	0.195			
		084394-001	Calcium	41700	B	38.7	96.7	47166.67	5220.47	11.07%
		084394-002	Calcium	52100	B	79.4	198			
		084394-003	Calcium	47700	B	39	97.5			
		084394-001	Chromium	11.7		0.193	0.58	20.70	14.31	69.13%
		084394-002	Chromium	13.2		0.198	0.595			
		084394-003	Chromium	37.2		0.195	0.585			
		084394-001	Cobalt	6.23		0.0193	0.193	6.14	0.09	1.47%
		084394-002	Cobalt	6.14		0.0198	0.198			
		084394-003	Cobalt	6.05		0.0195	0.195			
		084394-001	Copper	8.75		0.0387	0.193	9.81	1.81	18.42%
		084394-002	Copper	8.79		0.0397	0.198			
		084394-003	Copper	11.9		0.039	0.195			
		084394-001	Iron	13100		9.67	24.2	15166.67	2610.24	17.21%
		084394-002	Iron	14300		9.92	24.8			
		084394-003	Iron	18100		9.75	24.4			
		084394-001	Lead	13.1		0.0967	0.387	13.77	1.15	8.39%
		084394-002	Lead	15.1		0.0992	0.397			
		084394-003	Lead	13.1		0.0975	0.39			
		084394-001	Magnesium	4770		0.967	2.9	4883.33	105.99	2.17%
		084394-002	Magnesium	4980		0.992	2.98			
		084394-003	Magnesium	4900		0.975	2.92			
		084394-001	Manganese	345		0.967	4.84	373.33	28.01	7.50%
		084394-002	Manganese	401		0.992	4.96			
		084394-003	Manganese	374		0.975	4.87			
		084394-001	Mercury	0.0145		0.0024	0.0096	0.01	0.00	13.07%
		084394-002	Mercury	0.0117		0.00233	0.0093			
		084394-003	Mercury	0.0116		0.00232	0.00929			
		084394-001	Nickel	13.4		0.0967	0.387	14.10	0.66	4.65%

See notes at end of table.

TABLE C-12. Non-Radiological Replicate Results for Calendar Year 2007, Soil (continued)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result		Decision Level	Detection Limit	Average	Std Dev	CV
On-Site (cont'd)	33	084394-002	Nickel	14.2		0.0992	0.397	14.10	0.66	4.65%
		084394-003	Nickel	14.7		0.0975	0.39			
		084394-001	Potassium	3070		15.5	58	3190.00	252.39	7.91%
		084394-002	Potassium	3480		15.9	59.5			
		084394-003	Potassium	3020		15.6	58.5			
		084394-001	Selenium	0.484	U	0.484	0.967	0.49	0.01	1.28%
		084394-002	Selenium	0.496	U	0.496	0.992			
		084394-003	Selenium	0.487	U	0.487	0.975			
		084394-001	Silver	0.0472	J	0.0387	0.193	0.04	0.00	5.07%
		084394-002	Silver	0.0435	J	0.0397	0.198			
		084394-003	Silver	0.0431	J	0.039	0.195			
		084394-001	Sodium	1020		15.5	48.4	950.67	290.28	30.53%
		084394-002	Sodium	1200		15.9	49.6			
		084394-003	Sodium	632		15.6	48.7			
		084394-001	Thallium	0.19	J	0.0774	0.193	0.19	0.01	7.15%
		084394-002	Thallium	0.195	J	0.0794	0.198			
		084394-003	Thallium	0.17	J	0.078	0.195			
		084394-001	Vanadium	22.5		1.93	9.67	23.30	0.98	4.23%
		084394-002	Vanadium	23		1.98	9.92			
		084394-003	Vanadium	24.4		1.95	9.75			
		084394-001	Zinc	51.5		0.387	1.93	69.40	27.45	39.55%
		084394-002	Zinc	55.7		0.397	1.98			
		084394-003	Zinc	101		0.39	1.95			
Community	11	084436-001	Aluminum	4230	B	0.952	2.86	3580.00	841.13	23.50%
		084436-002	Aluminum	2630	B	0.965	2.9			
		084436-003	Aluminum	3880	B	0.971	2.91			
		084436-001	Antimony	0.306	U	0.306	0.988	0.30	0.00	1.40%
		084436-002	Antimony	0.3	U	0.3	0.969			
		084436-003	Antimony	0.362	J	0.302	0.973			
		084436-001	Arsenic	1.72		0.286	0.952	1.47	0.23	15.70%
		084436-002	Arsenic	1.27		0.29	0.965			
		084436-003	Arsenic	1.41		0.291	0.971			
		084436-001	Barium	140		0.0952	0.381	121.97	34.76	28.50%
		084436-002	Barium	81.9		0.0965	0.386			
		084436-003	Barium	144		0.0971	0.388			
		084436-001	Beryllium	0.234		0.019	0.0952	0.20	0.04	17.52%
		084436-002	Beryllium	0.164		0.0193	0.0965			

See notes at end of table.

TABLE C-12. Non-Radiological Replicate Results for Calendar Year 2007, Soil (continued)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result		Decision Level	Detection Limit	Average	Std Dev	CV
Community (cont'd)	11	084436-003	Beryllium	0.202		0.0194	0.0971	0.20	0.04	17.52%
		084436-001	Cadmium	0.126	J	0.019	0.19	0.12	0.03	26.50%
		084436-002	Cadmium	0.0903	J	0.0193	0.193			
		084436-003	Cadmium	0.156	J	0.0194	0.194			
		084436-001	Calcium	9060		28.6	95.2	7966.67	2078.23	26.09%
		084436-002	Calcium	5570		5.79	19.3			
		084436-003	Calcium	9270		5.83	19.4			
		084436-001	Chromium	5.1		0.19	0.571	4.30	0.87	20.15%
		084436-002	Chromium	3.38		0.193	0.579			
		084436-003	Chromium	4.43		0.194	0.583			
		084436-001	Cobalt	2.82	B	0.019	0.19	2.37	0.41	17.27%
		084436-002	Cobalt	2.02	B	0.0193	0.193			
		084436-003	Cobalt	2.27	B	0.0194	0.194			
		084436-001	Copper	4.01	B	0.0381	0.19	3.40	0.60	17.52%
		084436-002	Copper	2.82	B	0.0386	0.193			
		084436-003	Copper	3.37	B	0.0388	0.194			
		084436-001	Iron	6260		1.9	4.76	5333.33	1091.62	20.47%
		084436-002	Iron	4130		1.93	4.83			
		084436-003	Iron	5610		1.94	4.85			
		084436-001	Lead	5.77		0.0952	0.381	4.83	1.01	20.81%
		084436-002	Lead	3.77		0.0965	0.386			
		084436-003	Lead	4.96		0.0971	0.388			
		084436-001	Magnesium	2120		0.952	2.86	1700.00	452.99	26.65%
		084436-002	Magnesium	1220		0.965	2.9			
		084436-003	Magnesium	1760		0.971	2.91			
		084436-001	Manganese	253		0.952	4.76	216.67	36.00	16.62%
		084436-002	Manganese	181		0.193	0.965			
		084436-003	Manganese	216		0.971	4.85			
		084436-001	Mercury	0.0026	J	0.00145	0.00969	0.00	0.00	8.84%
		084436-002	Mercury	0.0026	J	0.00141	0.00938			
		084436-003	Mercury	0.0014	U	0.00143	0.00954			
		084436-001	Nickel	4.68		0.0952	0.381	4.08	0.64	15.78%
		084436-002	Nickel	3.4		0.0965	0.386			
		084436-003	Nickel	4.16		0.0971	0.388			
		084436-001	Potassium	1310		15.2	57.1	1093.67	230.63	21.09%
		084436-002	Potassium	851		15.4	57.9			
		084436-003	Potassium	1120		15.5	58.3			
		084436-001	Selenium	0.476	U	0.476	0.952	0.48	0.00	0.98%

See notes at end of table.

TABLE C-12. Non-Radiological Replicate Results for Calendar Year 2007, Soil (concluded)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result		Decision Level	Detection Limit	Average	Std Dev	CV
Community (cont'd)	11	084436-002	Selenium	0.483	U	0.483	0.965	0.48	0.00	0.98%
		084436-003	Selenium	0.485	U	0.485	0.971			
		084436-001	Silver	0.0988	U	0.0988	0.494	0.10	0.00	1.03%
		084436-002	Silver	0.0969	U	0.0969	0.484			
		084436-003	Silver	0.0973	U	0.0973	0.486			
		084436-001	Sodium	259		15.3	47.7	230.33	31.26	13.57%
		084436-002	Sodium	235		15.5	48.4			
		084436-003	Sodium	197		15.6	48.7			
		084436-001	Thallium	0.0855	J	0.0381	0.19	0.07	0.02	21.76%
		084436-002	Thallium	0.0562	J	0.0386	0.193			
		084436-003	Thallium	0.0652	J	0.0388	0.194			
		084436-001	Vanadium	14.2		0.381	1.9	12.67	2.24	17.66%
		084436-002	Vanadium	10.1		0.386	1.93			
		084436-003	Vanadium	13.7		0.388	1.94			
		084436-001	Zinc	19		0.381	1.9	16.77	2.30	13.73%
		084436-002	Zinc	14.4		0.386	1.93			
		084436-003	Zinc	16.9		0.388	1.94			

NOTES: B = The analyte was found in the blank above the effective decision level (organics), or the effective detection limit (inorganics).

J = Estimated value, the analyte concentration fell above the effective decision level and below the effective detection limit.

U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level.

CV = coefficient of variation

Std Dev = standard deviation

TABLE C-13. Non-Radiological Replicate Results for Calendar Year 2007, Vegetation

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result		Decision Level	Detection Limit	Average	Std Dev	CV
On-Site	33	084395-001	Aluminum	15.3		0.994	2.98	18.27	3.48	19.06%
		084395-002	Aluminum	17.4		0.969	2.91			
		084395-003	Aluminum	22.1		0.996	2.99			
		084395-001	Antimony	0.0994	BU	0.0994	0.398	0.10	0.00	1.53%
		084395-002	Antimony	0.0969	BU	0.0969	0.388			
		084395-003	Antimony	0.0996	BU	0.0996	0.398			
		084395-001	Arsenic	0.298	U	0.298	0.994	0.30	0.00	1.47%
		084395-002	Arsenic	0.291	U	0.291	0.969			
		084395-003	Arsenic	0.299	U	0.299	0.996			
		084395-001	Barium	3.27		0.0994	0.398	2.73	0.78	28.69%
		084395-002	Barium	3.08		0.0969	0.388			
		084395-003	Barium	1.83		0.0996	0.398			
		084395-001	Beryllium	0.0199	U	0.0199	0.0994	0.02	0.00	1.46%
		084395-002	Beryllium	0.0194	U	0.0194	0.0969			
		084395-003	Beryllium	0.0199	U	0.0199	0.0996			
		084395-001	Cadmium	0.0199	U	0.0199	0.199	0.02	0.00	1.46%
		084395-002	Cadmium	0.0194	U	0.0194	0.194			
		084395-003	Cadmium	0.0199	U	0.0199	0.199			
		084395-001	Calcium	1080		7.95	19.9	1220.00	163.71	13.42%
		084395-002	Calcium	1400		7.75	19.4			
		084395-003	Calcium	1180		7.97	19.9			
		084395-001	Chromium	0.349	J	0.199	0.596	0.43	0.07	16.29%
		084395-002	Chromium	0.474	J	0.194	0.581			
		084395-003	Chromium	0.466	J	0.199	0.598			
		084395-001	Cobalt	0.033	J	0.0199	0.199	0.06	0.03	43.50%
		084395-002	Cobalt	0.0665	J	0.0194	0.194			
		084395-003	Cobalt	0.0863	J	0.0199	0.199			
		084395-001	Copper	1.08		0.0398	0.199	0.95	0.22	22.73%
		084395-002	Copper	0.698		0.0388	0.194			
		084395-003	Copper	1.06		0.0398	0.199			
		084395-001	Iron	29.6		1.99	4.97	39.10	10.52	26.90%
		084395-002	Iron	37.3		1.94	4.84			
		084395-003	Iron	50.4		1.99	4.98			
		084395-001	Lead	0.0994	U	0.0994	0.398	0.13	0.02	13.58%
		084395-002	Lead	0.113	J	0.0969	0.388			
		084395-003	Lead	0.137	J	0.0996	0.398			
		084395-001	Magnesium	583		0.994	2.98	517.00	105.77	20.46%

See notes at end of table.

TABLE C-13. Non-Radiological Replicate Results for Calendar Year 2007, Vegetation (concluded)

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result		Decision Level	Detection Limit	Average	Std Dev	CV
On-Site (cont'd)	33	084395-002	Magnesium	395		0.969	2.91	517.00	105.77	20.46%
		084395-003	Magnesium	573		0.996	2.99			
		084395-001	Manganese	15.9		0.199	0.994	17.03	1.21	7.08%
		084395-002	Manganese	16.9		0.194	0.969			
		084395-003	Manganese	18.3		0.199	0.996			
		084395-001	Mercury	0.00258	J	0.00238	0.00951	0.00	0.00	38.06%
		084395-002	Mercury	0.0023	U	0.0023	0.00919			
		084395-003	Mercury	0.00448	J	0.00245	0.00982			
		084395-001	Nickel	0.238	J	0.0994	0.398	0.28	0.05	19.12%
		084395-002	Nickel	0.259	J	0.0969	0.388			
		084395-003	Nickel	0.339	J	0.0996	0.398			
		084395-001	Potassium	5000		15.9	59.6	4986.67	130.51	2.62%
		084395-002	Potassium	4850		15.5	58.1			
		084395-003	Potassium	5110		15.9	59.8			
		084395-001	Selenium	0.497	U	0.497	0.994	0.49	0.01	1.58%
		084395-002	Selenium	0.484	U	0.484	0.969			
		084395-003	Selenium	0.498	U	0.498	0.996			
		084395-001	Silver	0.0398	U	0.0398	0.199	0.04	0.00	1.46%
		084395-002	Silver	0.0388	U	0.0388	0.194			
		084395-003	Silver	0.0398	U	0.0398	0.199			
		084395-001	Sodium	178		15.9	49.7	244.00	120.43	49.36%
		084395-002	Sodium	383		15.5	48.4			
		084395-003	Sodium	171		15.9	49.8			
		084395-001	Thallium	0.0795	U	0.0795	0.199	0.08	0.00	1.54%
		084395-002	Thallium	0.0775	U	0.0775	0.194			
		084395-003	Thallium	0.0797	U	0.0797	0.199			
		084395-001	Vanadium	0.398	U	0.398	1.99	0.39	0.01	1.46%
		084395-002	Vanadium	0.388	U	0.388	1.94			
		084395-003	Vanadium	0.398	U	0.398	1.99			
		084395-001	Zinc	6.28		0.398	1.99	6.08	1.69	27.78%
		084395-002	Zinc	4.3		0.388	1.94			
		084395-003	Zinc	7.66		0.398	1.99			

NOTES: B = The analyte was found in the blank above the effective decision level (organics), or the effective detection limit (inorganics).
J = Estimated value, the analyte concentration fell above the effective decision level and below the effective detection limit.
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level.
CV = coefficient of variation
Std Dev = standard deviation

TABLE C-14. Non-Radiological Replicate Results for Calendar Year 2007, Sediment

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result		Decision Level	Detection Limit	Average	Std Dev	CV
On-Site	74N	084409-001	Aluminum	3440	B	0.978	2.94	3380.00	265.14	7.84%
		084409-002	Aluminum	3090	B	0.988	2.96			
		084409-003	Aluminum	3610	B	0.978	2.94			
		084409-001	Antimony	0.0978	U	0.0978	0.391	0.10	0.00	0.59%
		084409-002	Antimony	0.0988	U	0.0988	0.395			
		084409-003	Antimony	0.0978	U	0.0978	0.391			
		084409-001	Arsenic	0.428	J	0.294	0.978	0.50	0.12	24.08%
		084409-002	Arsenic	0.433	J	0.296	0.988			
		084409-003	Arsenic	0.639	J	0.294	0.978			
		084409-001	Barium	93.2		0.0978	0.391	60.00	28.92	48.20%
		084409-002	Barium	40.3		0.0988	0.395			
		084409-003	Barium	46.5		0.0978	0.391			
		084409-001	Beryllium	0.228	J	0.0978	0.489	0.22	0.01	2.99%
		084409-002	Beryllium	0.215	J	0.0988	0.494			
		084409-003	Beryllium	0.224	J	0.0978	0.489			
		084409-001	Cadmium	0.173	J	0.0196	0.196	0.16	0.02	15.38%
		084409-002	Cadmium	0.129	J	0.0198	0.198			
		084409-003	Cadmium	0.168	J	0.0196	0.196			
		084409-001	Calcium	39600		39.1	97.8	31300.00	7279.42	23.26%
		084409-002	Calcium	26000		39.5	98.8			
		084409-003	Calcium	28300		39.1	97.8			
		084409-001	Chromium	2.25		0.196	0.587	2.29	0.46	19.95%
		084409-002	Chromium	1.85		0.198	0.593			
		084409-003	Chromium	2.76		0.196	0.587			
		084409-001	Cobalt	2.49		0.0196	0.196	2.26	0.30	13.36%
		084409-002	Cobalt	1.92		0.0198	0.198			
		084409-003	Cobalt	2.38		0.0196	0.196			
		084409-001	Copper	4.48		0.0391	0.196	4.92	0.67	13.60%
		084409-002	Copper	4.59		0.0395	0.198			
		084409-003	Copper	5.69		0.0391	0.196			
		084409-001	Iron	6260		1.96	4.89	5600.00	858.08	15.32%
		084409-002	Iron	4630		1.98	4.94			
		084409-003	Iron	5910		1.96	4.89			
		084409-001	Lead	3.08		0.0978	0.391	3.33	0.37	10.99%
		084409-002	Lead	3.16		0.0988	0.395			
		084409-003	Lead	3.75		0.0978	0.391			
		084409-001	Magnesium	2970		4.89	14.7	2540.00	487.75	19.20%
		084409-002	Magnesium	2010		4.94	14.8			

See notes at end of table.

TABLE C-14. Non-Radiological Replicate Results for Calendar Year 2007, Sediment (continued)

(All results reported in milligrams per kilogram [mg/L] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result		Decision Level	Detection Limit	Average	Std Dev	CV
On-Site (cont'd)	74N	084409-003	Magnesium	2640		4.89	14.7	2540.00	487.75	19.20%
		084409-001	Manganese	195		0.196	0.978	165.33	29.50	17.84%
		084409-002	Manganese	136		0.198	0.988			
		084409-003	Manganese	165		0.196	0.978			
		084409-001	Mercury	0.00237	U	0.00237	0.00948	0.00	0.00	4.76%
		084409-002	Mercury	0.00218	U	0.00218	0.00872			
		084409-003	Mercury	0.00237	U	0.00237	0.00949			
		084409-001	Nickel	3.53		0.0978	0.391	3.22	0.43	13.33%
		084409-002	Nickel	2.73		0.0988	0.395			
		084409-003	Nickel	3.4		0.0978	0.391			
		084409-001	Potassium	1280		15.7	58.7	928.33	318.88	34.35%
		084409-002	Potassium	658		15.8	59.3			
		084409-003	Potassium	847		15.7	58.7			
		084409-001	Selenium	0.489	U	0.489	0.978	0.49	0.00	0.59%
		084409-002	Selenium	0.494	U	0.494	0.988			
		084409-003	Selenium	0.489	U	0.489	0.978			
		084409-001	Silver	0.0391	U	0.0391	0.196	0.04	0.00	0.59%
		084409-002	Silver	0.0395	U	0.0395	0.198			
		084409-003	Silver	0.0391	U	0.0391	0.196			
		084409-001	Sodium	78.3	U	78.3	245	86.95	4.03	4.64%
		084409-002	Sodium	89.8	J	79.1	247			
		084409-003	Sodium	84.1	J	78.3	245			
		084409-001	Thallium	0.0816	J	0.0783	0.196	0.08	0.00	0.72%
		084409-002	Thallium	0.0791	U	0.0791	0.198			
		084409-003	Thallium	0.0783	U	0.0783	0.196			
		084409-001	Vanadium	10.4		0.391	1.96	9.80	1.68	17.17%
		084409-002	Vanadium	7.9		0.395	1.98			
		084409-003	Vanadium	11.1		0.391	1.96			
		084409-001	Zinc	26.6		0.391	1.96	22.60	4.52	19.99%
		084409-002	Zinc	17.7		0.395	1.98			
		084409-003	Zinc	23.5		0.391	1.96			
Community	11	084438-001	Aluminum	10900	B	4.91	14.7	12866.67	1861.00	14.46%
		084438-002	Aluminum	13100	B	4.76	14.3			
		084438-003	Aluminum	14600	B	4.76	14.3			
		084438-001	Antimony	0.295	U	0.295	0.952	0.30	0.01	2.51%
		084438-002	Antimony	0.308	U	0.308	0.992			
		084438-003	Antimony	0.295	U	0.295	0.952			
		084438-001	Arsenic	2.46		0.295	0.982	3.13	0.59	18.84%

See notes at end of table.

TABLE C-14. Non-Radiological Replicate Results for Calendar Year 2007, Sediment (continued)

(All results reported in milligrams per kilogram [mg/L] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result		Decision Level	Detection Limit	Average	Std Dev	CV
Community (cont'd)	11	084438-002	Arsenic	3.57		0.286	0.952	3.13	0.59	18.84%
		084438-003	Arsenic	3.36		0.286	0.952			
		084438-001	Barium	206		0.0982	0.393	201.00	10.44	5.19%
		084438-002	Barium	208		0.0952	0.381			
		084438-003	Barium	189		0.0952	0.381			
		084438-001	Beryllium	0.492		0.0196	0.0982	0.58	0.08	13.06%
		084438-002	Beryllium	0.625		0.019	0.0952			
		084438-003	Beryllium	0.621		0.019	0.0952			
		084438-001	Cadmium	0.863		0.0196	0.196	0.96	0.29	30.07%
		084438-002	Cadmium	1.28		0.019	0.19			
		084438-003	Cadmium	0.728		0.019	0.19			
		084438-001	Calcium	22300		29.5	98.2	27333.33	4816.98	17.62%
		084438-002	Calcium	31900		28.6	95.2			
		084438-003	Calcium	27800		28.6	95.2			
		084438-001	Chromium	9.47		0.196	0.589	10.76	1.12	10.40%
		084438-002	Chromium	11.5		0.19	0.571			
		084438-003	Chromium	11.3		0.19	0.571			
		084438-001	Cobalt	4.17	B	0.0196	0.196	5.01	0.74	14.72%
		084438-002	Cobalt	5.55	B	0.019	0.19			
		084438-003	Cobalt	5.31	B	0.019	0.19			
		084438-001	Copper	7.12	B	0.0393	0.196	9.31	1.90	20.38%
		084438-002	Copper	10.5	B	0.0381	0.19			
		084438-003	Copper	10.3	B	0.0381	0.19			
		084438-001	Iron	9570		9.82	24.6	11090.00	1339.89	12.08%
		084438-002	Iron	12100		9.52	23.8			
		084438-003	Iron	11600		9.52	23.8			
		084438-001	Lead	8.13		0.0982	0.393	9.88	1.52	15.39%
		084438-002	Lead	10.9		0.0952	0.381			
		084438-003	Lead	10.6		0.0952	0.381			
		084438-001	Magnesium	4450		0.982	2.95	4976.67	581.06	11.68%
		084438-002	Magnesium	4880		0.952	2.86			
		084438-003	Magnesium	5600		0.952	2.86			
		084438-001	Manganese	228		0.982	4.91	283.00	47.66	16.84%
		084438-002	Manganese	312		0.952	4.76			
		084438-003	Manganese	309		0.952	4.76			
		084438-001	Mercury	0.00896		0.00134	0.00896	0.01	0.00	11.26%

See notes at end of table.

TABLE C-14. Non-Radiological Replicate Results for Calendar Year 2007, Sediment (concluded)

(All results reported in milligrams per kilogram [mg/L] unless otherwise specified.)

Location Type	Location	Sample ID	Analyte	Result		Decision Level	Detection Limit	Average	Std Dev	CV
Community (cont'd)	11	084438-002	Mercury	0.0108		0.0015	0.01	0.01	0.00	11.26%
		084438-003	Mercury	0.0111		0.0015	0.00998			
		084438-001	Nickel	8.52		0.0982	0.393	10.34	1.60	15.43%
		084438-002	Nickel	11.5		0.0952	0.381			
		084438-003	Nickel	11		0.0952	0.381			
		084438-001	Potassium	2200		15.7	58.9	2583.33	354.73	13.73%
		084438-002	Potassium	2900		15.2	57.1			
		084438-003	Potassium	2650		15.2	57.1			
		084438-001	Selenium	0.491	U	0.491	0.982	0.48	0.01	1.80%
		084438-002	Selenium	0.476	U	0.476	0.952			
		084438-003	Selenium	0.476	U	0.476	0.952			
		084438-001	Silver	0.145	J	0.0952	0.476	0.12	0.03	26.25%
		084438-002	Silver	0.0992	U	0.0992	0.496			
		084438-003	Silver	0.0996	J	0.0952	0.476			
		084438-001	Sodium	174		15.7	49.2	175.00	8.54	4.88%
		084438-002	Sodium	167		15.9	49.7			
		084438-003	Sodium	184		15.4	48			
		084438-001	Thallium	0.141	J	0.0393	0.196	0.17	0.03	15.36%
		084438-002	Thallium	0.188	J	0.0381	0.19			
		084438-003	Thallium	0.185	J	0.0381	0.19			
		084438-001	Vanadium	18.3		1.96	9.82	20.53	2.07	10.10%
		084438-002	Vanadium	22.4		1.9	9.52			
		084438-003	Vanadium	20.9		1.9	9.52			
		084438-001	Zinc	31		0.393	1.96	37.77	5.88	15.56%
		084438-002	Zinc	41.6		0.381	1.9			
		084438-003	Zinc	40.7		0.381	1.9			

NOTES: B = The analyte was found in the blank above the effective decision level (organics), or the effective detection limit (inorganics).

J = Estimated value, the analyte concentration fell above the effective decision level and below the effective detection limit.

U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective decision level. For radiochemical analytes the result is less than the decision level.

CV = coefficient of variation

Std Dev = standard deviation

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil
(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site	LST-CR-1	Aluminum	9970	B	4.89	14.7
		Antimony	0.0978	U	0.0978	0.391
		Arsenic	1.47		0.294	0.978
		Barium	71.1		0.0978	0.391
		Beryllium	0.444		0.0196	0.0978
		Cadmium	0.275		0.0196	0.196
		Calcium	1360		7.83	19.6
		Chromium	9.19		0.196	0.587
		Cobalt	3.78		0.0196	0.196
		Copper	7.2		0.0391	0.196
		Iron	8830		1.96	4.89
		Lead	10.3		0.0978	0.391
		Magnesium	2300		0.978	2.94
		Manganese	206		0.978	4.89
		Mercury	0.00995	J	0.00249	0.00995
		Nickel	6.52		0.0978	0.391
		Potassium	1990		15.7	58.7
		Selenium	0.489	U	0.489	0.978
		Silver	0.0607	J	0.0391	0.196
		Sodium	56.8		15.7	48.9
		Thallium	0.189	J	0.0783	0.196
		Vanadium	16		0.391	1.96
		Zinc	27.4		0.391	1.96
	LST-CR-2	Aluminum	8810	B	0.965	2.9
		Antimony	0.0965	U	0.0965	0.386
		Arsenic	1.37		0.29	0.965
		Barium	60.6		0.0965	0.386
		Beryllium	0.361		0.0193	0.0965
		Cadmium	0.225		0.0193	0.193
		Calcium	1120		7.72	19.3
		Chromium	7.78		0.193	0.579
		Cobalt	2.68		0.0193	0.193
		Copper	5.53		0.0386	0.193
		Iron	7520		1.93	4.83
		Lead	7.94		0.0965	0.386
		Magnesium	1970		0.965	2.9
		Manganese	140		0.193	0.965

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST-CR-2	Mercury	0.00654	J	0.0022	0.0088
		Nickel	5.14		0.0965	0.386
		Potassium	1860		15.4	57.9
		Selenium	0.483	U	0.483	0.965
		Silver	0.0446	J	0.0386	0.193
		Sodium	41.8	J	15.4	48.3
		Thallium	0.103	J	0.0772	0.193
		Vanadium	13.9		0.386	1.93
		Zinc	23.3		0.386	1.93
	LST-CR-3	Aluminum	9360	B	4.87	14.6
		Antimony	0.0975	U	0.0975	0.39
		Arsenic	1.37		0.292	0.975
		Barium	64.7		0.0975	0.39
		Beryllium	0.391		0.0195	0.0975
		Cadmium	0.257		0.0195	0.195
		Calcium	1260		7.8	19.5
		Chromium	9.04		0.195	0.585
		Cobalt	3.06		0.0195	0.195
		Copper	6.42		0.039	0.195
		Iron	8740		1.95	4.87
		Lead	9.31		0.0975	0.39
		Magnesium	2280		0.975	2.92
		Manganese	151		0.195	0.975
		Mercury	0.00499	J	0.00237	0.00946
		Nickel	5.81		0.0975	0.39
		Potassium	2710		15.6	58.5
		Selenium	0.487	U	0.487	0.975
		Silver	0.0563	J	0.039	0.195
		Sodium	53.3		15.6	48.7
		Thallium	0.112	J	0.078	0.195
		Vanadium	17.3		0.39	1.95
		Zinc	27.8		0.39	1.95
	LST-CR-4	Aluminum	6290	B	0.978	2.94
		Antimony	0.0978	U	0.0978	0.391
		Arsenic	1.07		0.294	0.978
		Barium	46.8		0.0978	0.391
		Beryllium	0.285		0.0196	0.0978
		Cadmium	0.174	J	0.0196	0.196

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-site Cont'd	LST-CR-4	Calcium	936		7.83	19.6
		Chromium	6.83		0.196	0.587
		Cobalt	2.49		0.0196	0.196
		Copper	4.82		0.0391	0.196
		Iron	6570		1.96	4.89
		Lead	5.87		0.0978	0.391
		Magnesium	1540		0.978	2.94
		Manganese	139		0.196	0.978
		Mercury	0.00485	J	0.00229	0.00915
		Nickel	4.49		0.0978	0.391
		Potassium	1630		15.7	58.7
		Selenium	0.489	U	0.489	0.978
		Silver	0.0391	U	0.0391	0.196
		Sodium	42.5	J	15.7	48.9
		Thallium	0.0933	J	0.0783	0.196
		Vanadium	12.8		0.391	1.96
		Zinc	19.1		0.391	1.96
	LST-CR-5	Aluminum	6380	B	0.967	2.9
		Antimony	0.0967	U	0.0967	0.387
		Arsenic	1.2		0.29	0.967
		Barium	50.2		0.0967	0.387
		Beryllium	0.286		0.0193	0.0967
		Cadmium	0.197		0.0193	0.193
		Calcium	970		7.74	19.3
		Chromium	6.82		0.193	0.58
		Cobalt	2.25		0.0193	0.193
		Copper	4.58		0.0387	0.193
		Iron	6500		1.93	4.84
		Lead	7.64		0.0967	0.387
		Magnesium	1550		0.967	2.9
		Manganese	121		0.193	0.967
		Mercury	0.00521	J	0.00234	0.00938
		Nickel	4.3		0.0967	0.387
		Potassium	1410		15.5	58
		Selenium	0.484	U	0.484	0.967
		Silver	0.0387	U	0.0387	0.193
		Sodium	39.5	J	15.5	48.4
		Thallium	0.0878	J	0.0774	0.193
		Vanadium	12.6		0.387	1.93
		Zinc	19.7		0.387	1.93

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST-CR-6	Aluminum	8250	B	0.984	2.95
		Antimony	0.0984	U	0.0984	0.394
		Arsenic	1.13		0.295	0.984
		Barium	55.1		0.0984	0.394
		Beryllium	0.299		0.0197	0.0984
		Cadmium	0.219		0.0197	0.197
		Calcium	1180		7.87	19.7
		Chromium	6.93		0.197	0.591
		Cobalt	2.38		0.0197	0.197
		Copper	5.17		0.0394	0.197
		Iron	6970		1.97	4.92
		Lead	9.3		0.0984	0.394
		Magnesium	1730		0.984	2.95
		Manganese	120		0.197	0.984
		Mercury	0.00643	J	0.00222	0.00886
		Nickel	4.56		0.0984	0.394
		Potassium	1770		15.7	59.1
		Selenium	0.492	U	0.492	0.984
		Silver	0.0455	J	0.0394	0.197
		Sodium	34.6	J	15.7	49.2
		Thallium	0.0902	J	0.0787	0.197
		Vanadium	12.8		0.394	1.97
		Zinc	21.6		0.394	1.97
	LST-CR-7	Aluminum	7210	B	0.965	2.9
		Antimony	0.0965	U	0.0965	0.386
		Arsenic	0.974		0.29	0.965
		Barium	50.9		0.0965	0.386
		Beryllium	0.298		0.0193	0.0965
		Cadmium	0.205		0.0193	0.193
		Calcium	1080		7.72	19.3
		Chromium	6.78		0.193	0.579
		Cobalt	2.32		0.0193	0.193
		Copper	4.57		0.0386	0.193
		Iron	6600		1.93	4.83
		Lead	7.81		0.0965	0.386
		Magnesium	1620		0.965	2.9
		Manganese	118		0.193	0.965
		Mercury	0.00511	J	0.0025	0.01
		Nickel	4.36		0.0965	0.386
		Potassium	1900		15.4	57.9

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result	Decision Level	Detection Limit	Location Type
On-Site Cont'd	LST-CR-7	Selenium	0.483	U	0.483	0.96.5
		Silver	0.0405	J	0.0386	0.193
		Sodium	45.1	J	15.4	48.3
		Thallium	0.0824	J	0.0772	0.193
		Vanadium	12.4		0.386	1.93
		Zinc	19.8		0.386	1.93
	LST-CR-8	Aluminum	8960	B	0.996	2.99
		Antimony	0.0996	U	0.0996	0.398
		Arsenic	1.25		0.299	0.996
		Barium	66.8		0.0996	0.398
		Beryllium	0.34		0.0199	0.0996
		Cadmium	0.26		0.0199	0.199
		Calcium	4940		7.97	19.9
		Chromium	7.71		0.199	0.598
		Cobalt	2.63		0.0199	0.199
		Copper	5.82		0.0398	0.199
		Iron	7390		1.99	4.98
		Lead	9.26		0.0996	0.398
		Magnesium	2550		0.996	2.99
		Manganese	137		0.199	0.996
		Mercury	0.00771	J	0.00217	0.0087
		Nickel	5.38		0.0996	0.398
		Potassium	2560		15.9	59.8
		Selenium	0.498	U	0.498	0.996
		Silver	0.0532	J	0.0398	0.199
		Sodium	49.5	J	15.9	49.8
		Thallium	0.0942	J	0.0797	0.199
		Vanadium	13.8		0.398	1.99
		Zinc	25.5		0.398	1.99
	LST-CR-9	Aluminum	7830	B	0.956	2.87
		Antimony	0.0956	U	0.0956	0.382
		Arsenic	1.07		0.287	0.956
		Barium	59.3		0.0956	0.382
		Beryllium	0.314		0.0191	0.0956
		Cadmium	0.211		0.0191	0.191
		Calcium	1190		7.65	19.1
		Chromium	7.43		0.191	0.574
		Cobalt	2.58		0.0191	0.191
		Copper	5.27		0.0382	0.191
		Iron	7020		1.91	4.78

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST-CR-9	Lead	8.8		0.0956	0.382
		Magnesium	2050		0.956	2.87
		Manganese	136		0.191	0.956
		Mercury	0.00319	J	0.00242	0.00969
		Nickel	4.8		0.0956	0.382
		Potassium	1870		15.3	57.4
		Selenium	0.478	U	0.478	0.956
		Silver	0.043	J	0.0382	0.191
		Sodium	42.9	J	15.3	47.8
		Thallium	0.086	J	0.0765	0.191
		Vanadium	13.1		0.382	1.91
		Zinc	22.6		0.382	1.91
	LST-CR-10	Aluminum	17700	B	4.92	14.8
		Antimony	0.0984	U	0.0984	0.394
		Arsenic	2.64		0.295	0.984
		Barium	113		0.0984	0.394
		Beryllium	0.575		0.0197	0.0984
		Cadmium	0.41		0.0197	0.197
		Calcium	10600		39.4	98.4
		Chromium	12.5		0.197	0.591
		Cobalt	4.3		0.0197	0.197
		Copper	8.9		0.0394	0.197
		Iron	12400		9.84	24.6
		Lead	13.9		0.0984	0.394
		Magnesium	4910		0.984	2.95
		Manganese	256		0.984	4.92
		Mercury	0.0135		0.00227	0.00908
		Nickel	8.88		0.0984	0.394
		Potassium	4620		15.7	59.1
		Selenium	0.492	U	0.492	0.984
		Silver	0.0801	J	0.0394	0.197
		Sodium	58.3		15.7	49.2
		Thallium	0.173	J	0.0787	0.197
		Vanadium	21.4		1.97	9.84
		Zinc	38.8		0.394	1.97
	LST-CR-11	Aluminum	18900	B	4.84	14.5
		Antimony	0.0967	U	0.0967	0.387
		Arsenic	3.54		0.29	0.967

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST-CR-11	Barium	161		0.0967	0.387
		Beryllium	0.712		0.0193	0.0967
		Cadmium	0.532		0.0193	0.193
		Calcium	24600		38.7	96.7
		Chromium	15.1		0.193	0.58
		Cobalt	5.55		0.0193	0.193
		Copper	11.4		0.0387	0.193
		Iron	15200		9.67	24.2
		Lead	18.3		0.0967	0.387
		Magnesium	6030		0.967	2.9
		Manganese	374		0.967	4.84
		Mercury	0.0223		0.0025	0.00998
		Nickel	11.7		0.0967	0.387
		Potassium	5240		15.5	58
		Selenium	0.484	U	0.484	0.967
		Silver	0.0954	J	0.0387	0.193
		Sodium	73.9		15.5	48.4
		Thallium	0.226		0.0774	0.193
		Vanadium	26.1		1.93	9.67
		Zinc	50		0.387	1.93
	LST-CR-12	Aluminum	24000	B	4.98	14.9
		Antimony	0.0996	U	0.0996	0.398
		Arsenic	5.52		0.299	0.996
		Barium	228		0.0996	0.398
		Beryllium	1.04		0.0199	0.0996
		Cadmium	0.615		0.0199	0.199
		Calcium	35000		39.8	99.6
		Chromium	20.9		0.199	0.598
		Cobalt	7.59		0.0199	0.199
		Copper	13.6		0.0398	0.199
		Iron	18300		9.96	24.9
		Lead	19.2		0.0996	0.398
		Magnesium	7290		0.996	2.99
		Manganese	479		0.996	4.98
		Mercury	0.0169		0.00249	0.00997
		Nickel	17.4		0.0996	0.398
		Potassium	6270		15.9	59.8
		Selenium	0.498	U	0.498	0.996

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST-CR-12	Silver	0.122	J	0.0398	0.199
		Sodium	122		15.9	49.8
		Thallium	0.316		0.0797	0.199
		Vanadium	30.3		1.99	9.96
		Zinc	68.4		0.398	1.99
	LST-CR-13	Aluminum	13800	B	4.93	14.8
		Antimony	0.0986	U	0.0986	0.394
		Arsenic	1.98		0.296	0.986
		Barium	82.2		0.0986	0.394
		Beryllium	0.517		0.0197	0.0986
		Cadmium	0.279		0.0197	0.197
		Calcium	1990		7.89	19.7
		Chromium	10.8		0.197	0.592
		Cobalt	3.34		0.0197	0.197
		Copper	6.76		0.0394	0.197
		Iron	10000		9.86	24.7
		Lead	9.7		0.0986	0.394
		Magnesium	3000		0.986	2.96
		Manganese	150		0.197	0.986
		Mercury	0.00742	J	0.00247	0.00988
		Nickel	7.23		0.0986	0.394
		Potassium	3060		15.8	59.2
		Selenium	0.493	U	0.493	0.986
		Silver	0.0655	J	0.0394	0.197
		Sodium	46.8	J	15.8	49.3
		Thallium	0.15	J	0.0789	0.197
		Vanadium	18.2		0.394	1.97
		Zinc	31.2		0.394	1.97
	LST-CR-14	Aluminum	9370	B	0.99	2.97
		Antimony	0.099	U	0.099	0.396
		Arsenic	1.45		0.297	0.99
		Barium	68.2		0.099	0.396
		Beryllium	0.365		0.0198	0.099
		Cadmium	0.239		0.0198	0.198
		Calcium	4310		7.92	19.8
		Chromium	8.29		0.198	0.594
		Cobalt	2.78		0.0198	0.198
		Copper	5.79		0.0396	0.198

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST-CR-14	Lead	8.9		0.099	0.396
		Magnesium	2430		0.99	2.97
		Manganese	142		0.198	0.99
		Mercury	0.00499	J	0.0023	0.0092
		Nickel	5.6		0.099	0.396
		Potassium	2420		15.8	59.4
		Selenium	0.495	U	0.495	0.99
		Silver	0.0489	J	0.0396	0.198
		Sodium	50.5		15.8	49.5
		Thallium	0.111	J	0.0792	0.198
		Vanadium	14.9		0.396	1.98
		Zinc	25.5		0.396	1.98
	LST-CR-15	Aluminum	9590	B	0.965	2.9
		Antimony	0.0965	U	0.0965	0.386
		Arsenic	1.36		0.29	0.965
		Barium	66.8		0.0965	0.386
		Beryllium	0.355		0.0193	0.0965
		Cadmium	0.237		0.0193	0.193
		Calcium	1670		7.72	19.3
		Chromium	8.31		0.193	0.579
		Cobalt	2.82		0.0193	0.193
		Copper	5.54		0.0386	0.193
		Iron	7680		1.93	4.83
		Lead	8.23		0.0965	0.386
		Magnesium	2320		0.965	2.9
		Manganese	153		0.193	0.965
		Mercury	0.00769	J	0.00218	0.00872
		Nickel	5.67		0.0965	0.386
		Potassium	2300		15.4	57.9
		Selenium	0.483	U	0.483	0.965
		Silver	0.0446	J	0.0386	0.193
		Sodium	44.7	J	15.4	48.3
		Thallium	0.108	J	0.0772	0.193
		Vanadium	14.4		0.386	1.93
		Zinc	24.4		0.386	1.93
	LST-CR-16	Aluminum	16400	B	4.82	14.5
		Antimony	0.0963	U	0.0963	0.385
		Arsenic	2.11		0.289	0.963

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST-CR-16	Barium	83.5		0.0963	0.385
		Beryllium	0.525		0.0193	0.0963
		Cadmium	0.225		0.0193	0.193
		Calcium	1800		7.71	19.3
		Chromium	10.7		0.193	0.578
		Cobalt	3.58		0.0193	0.193
		Copper	6.42		0.0385	0.193
		Iron	11000		9.63	24.1
		Lead	7.26		0.0963	0.385
		Magnesium	3030		0.963	2.89
		Manganese	129		0.193	0.963
		Mercury	0.00869	J	0.00246	0.00985
		Nickel	7.33		0.0963	0.385
		Potassium	3120		15.4	57.8
		Selenium	0.482	U	0.482	0.963
		Silver	0.0622	J	0.0385	0.193
		Sodium	42.3	J	15.4	48.2
		Thallium	0.144	J	0.0771	0.193
		Vanadium	19.1		0.385	1.93
		Zinc	28.2		0.385	1.93
	LST G-1	Aluminum	6740		0.996	2.99
		Antimony	0.0996	BU	0.0996	0.398
		Arsenic	1.31		0.299	0.996
		Barium	47.4		0.0996	0.398
		Beryllium	0.288		0.0199	0.0996
		Cadmium	0.181	J	0.0199	0.199
		Calcium	1090		7.97	19.9
		Chromium	7.17		0.199	0.598
		Cobalt	2.37		0.0199	0.199
		Copper	4.71		0.0398	0.199
		Iron	6840		1.99	4.98
		Lead	7.2		0.0996	0.398
		Magnesium	1440		0.996	2.99
		Manganese	131		0.199	0.996
		Mercury	0.00442	J	0.0025	0.01
		Nickel	4.46		0.0996	0.398
		Potassium	1590		15.9	59.8
		Selenium	0.498	U	0.498	0.996

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST G-1	Silver	0.0398	U	0.0398	0.199
		Sodium	40.8	J	15.9	49.8
		Thallium	0.169	J	0.0797	0.199
		Vanadium	13.6		0.398	1.99
		Zinc	20.4		0.398	1.99
	LST G-2	Aluminum	8530		0.975	2.92
		Antimony	0.0975	BU	0.0975	0.39
		Arsenic	1.46		0.292	0.975
		Barium	53.7		0.0975	0.39
		Beryllium	0.363		0.0195	0.0975
		Cadmium	0.222		0.0195	0.195
		Calcium	1710		7.8	19.5
		Chromium	7.85		0.195	0.585
		Cobalt	2.86		0.0195	0.195
		Copper	5.25		0.039	0.195
		Iron	7770		1.95	4.87
		Lead	7.9		0.0975	0.39
		Magnesium	1930		0.975	2.92
		Manganese	140		0.195	0.975
		Mercury	0.00424	J	0.0025	0.00998
		Nickel	5.28		0.0975	0.39
		Potassium	2050		15.6	58.5
		Selenium	0.487	U	0.487	0.975
		Silver	0.076	J	0.039	0.195
		Sodium	36.1	J	15.6	48.7
		Thallium	0.0967	J	0.078	0.195
		Vanadium	14.5		0.39	1.95
		Zinc	22.7		0.39	1.95
	LST G-3	Aluminum	9280		0.986	2.96
		Antimony	0.0986	BU	0.0986	0.394
		Arsenic	1.73		0.296	0.986
		Barium	66.1		0.0986	0.394
		Beryllium	0.401		0.0197	0.0986
		Cadmium	0.314		0.0197	0.197
		Calcium	3500		7.89	19.7
		Chromium	8.83		0.197	0.592
		Cobalt	3.16		0.0197	0.197
		Copper	6.49		0.0394	0.197
		Iron	8810		1.97	4.93
		Lead	12.7		0.0986	0.394

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST G-3	Magnesium	2380		0.986	2.96
		Manganese	156		0.197	0.986
		Mercury	0.00521	J	0.00237	0.00948
		Nickel	6.25		0.0986	0.394
		Potassium	2170		15.8	59.2
		Selenium	0.493	U	0.493	0.986
		Silver	0.0637	J	0.0394	0.197
		Sodium	45.1	J	15.8	49.3
		Thallium	0.105	J	0.0789	0.197
		Vanadium	16.7		0.394	1.97
		Zinc	26.8		0.394	1.97
	LST G-4	Aluminum	7720		0.98	2.94
		Antimony	0.098	BU	0.098	0.392
		Arsenic	1.28		0.294	0.98
		Barium	56.9		0.098	0.392
		Beryllium	0.31		0.0196	0.098
		Cadmium	0.261		0.0196	0.196
		Calcium	1190		7.84	19.6
		Chromium	7.19		0.196	0.588
		Cobalt	2.54		0.0196	0.196
		Copper	5.38		0.0392	0.196
		Iron	6990		1.96	4.9
		Lead	9.55		0.098	0.392
		Magnesium	1790		0.98	2.94
		Manganese	141		0.196	0.98
		Mercury	0.00523	J	0.00229	0.00916
		Nickel	4.82		0.098	0.392
		Potassium	1980		15.7	58.8
		Selenium	0.49	U	0.49	0.98
		Silver	0.0443	J	0.0392	0.196
		Sodium	43	J	15.7	49
		Thallium	0.0898	J	0.0784	0.196
		Vanadium	13		0.392	1.96
		Zinc	21.9		0.392	1.96
	LST G-5	Aluminum	8300		0.982	2.95
		Antimony	0.0982	BU	0.0982	0.393
		Arsenic	1.38		0.295	0.982

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST G-5	Barium	55		0.0982	0.393
		Beryllium	0.336		0.0196	0.0982
		Cadmium	0.23		0.0196	0.196
		Calcium	1750		7.86	19.6
		Chromium	12.5		0.196	0.589
		Cobalt	3.27		0.0196	0.196
		Copper	6.73		0.0393	0.196
		Iron	8270		1.96	4.91
		Lead	8.41		0.0982	0.393
		Magnesium	2400		0.982	2.95
		Manganese	155		0.196	0.982
		Mercury	0.00342	J	0.0022	0.00878
		Nickel	6.14		0.0982	0.393
		Potassium	1880		15.7	58.9
		Selenium	0.491	U	0.491	0.982
		Silver	0.0501	J	0.0393	0.196
		Sodium	59.7		15.7	49.1
		Thallium	0.103	J	0.0786	0.196
		Vanadium	16.3		0.393	1.96
		Zinc	34.1		0.393	1.96
	LST G-6	Aluminum	10200		4.86	14.6
		Antimony	0.0973	BU	0.0973	0.389
		Arsenic	1.89		0.292	0.973
		Barium	74.8		0.0973	0.389
		Beryllium	0.417		0.0195	0.0973
		Cadmium	0.227		0.0195	0.195
		Calcium	4360		7.78	19.5
		Chromium	8.38		0.195	0.584
		Cobalt	3.27		0.0195	0.195
		Copper	7.13		0.0389	0.195
		Iron	8510		1.95	4.86
		Lead	7.71		0.0973	0.389
		Magnesium	2630		0.973	2.92
		Manganese	151		0.195	0.973
		Mercury	0.00956	J	0.00242	0.00968
		Nickel	6.34		0.0973	0.389
		Potassium	2280		15.6	58.4
		Selenium	0.486	U	0.486	0.973
		Silver	0.0638	J	0.0389	0.195

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST G-6	Sodium	48.4	J	15.6	48.6
		Thallium	0.115	J	0.0778	0.195
		Vanadium	15.9		0.389	1.95
		Zinc	24.6		0.389	1.95
	LST G-7	Aluminum	12900		9.8	29.4
		Antimony	0.098	BU	0.098	0.392
		Arsenic	2.02		0.294	0.98
		Barium	75.4		0.098	0.392
		Beryllium	0.453		0.0196	0.098
		Cadmium	0.224		0.0196	0.196
		Calcium	2380		7.84	19.6
		Chromium	10.5		0.196	0.588
		Cobalt	3.51		0.0196	0.196
		Copper	5.49		0.0392	0.196
		Iron	10400		19.6	49
		Lead	6.76		0.098	0.392
		Magnesium	2510		0.98	2.94
		Manganese	164		0.196	0.98
		Mercury	0.00972	J	0.0025	0.00998
		Nickel	6.6		0.098	0.392
		Potassium	2460		15.7	58.8
		Selenium	0.49	U	0.49	0.98
		Silver	0.0563	J	0.0392	0.196
		Sodium	46.6	J	15.7	49
		Thallium	0.134	J	0.0784	0.196
		Vanadium	19.5		0.392	1.96
		Zinc	25.9		0.392	1.96
	LST G-8	Aluminum	6810		0.992	2.98
		Antimony	0.0992	BU	0.0992	0.397
		Arsenic	1.25		0.298	0.992
		Barium	47.5		0.0992	0.397
		Beryllium	0.295		0.0198	0.0992
		Cadmium	0.191	J	0.0198	0.198
		Calcium	1250		7.94	19.8
		Chromium	6.66		0.198	0.595
		Cobalt	2.36		0.0198	0.198
		Copper	4.12		0.0397	0.198
		Iron	6510		1.98	4.96
		Lead	6.45		0.0992	0.397

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST G-8	Magnesium	1480		0.992	2.98
		Manganese	124		0.198	0.992
		Mercury	0.00304	J	0.00241	0.00965
		Nickel	4.37		0.0992	0.397
		Potassium	1750		15.9	59.5
		Selenium	0.496	U	0.496	0.992
		Silver	0.0397	U	0.0397	0.198
		Sodium	39.9	J	15.9	49.6
		Thallium	0.0794	U	0.0794	0.198
		Vanadium	12.8		0.397	1.98
		Zinc	18.8		0.397	1.98
	LST G-9	Aluminum	13000		9.69	29.1
		Antimony	0.0969	BU	0.0969	0.388
		Arsenic	2.06		0.291	0.969
		Barium	91.7		0.0969	0.388
		Beryllium	0.556		0.0194	0.0969
		Cadmium	0.364		0.0194	0.194
		Calcium	3390		7.75	19.4
		Chromium	11.8		0.194	0.581
		Cobalt	4.46		0.0194	0.194
		Copper	9.24		0.0388	0.194
		Iron	11300		19.4	48.4
		Lead	14.6		0.0969	0.388
		Magnesium	3310		0.969	2.91
		Manganese	215		1.94	9.69
		Mercury	0.00544	J	0.0022	0.0088
		Nickel	8.48		0.0969	0.388
		Potassium	3060		15.5	58.1
		Selenium	0.484	U	0.484	0.969
		Silver	0.0922	J	0.0388	0.194
		Sodium	63.8		15.5	48.4
		Thallium	0.157	J	0.0775	0.194
		Vanadium	21.4		3.88	19.4
		Zinc	36.4		0.388	1.94
	LST G-10	Aluminum	12200		9.63	28.9
		Antimony	0.0963	BU	0.0963	0.385
		Arsenic	2.63		0.289	0.963
		Barium	101		0.0963	0.385

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST G-10	Beryllium	0.495		0.0193	0.0963
		Cadmium	0.378		0.0193	0.193
		Calcium	19400		77.1	193
		Chromium	10.4		0.193	0.578
		Cobalt	3.77		0.0193	0.193
		Copper	7.42		0.0385	0.193
		Iron	9780		19.3	48.2
		Lead	8.72		0.0963	0.385
		Magnesium	3500		0.963	2.89
		Manganese	153		0.193	0.963
		Mercury	0.00577	J	0.00242	0.00969
		Nickel	7.75		0.0963	0.385
		Potassium	2180		15.4	57.8
		Selenium	0.482	U	0.482	0.963
		Silver	0.0985	J	0.0385	0.193
		Sodium	86.3		15.4	48.2
		Thallium	0.121	J	0.0771	0.193
		Vanadium	20.8		3.85	19.3
		Zinc	29		0.385	1.93
	LST G-11	Aluminum	11900		9.63	28.9
		Antimony	0.0963	BU	0.0963	0.385
		Arsenic	3.07		0.289	0.963
		Barium	103		0.0963	0.385
		Beryllium	0.566		0.0193	0.0963
		Cadmium	0.414		0.0193	0.193
		Calcium	13800		77.1	193
		Chromium	10.2		0.193	0.578
		Cobalt	4.8		0.0193	0.193
		Copper	10.2		0.0385	0.193
		Iron	11400		19.3	48.2
		Lead	23.2		0.0963	0.385
		Magnesium	3610		0.963	2.89
		Manganese	238		1.93	9.63
		Mercury	0.00664	J	0.00237	0.00946
		Nickel	9.08		0.0963	0.385
		Potassium	3050		15.4	57.8
		Selenium	0.482	U	0.482	0.963
		Silver	0.0859	J	0.0385	0.193
		Sodium	74.5		15.4	48.2

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST G-11	Thallium	0.155	J	0.0771	0.193
		Vanadium	22.8		3.85	19.3
		Zinc	38.8		0.385	1.93
	LST G-12	Aluminum	803		0.994	2.98
		Antimony	0.0994	BU	0.0994	0.398
		Arsenic	0.298	U	0.298	0.994
		Barium	6.18		0.0994	0.398
		Beryllium	0.0322	J	0.0199	0.0994
		Cadmium	0.0237	J	0.0199	0.199
		Calcium	175		7.95	19.9
		Chromium	0.925		0.199	0.596
		Cobalt	0.299		0.0199	0.199
		Copper	0.594		0.0398	0.199
		Iron	797		1.99	4.97
		Lead	0.922		0.0994	0.398
		Magnesium	192		0.994	2.98
		Manganese	15.8		0.199	0.994
		Mercury	0.00497	J	0.00232	0.00927
		Nickel	0.574		0.0994	0.398
		Potassium	176		15.9	59.6
		Selenium	0.497	U	0.497	0.994
		Silver	0.0398	U	0.0398	0.199
		Sodium	15.9	U	15.9	49.7
		Thallium	0.0795	U	0.0795	0.199
		Vanadium	1.29	J	0.398	1.99
		Zinc	2.53		0.398	1.99
	LST G-13	Aluminum	7200		0.977	2.93
		Antimony	0.0977	BU	0.0977	0.391
		Arsenic	1.3		0.293	0.977
		Barium	51.1		0.0977	0.391
		Beryllium	0.279		0.0195	0.0977
		Cadmium	0.219		0.0195	0.195
		Calcium	1110		7.81	19.5
		Chromium	7.49		0.195	0.586
		Cobalt	2.59		0.0195	0.195
		Copper	5.06		0.0391	0.195
		Iron	7050		1.95	4.88
		Lead	8.92		0.0977	0.391

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST G-13	Magnesium	1440		0.977	2.93
		Manganese	141		0.195	0.977
		Mercury	0.00553	J	0.0023	0.00919
		Nickel	4.69		0.0977	0.391
		Potassium	1790		15.6	58.6
		Selenium	0.488	U	0.488	0.977
		Silver	0.0461	J	0.0391	0.195
		Sodium	48.9		15.6	48.8
		Thallium	0.0881	J	0.0781	0.195
		Vanadium	14.2		0.391	1.95
		Zinc	20.5		0.391	1.95
	LST G-14	Aluminum	7300		0.973	2.92
		Antimony	0.848	B	0.0973	0.389
		Arsenic	1.36		0.292	0.973
		Barium	58.6		0.0973	0.389
		Beryllium	0.327		0.0195	0.0973
		Cadmium	0.281		0.0195	0.195
		Calcium	1960		7.78	19.5
		Chromium	6.81		0.195	0.584
		Cobalt	2.35		0.0195	0.195
		Copper	141		0.0389	0.195
		Iron	6910		1.95	4.86
		Lead	11.5		0.0973	0.389
		Magnesium	1920		0.973	2.92
		Manganese	109		0.195	0.973
		Mercury	0.00427	J	0.00245	0.00979
		Nickel	4.92		0.0973	0.389
		Potassium	1710		15.6	58.4
		Selenium	0.486	U	0.486	0.973
		Silver	0.0554	J	0.0389	0.195
		Sodium	36.7	J	15.6	48.6
		Thallium	0.0782	J	0.0778	0.195
		Vanadium	12		0.389	1.95
		Zinc	20.2		0.389	1.95
	LST G-15	Aluminum	7770		0.982	2.95
		Antimony	0.171	BJ	0.0982	0.393
		Arsenic	1.56		0.295	0.982
		Barium	59.1		0.0982	0.393

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST G-15	Beryllium	0.365		0.0196	0.0982
		Cadmium	0.497		0.0196	0.196
		Calcium	2290		7.86	19.6
		Chromium	7.87		0.196	0.589
		Cobalt	2.7		0.0196	0.196
		Copper	6.42		0.0393	0.196
		Iron	7270		1.96	4.91
		Lead	10.9		0.0982	0.393
		Magnesium	1970		0.982	2.95
		Manganese	140		0.196	0.982
		Mercury	0.00789	J	0.00228	0.00913
		Nickel	5.36		0.0982	0.393
		Potassium	1990		15.7	58.9
		Selenium	0.491	U	0.491	0.982
		Silver	0.0861	J	0.0393	0.196
		Sodium	45.9	J	15.7	49.1
		Thallium	0.103	J	0.0786	0.196
		Vanadium	14.1		0.393	1.96
		Zinc	25.6		0.393	1.96
	LST G-16	Aluminum	7620		0.965	2.9
		Antimony	0.0965	BU	0.0965	0.386
		Arsenic	1.18		0.29	0.965
		Barium	49.8		0.0965	0.386
		Beryllium	0.302		0.0193	0.0965
		Cadmium	0.2		0.0193	0.193
		Calcium	977		7.72	19.3
		Chromium	7.14		0.193	0.579
		Cobalt	2.51		0.0193	0.193
		Copper	4.53		0.0386	0.193
		Iron	6700		1.93	4.83
		Lead	7.83		0.0965	0.386
		Magnesium	1620		0.965	2.9
		Manganese	136		0.193	0.965
		Mercury	0.004	J	0.00245	0.00982
		Nickel	4.61		0.0965	0.386
		Potassium	1910		15.4	57.9
		Selenium	0.483	U	0.483	0.965
		Silver	0.0402	J	0.0386	0.193
		Sodium	36.6	J	15.4	48.3

See notes at end of table.

TABLE C-15. Non-radiological Results for Special Sampling for Long Sled Track by Location for CY 2007, Soil (concluded) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	LST G-16	Thallium	0.0884	J	0.0772	0.193
		Vanadium	12.9		0.386	1.93
		Zinc	19.9		0.386	1.93

NOTES: B = The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).

J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.

U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.

Hh = Analytical holding time and prep holding time were exceeded.

TABLE C-16 . Non-radiological Results for Special Sampling for Thunder Range by Location for CY 2007, Soil

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site	TR-R1-0001-SS	Aluminum	8470		6.72	19.8
		Antimony	1.14	B	0.306	0.988
		Arsenic	4.44		0.494	1.48
		Barium	169		0.0988	0.494
		Beryllium	0.579		0.0988	0.494
		Cadmium	0.336	J	0.0988	0.494
		Calcium	36700		2.96	9.88
		Chromium	10.2		0.0988	0.494
		Cobalt	4.56		0.198	0.494
		Copper	8.54		0.296	0.988
		Iron	11400		2.47	9.88
		Lead	35.9		0.247	0.988
		Magnesium	3800		8.4	29.6
		Manganese	232		0.198	0.988
		Mercury	0.00455	J	0.00149	0.00992
		Nickel	9.24		0.0988	0.494
		Potassium	1410		4.94	14.8
		Selenium	1.04	J	0.494	1.48
		Silver	0.0988	U	0.0988	0.494
		Sodium	95.3	B	4.45	14.8
		Thallium	0.494	U	0.494	1.98
		Vanadium	25.3		0.0988	0.494
		Zinc	33		0.198	0.988
	TR-R1-0002-SS	Aluminum	6890		6.75	19.8
		Antimony	1.13	B	0.308	0.992
		Arsenic	4.52		0.496	1.49
		Barium	120		0.0992	0.496
		Beryllium	0.501		0.0992	0.496
		Cadmium	0.145	J	0.0992	0.496
		Calcium	24400		2.98	9.92
		Chromium	9.33		0.0992	0.496
		Cobalt	3.99		0.198	0.496
		Copper	9.47		0.298	0.992
		Iron	10900		2.48	9.92
		Lead	143		0.248	0.992
		Magnesium	2900		8.43	29.8
		Manganese	196		0.198	0.992
		Mercury	0.00344	J	0.00142	0.00943

See notes at end of table.

TABLE C-16. Non-radiological Results for Special Sampling for Thunder Range by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	TR-R1-0002-SS	Nickel	8.91		0.0992	0.496
		Potassium	1280		4.96	14.9
		Selenium	0.855	J	0.496	1.49
		Silver	0.0992	U	0.0992	0.496
		Sodium	69.1	B	4.46	14.9
		Thallium	0.496	U	0.496	1.98
		Vanadium	21.4		0.0992	0.496
		Zinc	33.7		0.198	0.992
	TR-R1-0003-SS	Aluminum	6990		6.72	19.8
		Antimony	1.16	B	0.306	0.988
		Arsenic	5.21		0.494	1.48
		Barium	121		0.0988	0.494
		Beryllium	0.48	J	0.0988	0.494
		Cadmium	0.102	J	0.0988	0.494
		Calcium	26500		2.96	9.88
		Chromium	9.01		0.0988	0.494
		Cobalt	3.88		0.198	0.494
		Copper	8.46		0.296	0.988
		Iron	11100		2.47	9.88
		Lead	208		0.247	0.988
		Magnesium	2890		8.4	29.6
		Manganese	195		0.198	0.988
		Mercury	0.00295	J	0.00149	0.00993
		Nickel	8.49		0.0988	0.494
		Potassium	1340		4.94	14.8
		Selenium	0.677	J	0.494	1.48
		Silver	0.0988	U	0.0988	0.494
		Sodium	68.3	B	4.45	14.8
		Thallium	0.494	U	0.494	1.98
		Vanadium	21.4		0.0988	0.494
		Zinc	32.3		0.198	0.988
	TR-R1-0004-SS	Aluminum	6430		6.58	19.3
		Antimony	0.358	BJ	0.3	0.967
		Arsenic	4.08		0.484	1.45
		Barium	139		0.0967	0.484
		Beryllium	0.445	J	0.0967	0.484
		Cadmium	0.135	J	0.0967	0.484
		Calcium	26700		2.9	9.67
		Chromium	8.33		0.0967	0.484

See notes at end of table.

TABLE C-16 . Non-radiological Results for Special Sampling for Thunder Range by Location for CY 2007, Soil

(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site	TR-R1-0001-SS	Aluminum	8470		6.72	19.8
		Antimony	1.14	B	0.306	0.988
		Arsenic	4.44		0.494	1.48
		Barium	169		0.0988	0.494
		Beryllium	0.579		0.0988	0.494
		Cadmium	0.336	J	0.0988	0.494
		Calcium	36700		2.96	9.88
		Chromium	10.2		0.0988	0.494
		Cobalt	4.56		0.198	0.494
		Copper	8.54		0.296	0.988
		Iron	11400		2.47	9.88
		Lead	35.9		0.247	0.988
		Magnesium	3800		8.4	29.6
		Manganese	232		0.198	0.988
		Mercury	0.00455	J	0.00149	0.00992
		Nickel	9.24		0.0988	0.494
		Potassium	1410		4.94	14.8
		Selenium	1.04	J	0.494	1.48
		Silver	0.0988	U	0.0988	0.494
		Sodium	95.3	B	4.45	14.8
		Thallium	0.494	U	0.494	1.98
		Vanadium	25.3		0.0988	0.494
		Zinc	33		0.198	0.988
	TR-R1-0002-SS	Aluminum	6890		6.75	19.8
		Antimony	1.13	B	0.308	0.992
		Arsenic	4.52		0.496	1.49
		Barium	120		0.0992	0.496
		Beryllium	0.501		0.0992	0.496
		Cadmium	0.145	J	0.0992	0.496
		Calcium	24400		2.98	9.92
		Chromium	9.33		0.0992	0.496
		Cobalt	3.99		0.198	0.496
		Copper	9.47		0.298	0.992
		Iron	10900		2.48	9.92
		Lead	143		0.248	0.992
		Magnesium	2900		8.43	29.8
		Manganese	196		0.198	0.992
		Mercury	0.00344	J	0.00142	0.00943

See notes at end of table.

TABLE C-16. Non-radiological Results for Special Sampling for Thunder Range by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	TR-R1-0005-SS	Zinc	49.9		0.199	0.996
	TR-R1-0006-SS	Aluminum	6180		6.67	19.6
		Antimony	0.304	BU	0.304	0.98
		Arsenic	5.05		0.49	1.47
		Barium	121		0.098	0.49
		Beryllium	0.412	J	0.098	0.49
		Cadmium	0.119	J	0.098	0.49
		Calcium	36500		2.94	9.8
		Chromium	8.79		0.098	0.49
		Cobalt	3.24		0.196	0.49
		Copper	15.7		0.294	0.98
		Iron	9680		2.45	9.8
		Lead	51.1		0.245	0.98
		Magnesium	2570		8.33	29.4
		Manganese	158		0.196	0.98
		Mercury	0.0014	U	0.0014	0.00936
		Nickel	10		0.098	0.49
		Potassium	1150		4.9	14.7
		Selenium	0.676	J	0.49	1.47
		Silver	0.327	J	0.098	0.49
		Sodium	109	B	4.41	14.7
		Thallium	0.49	U	0.49	1.96
		Vanadium	18.8		0.098	0.49
		Zinc	68.4		0.196	0.98
	TR-R1-0007-SS	Aluminum	6900		6.58	19.3
		Antimony	0.3	BU	0.3	0.967
		Arsenic	4.08		0.484	1.45
		Barium	154		0.0967	0.484
		Beryllium	0.477	J	0.0967	0.484
		Cadmium	0.0967	U	0.0967	0.484
		Calcium	30400		2.9	9.67
		Chromium	9.42		0.0967	0.484
		Cobalt	3.96		0.193	0.484
		Copper	9.19		0.29	0.967
		Iron	11000		2.42	9.67
		Lead	248		0.242	0.967
		Magnesium	2870		8.22	29
		Manganese	196		0.193	0.967

See notes at end of table.

TABLE C-16. Non-radiological Results for Special Sampling for Thunder Range by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified.)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	TR-R1-0007-SS	Mercury	0.00299	J	0.00131	0.00876
		Nickel	8.15		0.0967	0.484
		Potassium	1290		4.84	14.5
		Selenium	1.05	J	0.484	1.45
		Silver	0.0967	U	0.0967	0.484
		Sodium	95.8	B	4.35	14.5
		Thallium	0.484	U	0.484	1.93
		Vanadium	22.1		0.0967	0.484
		Zinc	32.7		0.193	0.967
	TR-R1-0008-SS	Aluminum	5260		6.65	19.6
		Antimony	0.303	BU	0.303	0.978
		Arsenic	3.54		0.489	1.47
		Barium	149		0.0978	0.489
		Beryllium	0.367	J	0.0978	0.489
		Cadmium	0.102	J	0.0978	0.489
		Calcium	35700		2.94	9.78
		Chromium	7.58		0.0978	0.489
		Cobalt	3.2		0.196	0.489
		Copper	7.12		0.294	0.978
		Iron	8770		2.45	9.78
		Lead	71.5		0.245	0.978
		Magnesium	2400		8.32	29.4
		Manganese	158		0.196	0.978
		Mercury	0.00149	U	0.00149	0.0099
		Nickel	6.57		0.0978	0.489
		Potassium	1180		4.89	14.7
		Selenium	0.489	U	0.489	1.47
		Silver	0.0978	U	0.0978	0.489
		Sodium	61.8	B	4.4	14.7
		Thallium	0.489	U	0.489	1.96
		Vanadium	19.1		0.0978	0.489
		Zinc	24.4		0.196	0.978
	TR-R1-0009-SS	Aluminum	6560		6.54	19.2
		Antimony	0.507	BJ	0.298	0.962
		Arsenic	3.92		0.481	1.44
		Barium	128		0.0962	0.481
		Beryllium	0.432	J	0.0962	0.481
		Cadmium	0.231	J	0.0962	0.481
		Calcium	39100		2.88	9.62

See notes at end of table.

TABLE C-16. Non-radiological Results for Special Sampling for Thunder Range by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	TR-R1-0009-SS	Chromium	8.64		0.0962	0.481
		Cobalt	3.39		0.192	0.481
		Copper	10.3		0.288	0.962
		Iron	9070		2.4	9.62
		Lead	114		0.24	0.962
		Magnesium	2650		8.17	28.8
		Manganese	170		0.192	0.962
		Mercury	0.00536	J	0.00146	0.00974
		Nickel	8.4		0.0962	0.481
		Potassium	1240		4.81	14.4
		Selenium	0.481	U	0.481	1.44
		Silver	0.731		0.0962	0.481
		Sodium	122	B	4.33	14.4
		Thallium	0.481	U	0.481	1.92
		Vanadium	18.9		0.0962	0.481
		Zinc	45.4		0.192	0.962
	TR-R1-0010-SS	Aluminum	7600		6.71	19.7
		Antimony	0.306	BU	0.306	0.986
		Arsenic	4.64		0.493	1.48
		Barium	141		0.0986	0.493
		Beryllium	0.502		0.0986	0.493
		Cadmium	0.158	J	0.0986	0.493
		Calcium	32000		2.96	9.86
		Chromium	13.9		0.0986	0.493
		Cobalt	4.25		0.197	0.493
		Copper	10.7		0.296	0.986
		Iron	11000		2.47	9.86
		Lead	204		0.247	0.986
		Magnesium	3120		8.38	29.6
		Manganese	215		0.197	0.986
		Mercury	0.00484	J	0.0015	0.00998
		Nickel	14.4		0.0986	0.493
		Potassium	1430		4.93	14.8
		Selenium	0.791	J	0.493	1.48
		Silver	0.121	J	0.0986	0.493
		Sodium	92	B	4.44	14.8
		Thallium	0.493	U	0.493	1.97
		Vanadium	21.8		0.0986	0.493

See notes at end of table.

TABLE C-16. Non-radiological Results for Special Sampling for Thunder Range by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	TR-R1-0010-SS	Zinc	36.9		0.197	0.986
	TR-R1-0011-SS	Aluminum	6820		6.61	19.5
		Antimony	1.51	BU	1.51	4.86
		Arsenic	4.58		0.486	1.46
		Barium	133		0.0973	0.486
		Beryllium	0.449	J	0.0973	0.486
		Cadmium	0.0973	U	0.0973	0.486
		Calcium	34900		2.92	9.73
		Chromium	8.81		0.0973	0.486
		Cobalt	3.98		0.195	0.486
		Copper	12.3		0.292	0.973
		Iron	10300		2.43	9.73
		Lead	101		0.243	0.973
		Magnesium	2820		8.27	29.2
		Manganese	187		0.195	0.973
		Mercury	0.00301	J	0.00143	0.00955
		Nickel	7.87		0.0973	0.486
		Potassium	1290		4.86	14.6
		Selenium	0.853	J	0.486	1.46
		Silver	0.276	J	0.0973	0.486
		Sodium	86.7	B	4.38	14.6
		Thallium	0.486	U	0.486	1.95
		Vanadium	20.7		0.0973	0.486
		Zinc	29.4		0.195	0.973
	TR-R1-0012-SS	Aluminum	7020		6.73	19.8
		Antimony	0.569	BJ	0.307	0.99
		Arsenic	4.55		0.495	1.49
		Barium	177		0.099	0.495
		Beryllium	0.482	J	0.099	0.495
		Cadmium	0.232	J	0.099	0.495
		Calcium	30000		2.97	9.9
		Chromium	8.86		0.099	0.495
		Cobalt	4.69		0.198	0.495
		Copper	8.01		0.297	0.99
		Iron	9920		2.48	9.9
		Lead	87.5		0.248	0.99
		Magnesium	3120		8.42	29.7
		Manganese	239		0.198	0.99
		Mercury	0.00319	J	0.00148	0.00984

See notes at end of table.

TABLE C-16. Non-radiological Results for Special Sampling for Thunder Range by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site	TR-R1-0012-SS	Nickel	8.55		0.099	0.495
		Potassium	1790		4.95	14.9
		Selenium	0.495	U	0.495	1.49
		Silver	0.624		0.099	0.495
		Sodium	67.7	B	4.46	14.9
		Thallium	0.495	U	0.495	1.98
		Vanadium	20.7		0.099	0.495
		Zinc	29.8		0.198	0.99
	TR-R1-0013-SS	Aluminum	6940		6.76	19.9
		Antimony	1.76	B	0.308	0.994
		Arsenic	4.99		0.497	1.49
		Barium	118		0.0994	0.497
		Beryllium	0.485	J	0.0994	0.497
		Cadmium	0.157	J	0.0994	0.497
		Calcium	21900		2.98	9.94
		Chromium	9.46		0.0994	0.497
		Cobalt	3.78		0.199	0.497
		Copper	7.5		0.298	0.994
		Iron	11000		2.49	9.94
		Lead	113		0.249	0.994
		Magnesium	2830		8.45	29.8
		Manganese	184		0.199	0.994
		Mercury	0.00337	J	0.00144	0.00958
		Nickel	7.9		0.0994	0.497
		Potassium	1410		4.97	14.9
		Selenium	0.725	J	0.497	1.49
		Silver	0.0994	U	0.0994	0.497
		Sodium	92.2	B	4.47	14.9
		Thallium	0.497	U	0.497	1.99
		Vanadium	22.6		0.0994	0.497
		Zinc	32.3		0.199	0.994
	TR-R1-0014-SS	Aluminum	8770		6.48	19
		Antimony	0.405	BJ	0.295	0.952
		Arsenic	5		0.476	1.43
		Barium	208		0.0952	0.476
		Beryllium	0.577		0.0952	0.476
		Cadmium	0.357	J	0.0952	0.476
		Calcium	51600		14.3	47.6

See notes at end of table.

TABLE C-16. Non-radiological Results for Special Sampling for Thunder Range by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	TR-R1-0014-SS	Chromium	10.5		0.0952	0.476
		Cobalt	4.71		0.19	0.476
		Copper	600		0.286	0.952
		Iron	11100		2.38	9.52
		Lead	70.3		0.238	0.952
		Magnesium	4100		8.1	28.6
		Manganese	232		0.19	0.952
		Mercury	0.00655	J	0.00144	0.00958
		Nickel	11		0.0952	0.476
		Potassium	1890		4.76	14.3
		Selenium	0.82	J	0.476	1.43
		Silver	0.0952	U	0.0952	0.476
		Sodium	83.4	B	4.29	14.3
		Thallium	0.476	U	0.476	1.9
		Vanadium	22.6		0.0952	0.476
		Zinc	35.5		0.952	4.76
	TR-R1-0015-SS	Aluminum	7530		6.54	19.2
		Antimony	0.298	BU	0.298	0.962
		Arsenic	4.86		0.481	1.44
		Barium	280		0.0962	0.481
		Beryllium	0.51		0.0962	0.481
		Cadmium	0.225	J	0.0962	0.481
		Calcium	36500		2.88	9.62
		Chromium	9.69		0.0962	0.481
		Cobalt	4.53		0.192	0.481
		Copper	8.86		0.288	0.962
		Iron	10900		2.4	9.62
		Lead	73.1		0.24	0.962
		Magnesium	3320		8.17	28.8
		Manganese	221		0.192	0.962
		Mercury	0.00403	J	0.00139	0.00929
		Nickel	8.8		0.0962	0.481
		Potassium	1460		4.81	14.4
		Selenium	0.84	J	0.481	1.44
		Silver	0.0962	U	0.0962	0.481
		Sodium	128	B	4.33	14.4
		Thallium	0.481	U	0.481	1.92
		Vanadium	25.4		0.0962	0.481
		Zinc	29.7		0.192	0.962

See notes at end of table.

TABLE C-16. Non-radiological Results for Special Sampling for Thunder Range by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site	TR-R1-0016-SS	Aluminum	7320		6.72	19.8
		Antimony	0.498	BJ	0.306	0.988
		Arsenic	4.25		0.494	1.48
		Barium	141		0.0988	0.494
		Beryllium	0.497		0.0988	0.494
		Cadmium	0.264	J	0.0988	0.494
		Calcium	31100		2.96	9.88
		Chromium	9.36		0.0988	0.494
		Cobalt	4.3		0.198	0.494
		Copper	8.01		0.296	0.988
		Iron	11200		2.47	9.88
		Lead	65.3		0.247	0.988
		Magnesium	3170		8.4	29.6
		Manganese	207		0.198	0.988
		Mercury	0.00359	J	0.00138	0.00923
		Nickel	8.41		0.0988	0.494
		Potassium	1250		4.94	14.8
		Selenium	0.756	J	0.494	1.48
		Silver	0.0988	U	0.0988	0.494
		Sodium	122	B	4.45	14.8
		Thallium	0.494	U	0.494	1.98
		Vanadium	24.4		0.0988	0.494
		Zinc	28.5		0.198	0.988
	TR-R1-0017-SS	Aluminum	6910		6.73	19.8
		Antimony	0.307	BU	0.307	0.99
		Arsenic	4.29		0.495	1.49
		Barium	136		0.099	0.495
		Beryllium	0.466	J	0.099	0.495
		Cadmium	0.179	J	0.099	0.495
		Calcium	38300		2.97	9.9
		Chromium	10.4		0.099	0.495
		Cobalt	3.65		0.198	0.495
		Copper	26.7		0.297	0.99
		Iron	10500		2.48	9.9
		Lead	64.2		0.248	0.99
		Magnesium	2920		8.42	29.7
		Manganese	167		0.198	0.99
		Mercury	0.0136		0.00133	0.00886

See notes at end of table.

TABLE C-16. Non-radiological Results for Special Sampling for Thunder Range by Location for CY 2007, Soil (continued) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	TR-R1-0017-SS	Nickel	10.5		0.099	0.495
		Potassium	1220		4.95	14.9
		Selenium	0.757	J	0.495	1.49
		Silver	0.099	U	0.099	0.495
		Sodium	93.4	B	4.46	14.9
		Thallium	0.495	U	0.495	1.98
		Vanadium	20.6		0.099	0.495
		Zinc	27.6		0.198	0.99
	TR-R1-0018-SS	Aluminum	6990		6.71	19.7
		Antimony	0.306	BU	0.306	0.986
		Arsenic	4.24		0.493	1.48
		Barium	126		0.0986	0.493
		Beryllium	0.454	J	0.0986	0.493
		Cadmium	0.142	J	0.0986	0.493
		Calcium	32100		2.96	9.86
		Chromium	8.72		0.0986	0.493
		Cobalt	3.85		0.197	0.493
		Copper	8.71		0.296	0.986
		Iron	9930		2.47	9.86
		Lead	221		0.247	0.986
		Magnesium	2840		8.38	29.6
		Manganese	266		0.197	0.986
		Mercury	0.00321	J	0.00146	0.00974
		Nickel	8.44		0.0986	0.493
		Potassium	1440		4.93	14.8
		Selenium	0.827	J	0.493	1.48
		Silver	0.0986	U	0.0986	0.493
		Sodium	181	B	4.44	14.8
		Thallium	0.493	U	0.493	1.97
		Vanadium	19.4		0.0986	0.493
		Zinc	36.4		0.197	0.986
	TR-R1-0019-SS	Aluminum	5910		6.56	19.3
		Antimony	0.685	BJ	0.299	0.965
		Arsenic	4.58		0.483	1.45
		Barium	119		0.0965	0.483
		Beryllium	0.401	J	0.0965	0.483
		Cadmium	0.185	J	0.0965	0.483
		Calcium	38600		2.9	9.65
		Chromium	7.59		0.0965	0.483
		Cobalt	3.37		0.193	0.483

See notes at end of table.

TABLE C-16. Non-radiological Results for Special Sampling for Thunder Range by Location for CY 2007, Soil (concluded) *(All results reported in milligrams per kilogram [mg/kg] unless otherwise specified)*

Location Type	Location	Analyte	Result		Decision Level	Detection Limit
On-Site Cont'd	TR-R1-0019-SS	Copper	6.67		0.29	0.965
		Iron	9020		2.41	9.65
		Lead	64.1		0.241	0.965
		Magnesium	2610		8.2	29
		Manganese	153		0.193	0.965
		Mercury	0.00391	J	0.00144	0.00958
		Nickel	6.82		0.0965	0.483
		Potassium	1050		4.83	14.5
		Selenium	0.642	J	0.483	1.45
		Silver	0.0965	U	0.0965	0.483
		Sodium	121	B	4.34	14.5
		Thallium	0.483	U	0.483	1.93
		Vanadium	19.3		0.0965	0.483
		Zinc	24.6		0.193	0.965

NOTES: B = The analyte was found in the blank above the effective MDL (organics), or the effective PQL (inorganics).
J = Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
U = The analyte was analyzed for, but not detected, below this concentration. For organic and inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the decision level.
Hh = Analytical holding time and prep holding time were exceeded.